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April 29, 2022

Ms. Mary Loos, Secretary
Arkansas Public Service Commission
1000 Center Street
Little Rock, AR 72201

Re: Docket No. 07-081-TF, 2022 Energy Efficiency Annual Report

Dear Ms. Loos:

Attached is CenterPoint Energy's 2021 Energy Efficiency Annual Report and SARP workbook. Please do not hesitate to contact me if you have any questions.

Sincerely,

Stephanie Hammons

Stephanie Hammons

Enclosures
cc: All Parties of Record (via electronic filing system)

CenterPoint Energy Arkansas Energy Efficiency Program Portfolio Annual Report PY 2021 Program Year

Filed: April 29, 2022

Contents

1.0 Executive Summary

1.1 Historical Background

On March 14, 2011, CenterPoint Energy Resources Corp. d/b/a CenterPoint Energy Arkansas Gas ("CenterPoint Energy" or the "Company") requested approval from the Arkansas Public Service Commission ("APSC" or the "Commission") of a new comprehensive portfolio of conservation improvement programs ("CIP") for implementation starting on July 1, 2011. The APSC approved the program portfolio on June 30, 2011 and subsequently extended that portfolio in various orders. In August of 2015, CenterPoint Arkansas received approval to replace the Arkansas Weatherization Program with the Saving Homes Weatherization Program for the 2016 program year ("PY").[1] On June 1, 2016, the Company requested approval of an updated comprehensive CIP Portfolio for PY 2017-2019. The APSC approved this request on October 24, 2016, and CenterPoint Arkansas began delivery of this CIP Portfolio on January 1, 2017. On March 15th of 2019, the Company submitted for commission approval a comprehensive CIP Portfolio for PY 2020 - 2022. The Commission approved the CIP Portfolio for PY 2020 - 2022 on June 19, 2019. As of January 10, 2022, CenterPoint Energy Arkansas was acquired by Summit Utilities (Summit) and is now operating as Summit Utilities Arkansas. This report will reference CenterPoint Energy Arkansas as the program was administered by CenterPoint Arkansas for PY 2021.

1.2 Current Portfolio of Programs

CenterPoint Arkansas's PY 2021 CIP Portfolio consisted of the following nine programs:

- Natural Gas Equipment Program

[1] Order No. 81 in Docket No. 07-081-TF.

- Low Flow Showerhead and Faucet Aerator Program
- Home Energy Reports
- Saving Homes Weatherization Program (SHP)
- Low-Income Savings Homes Program (LISHP)
- Commercial Boiler Program
- Commercial Food Service Program
- Energy Efficiency Arkansas
- Natural Gas Commercial and Industrial Solutions Program

1.3 Major Accomplishments and Milestones Reached

In PY 2021, CenterPoint Arkansas delivered its best performing CIP Portfolio since the Company began implementing energy efficiency programs in the state of Arkansas. The Company achieved 147% of its energy savings target with a net energy savings total of 4,124,913 therms. This represents a 2.5% increase from PY 2021 and is the highest level of annual energy savings achieved in any year of program delivery. The Company continued to deliver a comprehensive portfolio with offerings that included prescriptive rebates, direct-install equipment, residential and commercial energy audits, weatherization measures, technical assistance, custom project incentives, and energy usage comparisons. Overall, 106,004 residential and commercial participants were reached and measures installed through these program activities. All programs delivered in PY 2021 were cost-effective with a Total Resource Cost ("TRC") test ratio of at least one. All programs experienced a drop in cost-effectiveness due to lower avoided costs filed for PY 2020 – 2022 resulting in the Company's overall portfolio TRC to be 2.10. CenterPoint Arkansas's CIP portfolio for PY 2021 generated $14.9 million in net economic benefits.

1.4 Goals and Objectives of the CIP Portfolio

Specific objectives associated with the programs are to:

- Reduce end-use natural gas consumption in a cost-effective manner to minimize the long-term cost of utility service and to conserve resources;

- Protect the environment by encouraging installation of efficiency measures that help reduce carbon dioxide emissions and other air pollutant emissions;
- Increase residential and commercial customer awareness of available energy efficiency programs;
- Generate customer awareness of energy efficiency programs available through CenterPoint Arkansas;
- Provide hard-to-reach and low-income customers the opportunity to participate in the Company's energy efficiency programs by offering weatherization services specifically for LIHEAP eligible customers and customers that are older than 65 years of age, in accordance with ACT 1102.
- Educate trade allies on the value of energy efficiency and increase their participation in CenterPoint Arkansas's programs; and
- Support a more robust local and state-wide economy by using local labor (when possible) and helping Arkansas residents reduce monthly energy expenses.

1.5 Progress Achieved Versus Goals and Objectives

In PY 2021, CenterPoint Arkansas reached 147% of the Commission-ordered energy savings target while maintaining a comprehensive and cost-effective portfolio. As a result, the Company was successful at efficiently reducing end-use natural gas consumption throughout its service territory. The Company's PY 2021 energy efficiency efforts are also expected to provide significant environmental benefits. CenterPoint Arkansas utilized the United States Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator[2] to estimate the impact of reduced emissions attributable to the 4,124,913 in therms savings delivered through the PY 2021 CIP Portfolio. Overall, the Company's programs reduced carbon dioxide (CO2) emissions by 21,825 metric tons. This is equivalent to:

Greenhouse gas emissions from:

- 4,703 passenger vehicles driven for one year; or

[2] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

- 54,173,925 miles driven by an average passenger vehicle

Carbon dioxide emissions from:

- Annual energy use of 2,749 homes;
- 24,147,287 pounds of coal burned; or
- 2,143,901 gallons of gasoline consumed

CenterPoint Arkansas continued to educate its customers and trade allies on the value of energy efficiency and remained focused on creating awareness of the Company's CIP Portfolio offerings. CenterPoint Arkansas promoted its CIP programs through a variety of channels including its website, email communication, bill inserts, radio, television and print advertising, case studies and supply house displays. Due to continued COVID-19 restrictions, many in-person community and industry events were canceled, which is a large part of our outreach. Much of the outreach had to be conducted by phone and virtual meetings, which limited our contact with customers. Efforts to build a robust trade ally network continued in PY 2021 but was limited, due to ongoing COVID-19 restrictions as a result of new variants. The Company was able to maintain their network of 400+ trade allies participating in the Company's programs.

1.6 Portfolio Performance and Prior Year Comparisons

Despite COVID-19 limitations, CenterPoint Arkansas' PY 2021 CIP Portfolio had 106,004 distinct participants and measures installed and produced net energy savings of 4,124,913 therms. Overall program expenditure totaled $9,130,164 and reached 91% of budget. The total portfolio TRC was 2.10, and $14,959,492 of net benefits were generated through program activities.

Table 1: Portfolio Performance Results and Prior Year Comparison

2021 Energy Savings Summary			
PY	Commission Established Energy Savings Target (Therms)	Achieved Energy Savings (Therms)	% Reached
2020	3,800,225	4,022,955	106%
2021	2,799,934	4,124,913	147%

Table 2: Portfolio Budget Results and Prior Year Comparison

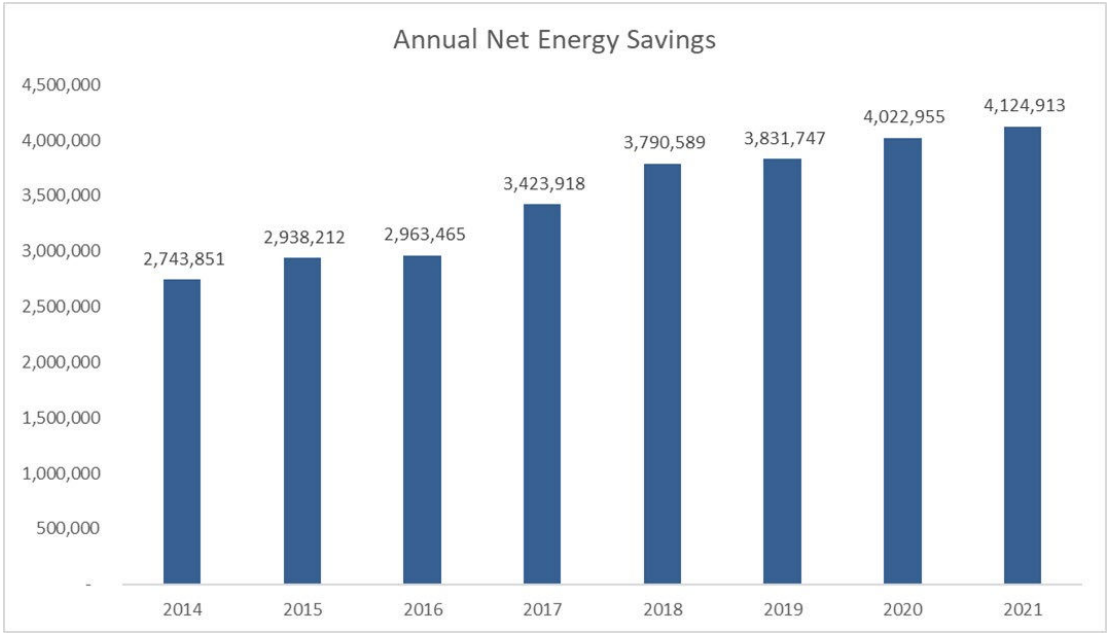
2021 Budget Summary			
PY	Total Portfolio Budget	Total Portfolio Expenditure	% Reached
2020	$9,875,811	$9,698,944	98%
2021	$10,025,159	$9,130,614	91%

Table 3: Portfolio Cost Effectiveness Results and Prior Year Comparison

2021 Cost Effectiveness Summary		
PY	Portfolio TRC	Portfolio Net Benefits
2020	1.79	$11,898,093
2021	2.10	$14,959,492

CenterPoint Arkansas's CIP Portfolio has experienced growth since 2014, and the net energy savings generated in 2021 represent a significant increase over totals achieved in previous years.

Figure 1: Annual Net Energy Savings in Therms



1.7 PY 2021 Highlights

Saving Homes Weatherization Program

CenterPoint Arkansas Saving Homes Weatherization Program continues to grow each year since its inception in 2016. PY 2021 was a good year for the program resulting in energy savings of 436,278 therms and remains cost-effective with a TRC Score of 6.36. Overall, 1246 distinct customers participated in the program in PY 2021.

Low- Income Saving Homes Weatherization Program

CenterPoint Arkansas Low-Income Saving Homes Weatherization Program is a new offering for PY 2020-2022. PY 2021 was a good year for the program resulting in energy savings of 47,516 therms, and it remained cost-effective with a TRC Score of 2.98. Overall, 142 distinct customers participated in the program.

Natural Gas Commercial and Industrial Solutions Program

The Natural Gas Commercial Solutions Program continued to be a major source of cost-effective energy savings in PY 2021. The program delivered a diverse set of custom projects that produced 1,588,992 net therms savings and 2,946,860 gallons of water savings. The Direct Install portion of the program delivered net savings of 394,051 therms and 2,310,109 gallons of water.

Commercial Boiler Program

The Commercial Boiler Program delivered notably strong performance in PY 2021 with net energy savings totaling 70,934 therms reaching 139% of goal. With the COVID-19 Pandemic making citizens shelter in place, commercial businesses had the opportunity to execute boiler projects while employees worked from home.

Natural Gas Equipment Program

In PY 2021, CenterPoint Arkansas Natural Gas Equipment Program delivered net energy savings of 464,240 therms. The Company continued to offer the $1,500 (combination) rebate for customers who install both a natural gas tankless water heater (.80 UEF or higher)

and a natural gas furnace (.95 Annual Fuel Utilization Efficiency ["AFUE"] or higher). CenterPoint Arkansas staff continues to work to create awareness of this opportunity and the Company has seen the rebates influence builders, homeowners, and housing authorities throughout the state. In total, 473 customers participated producing 66,789 net therms saved. CenterPoint Arkansas is encouraged by these results and expects continued growth in this offering.

Foodservice Program

In PY 2021, CenterPoint Arkansas Commercial Foodservice Equipment Program increased net energy savings 132% over last year. Many restaurateurs took advantage of PPP Loans to assist in updating their kitchen equipment. Unfortunately, the availability of qualified equipment fell victim to the supply chain in the latter part of the year.

1.8 Planned Changes to Programs or Budgets

CenterPoint Arkansas filed a new CIP Portfolio for PY 2020 - 2022, which was filed March 15th, 2019 in Docket No. 07-081-TF. The CIP Portfolio was approved by the APSC on June 17, 2019. Changes in the new CIP Portfolio PY 2020-2022 include the addition of a low-income weatherization program titled Low-Income Saving Homes Program ("LISHP"). In addition to the new program, new measures were added to the Gas Equipment Program, Food Service Program, and rebate amounts increased in the Boiler program. The new CIP Portfolio offerings began January 1, 2020. There were no additional changes to programs or budget for PY 2021.

Table 4: Portfolio Summary

2021 Portfolio Summary										
Net Energy Savings		Costs			Cost-Effectiveness			Goal Achievement		
Demand Therms	Energy Therms	Actual Expenditures	LCFC	Performance Incentives	TRC Net Benefits (NPV)	TRC Ratio	PAC Ratio	Commission Established Target % of Baseline	Actual Savings Achieved % of Baseline	% of Target Achieved (%)
n/a	4,124,913	$ 9,130,614	$ -	$ 802,013	$14,959,060	2.10	2.27	0.50%	0.74%	147%

Table 5: Expenditures by Program

EE Portfolio Expenditures by Program

Program Name	Target Sector	Program Type	2021 Budget ($)	2021 Actual ($)	% of Budget
Home Energy Reports	Residential	Behavior/Education	345,700	367,313	106%
LI Saving Homes Weatherization Program	Residential	Whole Home	304,168	301,038	99%
Low-Flow Showerhead and Faucet Aerator	Residential	Prescriptive/Standard Offer	290,596	157,244	54%
Saving Homes Weatherization Program	Residential	Whole Home	1,671,364	1,692,627	101%
Commercial Boiler Program	Small Business/C&I	Prescriptive/Standard Offer	270,474	260,602	96%
Commercial Foodservice Program	Small Business/C&I	Prescriptive/Standard Offer	178,216	150,488	84%
Natural Gas Commercial Solutions	Small Business/C&I	Custom	2,954,470	3,079,053	104%
Natural Gas Equipment Program	All Classes	Prescriptive/Standard Offer	3,883,750	3,084,891	79%
Energy Efficiency Arkansas Regulatory	All Classes	Behavior/Education	126,421	37,357	30%
	-	-	-	-	-
		Total	**10,025,159**	**9,130,614**	**91%**

Table 6: Expenditure Summary by Cost Type

EE Portfolio Expenditure Summary by Cost Type

Cost Type	2021 Total Expenditures			
	% of Total	Budget ($)	Actual ($)	% of Total
Planning / Design	1%	111,540	124,371	1%
Marketing & Delivery	33%	3,343,360	3,432,094	38%
Incentives / Direct Install Costs	56%	5,649,126	4,568,723	50%
EM&V	6%	588,429	702,719	8%
Administration	3%	332,704	302,707	3%
Regulatory	0%	-	-	0%
	100%	**10,025,159**	**9,130,614**	100%

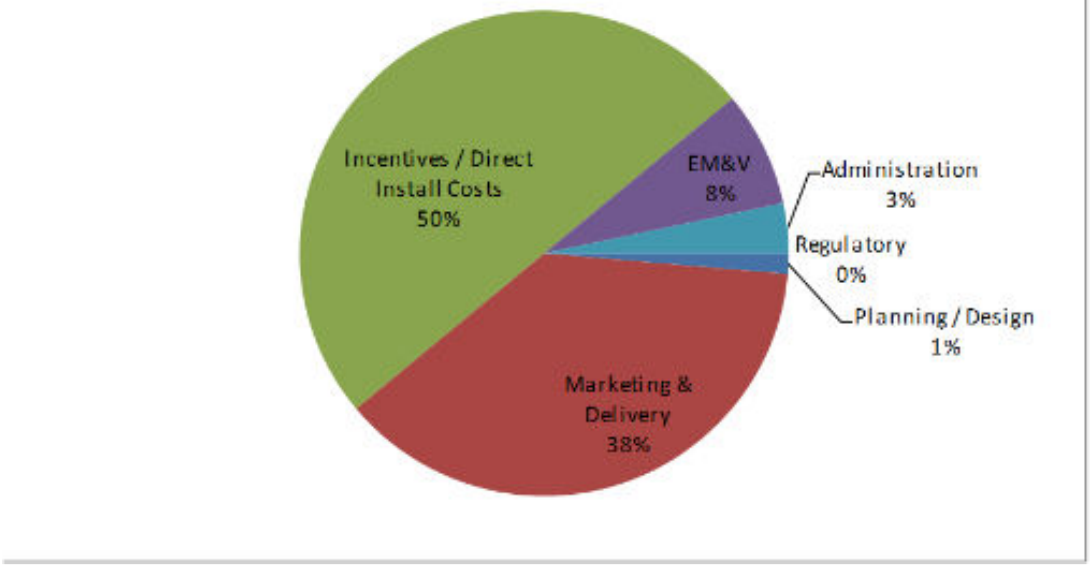
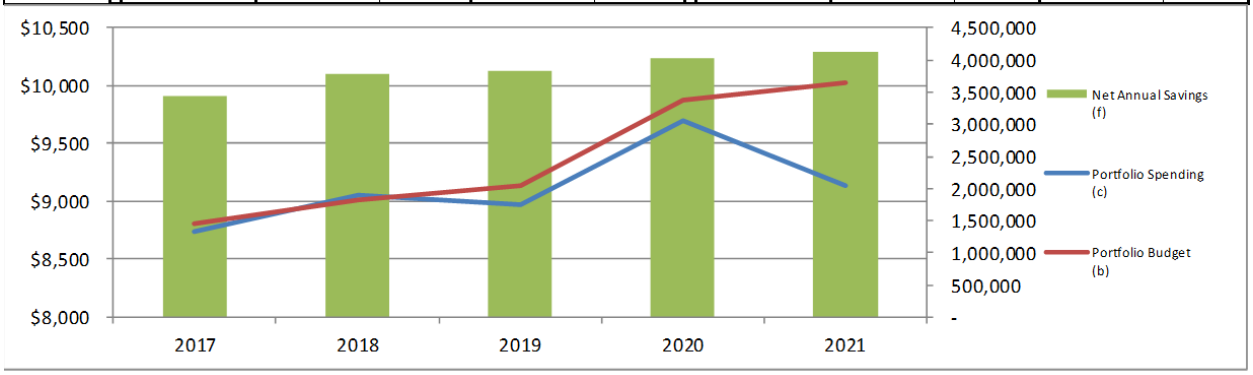


Table 7: Company Statistics

Company Statistics

Program Year	Revenue and Expenditures					Energy				
		Budget		Actual			Plan		Evaluated	
	Total Revenue (a) ($000's)	Portfolio Budget (b) ($000's)	% of Revenue (%=b/a)	Portfolio Spending (c) ($000's)	% of Revenue (%=c/a)	Total Annual Energy Sales (d) (Therms)	Net Annual Savings (e) (Therms)	% of Energy Sales (%=e/d)	Net Annual Savings (f) (Therms)	% of Energy Sales (%=f/d)
2017	$ 319,388	$ 8,807	2.8%	$ 8,738	2.7%	536,742,313	3,536,126	0.66%	3,423,918	0.64%
2018	$ 374,863	$ 9,011	2.4%	$ 9,056	2.4%	646,361,388	3,544,912	0.55%	3,790,589	0.59%
2019	$ 371,110	$ 9,140	2.5%	$ 8,972	2.4%	646,420,522	3,544,804	0.55%	3,831,747	0.59%
2020	$ 336,115	$ 9,876	2.9%	$ 9,699	2.9%	646,361,388	3,800,225	0.59%	4,022,955	0.62%
2021	$ 380,361	$ 10,025	2.6%	$ 9,131	2.4%	638,961,284	3,832,796	0.60%	4,124,913	0.65%



2.0 Portfolio Programs

2.1 Saving Homes Weatherization Program

Program Description

The CenterPoint Arkansas Saving Homes Program is designed to provide weatherization retrofits that will improve the efficiency and comfort of CenterPoint Arkansas's residential customers. Implementation of this program began in 2016, and it follows the guidelines developed for the Core Program approach approved by the Arkansas Public Service Commission in Order Nos. 22 and 23 in Docket No. 13-002-U. Under the management of CenterPoint Arkansas's vendor, contractors conduct whole-home energy assessments for residential customers and identify comprehensive and cost-effective energy efficiency measures eligible for installation. Following measure installation at the premise,

the participating contractor may apply for incentives from CenterPoint Arkansas, and if applicable, a participating electric utility.

Program Highlights

In PY 2021, the Saving Homes Weatherization Program achieved 103% of the savings target. Overall, 1,158 distinct customers participated in the program, 98% of participants installed at least one measure, and a total of 2,165 energy efficiency improvements were installed overall. The Program saw an increase in conversion rates from assessments to measures, with cumulative trade allies achieving conversion rates of 97.3%, an increase from 96% in 2020.

Program Budget, Savings & Participants

Table 8: Saving Homes Weatherization Program

Saving Homes Program	
Annual Net Energy Savings (Therms)	436,278
Lifetime Energy Savings (Therms)	7,457,512

Savings

CenterPoint Arkansas's customers saved 436,278 annual therms through the program. Evaluated energy savings for the PY 2021 Saving Homes Weatherization Program are below:

Table 9: Annual Net and Lifetime Savings

Saving Homes Program	
Annual Net Energy Savings (Therms)	436,278
Lifetime Energy Savings (Therms)	7,457,512

Description of Participants

Participants are CenterPoint Arkansas customers who have received in-home energy assessments and energy efficiency improvements through the Saving Homes Weatherization Program.

Challenges & Opportunities

The Saving Homes Program was very successful in PY 2021, with demand for the program exceeding the capacity of the program to serve all interested customers. With the strong demand for the program in mind, the Company sees it as a challenge to continue achieving high conversion rates in order to capture higher levels of energy savings and increase cost-effectiveness. There is an opportunity to develop marketing materials for the program, but the Company must be careful to balance increasing awareness of the program with increasing demand that may cause a longer wait for interested customers to be served. The Savings Homes Program achieved 6% higher therm savings when compared to 2020. Program participation continues to be strong despite the introduction of the Low-Income Saving Homes Program. There were initial concerns that the two programs might dilute the candidate pool; however, the number of eligible participants is large enough to accommodate both programs for now. The Company will continue to monitor the number and type of participants who utilize the program and make adjustments accordingly to make certain all customers receive the appropriate weatherization services for their situation. Customer participation dwindled in late Spring/early Summer, but ramped back up after the short lull.

Planned or Proposed Changes to Program & Budget

There are currently no planned changes to the program for PY 2021.

2.2 Low-Income Saving Homes Weatherization Program

Program Description

The CenterPoint Arkansas Low-Income Saving Homes Program is designed to provide weatherization retrofits that will improve the efficiency and comfort of CenterPoint Arkansas's qualifying residential customers. In addition to weatherization retrofits, the Low-Income Savings Home Program also provides a maximum incentive of $500 toward addressing health and safety issues in the home that might prevent measures from being applied or installed. Implementation of this program began in PY 2020, and it follows the guidelines developed for the Core Program approach approved by the Arkansas Public Service Commission in Order Nos. 22 and 23 in Docket No. 13-002-U. This program specifically addresses hard-to-reach and low-income customers who might not be able to otherwise participate in the Company's energy efficiency programs. This program is administered in accordance with ACT 1102. Under the management of CenterPoint Arkansas's vendor, contractors conduct whole-home energy assessments for residential customers and identify comprehensive and cost-effective energy efficiency measures eligible for installation. Following measure installation at the premise, the participating contractor may apply for incentives from CenterPoint Arkansas, and if applicable, a participating electric utility.

Program Highlights

In PY 2021, the Low-Income Saving Homes Weatherization Program achieved 101% of the savings target. Overall, 140 distinct customers participated in the program, 98% of participants installed at least one measure, and a total of 256 energy efficiency improvements were installed overall. The conversion rates, from assessments to measures, achieved by the trade allies was 100%.

Program Budget, Savings & Participants

Table 8: Low-Income Saving Homes Weatherization Program

LI Saving Homes Weatherization Program												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ -	$ -	-	0	0	-	n/a	n/a	-	0	0	-
Program Year 2020	$ 292,567	$ 299,846	102%	45,867	45,902	100%	n/a	n/a	-	364	235	65%
Program Year 2021	**$ 304,168**	**$ 301,038**	**99%**	**47,243**	**47,516**	**101%**	**n/a**	**n/a**	**-**	**374**	**256**	**68%**

Savings

CenterPoint Arkansas's customers saved 47,516 annual therms through the program. Evaluated energy savings for the PY 2021 Low-Income Saving Homes Weatherization Program are below:

Table 9: Annual Net and Lifetime Savings

Low- Income Saving Homes Program	
Annual Net Energy Savings (Therms)	47,516
Lifetime Energy Savings (Therms)	837,922

Description of Participants

Participants are CenterPoint Arkansas LIHEAP eligible customers or customers age 65 and over who have received in-home energy assessments and energy efficiency improvements through the Low-Income Saving Homes Weatherization Program.

Challenges & Opportunities

The Low-Income Saving Homes Program was very successful in PY 2021, with demand for the program exceeding the capacity of the program to serve all interested

customers. With the strong demand for the program in mind, the Company sees it as a challenge to continue achieving high conversion rates in order to capture higher levels of energy savings and increase cost-effectiveness. There is an opportunity to develop marketing materials for the program, but the Company must be careful to balance increasing awareness of the program with increasing demand that may cause a longer wait for interested customers to be served. Customer participation dwindled in late Spring/early Summer but ramped back up after the short lull. One opportunity that the Company will address is utilizing more of the health and safety budget to address issues that prevent customers from receiving the full benefits of the weatherization measures implemented or installed. The main reason the Company's implementation contractor did not fully utilize this budget is because of the reluctance of their subcontractors to repair or replace certain items that could put the company in a position of liability. Currently, there is no framework or guidance on how to utilize the health and safety budget. However, The Company, along with the Implementor, created a list of approved health and safety measures for the subcontractors to choose from and implement. Additionally, the Implementor developed a leave behind health & safety kit which includes weather stripping, window film, water leak alarm, combination smoke and CO detector, rope caulk, door draft stopper, LED night lights, wall plate insulation gaskets, and a ShowerStart device. The new list and health & safety kit helped increase the health & safety spend rate $3.43 to $60.54 per home.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

2.3 Energy Efficiency Arkansas

Program Description

Energy Efficiency Arkansas ("EEA") provides residential and commercial customers in Arkansas with training and information about cost-effective energy efficiency and conservation opportunities. It is managed by the Arkansas Economic Development Commission's Energy Office on behalf of the state's investor-owned public utilities and

participating electric cooperatives. For a detailed program description, see the EEA's report filed in Docket No. 07-083-TF.

Program Highlights

Please see the EEA's annual report filed in Docket No. 07-083-TF for this information.

Program Budget, Savings & Participants

The EEA program budget is shown below. While there are no direct, quantifiable energy savings attributable to this program, EEA offers a comprehensive statewide approach to training and offers utilities an additional resource to help promote their respective programs. Please see the EEA's annual report filed in Docket No. 07-083-TF for participation information.

Table 10: Energy Efficiency Arkansas

Energy Efficiency Arkansas												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 135,350	$ 58,823	43%	0	0	-	n/a	n/a	-	0	0	-
Program Year 2020	$ 134,471	$ 140,904	105%	0	0	-	n/a	n/a	-	0	0	-
Program Year 2021	**$ 126,421**	**$ 37,357**	**30%**	**NA**	**0**	**-**	**n/a**	**n/a**	**-**	**NA**	**0**	**-**

Program Events & Training

Please see the EEA's annual report filed in Docket No. 07-083-TF for this information.

Savings

While there are no direct, quantifiable energy savings attributable to this program, EEA offers a comprehensive statewide approach to training and offers utilities an additional resource to help promote their respective programs.

Challenges & Opportunities

Please see the EEA's annual report filed in Docket No. 07-083-TF for this information.

Outlook for Continuation, Expansion, Reduction or Termination

A comprehensive EEA program has been approved by the Commission through December 31, 2022. Please see filings made in Docket No. 07-083-TF for details.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

2.4 Residential Home Energy Reports Program

Program Description

The Residential Home Energy Reports (HER) program provides customers with energy usage information, including energy savings tips and personalized energy usage comparisons, to encourage and motivate recipients to lower their energy usage. CenterPoint Energy's HER program is administered by Oracle, and combines technology, direct marketing and behavioral science to deliver its Home Energy Reporting System. The Home Energy Reporting System is a unique software platform that combines energy usage data with customer demographics, housing and GIS data to develop specific, targeted recommendations that educate and motivate consumers to reduce their energy consumption.

Energy savings for the HER program are quantified by taking the difference in energy usage between a control group that receives no program information and a statistically identical group of customers that receive the home energy reports.

Program Highlights

The HER program continues to impact customers' awareness of their energy usage, influence energy-efficient behaviors, and produce a high level of quantifiable energy savings.

- Oracle analyzed customer data and established a control group and participant group, and program participants received four home energy reports throughout the heating season.
- In PY 2021, approximately 95,394 customers were actively enrolled in the program.
- In PY 2021, the program provided annual savings of 1,047,335 therms.

Program Budget, Savings and Participation

Table 11: Home Energy Reports

Home Energy Reports												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 345,485	$ 353,274	102%	583,900	998,174	171%	n/a	n/a	-	78,200	78,802	101%
Program Year 2020	$ 345,700	$ 370,145	107%	850,000	1,136,427	134%	n/a	n/a	-	85,000	90,211	106%
Program Year 2021	**$ 345,700**	**$ 367,313**	**106%**	**850,000**	**1,047,335**	**123%**	**n/a**	**n/a**	**-**	**85,000**	**95,394**	**112%**

Program Events and Training

To preserve the scientific integrity of calculating energy savings on the differences in usage between a control group and participant group, customers cannot opt into the program if they are not randomly selected into the participant group. For this reason, the program is not widely promoted to non-participants, and no mass marketing of the program is conducted.

Internal training regarding responses and support for customer requests is provided to CenterPoint Arkansas representatives. A select group of highly trained customer service representatives and energy efficiency program staff were trained on customer service tools provided by Oracle.

Savings

Oracle calculates the energy savings from the program by comparing the program participants against a similar size control group. The difference in energy usage will show the effect the program had on participating Arkansas customers.

The savings reported by the program are net savings, and there are no free riders because the program does not have an open enrollment process. In 2012, Protocol J of the TRM 2.0 was proposed by the IEM and Parties Working Collaboratively and was adopted by the Commission. Protocol J sets guidelines and standards for behavior-based programs. Savings for the program conform to this guideline. The HER program yielded the following residential energy savings in PY 2021:

Table 12: Annual Net and Lifetime Savings

Residential Home Energy Reports	
Annual Net Energy Savings (Therms)	1,047,335
Lifetime Energy Savings (Therms)	1,047,335

Description of Participants

Participants in the HER program are CenterPoint Arkansas customers who receive personalized energy reports.

Challenges & Opportunities

In PY 2021, a continued focus was placed on providing customers with information via email and enhanced online resources. These touchpoints are cost-effective ways to engage customers and provide them with gas usage information and recommendations to save energy. The Company will work with the Home Energy Reports implementation contractor to enhance the program to improve the customer experience and get more customer engagement.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

2.5 Low Flow Showerhead and Faucet Aerator Program

Program Description

The Low Flow Showerhead and Aerator Conservation Improvement Program (Low Flow Program) provides free energy-saving low flow showerheads and faucet aerators to CenterPoint Energy consumers. Customers can receive up to three low flow showerheads (1.5 GPM) or up to three faucet aerators (1.5 GPM).

Program Highlights

- The Low Flow Program distributed 3,242 kits containing low-flow showerheads and faucet aerators to CenterPoint Energy customers in PY 2021.
- The program was promoted through a combination of bill inserts and email campaign. Due to COVID-19 restrictions on in-person gatherings, we were unable to promote this program at local events and Home Shows. Email promotions have shown to be the most effective means of promoting program participation.
- With a TRC ratio of 4.20, the Low Flow Program remains the second most cost-effective offering in CenterPoint Arkansas's PY 2021 CIP Portfolio.
- Therm savings for the Low Flow Program totaled 25,098.

Program Budget, Savings & Participants

Table 13: Low-Flow Showerhead and Faucet Aerator

Low-Flow Showerhead and Faucet Aerator												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 290,362	$ 231,713	80%	165,898	108,933	66%	n/a	n/a	-	38,100	21,798	57%
Program Year 2020	$ 288,292	$ 198,745	69%	161,622	69,336	43%	n/a	n/a	-	38,100	4,469	12%
Program Year 2021	**$ 290,596**	**$ 157,244**	**54%**	**161,622**	**25,098**	**16%**	**n/a**	**n/a**	**-**	**38,100**	**11,245**	**30%**

Program Events & Training

Most of CenterPoint Arkansas's customers request low-flow equipment through an online portal, but the Company does provide internal training to its representatives so that customers can request kits and receive support via telephone. Low Flow kits mailed to customers include comprehensive installation instructions. CenterPoint Energy promoted this program through bill inserts and email campaigns.

Savings

The Low Flow program yielded the following residential energy savings:

Table 14: Annual Net and Lifetime Savings

Low-Flow Showerhead and Faucet Aerator Program	
Annual Net Energy Savings (Therms)	25,098
Lifetime Energy Savings (Therms)	250,982

Description of Participants

Participants in the Low-Flow Program are defined as CenterPoint Arkansas active gas account customers with a natural gas water heater who requested and received kits containing a combination of faucet aerators and showerheads.

Challenges & Opportunities

A historical decline in installation rates has resulted in lower savings. In order to combat this, a greater focus on promotional marketing will drive more customers to the marketplace. Marketing outreach will also engage customers whose eligibility has reset after ten years, bringing additional opportunities for increased installation rates. The Company will implement additional measures, including thermostats, to increase net savings. By offering these additional measures and variability in kit options, The Company aims to attract greater participation while meeting the planned budget for this program.

Planned or Proposed Changes to Program & Budget.

The Company will implement additional measures, including thermostats, to increase net savings. There are no planned or proposed changes to the budget at this time.

2.6 Natural Gas Equipment Program

Program Description

The Natural Gas Equipment Program is designed to promote efficient heating and water heating solutions to residential and commercial customers. Rebates are offered to consumers to encourage the purchase and installation of new high-efficient natural gas furnaces with an AFUE rating of 90% or higher. HVAC contractors can receive a $50 incentive for each qualifying rebate. Customers who receive furnace rebates are also eligible for a $50 incentive for the installation of a qualifying EnergyStar thermostat.

CenterPoint Arkansas customers can receive a $75 rebate for qualifying storage tank water heaters (.70 UEF or greater; Btu/hr input less than 75,000), or a $500 rebate for tankless water heaters (.80 UEF or greater). For tank water heaters with a Btu/hr input of 75,000 or greater and a thermal efficiency rating of 88%, customers are eligible for a rebate of $200 per 100,000 Btu. Plumbers can receive a $50 incentive for the installation of each natural gas tankless system or commercial tank water heater that qualifies for the rebate. The Company also offers a $1,500 rebate for the combination of a furnace rated at 95% AFUE or higher and a .80 UEF or greater tankless water heater. This rebate was added in 2017 to provide participants with an incentive for comprehensiveness at the highest efficiency level.

Program Highlights

Overall, CenterPoint Arkansas rebated 1,630 residential heating systems, 521 commercial heating systems, 1,288 residential water heaters, 235 commercial water heaters, 473 furnace/tankless water heater combination rebates, and 214 smart thermostats. Most program participants chose the highest efficiency option available. In most cases, customers who received rebates for natural gas furnaces elected 95% or greater AFUE models rather than 90%-94.9% AFUE models, and the majority of water heating inducements were for tankless water heaters.

CenterPoint Arkansas continued to promote these programs through a variety of channels including bill inserts, printed material, mass media, and supply house displays

throughout the state. Events included Home Shows, Home Builder Association events, numerous supply house customer appreciation and open house events, the annual conference for Arkansas Housing Authorities, the annual summer conference of the Arkansas Association of Educational Administrators were all canceled due to COVID-19 restrictions on in-person gatherings. However, CenterPoint Arkansas was able to conduct their annual Scoop Meeting for local HVAC and plumbing contractors via virtual. CenterPoint Arkansas also worked closely with school districts and housing authorities to promote energy efficient space heating and water heating solutions, and these entities comprise a significant portion of the participants utilizing the Company's rebate programs.

Program Budget, Savings & Participants

Table 15: Natural Gas Equipment Program

Natural Gas Equipment Program												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 3,259,834	$ 3,115,467	96%	541,828	497,251	92%	n/a	n/a	-	4,085	3,671	90%
Program Year 2020	$ 3,830,750	$ 3,466,070	90%	682,962	559,319	82%	n/a	n/a	-	5,240	4,590	88%
Program Year 2021	**$ 3,883,750**	**$ 3,084,891**	**79%**	**699,842**	**464,240**	**66%**	**n/a**	**n/a**	**-**	**5,325**	**3,888**	**73%**

Program Events & Training

The Company holds annual "Scoop" meetings for plumbers, HVAC contractors, and other stakeholders. The purpose of these meetings is to network with trade allies, educate them on the value of the Company's CIP Portfolio, and provide industry updates. In PY 2021, the company held only one Scoop Meeting in a virtual format.

Savings

CenterPoint Energy utilized Arkansas TRM 8.2 for all primary heating and water applications. The Natural Gas Equipment program yielded the following results in PY 2020:

Table 16: Annual Net and Lifetime Savings

Natural Gas Equipment Program	
Annual Net Energy Savings (Therms)	464,240
Lifetime Energy Savings (Therms)	7,336,999

Description of Participants

Participants in the Natural Gas Equipment Program are defined as the number of rebates provided to CenterPoint Arkansas customers.

Challenges & Opportunities

CenterPoint Arkansas has been successful in growing and educating its trade ally network, and the Company will continue these efforts as a strong base of trade allies is the primary key to program success. CenterPoint Arkansas is also working to improve its marketing strategy and deliver targeted promotions to customers and trade allies. Program year 2020 posed rebate processing challenges for our paper rebate submittals due to Covid-19 restrictions and the need for processors to work from home. This issue was address by moving Arkansas' customer rebate processing locally. Like other industries, program 2021 presented challenges in natural gas equipment availability due to COVID-19 supply chain issues. In addition, the severe winter weather experienced in February 2021 exposed several installation issues which resulted in the freezing of the condensate drains and exhaust lines of high-efficient natural gas equipment which ultimately shuts down the system. In events such as this, the short-term effect is for contractors to move away from the installation of high-efficient equipment. To address this issue, CenterPoint Arkansas worked with suppliers, code officials and contractors to ensure correct installation practices to prevent potential freezing.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

2.7 Commercial Boiler Program

Program Description

The Commercial Boiler program is designed to promote efficient heating and/or water heating solutions to all commercial customer classes. Rebate incentives are offered to consumers to encourage the purchase and installation of new high efficiency natural gas boiler equipment.

Program Highlights

In PY 2021, 25 boilers were rebated, which generated savings in the amount of 70,934 therms. Trade ally incentives (newly added in 2017) played a key role in influencing program participation, and the Company believes they will continue to do so in the future. PY 2021 brought higher customer rebate payouts, which should continue to drive participation in this program in the next few years. Efforts to educate customers and trade allies on the benefits of the boiler program are paying dividends, and the CenterPoint Energy's CIP staff continues to pursue opportunities to influence the installation of high efficiency equipment in commercial applications. The COVID-19 Pandemic provided commercial businesses the opportunity to execute boiler projects while employees worked from home.

Program Budget, Savings & Participants

Table 17: Commercial Boiler Program

Commercial Boiler Program												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 329,301	$ 338,377	103%	83,735	100,802	120%	n/a	n/a	-	36	41	114%
Program Year 2020	$ 270,444	$ 305,217	113%	57,585	82,962	144%	n/a	n/a	-	35	33	94%
Program Year 2021	**$ 270,474**	**$ 260,602**	**96%**	**57,585**	**70,934**	**123%**	**n/a**	**n/a**	**-**	**35**	**25**	**71%**

Program Events & Training

CenterPoint Arkansas CIP staff continues to focus on building and maintaining relationships with boiler manufacturer sales representatives, Engineering and Architecture

Firms, key customer accounts, and organizations such as Arkansas Association of Energy Engineers. Due to the COVID-19 Pandemic, trade shows and industry events were cancelled or conducted virtually in 2021.

Savings

CenterPoint Energy calculated energy savings according to Arkansas TRM 8.2 and yielded the following energy savings:

Table 18: Annual Net and Lifetime Savings

Commercial Boiler Program	
Annual Net Energy Savings (Therms)	70,934
Lifetime Energy Savings (Therms)	1,418,685

Description of Participants

Participants in the Commercial Boiler Program are defined as the number of rebates provided to CenterPoint Arkansas customers.

Challenges & Opportunities

CenterPoint Arkansas continues its efforts to build and maintain relationships with trade allies both in and out of state. With a limited number of local boiler trade allies, it is important to keep them engaged and supportive of the program so that opportunities for energy savings are not missed. Also, public sector facilities remain the strongest source of participation and energy savings, and the Company will continue to pursue opportunities at schools, government buildings, and other public organizations.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

2.8 Commercial Food Service Program

Program Description

The Commercial Food Service program is designed to promote the installation of high-efficiency food service equipment. Rebate incentives are offered to food service operators to encourage the purchase and installation of new, qualifying natural gas food service equipment. There are also Trade Ally incentives offered to equipment dealers to encourage an up-sale to qualifying high-efficiency cooking equipment.

Program Highlights

To combat the low participation rate caused by the COVID-19 Pandemic, an additional 50% Bonus Trade Ally Incentive and 20% Bonus Customer Rebate campaign was offered. The promotion experienced limited success due to the prolonged COVID-19 restriction enacted by the state and local government.

Additional 50% foodservice trade ally incentive† and 20% customer rebate* Sept. 1-Dec. 31, 2021.

Equipment	Efficiency rating		Usual trade ally/ dealer incentive/unit	50% Bonus: Bonus trade ally/dealer incentive/unit	20% Bonus: Customer bonus rebate/unit
Combi ovens greater than 28 pan	CEW	ENERGY STAR®	$225	$338	$2,880
Combi ovens 15-28 pan	CEW	ENERGY STAR®	$225	$338	$1,740
Combi ovens less than 15 pan	CEW	ENERGY STAR®	$225	$338	$1,320
Convection ovens	CEW	ENERGY STAR®	$75	$113	$600
Conveyor broilers	CEW		$150	$225	$900
Conveyor ovens	CEW		$115	$173	$900
Fryers 60% or greater cooking energy efficiency	CEW	ENERGY STAR®	$50	$75	$1,200
Fryers 51-59% cooking energy efficiency	CEW	ENERGY STAR®	$50	$75	$900
Fryers 50% cooking energy efficiency	CEW	ENERGY STAR®	$50	$75	$600
Griddles	CEW	ENERGY STAR®	$45	$68	$360
Rotating rack (double) ovens	CEW	ENERGY STAR®	$150	$225	$1,200
Rotating rack (single) ovens	CEW	ENERGY STAR®	$75	$113	$600
Steam Cookers	CEW	ENERGY STAR®	$150	$225	$1,200

Terms and conditions apply.
†BONUS trade ally incentives on installed foodservice equipment for rebate applications received between Sept. 1 and Dec. 31, 2021.
**BONUS customer incentives on installed foodservice equipment for rebate applications received between Sept. 1 and Dec. 31, 2021.*

Submit Rebates

Program Budget, Savings & Participants

Table 19: Commercial Foodservice Program

Commercial Foodservice Program												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 232,120	$ 155,206	67%	69,951	53,123	76%	n/a	n/a	-	135	112	83%
Program Year 2020	$ 172,491	$ 120,124	70%	60,941	21,693	36%	n/a	n/a	-	123	69	56%
Program Year 2021	**$ 178,216**	**$ 150,488**	**84%**	**62,873**	**50,469**	**80%**	**n/a**	**n/a**	**-**	**132**	**108**	**82%**

Program Events & Training

Due to the COVID-19 Pandemic, trade shows and industry events were cancelled in 2021.

Savings

CenterPoint Energy calculated energy savings according to Arkansas TRM 8.2. These savings were evaluated by ADM, and a 77% net-to-gross adjustment was applied. The Commercial Food Service program yielded the following savings:

Table 20: Annual Net and Lifetime Savings

Commercial Food Service Program	
Annual Net Energy Savings (Therms)	50,469
Lifetime Energy Savings (Therms)	605,624

Description of Participants

Participants in the Commercial Food Service program are defined as the number of rebates provided to CenterPoint Arkansas customers.

Challenges & Opportunities

In PY 2021, CenterPoint Arkansas Commercial Foodservice Equipment Program increased net energy savings 132% over last year. Many restaurateurs took advantage of PPP Loans to assist in labor retention and updating their kitchen equipment. Unfortunately, the availability of qualified equipment fell victim to the supply chain in the latter part of the year. The Manufacturers' Agents Association for the Food Service Industry (MAFSI) 2021 annual report stated "Demand quickly outpaced supply as manufacturers deal with a variety of problems as they expand their capacity from decimated COVID levels. These issues include labor, supply, and wage pressures, raw material shortages, and transportation availability. These inflationary pressures lead to second rounds of price increases, advancing of order placement, and longer lead times. The market is rapidly shifting from "Just in Time" to "Not in Time" delivery[3]. CenterPoint Arkansas will continue to leverage the rebates and educate customers and trade allies on the long-run value of efficient equipment. The Company will continue to seek and evaluate additional food service measures that could be viable additions to its existing program offerings.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

2.9 Natural Gas Commercial & Industrial Solutions Program

Program Description

The Natural Gas Commercial and Industrial (C&I) Solutions Program encourages C&I customers to use natural gas efficiently by installing energy efficient equipment, adopting energy efficient designs and using energy efficient processes at their facilities. The program is implemented by CLEAResult and includes the direct installation of equipment that

[3] https://www.mafsi.org/business-barometer

reduces energy consumption as well as financial incentives for customers that pursue custom energy efficiency projects. For custom measures, CLEAResult provides customers with technical assistance to identify energy efficiency projects and quantify energy savings, assists the customers through the incentive process and conducts the necessary EM&V work.

Program Highlights

In PY 2021, the Natural Gas Commercial and Industrial Solutions Program remained a high performing program achieving over 130% of goal and was again the largest single program contributor to energy savings and net economic benefits. Overall, the program yielded energy savings of 1,983,043 resulting in a TRC of 2.27 and a net benefit total of $7.9 million.

Program Budget, Savings & Participants

Table 21: Natural Gas Commercial Solutions

Natural Gas Commercial Solutions												
	Expenditures			Energy Savings (Therms)			Demand Savings (Therms)			Participants		
Program	Budget	Actual	%	Plan	Evaluated	%	Plan	Evaluated	%	Plan	Actual	%
Program Year 2019	$ 2,744,123	$ 2,870,289	105%	1,604,492	1,614,082	101%	n/a	n/a	-	17,790	20,952	118%
Program Year 2020	$ 2,928,574	$ 3,080,171	105%	1,528,448	1,696,653	111%	n/a	n/a	-	15,410	18,369	119%
Program Year 2021	**$ 2,954,470**	**$ 3,079,053**	**104%**	**1,528,448**	**1,983,043**	**130%**	**n/a**	**n/a**	**-**	**15,410**	**926**	**6%**

Program Events & Training

CenterPoint Arkansas and program implementer CLEAResult continuously pursue opportunities to promote the program to customers and trade allies through site visits, trade shows, and other industry events. CenterPoint Arkansas utilizes its Commercial and Industrial Transportation Sales Representatives to educate customers on the benefits of the program and identify opportunities for participation. The Company also develops case studies that highlight results of specific custom projects and show the value of the program to customers. In addition, CenterPoint Arkansas provided training to customers, industry professionals and financial institutions regarding the financial benefits of energy efficiency projects.

Savings

Custom energy efficiency projects and the direct installation of pre-rinse spray valves (PRSV), faucet aerators, low-flow showerheads, and weather stripping produced the energy savings delivered through the PY 2021 Natural Gas Commercial and Industrial Solutions Program. TRM 8.2 was utilized to calculate the savings for the direct install portion of program savings. The methodology for calculating the custom projects savings were evaluated by ADM and are discussed in detail in ADM's report, which can be found in Appendix A. The Natural Gas Commercial and Industrial Solutions Program yielded the following savings:

Table 22: Annual Net and Lifetime Savings

Commercial & Industrial Solutions Program	
Annual Net Energy Savings (Therms)	1,983,043
Lifetime Energy Savings (Therms)	29,478,887

Description of Participants

Participants in the Natural Gas Commercial and Industrial Solutions Program are defined as the number of custom commercial projects as well as facilities that have participated in the direct install component of the program provided to CenterPoint Arkansas customers.

Challenges & Opportunities

With a suite of direct-install measures, custom project incentives, and technical assistance, the Natural Gas Commercial and Industrial Solutions Program has a successful mix of cost-effective energy efficiency opportunities available to commercial customers. CenterPoint Arkansas believes there is opportunity to leverage this program to promote its other prescriptive rebate offerings. The program was over goal in PY 2021 and is

oversubscribed for the current program year. It may be necessary to reallocate resources from other programs to meet the needs of all customers wishing to participate. Although there were adjustments due to COVID-19 restrictions to field procedures for the C&I program staff, there were no large delays or impact on the program overall because of the pandemic.

Planned or Proposed Changes to Program & Budget

There are no planned or proposed changes to the program or budget at this time.

3.0 Supplemental Requirements

3.1 Staffing

CenterPoint Energy has five staff members in Little Rock, Arkansas who deliver its comprehensive energy efficiency portfolio. A CIP Implementation Manager oversees the day-to-day activities of the CIP team and assures that the programs are compliant with regulatory requirements. Additionally, two Energy Efficiency Consultants, an Energy Efficiency Coordinator, and an Energy Efficiency Analyst delivers, administers, and maintains compliance of CIP programs.

The Energy Efficiency Consultants' responsibilities are to implement energy efficiency programs that meet regulatory and legislative requirements and respond to customer needs. They manage productivity and build relationships with external vendors and trade allies to maximize the performance of programs and ensure those programs comply with CenterPoint Energy's corporate goals.

The Energy Efficiency Coordinator manages the trade ally database, assists with trade ally outreach, processes rebates paid to commercial CenterPoint Energy rebate program participants, processes invoices for external vendors, verifies that all equipment rebated meets minimum requirements, manages the CIP tracking systems, and assists the Energy Efficiency Consultants.

The Energy Efficiency Analyst maintains the program data, supports the regulatory function, and performs analysis to monitor and improve the CIP portfolio. The EE Analyst will also keep up with changes to the TRM and implement changes to ensure accurate calculations of program savings.

3.2 Stakeholder Activities

CenterPoint Energy actively participates in stakeholder collaborative efforts and continues to be an active participant in the collaborative process established by the Commission (also known as the "Parties Working Collaboratively" or PWC).

CenterPoint Energy has also been very active in local trade associations such as home builders associations, HVAC contractors associations, Arkansas Hospitality Associations, Arkansas Association of Healthcare Engineering, Gas Food Equipment Network, Arkansas Education Association, and the local public housing authorities.

Internally, CenterPoint Energy continues to train its Arkansas-based Marketing Consultants to work with local builders and trade allies, and also utilizes field employees to identify potential program participants throughout their day-to-day activities. In addition, CenterPoint Energy has trained Commercial and Industrial Transportation Sales Representatives that actively educate eligible transportation customers on the programs and make referrals to the C&I Solutions program.

3.3 Information Provided to Consumers to Promote EE.

CenterPoint Energy uses a variety of tools to provide information to consumers about energy efficiency programs. These include:

- Printed factsheets for consumers
- Printed factsheets for trade allies
- Supply house displays
- Bill inserts

- Website
- Emails
- Advertisements on TV, radio and in print
- Retail point of purchase displays and promotions

Select examples of each type of information can be found in Appendix B.

APPENDIX A – EM&V CONTRACTOR REPORT

EVALUATION, MEASUREMENT AND VERIFICATION REPORT FOR THE 2021 CENTERPOINT ENERGY ARKANSAS ENERGY EFFICIENCY PORTFOLIO

SUBMITTED TO: SUMMIT UTILTIES ARKANSAS

SUBMITTED ON: APRIL 22, 2022

SUBMITTED BY: ADM ASSOCIATES, INC.

ADM Associates, Inc

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summit UTILITIES

Acknowledgements

We would like to thank the staff at CenterPoint Energy Arkansas for their time and effort in contributing to the EM&V of the PY2021 programs. This evaluation was conducted with regular coordination with staff at CenterPoint, who provided quick feedback and turnaround to the requests of the evaluation team as well as open and forthright insights into the operations of their programs.

Further, we would like to acknowledge our gratitude towards CenterPoint customers, implementation contractor staff, and trade allies. As with the staff at CenterPoint, their active participation allowed for the evaluation team to collect all needed data for this effort.

In final, we would like to thank staff at the Independent Evaluation Monitor for their involvement in providing thorough answers and clarification to the evaluation team when higher-level questions arose over the course of the PY2021 EM&V effort.

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1 Executive Summary

In March of 2019, CenterPoint Energy Resources Corporation (CenterPoint, or CNP) filed its 2020-2022 Energy Efficiency Plan[1] in response to Commission Order No. 25 in Docket No. 13-002-U.[2] The APSC approved the 2020–2022 programs, which built upon CNP's Quick Start Energy Efficiency programs that have been implemented since late 2007[3] and the Comprehensive programs that have been implemented in Arkansas since 2011.[4] This was filed in compliance with Order No. 31 of Docket No. 13-002-U,[5] which required investor-owned natural gas utilities in Arkansas to capture energy savings equivalent to 0.50% of their 2018 energy sales.

As in previous APSC rulings, the Arkansas utilities retain flexibility to make up to 10% adjustments to program budgets and may adjust energy savings and demand reduction goals as appropriate within the modified budgets. Thus, CNP's 2021 budgets and energy savings goals, reflecting allowable adjustments as described above, serve as the basis against which its portfolio of programs were evaluated in 2021.

CNPs Plan include a portfolio of energy efficiency programs designed to facilitate energy savings in every customer class. CNP services approximately 415,243 customers in Arkansas, and serves southern, central, and northeast Arkansas, including the greater Little Rock metropolitan area, Texarkana, Jonesboro, and Pine Bluff.

The PY2021 CNP evaluation included impact and process analyses that are specified in the APSC rules and follow the Arkansas TRM Version 8.2 protocols and savings algorithms. In addition, ADM developed the program evaluation activities based upon discussions with CNP staff and its implementation contractors, reviews of program tracking and program documentation, a review of prior years' EM&V efforts and CenterPoint annual reports, and input from the IEM.

[1] PY2017-PY2019 Plan, filed in Docket 07-081-TF: http://www.apscservices.info/pdf/07/07-081-TF_402_1.pdf

[2] Order #25 in Docket 13-002-U: http://www.apscservices.info/pdf/13/13-002-U_198_1.pdf

[3] Quick Start Plan, filed in Docket 07-081-TF: http://www.apscservices.info/pdf/07/07-081-tf_1_1.pdf

[4] Comprehensive Program Plan, filed in Docket 07-081-TF: http://www.apscservices.info/pdf/07/07-081-tf_171_1.pdf

[5] Order #31 in Docket 13-002-U: http://www.apscservices.info/pdf/13/13-002-U_226_1.pdf

As of January 10, 2022, CenterPoint Energy Arkansas has been acquired by Summit Utilities (Summit) and is now operating as Summit Utilities Arkansas (SUA). For the entirety of this implementation period, the programs were administered under CNP's ownership. As a result, this report is submitted to Summit Utilities but refers to CNP as the utility that administered the programs for PY2021.

This report presents the EM&V results for CenterPoint's energy efficiency programs implemented in PY2021. In accordance with APSC C&EE Rules,[6] CenterPoint selected an independent, third-party EM&V contractor. The selected EM&V team is led by ADM Associates. The ADM staff, collectively referred to as the Evaluators, evaluated the CNP portfolio.

1.1 Summary of CenterPoint Energy Efficiency Programs

In PY2021, the CenterPoint portfolio contained the following programs:

- Residential Equipment Rebates;
- Commercial Equipment Rebates;
- Commercial Boiler Program;
- C&I Solutions;
- Commercial Food Service Program;
- Home Energy Reports;
- Low Flow Showerhead & Faucet Aerator Program;
- Saving Homes Program[7]; and
- Low Income Savings Homes Program[8].

CenterPoint designed its programs to achieve the following objectives:

- Meet or exceed a PY2021 net savings goal of 3,832,796 therms;
- Significant energy-saving opportunities for all customers and market segments;
- Broad ratepayer benefits; and

[6] APSC C&EE Rules: http://www.apscservices.info/pdf/16/16-075-SD_5_1.pdf

[7] The SHP is CNP's implementation of the Consistent Weatherization Approach (CWA)

[8] The LISHP is CNP's implementation of the Consistent Weatherization Approach (CWA) for Act 1102

- Comprehensiveness in seven areas (i.e., comprehensiveness factors) defined by the APSC.[9]

Through its energy efficiency portfolio, CenterPoint also seeks to provide customers with easy program entry points, flexible options for saving energy, and ongoing support for those who want to pursue deeper energy savings. Refer to Table 1-1 for a list of the CenterPoint programs and targeted customer segments.

Table 1-1: CenterPoint PY2021 Energy Efficiency Portfolio Sectors Serviced

Program	Single Family	Multifamily	Small Business	Large C&I	Municipal	Agricultural
Residential Equipment Rebates	✓	✓			✓	
Commercial Equipment Rebates		✓	✓	✓	✓	✓
Commercial Boiler			✓	✓		
C&I Solutions			✓	✓	✓	✓
Commercial Food Service			✓	✓	✓	
Home Energy Reports	✓	✓				
Low Flow Program	✓	✓				
Saving Homes Program	✓	✓				
Low-Income Savings Homes Program	✓	✓				

1.2 Evaluation Goals

The goals of the PY2021 EM&V effort are as follows:

- **For prescriptive measures,** verify that savings are being calculated according to appropriate TRM guidelines. For most measures, this constitutes applying TRM V8.2 methodologies.
- **For custom measures,** this effort comprises the calculation of savings according to accepted protocols (such as IPMVP). This is to ensure that custom measures are cost-effective and providing reliable savings.
- **Conduct process evaluations of CenterPoint programs.** Full process evaluations were completed in PY2019 and PY2020 and as a result process evaluation needs in PY2021 were limited.

[9] As defined by the APSC in the C&EE Rules of Order No. 17 in Docket 08-144-U

- **Conduct net-to-gross assessments.** The Evaluators conducted program-specific net-to-gross assessments in from PY2018-PY2020, and as a result, net-to-gross assessment needs in PY2021 were limited.

1.3 Summary of Findings

1.3.1 Impact Findings

Table 1-2 and 12 present the gross and net impact by program.

Table 1-2: Gross Impact Summary

Program	Annual Therms Savings		Lifetime Therms Savings		Gross Realization Rate
	Ex Ante	Ex Post	Ex Ante	Ex Post	
Residential Equipment Rebates	401,498	402,236	5,861,992	5,866,061	100.2%
Comm. Equipment Rebates	129,763	149,340	2,537,342	2,908,550	115.1%
Commercial Boiler CIP	88,359	88,359	1,767,171	1,767,171	100.0%
C&I Solutions	1,970,656	1,983,043	29,478,887	29,478,887	100.6%
Commercial Food Service CIP	59,296	65,374	711,558	784,487	110.2%
Home Energy Reports	1,043,726	1,047,335	1,043,726	1,047,335	100.3%
Low Flow CIP	56,545	49,867	565,455	498,672	87.9%
Saving Homes Program	437,544	440,595	7,653,667	7,662,090	100.7%
Low-Income Saving Homes	46,374	47,516	822,840	837,694	102.5%
Total	**4,233,761**	**4,273,664**	**50,442,638**	**50,850,947**	**100.9%**

Table 1-3: Net Impact Summary

Program	Annual Therms Savings		Lifetime Therms Savings		NTGR	Net Realization Rate
	Ex Ante	Ex Post	Ex Ante	Ex Post		
Res. Equipment Rebates	345,760	348,409	5,048,197	5,081,064	86.6%	100.8%
Comm. Equipment Rebates	105,533	115,831	2,063,564	2,255,935	77.6%	109.8%
Commercial Boiler CIP	70,934	70,934	1,418,685	1,418,685	80.3%	100.0%
C&I Solutions	1,970,656	1,983,043	29,478,887	29,478,887	100.0%	100.6%
Comm. Food Service CIP	45,777	50,469	549,322	605,624	77.2%	110.2%
Home Energy Reports	1,043,726	1,047,335	1,043,726	1,047,335	100.0%	100.3%
Low Flow CIP	28,459	25,098	284,593	250,982	50.5%	88.2%
Saving Homes Program	437,544	436,278	7,653,667	7,457,512	99.0%	99.7%
Low-Income Saving Homes	46,374	47,516	822,840	837,694	100.0%	102.5%
Total	**4,094,763**	**4,124,913**	**48,363,481**	**48,433,718**	**96.5%**	**100.7%**

The contribution to portfolio savings by program is summarized in Figure 1-1.

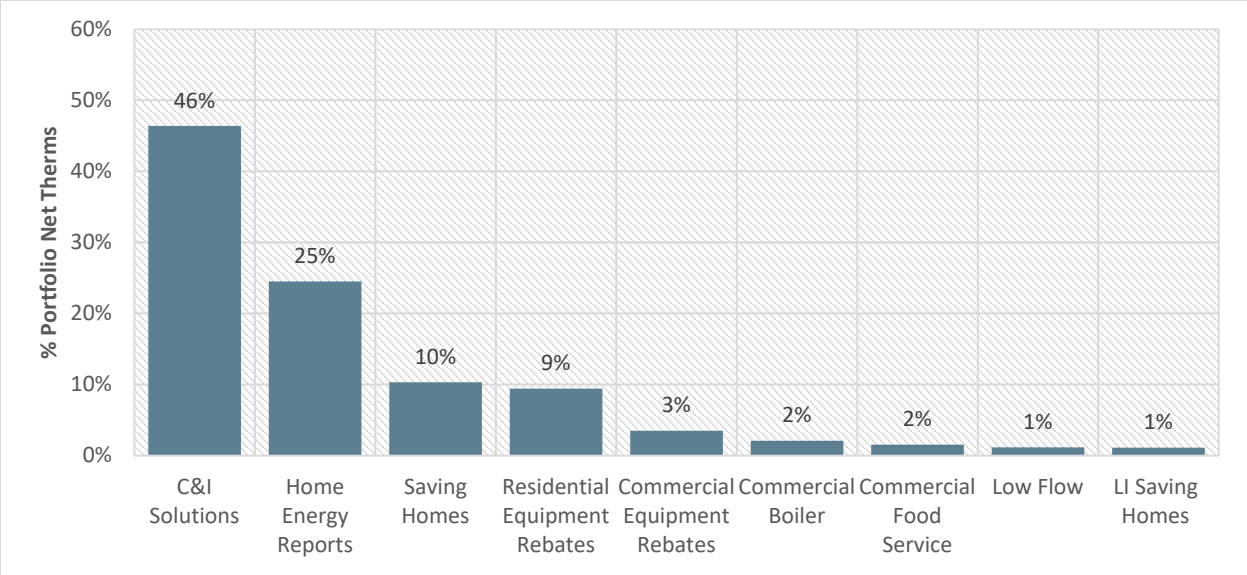


Figure 1-1: Contribution to Portfolio Net Savings by Program

Figure 1-2 and Figure 1-3 summarize the share of savings by measure category for residential and non-residential segments, respectively.

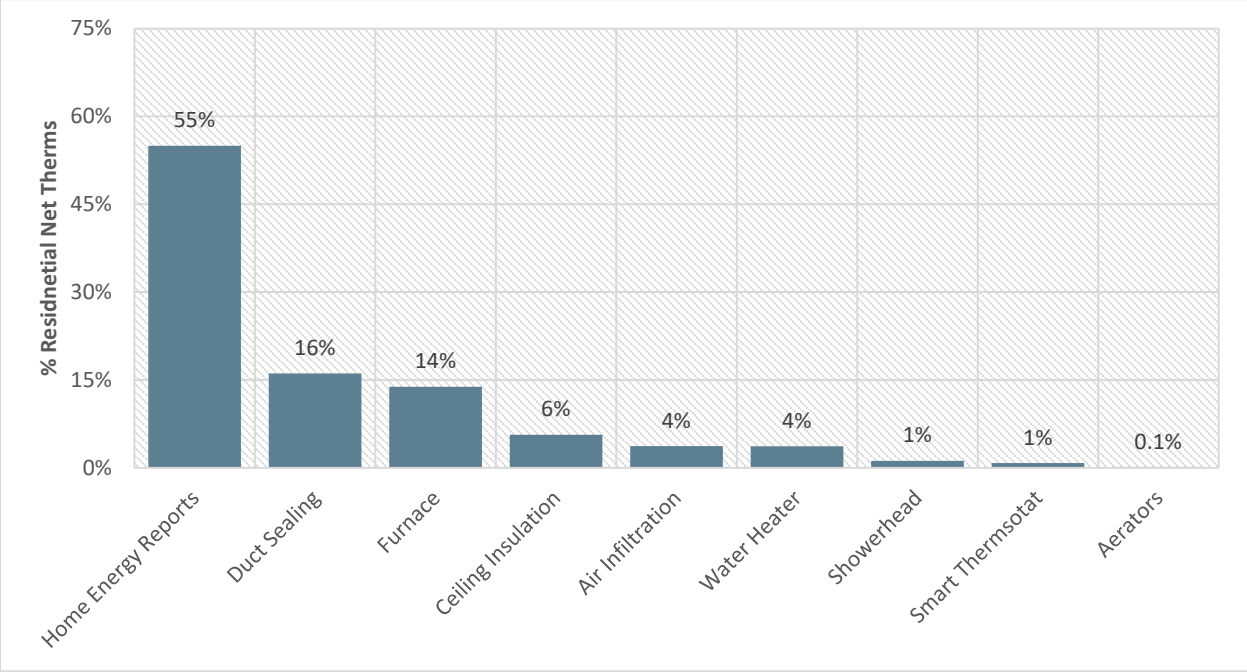


Figure 1-2: Residential Portfolio Savings Share by Measure

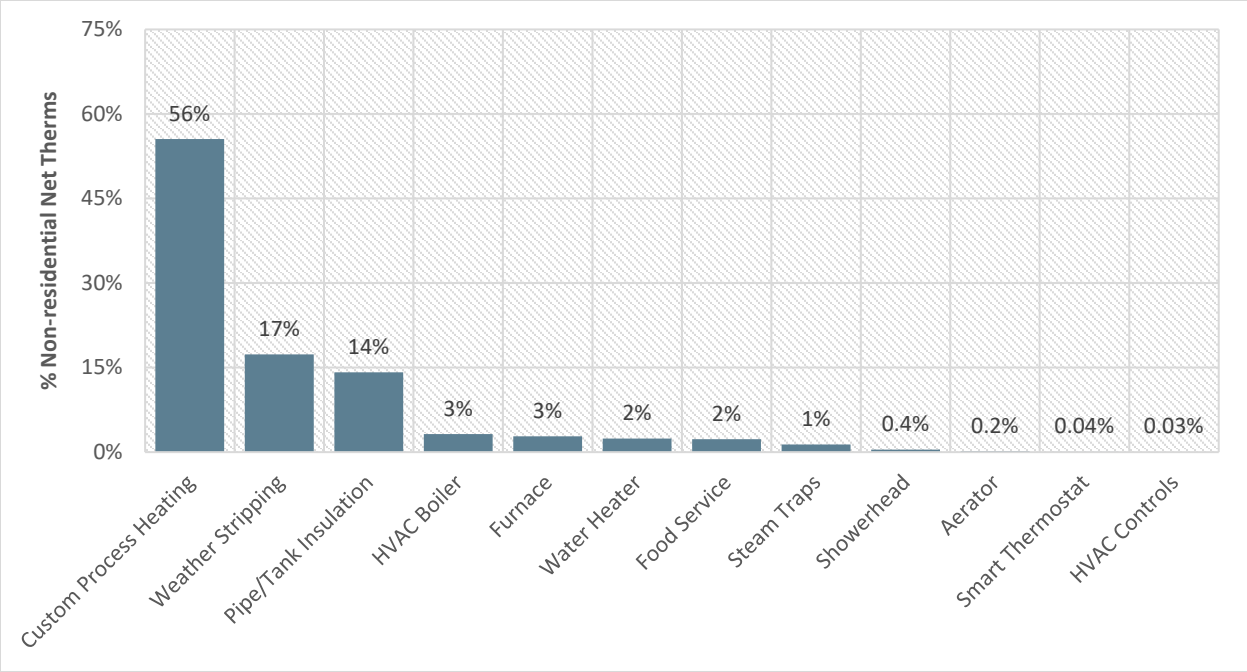


Figure 1-3: C&I Portfolio Savings Share by Measure

From this, the Evaluators have identified the following High Impact Measure (HIMs):

Residential:

- Home Energy Reports;
- Duct Sealing;
- Furnace; and
- Ceiling Insulation.

Non-residential:

- Custom process heating;
- Weather stripping; and
- Pipe/tank insulation.

Further, the Evaluators put the net savings into the context of CenterPoint's PY2021 filed goal[10]. Table 1-4 summarizes the performance against goals of programs evaluated in this report.

Table 1-4: CenterPoint PY2021 EE Portfolio Performance against Goals

Program	PY2021 Verified Net Therms	PY2021 Net Therms Goal	% of Goal Attained
Residential Equipment Rebates	348,409	699,842	66.3%
Commercial Equipment Rebates	115,831		
Commercial Boiler	70,934	57,585	123.2%
C&I Solutions	1,983,043	1,528,448	129.7%
Commercial Food Service	50,469	62,873	80.3%
Home Energy Reports	1,047,335	850,000	123.2%
Low Flow Program	25,098	161,622	15.5%
Saving Homes Program	436,278	425,184	102.6%
Low-Income Saving Homes	47,516	47,243	100.6%
Total	**4,124,913**	**3,832,796**	**107.6%**

The CenterPoint portfolio reached 107.6% of their filed savings goal, compared to 105.9% in PY2020. There was notably strong performance relative to goals in the Commercial Boiler, Home Energy Reports, and C&I Solutions programs. This was achieved while spending 98.2% of the available budget. The PY2021 verified net therms of 4,124,913 is the highest ever attained by CenterPoint in any single program year.

Programs with lower performance relative to goal attainment included the Residential/Commercial Equipment Rebates Program, Low-Flow Showerhead and Faucet Aerator Program, and the Commercial Food Service Program. Percent of goal attained and

[10] This differs from the APSC-required target of .5% of sales. CenterPoint's filed goals are designed to exceed APSC targets.

budget spent by program is summarized in

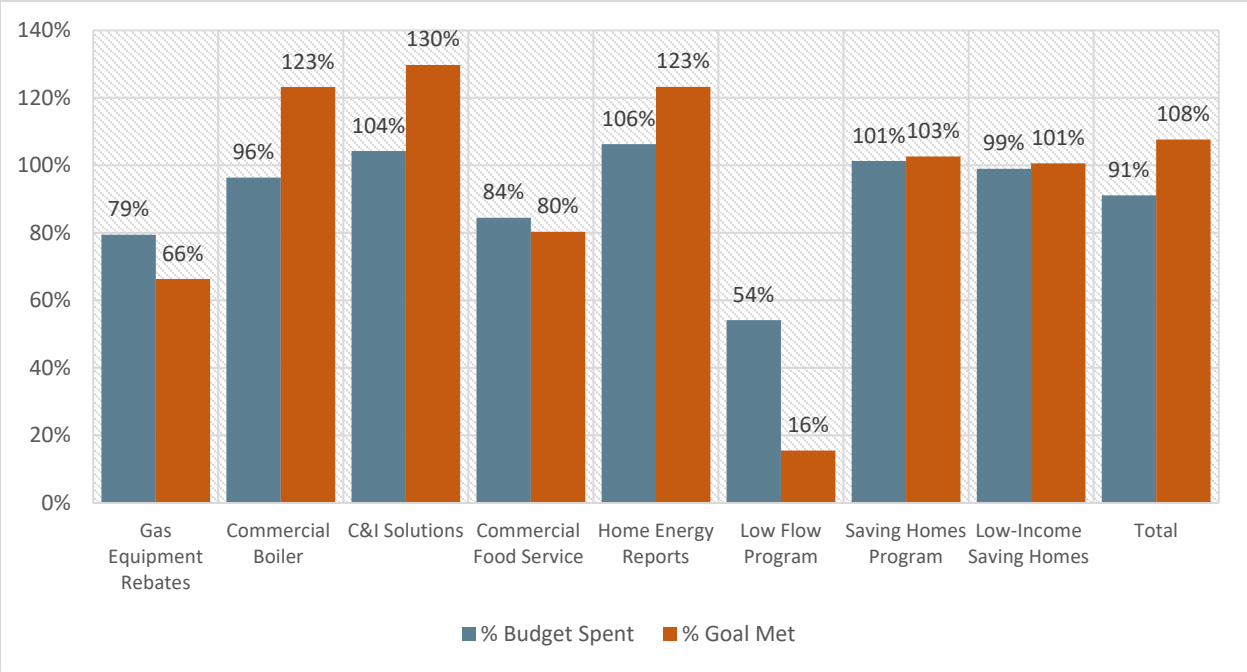


Figure 1-4.

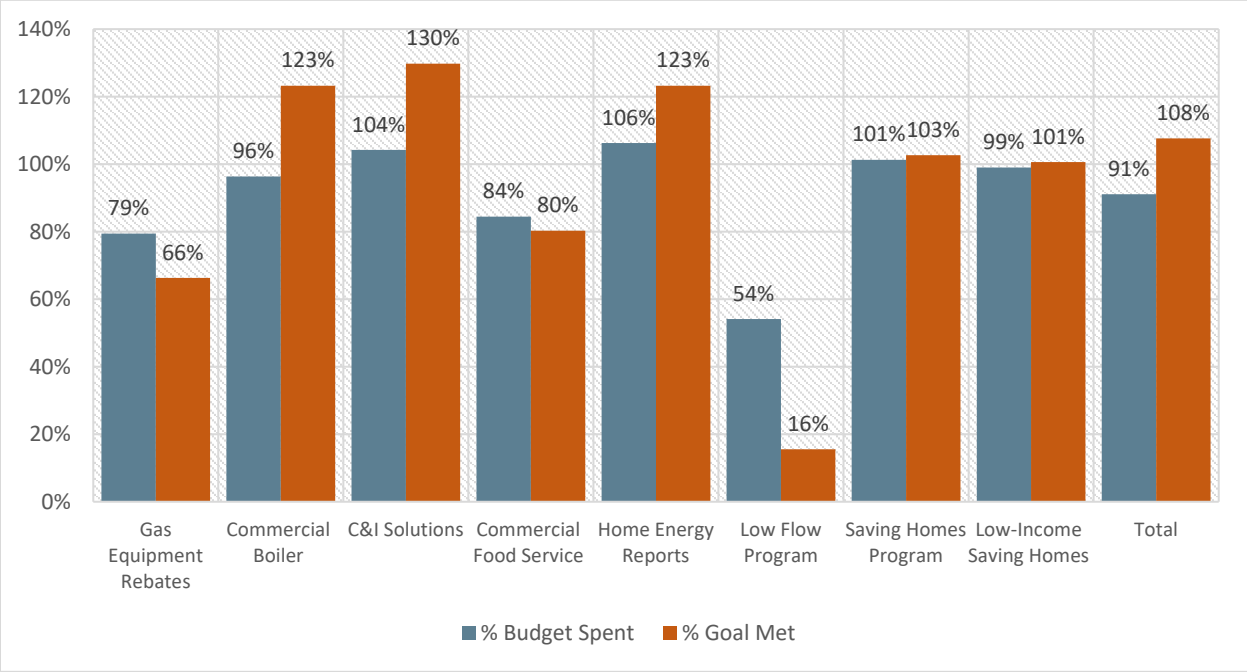


Figure 1-4: Summary of Goal Attainment & Budget Expenditure by Program

The non-energy benefits (NEBs) attained by the CenterPoint portfolio in PY2021 are detailed in the tables to follow.

Table 1-5: CenterPoint PY2021 Verified Electric Savings

Program	Measure	Net Annual kWh	Net Peak kW	Lifetime Net kWh
Res. Equipment Rebates	Smart Thermostats	181,045	-	1,991,495
Comm. Equipment Rebates	Smart Thermostats	11,129	-	122,418
C&I Solutions	Weather Stripping	48	0.03	527
Low Flow Program	Aerators	9,383	0.98	93,830
	Showerheads	80,252	8.35	802,523
Saving Homes Program	Duct Sealing	1,463,083	770.68	26,335,492
	Air Infiltration	137,105	103.47	1,508,160
	Ceiling Insulation	498,263	545.90	9,965,257
Low Income Saving Homes	Duct Sealing	80,545	43.65	1,449,812
	Air Infiltration	10,400	7.98	114,395
	Ceiling Insulation	36,019	38.30	720,378
Total		**2,507,272**	**1,519.33**	**43,104,287**

Table 1-6: CenterPoint PY2021 Verified Water Savings

Program	Measure	Net Annual Water	Net Lifetime Water
C&I Solutions[11]	Direct Install	2,310,109	24,670,081
	Custom	2,946,860	47,136,500
Commercial Food Service	Combi Oven	904,007	10,848,079
	Steamer	231,961	2,783,536
Low Flow Program	Aerators & Showerheads	7,014,506	70,145,055
Saving Homes Program	Aerators	2,446	24,460
	Showerheads	5,943	59,432
Low Income Saving Homes	Showerheads	6,106	61,060
Total		**13,421,938**	**155,728,203**

Table 1-7: CenterPoint PY2021 Avoided/Deferred Replacement Cost

[11] Direct Install comprised showerheads, PRSVs, and faucet aerators. Custom comprised of process boilers, boiler controls, steam leak repair, and condensate return improvement.

Program	Measure	Net A/DRC per Unit	Total Net A/DRC
Residential Equipment Rebates	Tankless Water Heater	$304.68	$504,205
	Furnace Early Retirement	$721.92	$684,238
Commercial Equipment Rebates	Tankless Water Heater	$124.34	$30,717
Total			**$1,219,161**

Overall portfolio savings have increased in comparison to PY2021. Net savings increased by 2.5%, to a record-high of 4,124,913 net annual therms.

1.4 Program-level Findings

1.4.1 Residential Equipment Rebates

CenterPoint accurately calculates savings per TRM V8.2 protocols.	All projects at 100.2% gross realization. CenterPoint's tracking system accurately applies TRM V8.2, algorithms and early retirement adjustments.
CenterPoint has endeavored to encourage comprehensiveness via combination rebates.	A rebate of $1,500 is provided for participants who simultaneously install a qualifying furnace and tankless water heater. These rebates comprised 26% of furnace and 23% of water heater projects.
Savings declined compared to PY2020.	Savings decreased by 15%, corresponding with lower participation.

1.4.2 Commercial Equipment Rebates

Tracking data for water heaters has improved significantly.	In PY2020, the Evaluators had to develop DHW load inputs for over 80% of commercial projects. In PY2021, this was only required for a total of 8 projects (3% of total projects). CenterPoint attributes this to the addition of a new staff member that is responsible for this data collection.
The program has ARC NEBs from tankless water heaters.	They are lower than observed for residential tankless systems, however, due to a lower volume of units and that the baseline system has an EUL of 15 years, compared to 11 years for residential systems. Further, there was significant participation from master-metered multifamily units which have ARC values similar to residential participants (differing solely by NTGR).
The program performed significantly well in PY2021.	In PY2021, overall program realization was 115%. Compared to PY2020, the program experienced a significant increase in both participation and claimed savings, achieving a 168% increase in participation and a 60% increase in claimed savings.

1.4.3 Commercial Boiler Program

The program met its savings goal.	In PY2021, the Commercial Boiler CIP reached 139% of its net savings goal.
CenterPoint accurately calculates savings per TRM V8.2 protocols.	All projects at 100% gross realization. CenterPoint's tracking system accurately adjusts baseline to align with code requirements by size category and boiler type.
There was no participation in the lower efficiency tier.	As found in the prior two program years, there was no participation in the 85%-92% efficiency tier.

1.4.4 C&I Solutions

The program met savings goals and was highly cost-effective.	With 1,983,043 therms, the program has had its highest annual savings to-date, with 71.8% of this from custom projects.
	Savings increased by 16.9% compared to PY2020

	The program met 130% of its savings goal.
The program has seen a reduction in annual water savings	The water savings claimed in PY2021 have fallen compared to previous years. PY2019 projects saved 10,046,998 gallons of water annually, and in PY2020, water savings increased to 34,738,559 gallons, based off direct install, steam leak repair, condensate return, and custom low flow device projects. In PY2020, the custom program channel produced 30,415,468 gallons of water savings and in PY2021, the custom program only produced 2,946,860 gallons of water savings.

1.4.5 Commercial Food Service Program

Savings have more than doubled since PY2020	COVID-19 has affected this program more than most as the restaurant industry was hard-hit by the pandemic. Savings from PY2020 to PY2021 have increased from 21,693 to 50,469. Though still short of savings goal (meeting 73%), this may indicate an improvement in market conditions for the program.
CenterPoint accurately calculates savings per TRM V8.2 protocols.	All projects at 100% gross realization. CenterPoint's tracking system accurately adjusts baseline to align with code requirements by size category and boiler type.
Discrepancies were found in savings estimates for combi ovens.	Baseline efficiency was entered as "37" instead of "37%", erroneously underestimating impacts.

1.4.6 Home Energy Reports

The program continues to provide reliable savings as a percent of billed use but faces ongoing issues with customer attrition.	Wave 1 is responsible for 38.9% of program savings. This wave has had 46.0% attrition overall.
Savings per customer increased for Wave 2 and Wave 4 compared to prior program years.	Savings increased from 7.9 to 8.2 therms per customer for Wave 2, and from 10.1 to 11.9 therms per customer for Wave 4. As a result, the Home Energy Reports program significantly outperformed compared to program plan savings.
Although Wave 4 was recently launched in September 2019, impact trends are continuing to develop.	Wave 4 outperformed in PY2021 compared to PY2020, achieving a 17.7% increase in savings per customer (11.9 compared to 10.1). Wave 4 in PY2021 is responsible for 19.6% of overall program savings compared to 17.4% in PY2020

1.4.7 Low Flow Showerhead & Faucet Aerator Program

The program is cost-effective but has had continuously declining participation and savings.	The program expended only 54% of its budget and met 16% of its savings goal. Much of this decline in savings is due to revised NTG findings, but at the prior (higher) NTG, the program still significantly over-expended relative to participation volume.

1.4.8 Saving Homes Program

Satisfaction has increased from PY2020 to PY2021.	The percent of SHP survey respondents noting that they are “very satisfied’ has increased from 70% to 80%.
Realization rates were high overall.	The overall realization rate was 100.7%.

Program implementation contractors have been responsive to recommendations.	The Evaluators issued multiple recommendations in PY2020 and all have been addressed or are in progress.
Project comprehensiveness has declined.	The average measures per-project has declined from 2.95 to 1.78 from PY2020 to PY2021. CenterPoint and CLEAResult staff noted supply chain issues limited installation of ceiling insulation.

1.4.9 Low Income Saving Homes Program

The program met savings goals and was highly cost-effective.	The program met 101% of its net savings goal and had a 2.97 TRC.
Progress was made on H&S measures, but the program is not yet meeting Act 1102 requirements.	H&S spending increased from $3.43 to $60.54 per participant, and the percent of homes with any H&S spending increased from 3.5% to 29.3%. In contrast, BHE spent $489.01 per home, with 87.2% of participants receiving any H&S spending.
	H&S measures have been expanded from smoke alarms and carbon monoxide detectors to also include gas leak repair and night lights. However, the H&S measure list is less comprehensive that offered by BHE elsewhere in Arkansas.

The program budget is inadequate to meet both savings and H&S goals	The program spent 99% of its budget to meet 101% of the filed savings goal. To meet Act 1102 H&S benchmarks set elsewhere in Arkansas while maintaining this rate of savings, a budget reallocation of $50,000 would be required.

1.4.10 Recommendation Summary

In PY2020, 13 program or portfolio level recommendations were provided to CenterPoint as part of the EM&V of their portfolio. The Evaluators reviewed CenterPoint's response to recommendations from the PY2020 EM&V report and categorized them as follows:

1) **Adopted.** This applied to recommendations that pertained to the correction of an issue (such as using an incorrect baseline methodology) or modifications in program outreach that do not require a filing.
2) **Under consideration.** This applies most typically to larger recommendations that would require APSC approval. This includes mid-cycle adjustment of incentive levels.
3) **Rejected.** This applies to recommendations which are reviewed by CenterPoint and rejected.
4) **Not applicable.** This would apply to recommendations which are no longer applicable to the CenterPoint portfolio.
5) **In progress.** This refers to recommendations that have been accepted, but implementation of them in program operations is not yet complete.
6) **Incomplete.** This applies to recommendations which were included in the PY2020 EM&V report but have either not yet been adopted or have been explicitly rejected by CenterPoint.

The responses recommendations are summarized in Figure 1-5.

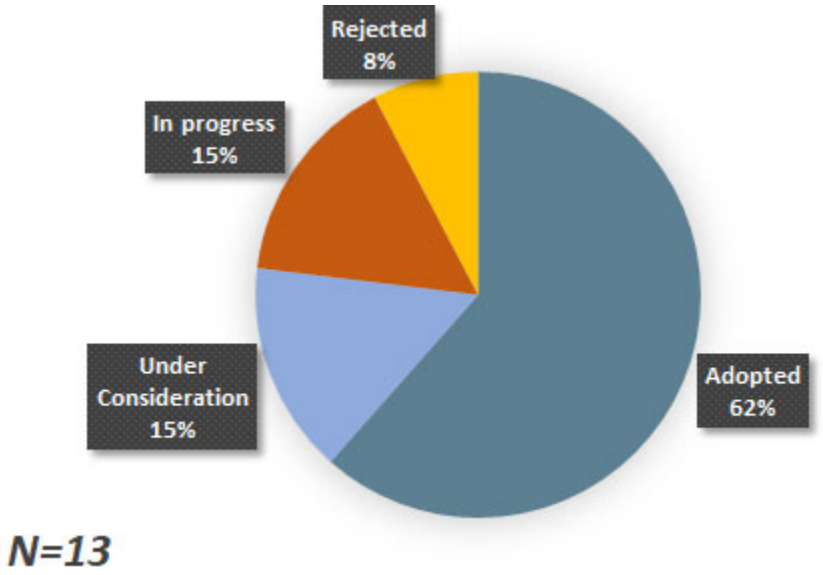


Figure 1-5: Summary of Status of PY2020 Recommendations

1.5 Report Organization

This report is organized with one chapter providing the full impact and process summary of a specified program. The report is organized as follows:

- Chapter 3 provides portfolio-level and cross-cutting findings;
- Chapter 4 provides results for the Residential Equipment Rebates Program;
- Chapter 5 provides results for the Commercial Equipment Rebates Program;
- Chapter 6 provides results for the Commercial Boiler Program;
- Chapter 7 provides results for the C&I Solutions Program;
- Chapter 8 provides results for the Commercial Food Service Program;
- Chapter 9 provides results for the Home Energy Reports Program;
- Chapter 10 provides results for the Low Flow Showerheads & Faucet Aerators Program;
- Chapter 11 provides the results for the Saving Homes Program;
- Chapter 12 provides results for the Low Income Saving Homes Program.
- Chapter 13 provides a summary of recommendations for TRM updates; and
- Appendix A provides the site-level custom reports for the C&I Solutions Program;
- Appendix B summarizes deferred replacement cost calculations; and
- Appendix C provides sample TRM calculations.

2 General Methodology

This section details general impact evaluation methodologies by program-type as well as data collection methods applied. This section will present full descriptions of:

- Gross savings estimation;
- Sampling methodologies;
- Free-ridership determination;
- Process evaluation methodologies; and
- Data collection procedures.

2.1 Glossary of Terminology

A first step to detailing the evaluation methodologies, the Evaluators provide a glossary of terms to follow[12]:

- *Ex Ante* – Savings estimates provided by program administrators prior to review from a third-party- evaluator (from the Latin for "beforehand")
- *Ex Post* – Savings estimates reported by an evaluator after the energy impact evaluation has been completed (From the Latin for "something done afterward")
- *Deemed Savings* – An estimate of an energy savings or demand savings outcome (gross savings) for a single unit of an installed energy efficiency measure. This estimate (a) has been developed from data sources and analytical methods that are widely accepted for the measure and purpose and (b) are applicable to the situation being evaluated. (e.g., assuming 17.36 Therms savings for a low-flow showerhead)
- *Gross Savings* – The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated
- *Gross Realization Rate* – Ratio of Ex Post Savings / Ex Ante Savings (e.g. If ADM verifies 15 therms per showerhead, Gross Realization Rate = 15/17.36 = 86%)
- *Free-Rider* – A program participant who *would have* implemented the program measure or practice in the absence of the program. Free riders can be total, partial, or deferred.

[12] Arkansas TRM V8.2, Volume 1, Pg. 86-92

- *Spillover* – Reductions in energy consumption and/or demand caused by the presence of the energy efficiency program that exceed the program-related gross savings of the participants. There can be participant and/or non-participant spillover rates depending on the rate at which participants (and non-participants) adopt energy efficiency measures or take other types of efficiency actions on their own (i.e., without an incentive being offered).
- *Net Savings* – The total change in load that is attributable to an energy efficiency program. This change in load may include, implicitly or explicitly, the effects of free drivers, free riders, energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand. (e.g., if free-ridership for low-flow showerheads = 50%, net savings = 15 therms x 50% = 7.5 therms)
- *Net-to-Gross-Ratio (NTGR)* = (1 – Free-Ridership % + Spillover %), also defined as Net Savings / Gross Savings
- *Ex Ante Net Savings* = Ex Ante Gross Savings x Ex Ante Free-Ridership Rate
- *Ex Post Net Savings* = Ex Post Gross Savings x Ex Post Free-Ridership Rate
- *Net Realization Rate* = Ex Post Net Savings / Ex Ante Net Savings
- *Effective Useful Life (EUL)* – An estimate of the median number of years that the efficiency measures installed under a program are still in place and operable.
- *Gross Lifetime Therms* = Ex Post Gross Savings x EUL

2.2 Overview of Methodology

The proposed methodology for the evaluation of the PY2021 CenterPoint EE Portfolio is intended to provide:

- Net impact results at the 90% confidence and +/-10% precision level; and
- Program feedback and recommendations via process evaluation.

In doing so, this evaluation will provide the verified net savings results, provide the recommendations for program improvement, and ensure cost-effective use of ratepayer funds. By leveraging experience and lessons learned from prior evaluations, the PY2021 evaluation is streamlined to focus on areas in needed of research and improvement.

2.2.1 Sampling

Sampling is necessary to evaluate savings for the CenterPoint EE portfolio insomuch as verification of a census of program participants is typically cost-prohibitive. As per evaluation requirements set forth by the Independent Evaluation Monitor (IEM), samples are drawn in order to ensure 90% confidence at the +/- 10% precision level. Programs are evaluated on one of three bases:

- Census of all participants
- Simple random sample
- Stratified random sample

2.2.1.1 Census of Participants

- A census of participant data was used to select programs where such review is feasible. For example, the Home Energy Reports program's savings estimates are based on a regression model that incorporates billing data for a census of program recipients. Programs that received analysis of a census of participants include:
- Home Energy Reports;
- Commercial & Industrial Solutions – Custom Component

2.2.1.2 Simple Random Sampling

For programs with relatively homogenous measures (largely in the residential portfolio), the Evaluators conducted a simple random sample of participants. The sample size for verification surveys is calculated to meet 90% confidence and 10% precision (90/10). The sample size to meet 90/10 requirements is calculated based on the coefficient of variation of savings for program participants. Coefficient of Variation (CV) is defined as:

$$CV(x) = \frac{Standard\ Deviation\ (x)}{Mean(x)}$$

Where x is the average Therms savings per participant. Without data to use as a basis for a higher value, it is typical to apply a CV of .5 in residential program evaluations. The resulting sample size is estimated at:

$$n_0 = \left(\frac{1.645 * CV}{RP}\right)^2$$

Where,

1.645 = Z Score for 90% confidence interval in a normal distribution
CV = Coefficient of Variation
RP = Required Precision, 10% in this evaluation

With 10% required precision (RP), this calls for a sample of 68 for programs with a sufficiently large population. However, in some instances, programs did not have enough participation to make a sample of this size cost-effective. In instances of low participation, ADM then applied a finite population correction factor, defined as:

$$n = \frac{n_0}{1 + {n_0}/{N}}$$

Where

n_0 = Sample Required for Large Population
N = Size of Population

n = Corrected Sample

For example, if a program were to have only 100 participants, the finite population correction would result in a final required sample size of 41. The Evaluators applied finite population correction factors in instances of low participation in determining samples required for surveying or onsite verification. Programs subject to Simple Random Sampling include:

- Residential Commercial Equipment Rebates;
- Commercial Equipment Rebates;
- Low Flow Showerhead & Faucet Aerator Program; and
- Saving Homes Program.

2.2.1.3 Stratified Random Sampling

For the CenterPoint Commercial & Industrial programs, simple random sampling is not an effective sampling methodology as the CV values observed in business programs are typically very high because the distributions of savings are generally positively skewed. Often, a relatively small number of projects account for a high percentage of the estimated savings for the program.

To address this situation, we use a sample design for selecting projects for the M&V sample that takes such skewness into account. With this approach, we select a number of sites with large savings for the sample with certainty and take a random sample of the remaining sites. To further improve the precision, non-certainty sites are selected for the sample through systematic random sampling. That is, a random sample of sites remaining after the certainty sites have been selected is selected by ordering them according to the magnitude of their savings and using systematic random sampling. Sampling systematically from a list that is ordered according to the magnitude of savings ensures that any sample selected will have some units with high savings, some with moderate savings, and some with low savings. Samples cannot result that have concentrations of sites with atypically high savings or atypically low savings.

2.2.2 Free-Ridership

In determining ex post net savings for the CenterPoint EE portfolio, the Evaluators provide estimates of free ridership for individual programs. Free riders are program participants that would have implemented the same energy efficiency measures at nearly the same time absent the program. As per TRM guidelines, free riders are defined as:

"…program participants who received an incentive but would have installed the same efficiency measure on their own had the program not been offered. This includes partial free riders, defined as customers who, at some point, would have installed the measure anyway, but the program persuaded them to install it *sooner* or customers who would have installed the measure anyway but the program persuaded them to install more efficient equipment and/or more equipment. For the purposes of EM&V activities, participants who would have installed the equipment within one year will be considered full free riders; whereas participants who would have installed the equipment later than one year will not be considered to be free riders (thus no partial free riders will be allowed)."[13]

Given this definition, participants are defined as free riders through a binary scoring mechanism, in being either 0% or 100% free riders.

2.2.2.1 Residential Free-Ridership

The Evaluators determine free-ridership by measure type and installation type for CenterPoint programs. Free-ridership study groups are delineated by technology, delivery mechanism and target market. The taxonomy of residential free-ridership designations is summarized in Figure 2-1. Blocks marked in light blue indicate a final free-ridership category.

[13] Arkansas TRM V8.2, Pg. 49.

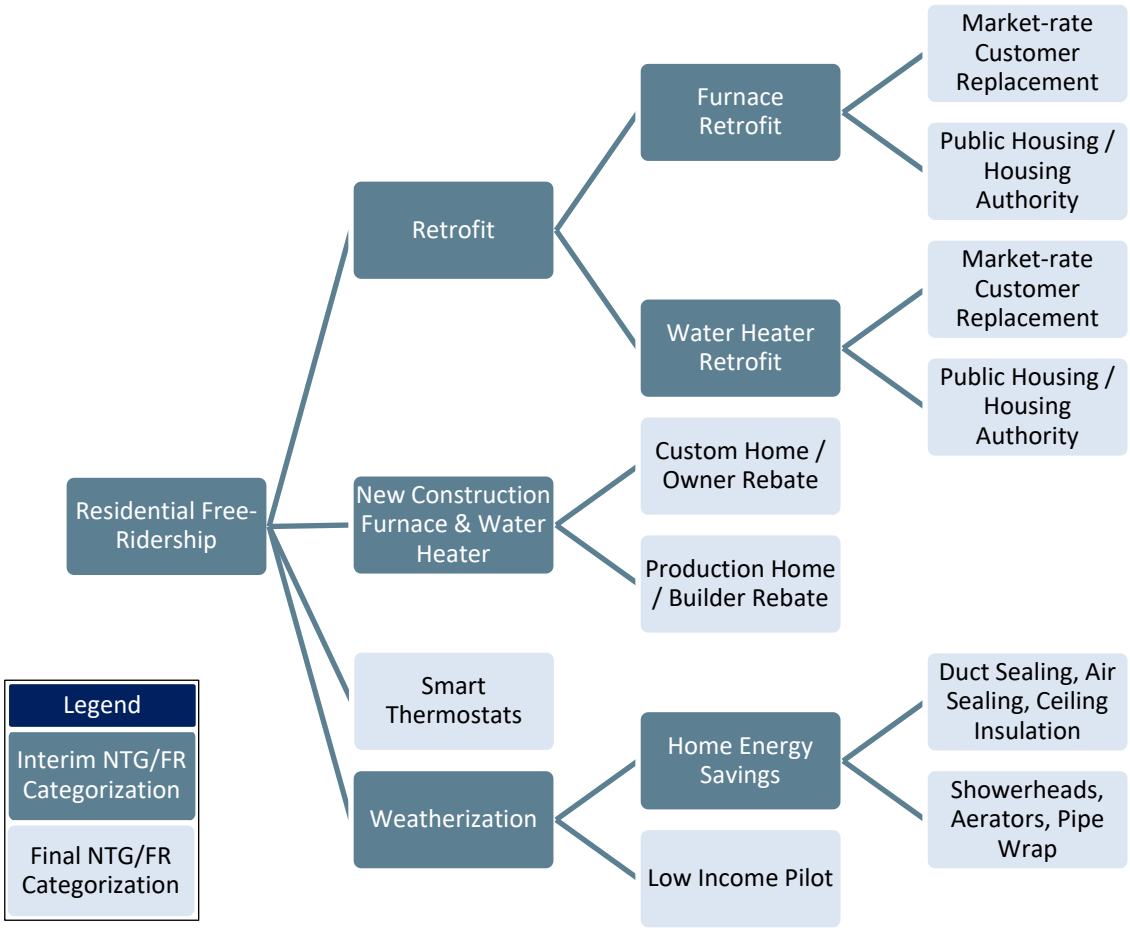


Figure 2-1: Residential Free-ridership Designations

Certain measures were selected to have NTG evaluated by different market segments, as these segments can demonstrate markedly different decision-making processes and cost sensitivities. For example, installation of a high efficiency furnace or tankless water heater is a simpler process in new construction than in retrofit, and the decision is often made by a homeowner. In instances such as this, the Evaluators segmented participation into key subgroups to better-differentiate the impact of CenterPoint program interventions on various customer segments' decision-making.

The general methodology for evaluating free ridership among residential participants involved examination of four factors:

(1) Demonstrated financial ability to purchase high-efficiency equipment absent the rebate

(2) Importance of the rebate in the decision-making process

(3) Prior planning to purchase high-efficiency equipment

(4) Demonstrated behavior in purchasing similar equipment absent a rebate

In this methodology, Part (1) is essentially a gateway value, in that if a participant does not have the financial ability to purchase energy efficient equipment absent a rebate, the other components of free ridership become moot. As such, if they could not have afforded the high-efficiency equipment absent the rebate, free ridership is scored at 0%. If they did have the financial capability, the Evaluators then examine the other three components. The respondent is determined to be a free rider based upon a preponderance of evidence of these three factors; that is, if the respondent's answers indicate free ridership in two or more of these three components, they are considered free riders. Specific questions and modifications to this general methodology are presented in the appropriate program chapters.

For residential programs, free ridership is calculated as the average score determined for the sample of participants surveyed. For programs that are contractor-driven, the free rider score of a survey respondent incorporates the relative importance of advice from their contractor, provided that the contractor is a program trade ally that received training from the appropriate program. This value is then applied to the program-level savings to discount savings attributable to free ridership

2.2.2.2 Prescriptive Non-Residential Free-Ridership

The general methodology for evaluating free ridership among prescriptive program participants involved examination of four factors:

- Demonstrated financial ability to purchase high-efficiency equipment absent the rebate
- Importance of the rebate in the decision-making process
- Prior planning to purchase high-efficiency equipment
- Importance of the contractor in influencing the decision-making process

In this methodology, Part (1) is essentially a gateway value, in that if a participant does not have the financial ability to purchase energy efficient equipment absent a rebate, the other components of free ridership become moot. As such, if they could not have afforded the high-efficiency equipment absent the rebate, free ridership is scored at 0%. If they did have the financial capability, the Evaluators then examine the other three components. The respondent is determined to be a free rider based upon a preponderance of evidence of these three factors; that is, if the respondent's answers indicate free ridership in two or more of these three components, they are considered free riders. Specific questions and modifications to this general methodology are presented in the appropriate program chapters.

For residential programs, free ridership is calculated as the average score determined for the sample of participants surveyed. This value is then applied to the program-level savings to discount savings attributable to free ridership.

2.2.2.3 Custom Free-Ridership

For custom projects from the C&I Solutions program, free ridership is assessed on a case-study basis, through which the Evaluators conduct an in-depth interview that includes a battery of questions addressing:

- The timing of learning of the program relative to the timing of the planning of the retrofit;
- The impact the program incentive has on measure payback relative to the stated payback requirements by the respondent;
- Whether the respondent learned of the energy efficiency measure from a program-funded audit; and
- Whether any influence the program had in modifying the project affected savings by greater than 50%.

In the C&I Solutions chapter, the free rider "case studies" are provided for every custom project.

2.2.3 Impact Evaluation Activities by Program

The Evaluators used established, industry-standard approaches to estimate energy savings and demand reductions at the measure, program, and portfolio levels. We followed all applicable measure- and program-level guidelines and protocols from the AR TRM 8.0.

To evaluate program impacts, ADM adjusted program-reported gross savings using the results of our research, relying primarily on engineering desk reviews, TRM deemed savings calculation, and onsite verification and metering for applicable programs. To calculate deemed savings, we verified the appropriateness of savings algorithms and values in program tracking data as compared to guidelines in the TRM V8.2. Where sampling was used (for surveys and site visits), we designed a sampling plan to achieve a minimum precision of ±10% of the gross realized savings estimate with 90% confidence at the program-level.

Impact evaluation activities by program are summarized in Table 2-1.

Table 2-1: PY2021 Impact Evaluation Activities by Program

Program	Database / Document Review	Engineering Desk Review	Deemed Savings Review	On-site Verification / Metering	Simulation Modeling	Billing Analysis
Res. Equipment Rebates	✓		✓			
Comm. Equipment Rebates	✓	✓	✓			
Commercial Boiler	✓		✓			
C&I Solutions	✓	✓	✓	✓	✓	✓
Comm. Food Service	✓		✓			
Home Energy Reports	✓					✓
Low Flow Program	✓		✓			
Saving Homes Program	✓		✓	✓		

2.2.3.1 Net-to-Gross Approach by Program

For the PY2021 evaluation, the evaluation team conducted data collection and analysis to support Net-to-Gross (NTG) calculations. Table 2-1 shows the NTG approach the Evaluators followed for each program based on our assessment of specific program needs and the availability of accurate, existing information. These data collection and analysis activities comply with one of the five accepted approaches listed in the TRM 8.2, Protocol F.

Table 2-2: PY2021 NTG Approaches by Program

Program	Assigned PY2021 Value	Literature Review	CenterPoint-specific Survey	Multi-utility Survey	Control Group Billing Analysis
Residential furnace retrofit	✓				
Residential DHW retrofit	✓				
Residential smart thermostats	✓				
Housing authority furnace & DHW	✓				
New construction – builders	✓				
New construction – custom	✓				
Multifamily	✓				
Commercial Equipment Rebates	✓				
Commercial Boiler	✓				
C&I Solutions					
Direct install	✓				
Custom			✓		
Commercial Food Service	✓				
Home Energy Reports					✓
Low Flow Showerhead / Aerator	✓				
Saving Homes Program			✓		

2.3 Process Evaluation

2.3.1 General Approach

The Evaluators' general approach to process evaluation begins with a review of the tests for timing and appropriateness of process evaluation as defined in Protocol C of the TRM V8.2. In this review, the Evaluators determine what aspects of the program warrant a process evaluation (due to issues identified in the PY2020 evaluations). CenterPoint was in the process of going through an acquisition in PY2021 that took effect for PY2022; conducting full process evaluations would have been inappropriate in light of that as programs will undergo larger changes subsequent to the integration with Summit Utilities. As a result, most of the PY2021 process evaluation activity was focused around identifying CenterPoint and implementer response to PY2020 recommendations.

The PY2021 process overviews began with interviews of program staff. These interviews, along with guidance from IEM protocols, inform the establishment of goals for the process evaluation, provide background history of programs, and introduce portfolio-level issues. From this, the Evaluators then develop a list of data collection activities. The data collection procedures for process evaluations typically included:

- *Participant Surveying*. The Evaluators surveyed statistically significant samples of participants in each program in order to provide feedback for the program and provide an assessment of participant satisfaction.
- *In-Depth Interviews*. The Evaluators conducted in-depth interviews with high-level program actors, including CenterPoint program staff, third-party implementation staff, and program Trade Allies. These interviews are semi-structured, in having general topics to be covered, with a general question and answer outline.

3 Portfolio-Level Findings

This chapter provides a summary of the portfolio-level findings and any cross-cutting evaluation activities that occurred over the course of the PY2021 EM&V Effort. Specifically, this chapter includes:

- A summary of program and portfolio performance in PY2021;
- A summary of EM&V activities and expenditures in PY2021; and
- High-level findings that cut across programs.

3.1 Summary of EM&V Effort

Table 3-1 summarizes the data collection efforts for the PY2021 EM&V effort. "Interviews" should be distinguished from "Surveys" in that "Interviews" reflect semi-structured, in-depth discussions with high-level program actors (such as utility staff and third-party implementation staff) whereas surveys are fully-structured and typically conducted with program participants.

Table 3-1: Summary of Data Collection Efforts

Program	# Site Visits	# Surveys	# Interviews
Residential Equipment Rebates	0	83	2
Commercial Equipment Rebates	0	39	2
C&I Boiler	0	0	2
C&I Solutions	13	13	3
Commercial Food Service	0	7	2
Home Energy Reports	0	0	1
Low Flow Showerhead & Faucet Aerator Program	0	0	1
Saving Homes Program	37	83	1
Low Income Saving Homes Program	0	0	1
Total	50	225	15

3.2 Tests of Portfolio Comprehensiveness

The Arkansas Public Service Commission has in place a set of criteria in order to determine whether an EE portfolio qualifies as "Comprehensive". These criteria are:

- **Factor 1:** Whether the programs and/or portfolio provide, either directly or through identification and coordination, the education, **training**, marketing, or outreach needed to address market barriers to the adoption of cost-effective energy efficiency measures;

- **Factor 2:** Whether the programs and/or portfolio, have adequate **budgetary**, management, and program delivery resources to plan, design, implement, oversee and evaluate energy efficiency programs;
- **Factor 3:** Whether the programs and/or portfolio, reasonably address all major **end-uses** of electricity or natural gas, or electricity and natural gas, as appropriate;
- **Factor 4:** Whether the programs and/or portfolio, to the maximum extent reasonable, comprehensively address the needs of customers at one time, in order to avoid **cream-skimming** and lost opportunities
- **Factor 5:** Whether such programs take advantage of opportunities to address the comprehensive needs of **targeted customer sectors** (for example, schools, large retail stores, agricultural users, or restaurants) or to leverage non-utility program resources (for example, state or federal tax incentive, rebate, or lending programs)
- **Factor 6:** Whether the programs and/or portfolio enables the delivery of all achievable, **cost-effective** energy efficiency within a reasonable period of time and maximizes net benefits to customers and to the utility system;
- **Factor 7:** Whether the programs and/or portfolio, have evaluation, measurement, and verification ("EM&V") procedures **adequate** to support program management and improvement, calculation of energy, demand and revenue impacts, and resource planning decisions.

The Evaluators reviewed the CenterPoint programs and portfolio in order to assess whether it complied with the APSC Comprehensiveness Goals. In assessing these metrics, the Evaluators score them on numerous subcomponents. The scoring methodology is as follows:

●: Meets all requirements and is in full compliance with this performance indicator

◒: Meets some requirements and is in partial compliance with this performance indicator

○: Is not in compliance with this performance indicator.

NA: Performance indicator is not applicable to this program.

3.2.1 Factor 1: Education, Training, Marketing, and Outreach

3.2.1.1 Assessment of Education

The Evaluators assessed the educational components of the CenterPoint programs, in order to identify whether the programs were providing potential participants with the needed information to guide their decision-making, and whether the channels used to reach the target markets are appropriate. The Evaluators found that:

- CenterPoint's programs used a range of channels to provide educational materials to their programs' target markets. The educational materials included brochures, case studies, and presentations to trade & industry groups.

- CenterPoint program staff conducts outreach and education through a wide range of potential program partners, including contractors, retailers, home builders, and local governments.

The breadth of educational materials by program is summarized in Table 3-2.

Table 3-2: Assessment of Customer Education by Program

Program	Provides Educational Materials	Outreach Through Multiple Channels	Education Targeted to Specific Market Barriers	Coordination of Education by Multiple Entities
Gas Equipment Rebates	●	●	●	●
Commercial Boiler	●	●	●	●
Commercial Food Service	●	●	●	●
C&I Solutions	●	●	●	●
Home Energy Reports	●	NA	●	NA
Low Flow Program	●	●	●	NA
Saving Homes Program	●	●	●	●
Low Income Saving Homes Program	●	NA	●	NA

● Educational materials broadly provided
◒ Program budgeting includes educational materials, but materials not broadly provided
○ Educational materials not offered

3.2.1.2 Assessment of Training

The Evaluators reviewed each CenterPoint program to assess whether:

1) Whether the program is trade ally-driven;
2) If not, is it a program that could or should be trade ally-driven;
3) The program provides training classes to support their program offerings; and
4) Whether the programs need trade ally certification.

Table 3-3: Assessment of Trade Ally Training by Program

Program	Trade Ally Training Offered	Training Requirements Adhere to Best Practices	Trade Allies Participate in Training
Gas Equipment Rebates	●	●	●
Commercial Boiler	●	●	●
Commercial Food Service	●	NA	●
C&I Solutions	●	●	●
Home Energy Reports	NA	NA	NA
Low Flow Program	NA	NA	NA
Saving Homes Program	●	●	●
Low Income Saving Homes Program	●	◒	●

● Category fulfilled in most instances (deviations are an exception)
◒ Category fulfilled in some instances (deviations occur regularly)
○ Category not offered not offered/not fulfilled at all

The Commercial Food Service Program has several categories marked as "NA" in that it is driven by equipment vendors, but that their training only constitutes being informed on identifying qualifying equipment and instruction on the application process. Technical training was not provided (and was not needed).

CenterPoint does not require trade ally registration to participate, except for in the Saving Homes and Low Income Savings Homes Programs. Their approach has been to allow all licensed dealers or contractors to apply for the appropriate equipment rebates. The Evaluators have concluded that this has not to-date affected the quality assurance of the programs.

The Evaluators assigned a half Harvey Ball for the Low Income Saving Homes Program due to the lack of health and safety measure installations.

3.2.1.3 Marketing & Outreach

The Evaluators reviewed the marketing and outreach strategies associated with each of the CenterPoint programs. These strategies were reviewed to assess whether they adequately addressed the relevant participant barriers, the extent to which trade allies were actively marketing the program (where appropriate), and whether the materials were correctly targeted in marketing a comprehensive approach to energy efficiency.

A summary of the Evaluators' assessment of CenterPoint's marketing and outreach is presented in Table 3-4.

Table 3-4: Assessment of Marketing & Outreach by Program

Program	Marketing Addresses Specific Barriers	Trade Allies Promote Program	Marketing Support Provided to Trade Allies	Marketing Performed Through Diverse Channels
Gas Equipment Rebates	●	●	●	●
Commercial Boiler	●	●	●	●
Commercial Food Service	●	●	●	●
C&I Solutions	●	●	●	●
Home Energy Reports	●	NA	NA	NA
Low Flow Program	●	NA	NA	●
Saving Homes Program	●	●	●	●
Low Income Saving Homes Program	N/A	●	●	N/A

●Category fulfilled in most instances (deviations are an exception)

◒ Category fulfilled in some instances (deviations occur regularly)

○ Category not offered not offered/not fulfilled at all

After reviewing the marketing and outreach materials, the Evaluators concluded that:

- Most programs have marketing materials that address specific barriers associated with the targeted segments or technologies.
- CenterPoint has initiated sector-specific marketing, including fact sheets for restaurants and food processing plants.
- The CenterPoint programs are marketed through a diverse range of channels, including mass-media advertising, online advertising, meetings and training sessions with professional organizations and trade groups, and partnered marketing with municipal governments.
- The Low Income Saving Homes Program is not broadly marketed during pilot phase and as a result the Evaluators have assigned “N/A” to some categories.

3.2.2 Factor 2: Budgetary, Management, and Program Delivery Resources

Several performance indicators were assessed in reviewing the adequacy of budgetary, management, and program delivery resources. This included:

- Self-reports from program management staff
- Cost per Therm saved
- Review of trade ally resources dedicated to program promotion.

Table 3-5: Assessment of Budgetary, Management, and Program Delivery Resources by Program

Program	Budget is Sufficient to Support Program Goals	Cost per-Therm Aligns with Program Plan	Program Has Sufficient Staffing	Program Has Sufficient Trade Ally Support
Gas Equipment Rebates	●	○	●	●
Commercial Boiler	●	●	●	●
Commercial Food Service	●	◒	●	●
C&I Solutions	●	●	●	●
Home Energy Reports	●	●	●	N/A
Low Flow Program	●	○	●	N/A
Saving Homes Program	●	●	●	●
Low Income Saving Homes Program	◒	●	●	◒

● Quantitative: meets of expectation/requirement

Qualitative: Category fulfilled in most instances (deviations are an exception)

◒ Quantitative: value no lower than 80% of expectation/requirement

Qualitative: Category fulfilled in some instances (deviations occur regularly)

○ Quantitative: value is lower than 80% of expectation/requirement

Qualitative: Category not offered not offered/not fulfilled at all

From this review, the Evaluators concluded that the CenterPoint portfolio overall has the adequate budget and staff allocations. Programs were credited with full compliance if acquisition costs exceeded plan values by no more than 10%. Programs were credited with

partial compliance if acquisition costs exceeded program plan values by no more than 20%.

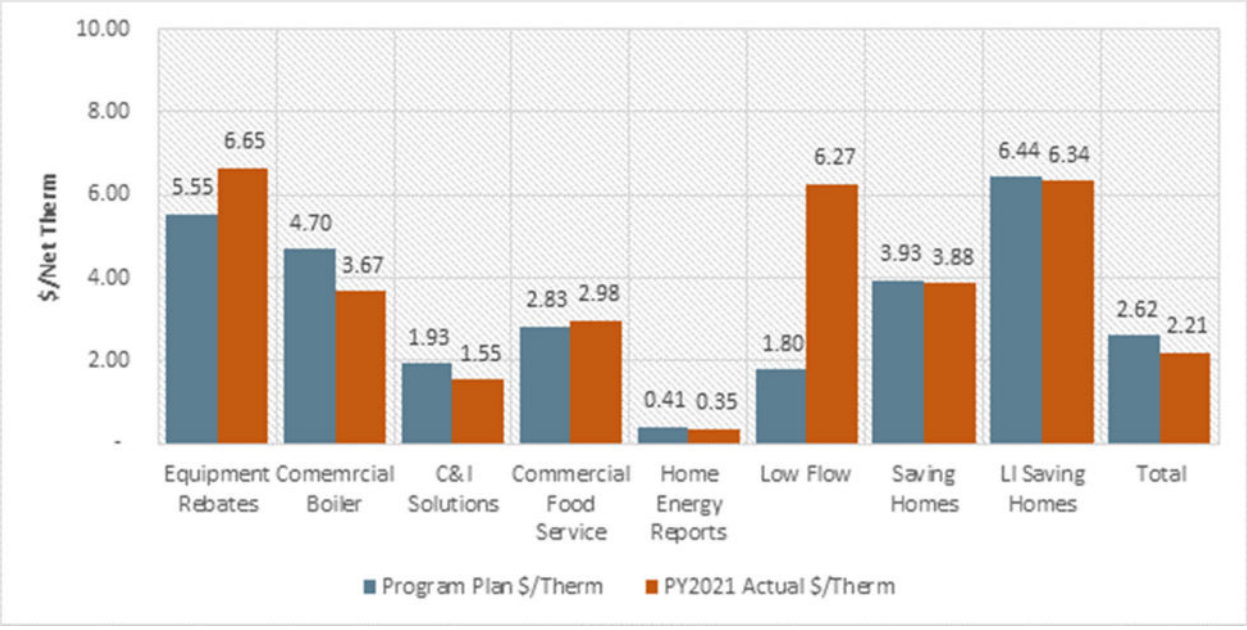


Figure 3-1 summarizes the planned and actual first-year savings acquisition costs.

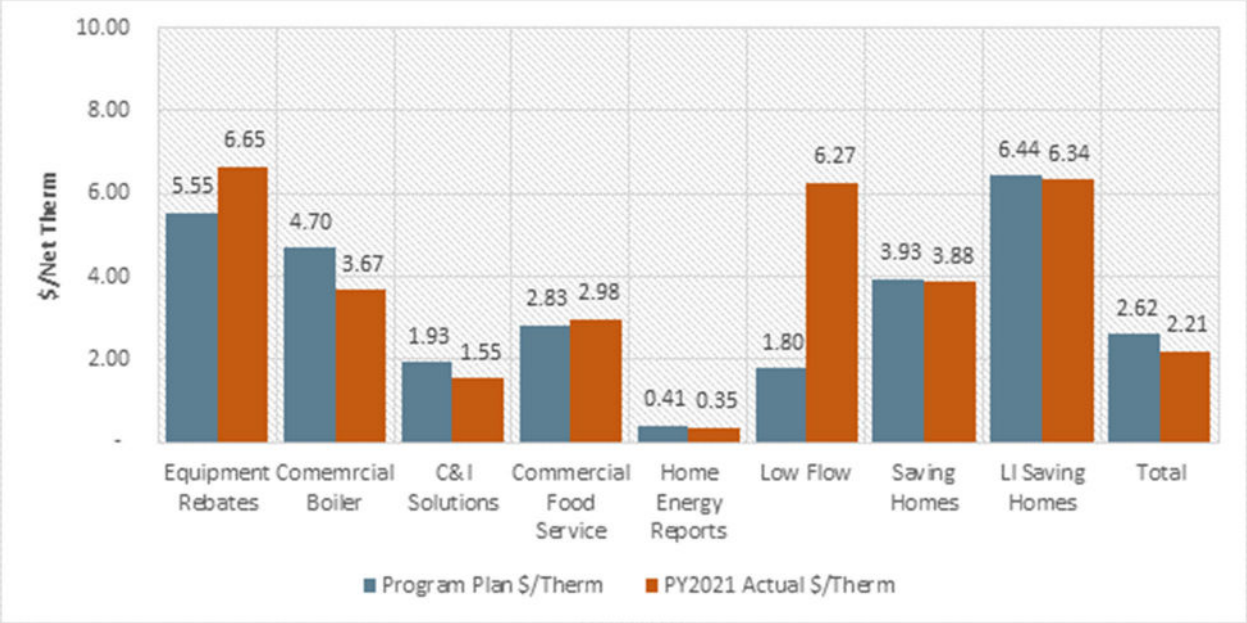


Figure 3-1 Planned vs. Actual Acquisition Costs

- The portfolio overall had acquisition costs that were 15.6% lower than the program plan. This is due largely to the effects of the Home Energy Reports program, which had acquisition costs 14.6% lower than program plan values, while accounting for 25.4% of portfolio-level savings. In addition, the Commercial Boiler costs were 21.8% lower than

planned, and the C&I Solutions Program acquisition costs were 19.7% lower than planned.

- Two programs had costs that were at least 10% higher than planned: Gas Equipment Rebates and the Low Flow Showerhead & Aerator Program.
- C&I Solutions has historically been among the lowest-cost programs offered by CenterPoint and continues to be so. It had lower first-year acquisition cost than all programs other than Home Energy Reports.

3.2.3 Factor 3: Addressing Major End-Uses

The Evaluators identified the end-uses served by each of the CenterPoint programs. Most CenterPoint programs are designed around a specific technology or end-use. Table 3-6 summarizes the end-uses addressed by each program.

Table 3-6: End-Uses Addressed by Program

Program	HVAC	Hot Water	Food Service	Building Envelope	Industrial Process	Behavioral
Gas Equipment Rebates	●	●	○	○	○	○
Commercial Boiler	●	◒	○	○	○	○
Commercial Food Service	○	○	●	○	○	○
C&I Solutions	●	●	◒	◒	●	▪
Home Energy Reports	○	○	○	○	○	●
Low Flow Program	○	●	○	○	○	○
Saving Homes Program	●	◒	○	●	○	○
LI Saving Homes Program	●	◒	○	●	○	○

● Measure targeted ◒ Measure offered ○ Measure not offered

3.2.4 Factor 4: Comprehensively Addressing Customer Needs

To assess Factor 4, the Evaluators reviewed CenterPoint programs to discern the extent of:

- Program-provided technical assistance;
- Incentives of comprehensive projects/measure suites; and
- Tiered incentives for higher efficiency levels.

The CenterPoint portfolio has no specific requirements for installation of multiple measures. Customers can participate to an extent of their choice. This is a program best-practice in enabling customers to engage in energy efficiency in a manner in accordance with their budget constraints.

Table 3-7 summarizes the comprehensiveness of offerings for each program.

Table 3-7: Assessment of Project Comprehensiveness by Program

Program	Technical Assistance and/or Audits	Information Provided Comprehensive for Efficiency	Bundled Incentives for Multiple Measures	Tiered Incentives for Premium Efficiency	Trade Ally Incentives for Premium Efficiency
Gas Equipment Rebates	◒	◒	●	●	●
Commercial Boiler	◒	◒	●	●	●
Commercial Food Service	◒	◒	●	●	●
C&I Solutions	●	●	●	●	●
Home Energy Reports	○	◒	NA	NA	NA
Low Flow Program	○	○	NA	NA	NA
Saving Home Program	●	◒	NA	NA	NA
Low Income Saving Homes	●	◒	NA	NA	NA

● Broadly provided ◒ Available ○ Not offered

Findings from the assessment of this factor included:

- Most CenterPoint prescriptive programs offer incentives to trade allies for installation of top-tier efficiency measures. This has included incentives for condensing furnaces, tankless water heaters, and high-efficiency food service equipment, and boilers.

- The CenterPoint portfolio offers tiered incentives for premium efficiency across all of their rebate programs. This includes:
  - The incentives for efficient furnaces increase from $400 to $600 for units with 95% AFUE or greater.
  - Incentives for efficient water heaters range from $75 for storage tank water heaters to $500 for tankless water heaters, and large commercial water heaters have an incentive that scales with system size ($200 per 100,000 input BTU).
  - High-efficiency boiler incentives are $1,800/MMBtuh for units < 92% efficient and $3,500/MMBtuh for units with 92% efficiency or greater.
  - The Commercial Food Service now offers tiered incentives for different system capacities and efficiencies for key measures (ovens, fryers).
  - The C&I Solutions program pays an incentive per verified Therm, and as a result projects with higher savings are by design paid a higher incentive.
- The CenterPoint portfolio has programs that bundle on-site technical assistance with direct installation.
- The range of technical assistance varies by program. Equipment Rebates and Commercial Boiler Programs offer technical assistance through program trade allies. The level of on-site technical assistance is lower for the Commercial Food Service Program in that the market is driven by in-store contact with vendors rather than by on-site assessment. C&I Solutions, Saving Homes, and Low Income Saving Homes provide on-site technical assistance that is directly funded by the program. SHP and LISHP received half a Harvey Ball due to declining comprehensiveness in PY2021 (as measure by total energy-saving measures installed per home).
- The programs have procedures for following up with customers after their participation, which includes thank-you calls or emails and verification inspection.
- Marketing materials typically make attempts at cross-promotion of programs.

3.2.5 Factor 5: Targeting Market Sectors & Leveraging Opportunities

The Evaluators reviewed whether the CenterPoint portfolio offered a comprehensive range of energy efficiency opportunities to all major customer sectors. Table 3-8 summarizes the market sectors and what programs target or allow each sector.

Table 3-8: Assessment of Targeted Customer Sectors by Program

Program	Residential	Multifamily	Mobile Home	Small Commercial	Large Commercial	Industrial	Agricultural	Public Sector
Gas Equipment Rebates	●	●	◒	●	◒	◒	◒	●
Commercial Boiler	○	◒	○	◒	●	◒	◒	●
Commercial Food Service	○	◒	○	●	●	◒	◒	●
C&I Solutions	○	◒	○	●	●	●	●	●
Home Energy Reports	●	◒	◒	○	○	○	○	○
Low Flow Program	●	◒	◒	○	○	○	○	○
Saving Homes Program	●	◒	◒	○	○	○	○	◒
Low Income Saving Homes Program	●	◒	◒	○	○	○	○	◒

● Program targets this sector

◒ Sector is eligible for this program

○ Sector is ineligible for this program

Each sector has several programs for which they are eligible, and at least one program that targets them. Segments with fewer targeted outreach avenues include:

- Mobile/manufactured housing is often not targeted as there is a much higher prevalence of electric space and water heating.
- Agriculture and Industrial sectors are not specifically targeted by the Commercial Equipment Rebates Program as the equipment used by these facilities generally requires custom calculations.
- Public Sector facilities are targeted with a wide range of programs. This has included residential programs that reach out to public housing authorities.

In addition, the Evaluators reviewed the extent of collaboration and leveraging of available partnership opportunities by CenterPoint.

Examples of cross-utility coordination included:

- The Evaluators provide EM&V to CenterPoint, Black Hills Energy, and Arkansas Oklahoma Gas. This allows for sharing of fixed EM&V costs (such as development of data collection instruments) and more seamless comparison of program offerings and lessons learned across the natural gas energy efficiency portfolio. This has reduced the overall cost of EM&V across all three natural gas utilities.
- CenterPoint has brought on a third-party implementer (CLEAResult) for their C&I Solutions, Saving Homes, and Low Income Saving Homes Programs. This implementer

uses the same program design and similar incentive levels for Black Hills Energy and AOG. This has allowed for reduced program costs for C&I Solutions, which is the largest program in each of the three gas utility portfolios.

- CenterPoint engages in several joint-marketing efforts with the other gas utilities as well as with Entergy Arkansas, Inc. (EAI) and Southwestern Electric Power Company (SWEPCO). This has included joint-implementation of education and promotional opportunities when interests with the other gas or electric utilities align.

Examples of coordination with non-utility partners included:

- CenterPoint's programs are marketed through industry partners including professional organizations, trade groups, universities, and homeowners' associations.
- CenterPoint works with a local technical college to help provide training opportunities to trade allies and students interested in careers related to energy efficiency.

3.2.6 Factor 6: Cost-Effectiveness of Energy Efficiency

To assess this factor, the Evaluators reviewed whether:

- Programs met net savings goals;
- Whether the NTG ratios were in line with industry norms; and
- Whether programs passed cost-effectiveness (TRC) testing.

Table 3-9: Assessment of Cost-Effectiveness

Program	NTGR	NTGR Within Industry Norms	Met Net Savings Goal	Program TRC
Residential Equipment Rebates	86.6%	Yes	○	1.00
Commercial Equipment Rebates	77.6%	Yes		
Commercial Boiler	80.3%	Yes	●	2.11
C&I Solutions	100.0%	Yes	●	2.27
Commercial Food Service	77.2%	Yes	◒	1.37
Home Energy Reports	100.0%	Yes	●	1.25
Low Flow Showerhead & Aerator	50.5%	Yes	○	4.20
Saving Homes Program	99.0%	Yes	●	6.36
Low Income Saving Homes Program	100.0%	Yes	●	2.97

Programs were assessed as meeting net savings goal if they had at least 90% of goal. Programs were assessed as "partial" if they met at least 80% of their savings goal. All programs passed TRC.

3.2.7 Factor 7: Adequacy of EM&V Procedures

The Evaluators conducted a review of EM&V procedures by program as implemented by several parties:

- Quality Assurance and Quality Control (QA/Q)C and EM&V procedures by CenterPoint program staff;
- QA/QC and EM&V procedures by third-party implementation staff (where applicable)
- QA/QC and EM&V procedures by the Evaluators.

The EM&V of the CenterPoint programs incorporated industry best practices and was conducted in an iterative process that incorporated feedback from CenterPoint and implementation contractors as well as the Independent Evaluation Monitor (IEM). The Evaluators developed EM&V plans that corresponded to protocols set out in the Arkansas TRM V8.2.

Finally, the Evaluators reviewed the quality of program tracking data in order to assess whether the data allowed for complete evaluation. Further, the Evaluators reviewed the extent to which individual savings calculations were performed using facility-specific inputs into the TRM V8.2 algorithms versus the use of simplifying assumptions[14]. The results of the review are summarized in Table 3-10.

Table 3-10 Assessment of Data & QA/QC Procedures by Program

Program	Tracking Contains Necessary Fields	Savings Calculations Performed and Reported	Savings Calculations Based on Facility Data	QA/QC Inspections by Program Staff
Residential Equipment Rebates	●	●	◒	●
Commercial Equipment Rebates	◒	●	◒	●
Commercial Boiler	●	●	●	●
Commercial Food Service	●	●	◒	●
C&I Solutions	●	●	●	●

[14] Examples of this could include assuming average facility square footage for commercial water heating and using that as an input to the savings calculation, as opposed to collecting facility-specific square footage.

Home Energy Reports	●	◒	●	NA
Low Flow Program	●	●	◒	NA
Saving Homes Program	●	●	●	●
Low Income Saving Homes	●	●	●	●

● Data and QA/QC procedures conform to all AR TRM V8.2 guidelines

◒ Data and QA/QC procedures conform to most AR TRM V8.2 guidelines

○ Data and QA/QC procedures fail to conform to most AR TRM V8.2 guidelines

Findings of this review included:

- The Commercial Equipment Rebates Program lacked contact names for most commercial projects. This added a significant amount of difficulty to the EM&V process.
- Water heating projects in Commercial Equipment Rebates had significantly improved data compared to prior program years.
- Home Energy Reports has savings calculations performed at the end of the program year. This is not tracked mid-year, though that might not be necessary given the program's existing verified performance.
- C&I Solutions tracking data contained all needed fields for evaluation and recreation of energy savings calculations.
- The Saving Homes and Low Income Saving Homes Program tracking data contained all needed fields for evaluation and recreation of energy savings calculations.
- QA/QC inspections are in place for all programs other than Home Energy Reports (where it is not needed) and the Low Flow Showerhead & Faucet Aerator Program. For the Low Flow Showerhead & Faucet Aerator Program, post-inspection of participant residences is not likely to add value, and savings calculations by CenterPoint already incorporate expected in-service rates. QA/QC is performed by the Evaluators via telephone survey.

3.3 NEBs Summary

NEBs claimed by-program are as follows:

- **Residential Equipment Rebates:** avoided replacement costs, deferred replacement costs, kWh;
- **Commercial Equipment Rebates:** avoided replacement costs, kWh, kW;
- **C&I Solutions:** water, kWh;
- **Commercial Food Service:** water;
- **Low Flow Showerhead & Faucet Aerator:** water, kWh, kW; and

- **Saving Homes Program:** water, kWh, kW.
- **Low Income Saving Homes Program:** water, kWh, kW.

Table 3-11: Residential NEBs

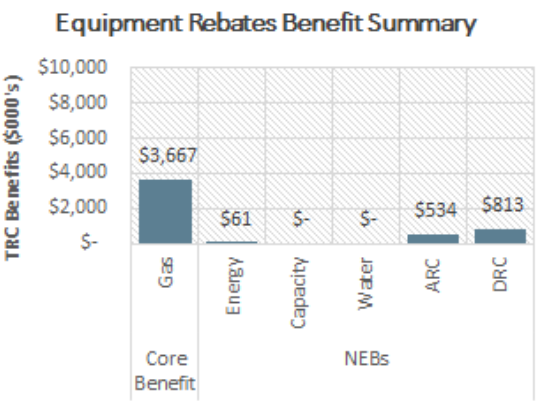
Measure	Water	kWh / kW	ARC / DRC	AR TRM V8.2 Section
Smart thermostat		✓		2.1.12
Furnace (early retirement only)			✓	2.1.3
Duct sealing		✓		2.1.11
Ceiling insulation		✓		2.2.2
Air infiltration		✓		2.2.9
Tankless water heater			✓	2.3.1
Faucet aerators	✓			2.3.4
Low-flow showerheads	✓			2.3.5

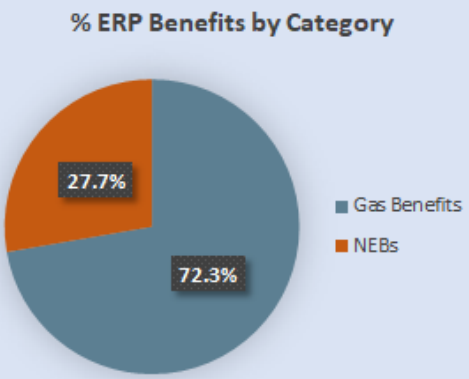
Table 3-12: Commercial NEBs

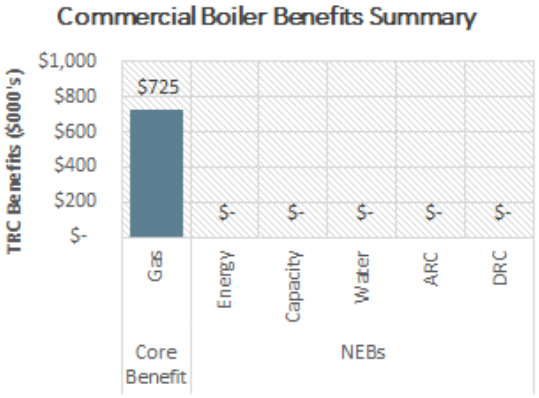
Measure	Water	kWh / kW	ARC / DRC	AR TRM V8.2 Section
Furnace (early retirement only) [15]			✓	2.1.3
Smart thermostat[15]		✓		2.1.12
Tankless water heater[15]			✓	3.3.1
Faucet aerators	✓			3.3.2
Low-flow showerheads	✓			3.3.5
Combi oven	✓			3.8.5
Steam cooker	✓			3.8.7
Pre-rinse spray valves	✓			3.8.11
Condensate return	✓			N/A - Custom
Steam leak repair	✓			N/A - Custom

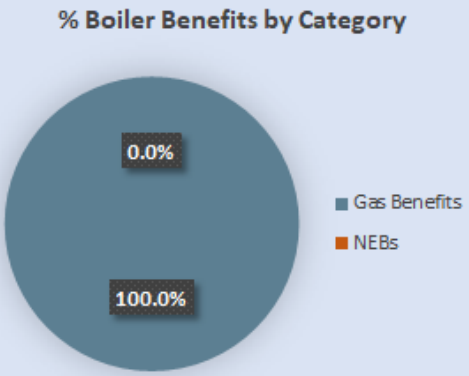
[15] Furnace and smart thermostat projects were residential end-use space types (e.g., multifamily) under a commercial meter. Tankless water heaters included both residential end-use space types and commercial space types.

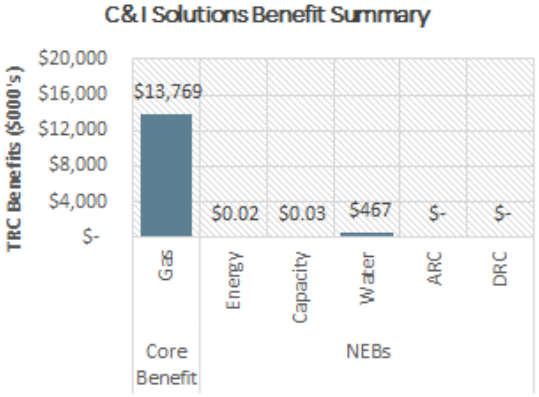
NEBs were a significant contributor to program benefits in PY2021, accounting for 19% of portfolio-level TRC benefits. Summaries of benefits by program are presented below.

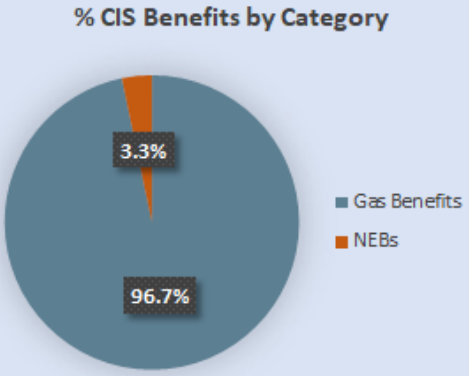

Equipment Rebates Benefit Summary
TRC Benefits ($000's)
$10,000
$8,000
$6,000
$4,000
$2,000
$-
$3,667
$61
$-
$-
$534
$813
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs

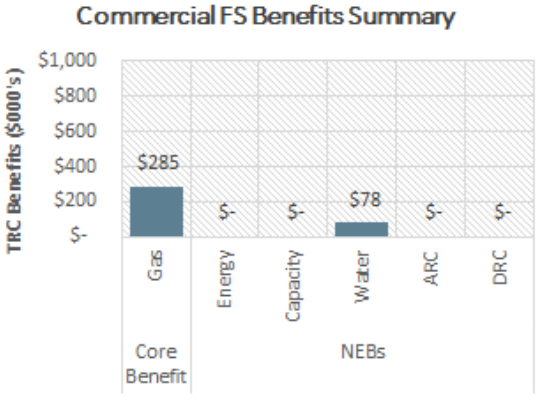

% ERP Benefits by Category
27.7%
72.3%
Gas Benefits
NEBs

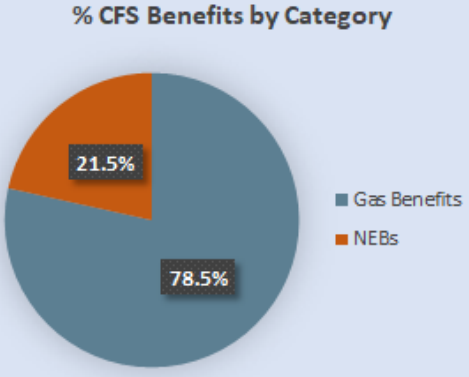

Commercial Boiler Benefits Summary
TRC Benefits ($000's)
$1,000
$800
$600
$400
$200
$-
$725
$-
$-
$-
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs

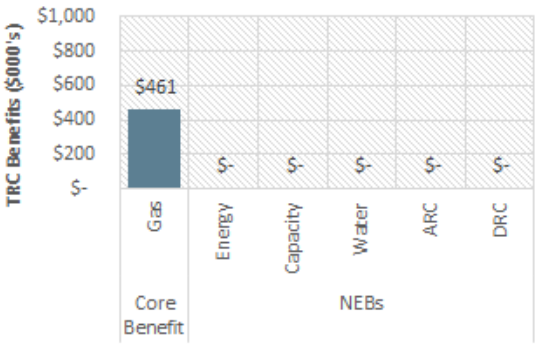

% Boiler Benefits by Category
0.0%
100.0%
Gas Benefits
NEBs

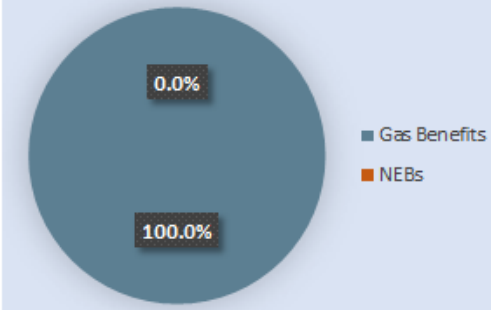

C&I Solutions Benefit Summary
TRC Benefits ($000's)
$20,000
$16,000
$12,000
$8,000
$4,000
$-
$13,769
$0.02
$0.03
$467
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs

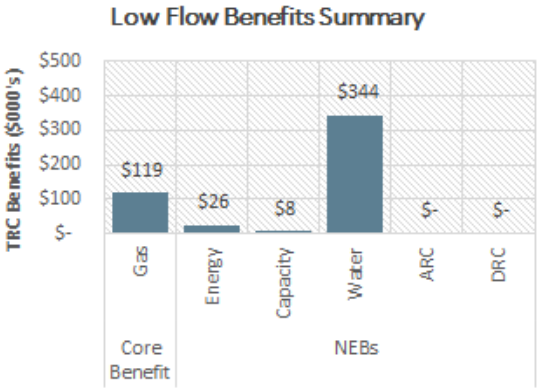

% CIS Benefits by Category
3.3%
96.7%
Gas Benefits
NEBs

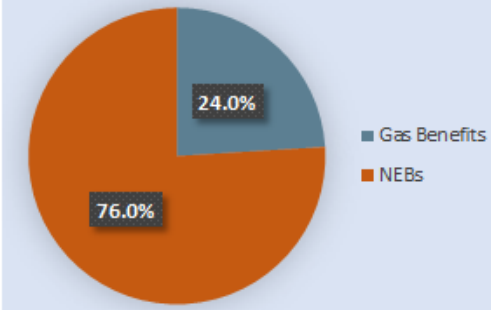

Commercial FS Benefits Summary
TRC Benefits ($000's)
$1,000
$800
$600
$400
$200
$-
$285
$-
$-
$78
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs

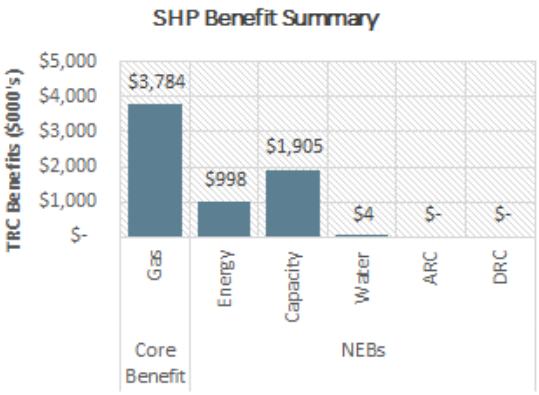

% CFS Benefits by Category
21.5%
78.5%
Gas Benefits
NEBs

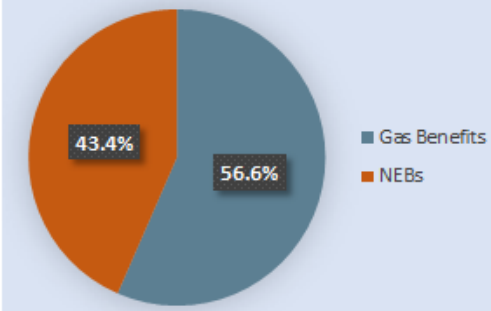

Home Energy Reports Benefit Summary
TRC Benefits ($000's)
$1,000
$800
$600
$400
$200
$-
$461
$-
$-
$-
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs

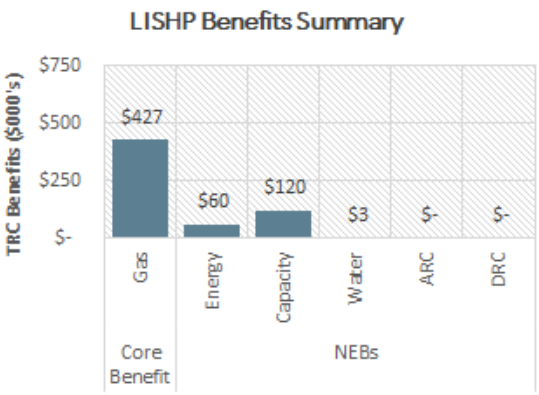

% HER Benefits by Category
0.0%
100.0%
Gas Benefits
NEBs

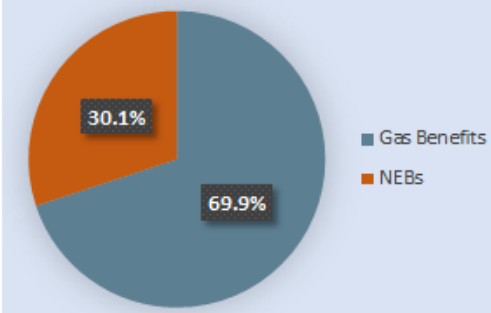

Low Flow Benefits Summary
TRC Benefits ($000's)
$500
$400
$300
$200
$100
$-
$119
$26
$8
$344
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs


% Low Flow Benefits by Category
24.0%
76.0%
Gas Benefits
NEBs


SHP Benefit Summary
TRC Benefits ($000's)
$5,000
$4,000
$3,000
$2,000
$1,000
$-
$3,784
$998
$1,905
$4
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs


% SHP Benefits by Category
43.4%
56.6%
Gas Benefits
NEBs


LISHP Benefits Summary
TRC Benefits ($000's)
$750
$500
$250
$-
$427
$60
$120
$3
$-
$-
Gas
Energy
Capacity
Water
ARC
DRC
Core Benefit
NEBs


% LISHP Benefits by Category
30.1%
69.9%
Gas Benefits
NEBs

4 Residential Equipment Rebates

The Residential Natural Gas Equipment Rebates Program provides incentives to residential customers for high-efficiency space and water heating equipment. Eligible measures for this program include:

- $400 for gas furnaces with 90%-94.9% AFUE;
- $600 for gas furnaces with 95% or higher AFUE;
- $50 for a smart thermostat installed with the qualifying furnace;
- $75 for storage tank water heaters with rated at less than 75,000 BTU with an EF of .70 or greater;
- $200 per 100,000 input BTU for larger storage tank water heaters with 88% or greater thermal efficiency;
- $500 for tankless water heaters with an EF of 0.80 or greater;
- $1500 for simultaneous installation of a 95% AFUE furnace and a tankless water heater; and
- $1500 for a combi boiler with 95% AFUE.

The program is targeted at the residential market sector and offers rebates for retrofit and new construction applications. The space heating equipment utilizes an 80% baseline AFUE, while the water heating equipment utilizes the same baseline Uniform Energy Factors as determined through equipment capacity. The marketing efforts for the space and water heating equipment were largely directed at plumbing and HVAC contractors; their involvement is seen as crucial, as they are generally a primary source of information for end-use customers when deciding upon a replacement system.

4.1 Program Overview

The Residential Natural Gas Equipment Rebates Program is a component of the Natural Gas Equipment Rebates Program. The program provides prescriptive incentives for space heating and water heating equipment.

4.1.1 Participation Summary

4.1.1.1 Space Heating Participation Summary

In PY2021, the space heating channel had a total of 1,632 processed rebates. The participation comprised:

- 886 single family furnace retrofits;
- 140 multifamily furnace retrofits;
- 503 new construction rebates;
- 103 rebated units at housing authorities;
- 203 smart thermostats (all as add-ons to rebated furnaces).

4.1.1.2 Water Heating Participation Summary

In PY2021, Water Heating equipment had a total of 1,673 processed rebates. The participation comprised:

- 775 retrofit rebates;
- 776 new construction rebates;
- 122 rebated unites for housing authorities; and

At the equipment level, participation included:

- 1 storage tank water heater; and
- 1,672 tankless water heaters.

4.2 Process Evaluation

Table 4-1 and Table 4-2 summarize the Evaluators' review of the Residential Equipment Rebates program compared to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 4-1: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is unchanged from PY2020.
No Previous Process Evaluation	No. The program received a partial process evaluation in PY2020.
New Vendor or Contractor	No. The program has been run internally by CenterPoint since program inception in 2010.

Table 4-2: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	Yes. The program reached only 69% of the PY2020 savings goal due to budget constraints.
Are the educational or informational goals not meeting program goals?	No. The programs have had successful consumer and contractor outreach & education.
Are the participation rates lower or slower than expected?	Yes. The program reached only 69% of the PY2020 savings goal.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. Past process evaluations found that operational and management structure to be up to speed and efficient in administering the program.
Is the program's cost-effectiveness less than expected?	No, the program's cost-effectiveness was within expected boundaries given participation rates.
Do participants report problems with the programs or low rates of satisfaction?	No. 2017 - 2019 participant surveys found exceedingly high satisfaction levels.
Is the program producing the intended market effects?	Yes. Interviews with participating contractors found significant market transformation occurring.

A full process evaluation was conducted in PY2021.

4.2.1 Data Collection Activities

The process evaluation of the Residential Equipment Rebates Program included the following data collection activities:

- *CenterPoint Program Staff Interviews.* The Evaluators interviewed staff at CenterPoint involved in the administration of the Residential Equipment Rebates. These interviews were to collect information from program staff as to any changes or developments, as well as response to program recommendations.
- *Participant Surveying.* The Evaluators surveyed a sample of participants in the Residential Equipment Rebates Program. In addition to their use in developing free ridership and spillover estimates, these surveys informed the process evaluation of the Residential Equipment Rebates Program. These surveys addressed issues including participant satisfaction with the program offerings, demographics and firmographics, and other contextual issues regarding the participation process. Further, the data from these surveys served to quantify the extent of early replacement.

Table 4-3 summarizes the data collection for this process evaluation effort. This includes the titles, role, sample sizes, timeframe of data collection.

Table 4-3: CenterPoint Residential Equipment Rebates Data Collection Summary

Target	Component	Activity	N	Sample Precision	Role
CenterPoint Program Staff	Manager, Conservation Improvement Program Implementation	Interview	1	NA	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with the Residential Equipment Rebates Program in the overall coordination of utility resources.
	Energy Efficiency Consultant	Interview	1	NA	The Energy Efficiency Consultants at CenterPoint is responsible for much of the day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.
Program Participants	Residential Equipment Rebates	Survey	83	±9.1%	Survey covering reasons to participate, satisfaction, and demographics.

4.2.2 Process Results & Findings

This section will present the results and key findings from the data collection activities. These findings are based upon interviews with utility staff, implementation staff, and surveys with participants, and a literature review.

4.2.3 Response to Program Recommendations

Table 4-4 summarizes the status of issues and recommendations identified in the PY2020 process evaluation.

Table 4-4: Equipment Rebates Response to PY2020 Recommendations

Recommendation	CenterPoint Response	Status of Issue
Consider a standalone rebate for smart thermostats.	CenterPoint has been gathering feedback from trade allies and supply houses about the impact of offering a standalone rebate for smart thermostats. CenterPoint's current model is to have a thermostat sold with an installed furnace as this would be an opportunity for an upsell of the thermostat. If we offer up a thermostat on our marketplace, trade allies and supply house feedback is that it would directly compete with their sales. We are considering a model that could reduce trade allies and supply house reluctance and promote participation in the program.	Under Consideration
Update water heater setpoints to 124 degrees for all DHW measures.		Adopted
Add home vintage to the project application.	CenterPoint is wary of asking Trade Allies to collect additional information from the customer in order to submit their rebate. They ask Trade Allies to submit rebates for their customers either on-line or through mail and would like this process to be as quick and streamlined as possible. CenterPoint worries that if they ask for additional information they could slow the process down and delay rebate submissions.	Under Consideration
Align water heater savings calculations such that baseline and volume derive consistently from the same size category		Adopted

4.2.4 Program Design Changes

No changes were made to the program in 2021.

4.2.5 Program Data Collection

The Evaluators reviewed the application forms for Residential Equipment Rebates:

- The current application form is not collecting the data needed to comply with TRM V8.2 requirements. The form should add check-off boxes for construction date[16] and home square footage.

[16] According to the TRM V8.2 guidelines, these would be 1979 & earlier, 1980-1989, 1990-1999, and 2000-present.

- The current application does not collect data to support residential early replacement calculations. The application would need to include fields to collect whether the replaced unit was functioning and to collect the age of the replaced unit (though those fields should be optional rather than mandatory for a rebate to be approved).

4.2.6 Adherence to Protocol A

CenterPoint maintains an internal tracking system based on the SAP platform.

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM V8.2. The Evaluators reviewed program tracking data to assess its compliance with Protocol A of the AR TRM V8.2 which specifies that tracking data should be checked for:

- Participating customer information;
- Measure specific information;
- Vendor specific information;
- Program tracking information;
- Program costs; and
- Marketing and outreach activities.

The Evaluators conducted a review of each of the above factors within PY2021 tracking data except for marketing and outreach activities as these are outside the scope of the tracking system's reporting.

4.2.6.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for nearly all participants.
- Projects contained complete information on the contractor that completed the installation.
- Weather zones were provided in the tracking data.
- All inputs needed to re-calculate savings according to TRM V8.2 protocols were present in the database.

4.2.6.2 Measure Specific Information

Measure data was enough to support deemed savings calculations.

4.2.7 Participant Survey Results

A phone survey was administered to program participants during the Fall of 2021. A total of 83 participants completed a survey about their experience with the CenterPoint Residential Equipment Rebates Program in PY2021.

4.2.7.1 Sources of Awareness and Decision to Participate

To gauge the effectiveness of various approaches to promoting the program, survey respondents were asked how they learned of the ERP. Respondents were able to select more than one response. Respondents primarily learned about the program through other sources (Figure 4-1).

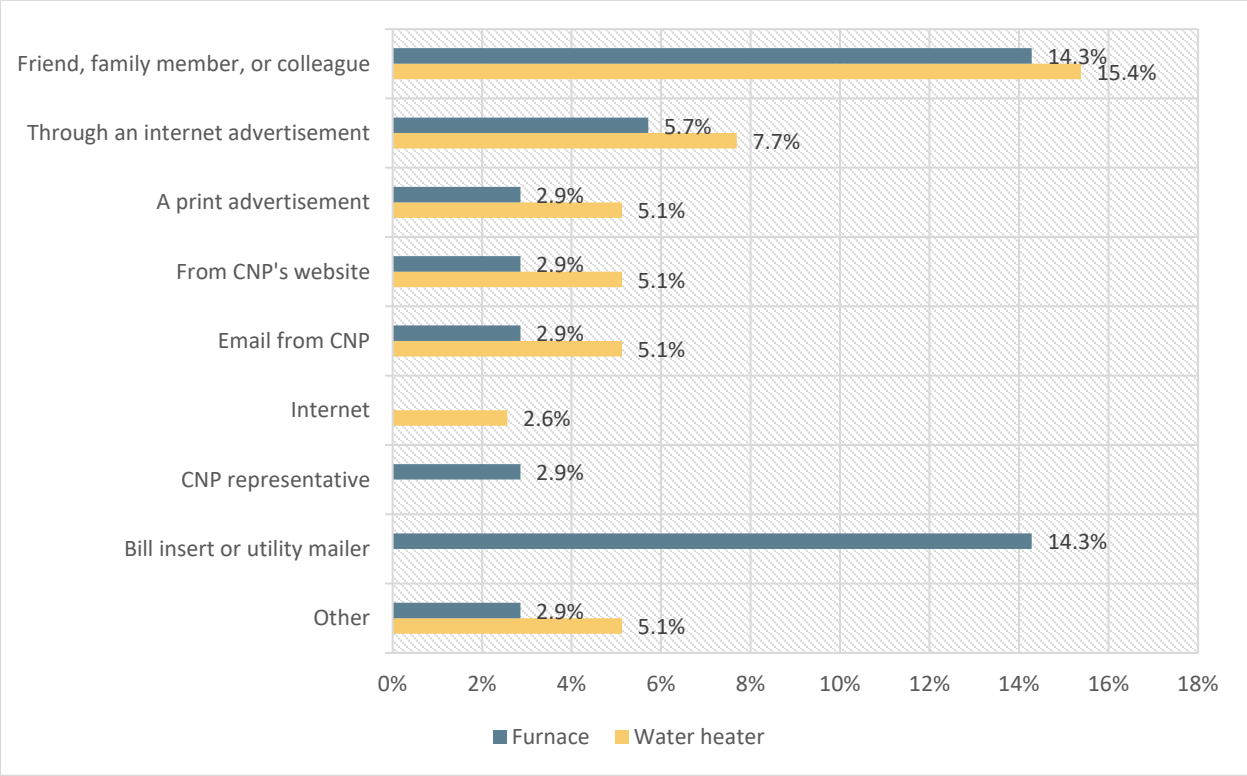


Figure 4-1: Sources of Program Awareness

Among respondents who received water heaters, saving money on their energy bills was the most important reason for selecting a high efficiency water heater (50%), while improving the comfort of the home was the most important reason for respondents who received furnaces (44%) (Figure 4-2).

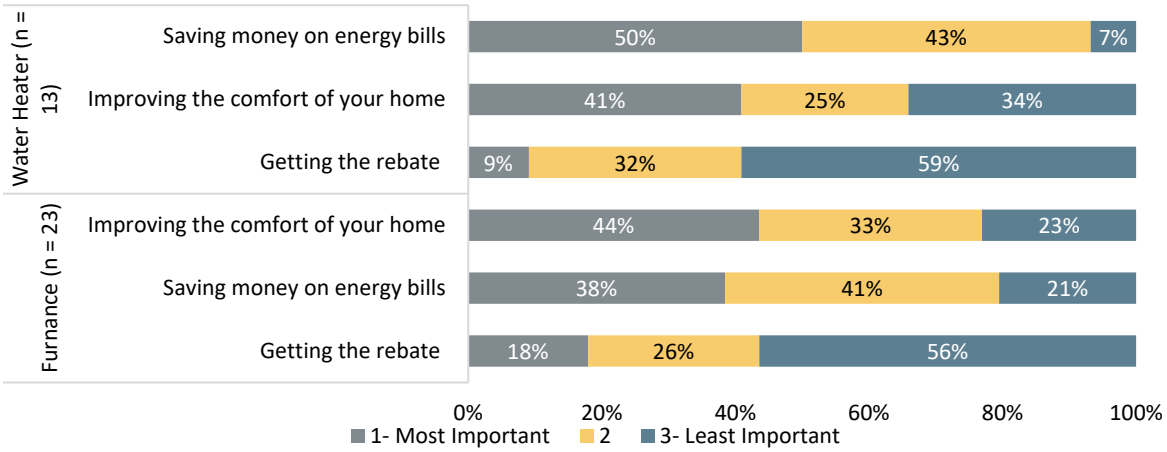


Figure 4-2: Respondents Reason for Participation

4.2.7.2 Contractor Experience

When selecting the equipment 54% of furnace respondents and 64% of water heater respondents indicated the contractor was "very influential" or "extremely influential" in their decision making. Overall, respondents had a positive experience with their contractor.

- 87% *"strongly agreed"* that the contractor was courteous and professional (n=82)
- 85% *"strongly agreed"* that the work was scheduled in a reasonable amount of time (n=81)
- 88% *"strongly agreed"* that the work was completed in a reasonable amount of time (n=82)

38.5% of respondents who received a furnace and 44.7% of respondents who received a water heater had worked with their contractor previously (Table 4-5).

Table 4-5: Contractor Selection

	Furnace (n=39)	Water Heater (n=38)
CNP program website	2.6%	0.0%
Contractor was someone you worked with before	38.5%	44.7%
Internet search	20.5%	23.7%
Word of mouth	33.3%	23.7%
Other	5.1%	7.9%

4.2.7.3 Program Satisfaction

The majority of furnace (59%) and water heater respondents (59%) were *"somewhat satisfied" or very satisfied"* with all aspects of the program (Figure 4-3, Figure 4-4).

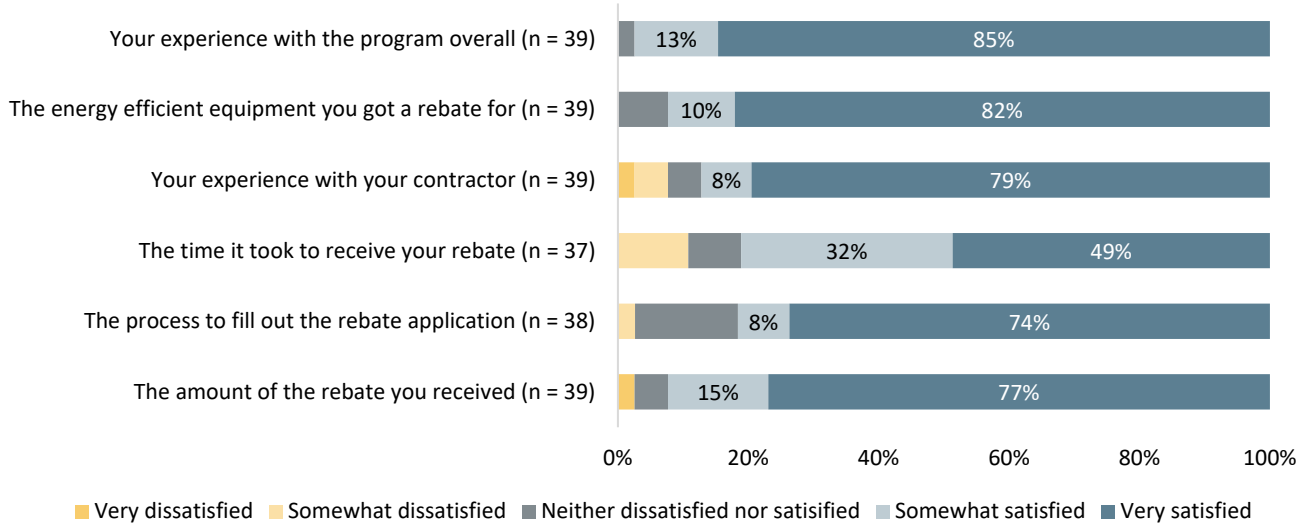


Figure 4-3: Program Satisfaction (Furnace)

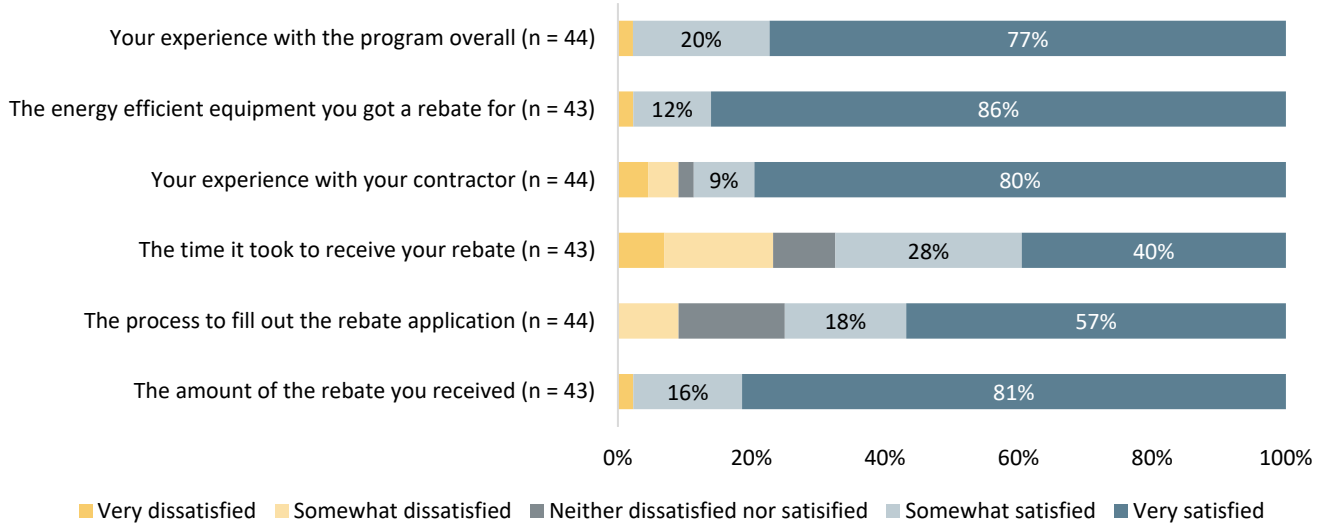


Figure 4-4: Program Satisfaction (Water Heater)

4.2.8 Measure Offerings

The Evaluators reviewed CenterPoint program offerings compared to other programs in Arkansas as well as by other regional gas utilities. Key measures that could be considered by CenterPoint include:

4.2.8.1 Smart Thermostats

Smart thermostats are offered only has an add-on to a furnace by CenterPoint. BHE and AOG offer standalone incentives for them, and this is typical among regional gas utilities (other examples include Ameren Gas, Nicor Gas, Oklahoma Natural Gas). CenterPoint has indicated concern that trade allies may see a standalone incentive as competing with their current offering. However, CenterPoint's project volume for thermostats lags behind BHE and AOG (with fewer thermostats despite the larger service territory) and would benefit significantly from the introduction of a standalone thermostat rebate. Where this has been implemented elsewhere in Arkansas, it has not affected the engagement of HVAC trade ally networks.

4.2.8.2 Furnace Tune-ups

Furnace tune-ups have been rejected in the past due to not being cost-effective. The savings estimates for this measure are as follows, based on a 74,000 BTU average input capacity (average value from PY2021 furnace rebates):

Table 4-6: Furnace Tune-up Average Savings

Weather Zone	Annual Therms	Lifetime Therms	NPV of Benefits	Maximum Incremental Cost where Measure Passes TRC
9	70.9	212.66	$ 129.96	$ 103.04
8	66.0	197.86	$ 120.91	$ 95.87
7	63.8	191.38	$ 116.95	$ 92.73
6	57.7	173.16	$ 105.82	$ 83.90

When addressing the question of incremental cost, the Evaluators assumed that the administrative cost per-therm for tune-ups would remaining the same as currently observed for furnace and water heater equipment rebates. The larger share of CenterPoint's residential customers are in Weather Zone 7; CenterPoint should consider this rebate if contractors are willing to provide the service for $90 or less or if incremental costs are forecasted to increase significantly in the upcoming planning cycle. Currently, CenterPoint offers this measure for a $119 customer charge in Minnesota.

Alternatively, this measure could be pilot tested with a sample of homes receiving pre-and post-tune-up combustion efficiency testing to address whether the TRM assumption of a 75% baseline AFUE and post-tune-up 78% AFUE is accurate; early retirement analysis for furnace retrofits showed an AFUE of 65% so there is a possibility of TRM assumptions being overly conservative.

4.3 Impact Evaluation

The impact evaluation effort of the Residential Equipment Rebates Program included the following:

- *Desk review of residential calculations.* The Evaluators utilized TRM V8.2 values in assessing savings from residential furnaces.

4.3.1 Summary of Non-Energy Benefits

Table 4-7 summarizes the non-energy benefits by measure that will be credited to the Equipment Rebates Program.

Table 4-7: Equipment Rebates Non-Energy Benefits

Measure	Electric Savings	Water Savings	Propane Savings	Avoided Replacement Cost	Deferred Replacement Cost
Furnace Early Replacement					✓
Tankless Water Heater				✓	
Smart Thermostat	✓				

4.3.2 Free Ridership

Figure 4-5 summarizes the free ridership scoring scheme for residential furnaces and water heaters.

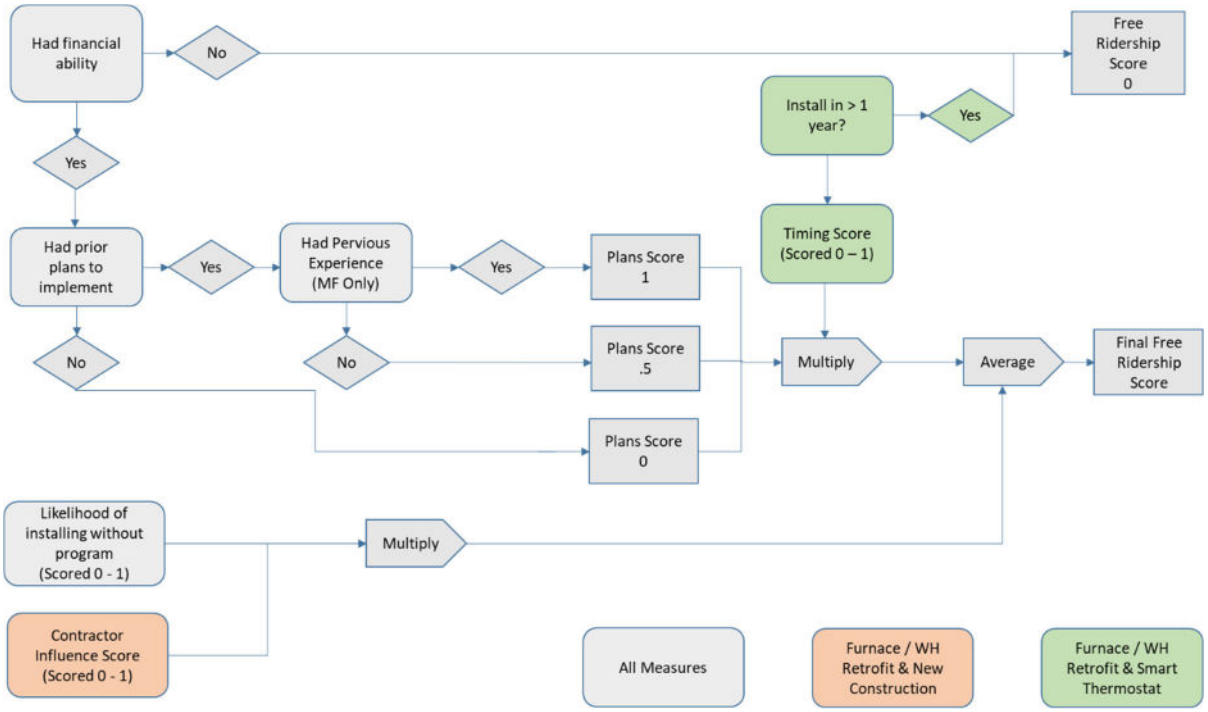


Figure 4-5: Residential Equipment Rebates FR Diagram

The plans score was factored by the programs impact on timing. Specifically,

- If the respondent stated that they would have installed the measure more than one year after the measure was installed, the prior plan score reduced to zero.
- If the respondent stated that they would have installed the measure in 6 months to one year, then the prior plans score was reduced by one-half.
- If the respondent stated that they would have installed the measure at the same time or within 6 months of when it was installed, the prior plans score was not adjusted.

A likelihood of installing the measure in the absence of the program was developed based on respondents stated likelihood of installing a measure. Specifically, responses to this question were scored as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely nor unlikely: .5
- Somewhat unlikely: .25
- Very unlikely: 0

Contractor Influence: This score is first determined via respondent answers to Question 18. The scores are as follows:

- Very influential: .5
- Somewhat influential: .25
- All other answers: .00

This value is then scaled by .667 due to contractor estimates that the rebate assisted them in upselling to a high-efficiency model two-thirds of the time.

The resulting NTGRs from PY2020 surveying are as follows:

- Residential furnace retrofit: 86.0%
- Housing authority furnace retrofit: 100.0%
- Residential water heating retrofit: 74.7%
- Housing authority water heating retrofit: 100.0%

For new construction applications, we apply a similar scoring mechanism as-completed in the multi-utility survey effort for owner-built custom homes. For homes from production builders, we apply the PY2017 values developed as part of the new construction builder survey effort completed for CenterPoint Energy Arkansas. The values are:

- New construction: owner-built custom: 64.4%
- New construction: builder production homes: 91.0%

Lastly, values for multifamily furnace retrofits NTG cite PY2016 survey efforts. The Multifamily NTG is 89.6%.

4.3.3 Impact of Early Replacement

For residential furnaces, early retirement AFUE is calculated by a degradation factor of a 78% AFUE unit. This is calculated as:[17]

$$AFUE_{base\_early} = (Base\ AFUE) \times (1 - M)^{age}$$

$Base\ AFUE$ = efficiency of the existing equipment when new, 78% AFUE.

[17] Arkansas TRM V8.2 Volume 2, Section 2.1.3 Gas Furnace Replacement, Pg. 41

M[18] = maintenance factor, 0.01.

age = the age of the existing equipment, in years.

Following this, lifetime savings are determined based on the Remaining Useful Life (RUL) of the old equipment. The TRM V8.2 updated the RUL table, which has been reflected in Table 4-8.[19]

Table 4-8: Residential Furnace RUL

Unit Age	RUL	Unit Age	RUL
5	14.7	19	3.6
6	13.7	20	3.2
7	12.7	21	2.9
8	11.8	22	2.6
9	10.9	23	2.4
10	10.0	24	2.1
11	9.1	25+	0.0
12	8.3		
13	7.5		
14	6.8		
15	6.2		
16	5.5		
17	4.5		
18	4.0		

To assess whether a unit qualified for early retirement, the Evaluators examined the following survey questions:

7. Was the replaced [BASELINE]….(READ LIST)?

1. Fully functional and not in need of repair?
2. Functional, but needed minor repairs?
3. Functional, but needed major repairs?
4. Not functional?

98. DON'T KNOW

[18] Maintenance factor of 0.01 is the average maintenance factor for gas furnaces taken from the October 2010 National Renewable Energy publication "Building America House Simulation Protocols", table 30.

[19] AR TRM V8.2 Volume 2, Section 2.1.3, Pg. 43

99. REFUSED

8. How old was the [BASELINE] at the time you replaced it?

1. ___ # Years
98. DON'T KNOW
99. REFUSED

1.

9. How long do you think your [BASELINE] would have lasted if you had not replaced it?

1. ___ # Years
98. DON'T KNOW

Figure 4-6 summarizes the scoring for early retirement based on these three questions.

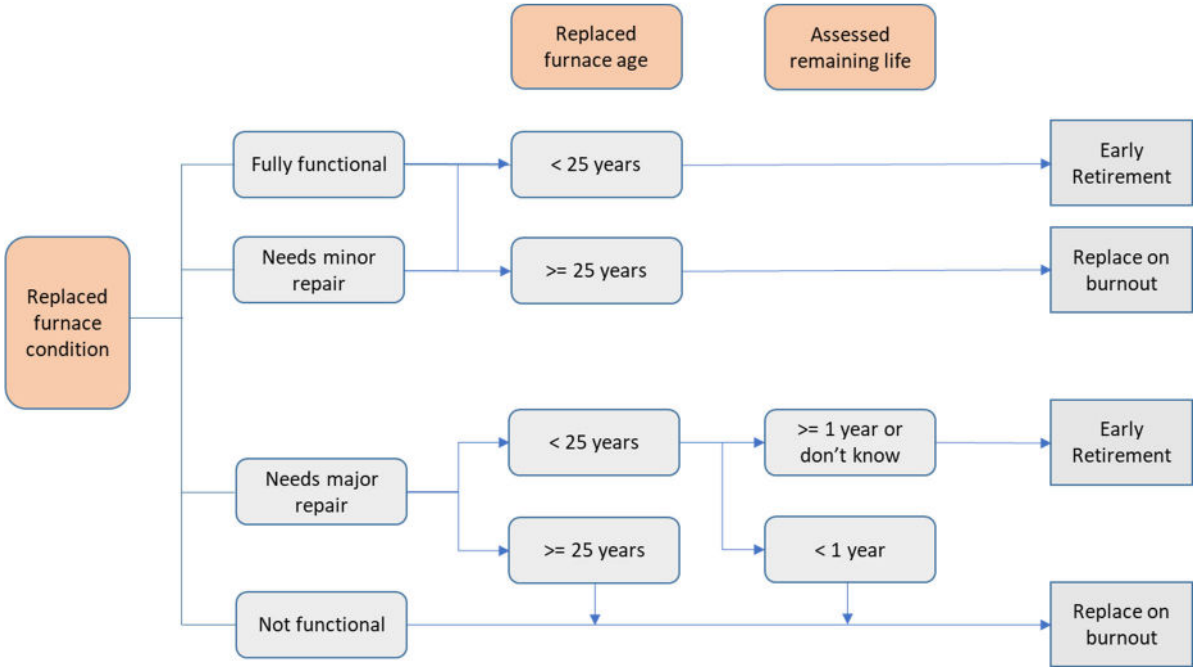


Figure 4-6: Residential Furnace Early Retirement Flowchart

In total, in the PY2020 survey the Evaluators found that 67.65% of CenterPoint furnace retrofits were early retirement. The average age of functioning and failed units was as follows:

- 16.08 for functioning units
- 28.40 for failed units

Based on the degradation equation from TRM V8.2[20], this leads to an Early Retirement AFUE of:

$$AFUE_{base_{early}} = (.78) \times (1 - .01)^{16.08} = .6636$$

Further, based on the values in Table 4-8, the RUL of the early replacement units is four years. For years 5-20 of the unit EUL, the normal replacement baseline applies. The savings for each residential retrofit unit were calculated using both the normal and early replacement baselines, and final savings reflect a weighted average of these two values based on participant survey data findings. These values were then applied on a weighted basis to the residential retrofit units using weights of 67.65% early replacement and 35.14% normal replacement. The resulting weighted average baseline is:

$$AFUE_{base_{early\_weighted}} = 67.65\% \times .6636 + 32.35\% \times .80 = .7077$$

4.3.4 Residential Water Heating Impact Evaluation

Savings from tankless water heaters were calculated using protocols from Arkansas TRM V8.2 Vol. 2 Section 2.3.1. For sample calculations see Appendix C.

4.3.5 Ex Post Savings

Table 4-9 presents the gross savings results of the evaluation of the PY2021 Equipment Rebates Program. Total gross savings summarizes the savings calculations performed by TRM V8.2 protocols.

Table 4-9: Equipment Rebates Ex Post Gross Therms Savings

Measure Category	Ex Ante Therms Savings	Ex Post Therms Savings	Gross Realization Rate	EUL	Lifetime Therms Savings
Furnace	302,950	303,688	100.2%	13.34	4,051,207
Water Heater	81,435	81,435	100.0%	20	1,626,780
Smart Thermostat	17,113	17,113	100.0%	11	188,074
Total	**401,498**	**402,236**	**100.2%**	**14.58**	**5,866,061**

The resulting net savings are presented in Table 4-10.

[20] AR TRM V8.2 Vol. 2 Pg. 44

Table 4-10: Equipment Rebates Net Savings Summary

Project Category	Free Ridership Rate		Net Annual Savings		Net Realization Rate	Net Lifetime Therms Savings
	Ex Ante	Ex Post	Ex Ante	Ex Post		
Furnace	13.9%	13.3%	260,797	263,446	101.0%	3,517,489
Water Heater	14.1%	14.1%	69,989	69,989	100.0%	1,399,368
Smart Thermostat	12.5%	12.5%	14,974	14,974	100.0%	164,710
Overall:	**13.9%**	**13.4%**	**345,760**	**348,409**	**100.8%**	**5,081,567**

4.3.6 Non-Energy Benefits Summary

4.3.6.1 Furnace Early Retirement

Furnace early retirement is eligible for the Deferred Replacement Cost Non-Energy Benefit. This benefit is the present value of the perpetuity of the deferred installation of new equipment. The inputs are as follows:

- Full installed cost of efficient furnace: $2,548
- Full installed cost of baseline furnace: $2,011
- Remaining useful life of existing furnace: 4 years
- Nominal Discount Rate: 5.7%
- Inflation Rate: 1.9%
- Real Discount Rate: 3.7%

The resulting deferred replacement cost is $1,484.68. This is parsed out proportionally to furnace retrofits based on the rate of early retirement and appropriate NTGR. There were 1,114 units for which DRC is applicable. The total net DRC is $812,955.

4.3.6.2 Tankless Water Heaters

Residential tankless water heaters have an EUL of 20 years. The baseline system has an EUL of 11 years. This makes the systems eligible for the Avoided Replacement Cost Non-Energy Benefit. This NEB was calculated using the IEM calculation tool[21]. This is then scaled by the NTG ratio for the water heater. The input assumptions were as follows:

[21] Protocol L Avoided & Deferred Replacement Cost_08_31_16.xlsx

- Full installed cost of tankless system: $1,219
- Full installed cost of baseline storage tank system: $614
- Nominal Discount Rate: 5.7%
- Inflation Rate: 1.9%
- Real Discount Rate: 3.7%

The resulting deferred replacement cost is $348.90. This is parsed out proportionally to water heater retrofits based on the rate of early retirement and appropriate NTGR. The calculator for this is provided in Appendix B of this report.

There were 1,672 residential tankless systems rebated in PY2021, and the resulting net ARC value is $503,903.

4.3.7 Electric Savings

The Evaluators credited smart thermostats with electric savings. Smart thermostats are installed in the program only as an add-on to a furnace retrofit. There were 203 units rebated in the program, with total net electric impacts of:

- 181,045 kWh;
- 0 kW; and
- 1,991,495 lifetime kWh.

The kWh savings resulted in an additional $57,920 in TRC benefits.

4.4 Conclusions

CenterPoint accurately calculates savings per TRM V8.2 protocols.	All projects at 100.2% gross realization. CenterPoint's tracking system accurately applies TRM V8.2, algorithms and early retirement adjustments.
CenterPoint has endeavored to encourage comprehensiveness via combination rebates.	A rebate of $1,500 is provided for participants who simultaneously install a qualifying furnace and tankless water heater. These rebates comprised 26% of furnace and 23% of water heater projects.
Savings declined compared to PY2020.	Savings decreased by 15%, corresponding with lower participation.

4.5 Recommendations

Develop a stand-alone rebate for smart thermostats.	This recommendation was made in PY2020 but is reiterated here. CenterPoint has indicated concern that a standalone thermostat rebate may be perceived as "competition" by their trade allies. However, if this is offered solely as a rebate for customer purchase from retailers and not via the CenterPoint website/marketplace, this concern could be alleviated at project launch. Further, this rebate is offered by AOG and BHE without negative consequences with their HVAC trade ally networks.
Reassess furnace tune-ups for program inclusion.	Furnace tune-ups have been rejected in the past due to not being cost-effective CenterPoint should consider this rebate if contractors are willing to provide the service for $90 or less or if incremental costs are forecasted to increase significantly in the upcoming planning cycle. Alternatively, this measure could be pilot tested with a sample of homes receiving pre-and post-tune-up combustion efficiency testing to address whether the TRM assumption of a 75% baseline AFUE and post-tune-up 78% AFUE is accurate; early retirement analysis for furnace retrofits showed an AFUE of 65% so there is a possibility of TRM assumptions being overly conservative.

5 Commercial Equipment Rebates

The Commercial Natural Gas Equipment Rebates Program provides incentives to commercial customers for high-efficiency space and water heating equipment. Eligible measures for this program include:

- $400 for Gas furnaces with 90%-94.9% AFUE;
- $600 for Gas furnaces with 95% or higher AFUE;
- $500 for tankless water heaters with an UEF of .80 or greater;
- $75 for a tank unit rated lower than 75,000 BTUh with an UEF of .70 or higher; and
- $200 per 100,000 BTUh for large storage tank units exceeding 88% thermal efficiency.

The program is targeted at the small commercial market sector and retrofit and new construction applications are both allowed. The space heating equipment utilizes an 80% baseline AFUE, while the water heating equipment utilizes the same baseline Energy Factors as determined through equipment capacity. The marketing efforts for the space and water heating equipment were largely directed at plumbing and HVAC contractors; their involvement is seen as crucial, as they are generally a primary source of information for end-use customers when deciding upon a replacement system.

5.1 Program Overview

5.1.1 Participation Summary

5.1.1.1 Space Heating Participation Summary

There were 521 furnaces at 115 facilities rebated in PY2021. Eighty percent of commercial rebates were for retrofit projects, while 20% were for new construction projects. Figure 5-1 summarizes the participation levels by facility type.

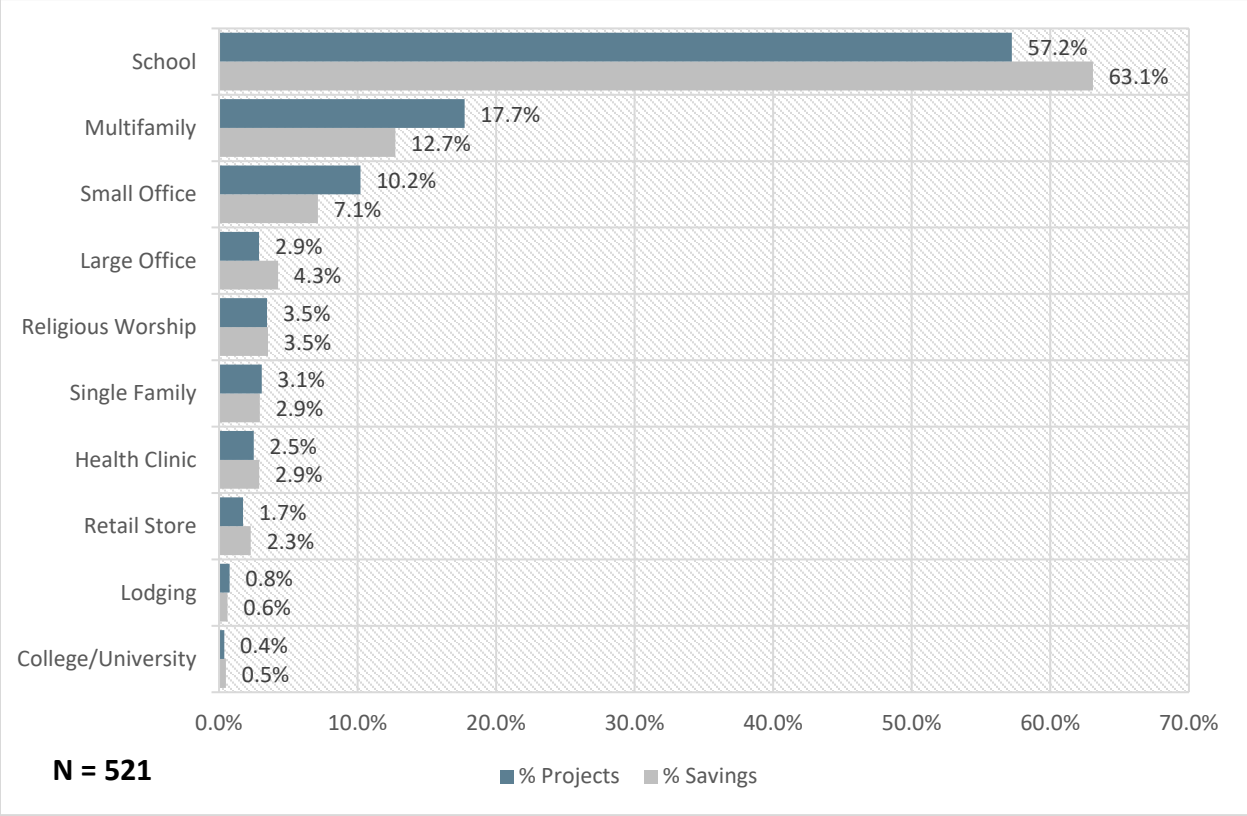


Figure 5-1: Space Heating Participation Summary

The bulk of participation and savings was driven by education, multifamily, and small office facilities. There were 389 units rebated in educational and multifamily facilities. These groups accounted for 75.0% of participants and 75.8% of savings for commercial furnaces.

5.1.1.2 Water Heating Participation Summary

In PY2021, Water Heating equipment had 279 commercial rebates at 92 premises. Commercial participation comprised:

- 7 high-efficiency storage tank water heater; and
- 272 tankless water heaters.

Sixty-three percent of commercial rebates were for retrofit projects and 37% were for new construction projects. Figure 5-2 summarizes the participation by facility type, denominated both in terms of percent of units rebated and percent of savings. Further, the savings acquisition cost is summarized in the overlain line graph (total rebate spending divided by total annual net therms).

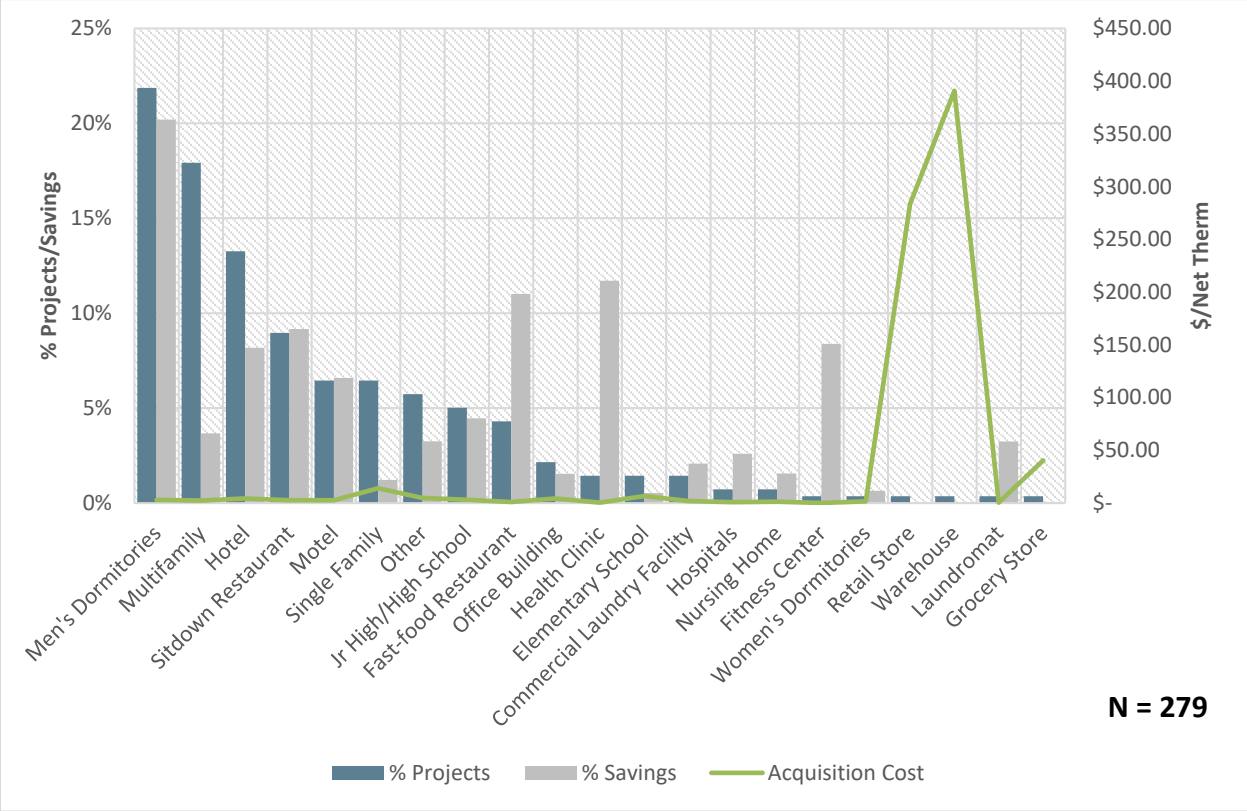


Figure 5-2: Water Heating Participation Summary

As seen in the figure above, the bulk of program savings was driven by men's dormitories, health clinics, and fast-food restaurants. The program rebated seven storage tank systems which were installed in sit-down restaurants, elementary schools, and fast-food restaurants. The seven program storage tank systems saved a total of 1,990 net therms.

Key takeaways include:

- **Median acquisition cost was $2.62 per therm.**
- **Men's dormitories comprised a significant share of participation (21.9%) while also being a large contributor to overall savings (23.2%) for this measure.** This is a high-use building type that is among facilities that was as a result had a below-median acquisition cost per-therm ($2.21).
- **Single family, Warehouse, Retail, and Other facilities had significantly higher acquisition costs.** Their costs ranged from $14.02 to $390.95 per therm.
- **There was a shift in participation to higher-use facilities overall.** In PY2021, there were more water heaters installed in men's dormitories, multifamily, and motels compared to

the PY2020 savings driven by hotel participants, junior high / high schools, and sit-down restaurants. The median acquisition cost has declined by 36% as a result.

5.2 Process Evaluation

The Evaluators conducted a formal process evaluation of the program in the last triennial cycle found that the program was successful in meeting participation, savings, and satisfaction goals. Table 5-1 and Table 5-2 summarize the Evaluators' review of the Commercial Equipment Rebates Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 5-1: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in PY2017 and a limited process evaluation in PY2020
New Vendor or Contractor	No. The program has been run internally by CenterPoint since program inception in 2010.

Table 5-2: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No. The program exceeded its savings goal in PY2020.
Are the educational or informational goals not meeting program goals?	No. The programs have had successful consumer and contractor outreach & education.
Are the participation rates lower or slower than expected?	No. The program exceeded its participant goal in PY2020.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. Data issues that had been identified in the PY2019 evaluation had been corrected in PY2020.
Is the program's cost-effectiveness less than expected?	No, the program's cost-effectiveness was within expected boundaries.
Do participants report problems with the programs or low rates of satisfaction?	No. Prior participant surveys found exceedingly high satisfaction levels.
Is the program producing the intended market effects?	Yes. Interviews with participating contractors in prior process evaluations found significant market transformation occurring.

On this basis, the Evaluators conducted a limited process evaluation pertaining to water heating gross impact issues.

5.2.1 Data Collection Activities

The process evaluation of the Commercial Equipment Rebates Program included the following data collection activities:

- *CenterPoint Program Staff Interviews.* The Evaluators interviewed staff at CenterPoint involved in the administration of the Commercial Equipment Rebates Program. These interviews were to collect information from program staff as to any changes or developments, as well as response to program recommendations.
- *Participant Surveying.* The Evaluators surveyed a combined sample of non-residential participants across CenterPoint, BHE, and AOG programs. In addition to their use in developing free ridership and spillover estimates, these surveys informed the process evaluation of the Commercial Equipment Rebates Program. These surveys addressed issues including participant satisfaction with the program offerings, demographics and firmographics, and other contextual issues regarding the participation process. Further, the data from these surveys served to quantify the extent of early replacement.

Table 5-3 summarizes the data collection for this process evaluation effort. This includes the titles, role, sample sizes, timeframe of data collection.

Table 5-3: CenterPoint Commercial Equipment Rebates Data Collection Summary

Target	Component	Activity	N	Precision	Role
CenterPoint Program Staff	Manager, Conservation Improvement Program Implementation	Interview	1	N/A	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with overall coordination of utility resources.
	Energy Efficiency Consultant	Interview	1	N/A	The Energy Efficiency Consultant at CenterPoint is responsible for much of the day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.
Program Participants	Residential Equipment Rebates	Survey	39	±11.8%	Survey covering reasons to participate, satisfaction, and demographics.

5.2.2 Process Results & Findings

This section will present the results and key findings from the data collection activities. These findings are based upon interviews with utility staff, implementation staff, and surveys with participants, and a thorough and in-depth literature review.

5.2.2.1 Response to Program Recommendations

Table 5-4 summarizes the status of issues and recommendations identified in the PY2020 process evaluation.

Table 5-4: Commercial Equipment Rebates Response to PY2020 Recommendations

Recommendation	***CenterPoint Response***	***Status of Recommendation***
Reassess tracking data issues identified in the evaluation (EUL, UEF, load inputs, EFLH)		Adopted
Engage the Evaluators earlier when facilities are categorized as "other" or are missing calculation data.		Adopted

5.2.2.2 Program Design Changes

No changes were made to the program in 2021.

5.2.3 Adherence to Protocol A

CenterPoint maintains an internal tracking system based on the SAP platform.

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM V8.2. The Evaluators reviewed program tracking data in PY2021 to assess its compliance with Protocol A of the AR TRM V8.2 which specifies that tracking data should be checked for:

- Participating Customer Information;
- Measure Specific Information;
- Vendor Specific Information;
- Program Tracking Information;
- Program Costs; and
- Marketing & Outreach Activities.

5.2.3.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was incomplete; addresses and phone numbers were provided but data did not include a contact name.

- Projects contained complete information on the contractor that completed the installation.
- Weather zones were provided in the tracking data.
- All inputs needed to re-calculate savings according to TRM V8.2 protocols were present in the database for space heating, but not for water heating.

5.2.3.2 Measure Specific Information

Program tracking for commercial water heaters was missing the necessary input data to calculate therms savings. The Evaluators determined that there were 7 projects (2.5% of total) that did not have any premise-specific inputs, neither square feet nor units of production, needed to perform proper calculations. Measure-specific capacity, efficiency, and weather zone was included, however. Although there were no ex ante savings that were calculated for these projects, the Evaluators gathered the necessary inputs to calculate ex post savings.

5.2.4 Commercial Equipment Rebate Program Participant Survey Response

Commercial participants were contacted via phone to complete an online survey regarding their experience with the equipment rebates program. Due to the limited number of survey completes, utility respondents were aggregated to provide valuable insights. At the time of survey administration, contact information was available for 203 customers that had completed the program. The response rate was 19.2% with 39 participants completing the survey. Of those 39 respondents, 23 installed high efficiency furnaces and 13 installed high efficiency water heaters.

Table 5-5: Total Respondents by Utility

Sample Breakdown	Sample Size (N = 179)	Survey Completes (n = 39)
Arkansas Oklahoma Gas	12	2
Black Hills Energy	19	4
CenterPoint Arkansas	148	33

5.2.4.1 Decision Making Process

Table 5-6 summarizes the level of influence various parties had in the decision-making surrounding the project. Vendors and contractors were most typically characterized as having a “moderate to large effect” on the project.

Table 5-6: Influence Level of Project Stakeholders

	No effect	Small effect	Moderate to large effect	Critical effect
Installed a furnace (n = 22)				
Vendor (n = 9)	33.3%	-	66.7%	-
Contractor (n = 9)	-	-	100.0%	-
Program Representative (n = 1)	-	-	100.0%	-
Other (n = 4)	-	-	75.0%	25.0%
	No effect	**Small effect**	**Moderate to large effect**	**Critical effect**
Installed a water heater (n = 11)				
Vendor (n = 3)	-	-	100.0%	-
Contractor (n = 7)	-	28.6%	42.9%	28.6%
Program Representative (n = 2)	-	50.0%	50.0%	-
Other (n = 1)	-	-	0.0%	100.0%

5.2.4.2 Participant Satisfaction

Overall, respondents are satisfied with all aspects of the program as well as the utility as their service provider.

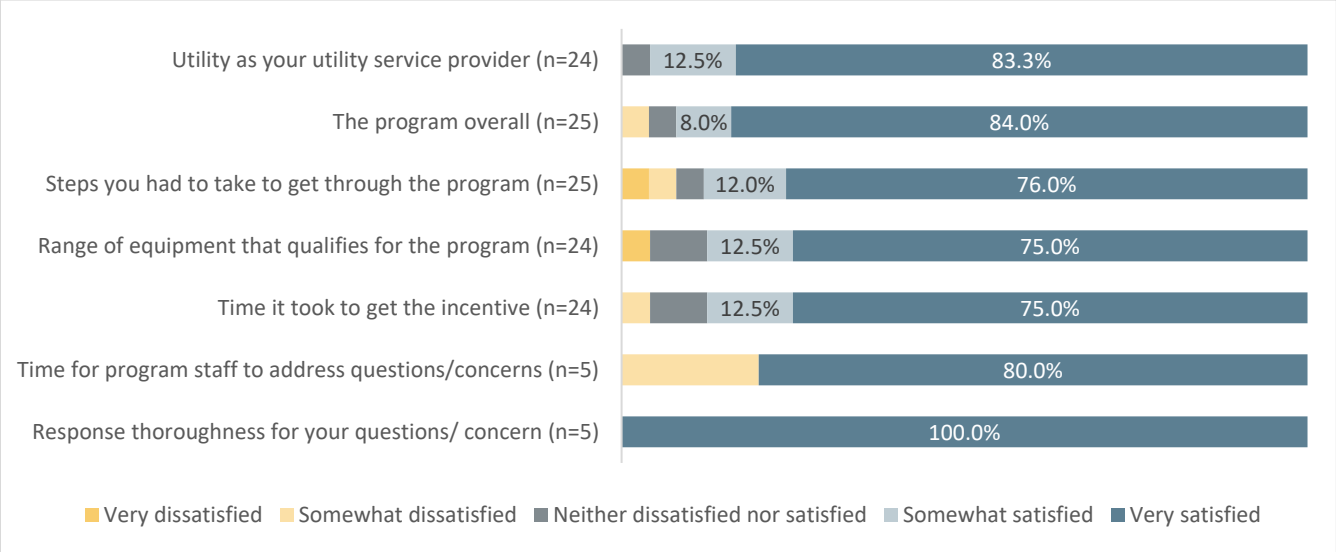


Figure 5-3: Furnace Respondent Satisfaction

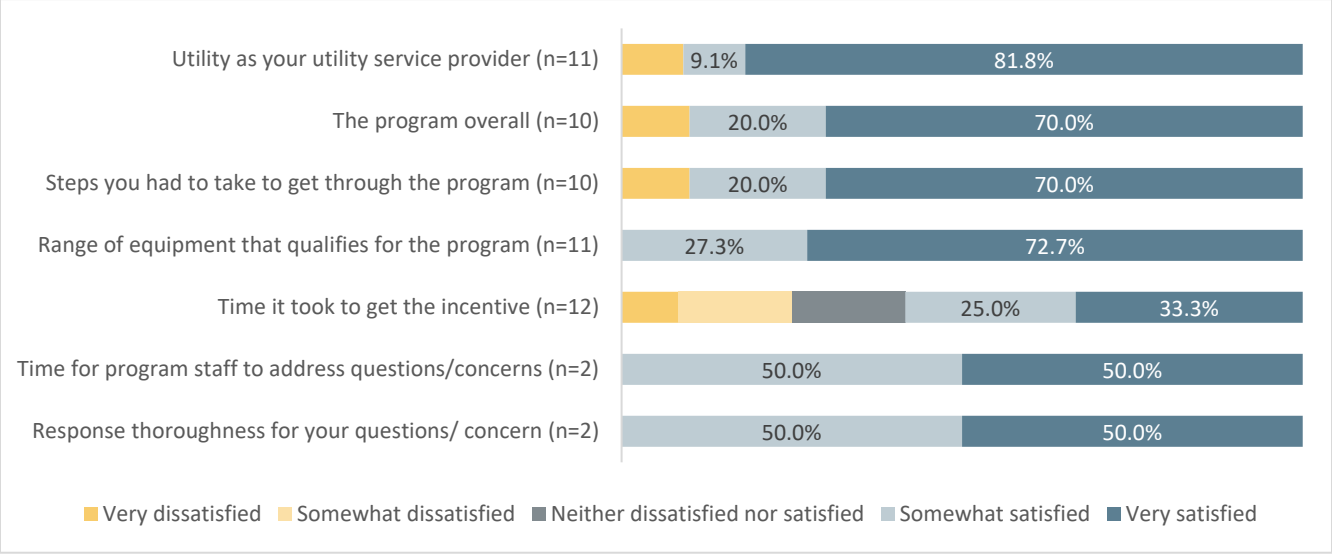


Figure 5-4: Water Heater Respondent Satisfaction

5.3 Impact Evaluation

5.3.1 Space Heating

The impact evaluation effort of the Space Heating measures included the following:

- *Commercial Verification*. The Evaluators applied TRM V8.2 deemed savings parameters in assessing savings of the commercial component.
- *Free-Ridership Estimation.* The Evaluators utilized NTGR estimates developed in PY2020.

Energy savings calculation protocols for commercial furnaces are summarized in Appendix C.

5.3.2 Water Heating

For the equipment rebates component, savings were calculated using methodologies detailed in Section 3.3.1 of the TRM Version 8.2 for commercial applications. The details of this methodology are presented in Appendix C.

5.3.3 Commercial Desk Review Findings

In past program years, the data submitted by CenterPoint to the Evaluators was often missing energy savings inputs (such as units of production or square feet) and the evaluation of the program necessitated large-scale data collection by the Evaluators to support deemed savings estimates. This was improved significantly in PY2021, with CenterPoint collecting the required inputs for over 90% of commercial projects.

The approaches used for projects with missing inputs were as follows:

- **Residential housing under commercial meter:** these premises had savings calculated using protocols detailed in Section 2.3.1 of the TRM V8.2. Though they are on a commercial meter, if it is a space intended for residential occupancy the residential protocols are appropriate to establish baseline and DHW load.
- **Commercial facilities with a square foot multiplier available in the TRM:** for these facility types[22] the Evaluators first searched for public records detailing facility square footage. This was found documented in building permit and realtor records. If this was not available, facility square footage was instead measured using Google Maps and street view mode. This was feasible for buildings without significant roof space covered by foliage and for buildings with a rectangular shape. Street view was used to confirm the number of stories for the premise.
- **Commercial facilities using per unit multipliers:** some facilities had researchable production units:
    a. **Hotel / Motel:** The Evaluators were able to identify the number of rooms available through publicly available information (typically hotel marketing collateral)
    b. **K-12 Education:** The Evaluators were able to research publicly available enrollment totals to apply the per-student multipliers.
    c. **Dormitories:** The Evaluators were similarly able to research number of dormitory beds available at university facilities that participated.

5.3.4 Net Savings Estimation

Figure 5-5 summarizes the scoring mechanism for commercial free ridership.

[22] AR TRM V8.2 Vol. 2 Table 346, Pg. 362

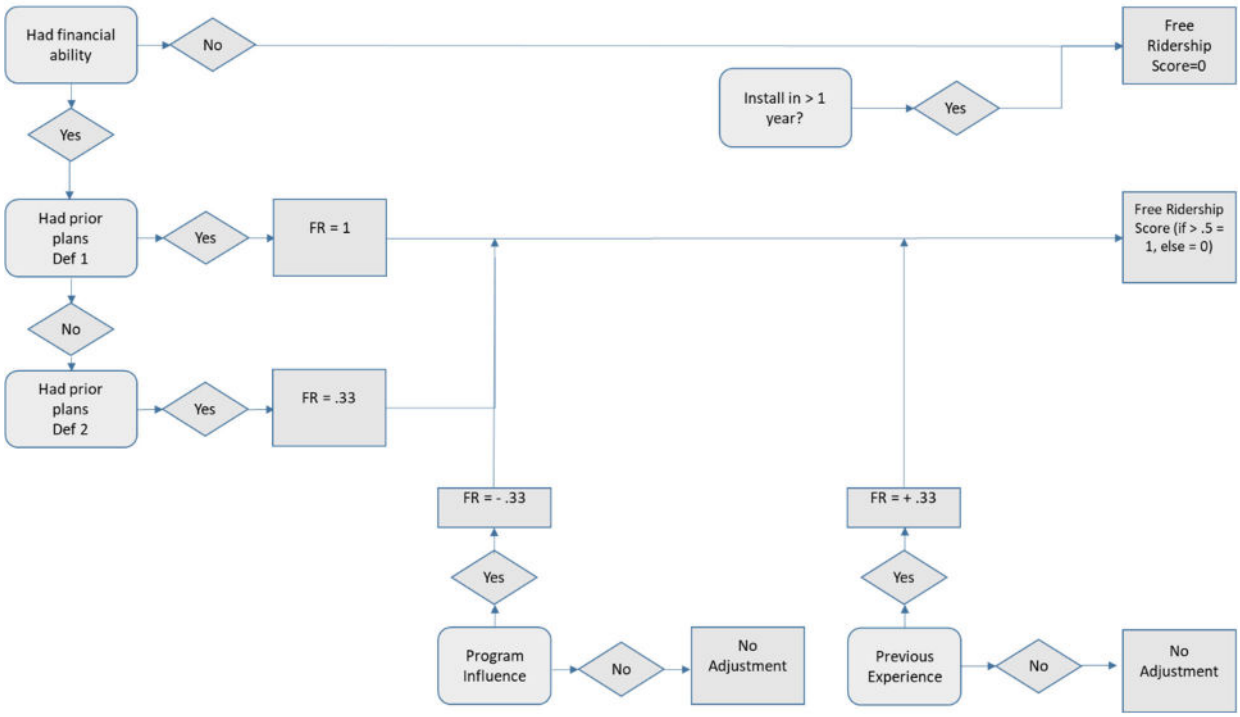


Figure 5-5: Nonresidential Free ridership Scoring Flow Chart

The resulting NTGRs from PY2020 surveys were 76.2%.

5.3.5 Verified Savings

Gross Therms are summarized in Table 5-7. Net therms are summarized in Table 5-8.

Table 5-7: Gross Therms Savings

Measure	Ex Ante Gross Therms	Ex Post Gross Therms	Gross Realization Rate	Lifetime Therms Savings
Furnace	69,071	79,847	115.6%	1,578,331
Smart Thermostat	1,052	1,052	100.0%	11,837
Water Heater	59,640	68,441	114.8%	1,318,382
Total	**129,763**	**149,340**	**115.1%**	**2,908,550**

Table 5-8: Net Therms Savings Summary

Measure	Free Ridership		Ex Ante Net Therms	Ex Post Net Therms	Net Realization Rate	Lifetime Therms Savings
	Ex Ante	Ex Post				
Furnace	24.7%	21.4%	51,989	62,745	120.7%	1,212,446
Smart Thermostat	12.5%	12.5%	920	920	100.0%	10,125
Water Heater	11.8%	23.8%	52,623	52,166	99.1%	1,033,364
Total	**18.7%**	**22.4%**	**105,533**	**115,831**	**109.8%**	**2,255,935**

Commercial furnaces had 120.7% net realization. This estimate included commercial furnaces that are in residential end-uses under a commercial meter (such as master-metered multifamily and single family). The higher realization rate is due to the Evaluators reassigning the furnace baseline AFUE from 0.80 to 0.78.

For commercial end-use water heaters, net realization was 99.1%. Many units were missing volume of use inputs and did not have a calculated ex ante savings value. The Evaluators collected the input data required for all water heaters in the program, as described in Section **Error! Reference source not found.**.

5.3.6 Non-Energy Benefits Summary

5.3.6.1 Commercial Tankless Water Heaters.

Commercial tankless water heaters have an EUL of 20 years. The baseline system has an EUL of 15 years. This makes the systems eligible for the Avoided Replacement Cost Non-Energy Benefit. This NEB was calculated using the IEM calculation tool[23]. The input assumptions were as follows:

- Full installed cost of tankless system: $1,219
- Full installed cost of baseline storage tank system: $614
- Nominal Discount Rate: 5.7%
- Inflation Rate: 1.9%
- Real Discount Rate: 3.7%

[23] Protocol L Avoided & Deferred Replacement Cost_08_31_16.xlsx

The resulting deferred replacement cost is $140.91 per unit. This is then scaled by the project NTG ratio. The calculator for this is provided in Appendix B of this report.

There were 279 commercial tankless systems rebated in PY2021, and the resulting net ARC value is $$29,965.

5.3.6.2 Smart Thermostats

The program rebated eleven smart thermostats. A large portion of the thermostats were installed in commercially metered single-family buildings and in schools, each accounting for 5 smart thermostats each. The remaining smart thermostat was installed in a small office. The smart thermostats had TRM V8.2 residential smart thermostat inputs used to estimate energy savings. Net kWh from this is as follows:

- 12,719 annual kWh;
- 0 kW; and
- 139,907 lifetime kWh.

The kWh savings resulted in an additional $3,560 in TRC benefits.

5.4 Conclusions

Tracking data for water heaters has improved significantly.	In PY2020, the Evaluators had to develop DHW load inputs for over 80% of commercial projects. In PY2021, this was only required for a total of 8 projects (3% of total projects). CenterPoint attributes this to the addition of a new staff member that is responsible for this data collection.
The program has ARC NEBs from tankless water heaters.	They are lower than observed for residential tankless systems, however, due to a lower volume of units and that the baseline system has an EUL of 15 years, compared to 11 years for residential systems. Further, there was significant participation from master-metered multifamily units which have ARC values similar to residential participants (differing solely by NTGR).
The program performed significantly well in PY2021.	In PY2021, overall program realization was 115%. Compared to PY2020, the program experienced a significant increase in both participation and claimed savings, achieving a 168% increase in participation and a 60% increase in claimed savings.

5.5 Recommendations

Engage the Evaluators earlier when there are ambiguities in water heater calculation inputs for certain facilities that don't have explicitly deemed inputs per AR TRM 8.2.	There are examples of facility reclassifications that are reasonable; the Evaluators found that 5 commercial laundry facilities that were missing inputs needed to calculate daily hot water usage. The Evaluators reviewed the facilities and reassigned the majority as 'Health Clinic' based on deemed water usage. This may also identify facilities that require custom billing analysis approaches.

6 Commercial Boiler Program

The Commercial Boiler Program provides incentives for boilers and boiler controls used in HVAC applications. Eligible measures include:

- $1,800/MMBtuh input for boilers that are 83% - 91.9% efficient;
- $3,500/MMBtuh input for boilers that are 92% efficient or greater; and
- $1,000/MMBtuh for Burner replacement – 6 step modulation or fully modulating.

In addition, trade ally incentives range from $200 to $300 per unit.

The Commercial Boiler Program is targeted at large commercial facilities using boilers in HVAC applications. Boilers serving process loads are required to enter the custom component of the Commercial Boiler Program.

6.1 Program Overview

The Commercial Boiler Program began in 2010. The program is designed to incentivize the purchase of high-efficiency HVAC boiler equipment. This program originally included boilers serving process loads, but with the development of the Arkansas TRM, HVAC boilers were set as prescriptive measures while process boilers require custom calculation. Given this, CenterPoint developed a separate custom program to cover non-HVAC loads.

The history of program performance and expenditures is presented in Table 6-1.

Table 6-1: Commercial Boiler Program Historical Performance against Goals

Program Year	Budget			Net Therms		
	Spent	Allocated	%	Achieved	Goal	%
2010	$334,785	$380,074	88%	16,988	171,304	10%
2011	$220,321	$377,967	58%	24,845	128,277	19%
2012	$221,585	$464,618	48%	100,322	371,696	27%
2013	$184,937	$551,650	34%	65,390	580,890	11%
2014	$150,113	$551,661	27%	21,213	92,160	23%
2015	$259,477	$251,650	103%	80,476	92,160	87%
2016	$232,857	$251,650	93%	67,491	92,160	73%
2017	$234,592	$329,879	71%	55,756	83,740	67%
2018	$225,907	$329,496	69%	52,335	83,735	63%
2019	$306,128	$329,301	93%	100,802	83,735	120%
2020	$305,235	$270,444	113%	82,962	59,710	139%
2021	$260,602	$270,474	96%	70,934	57,585	123%

6.2 Participation Summary

In PY2021, the Commercial Boiler Program had 15 participants received 25 boiler rebates.

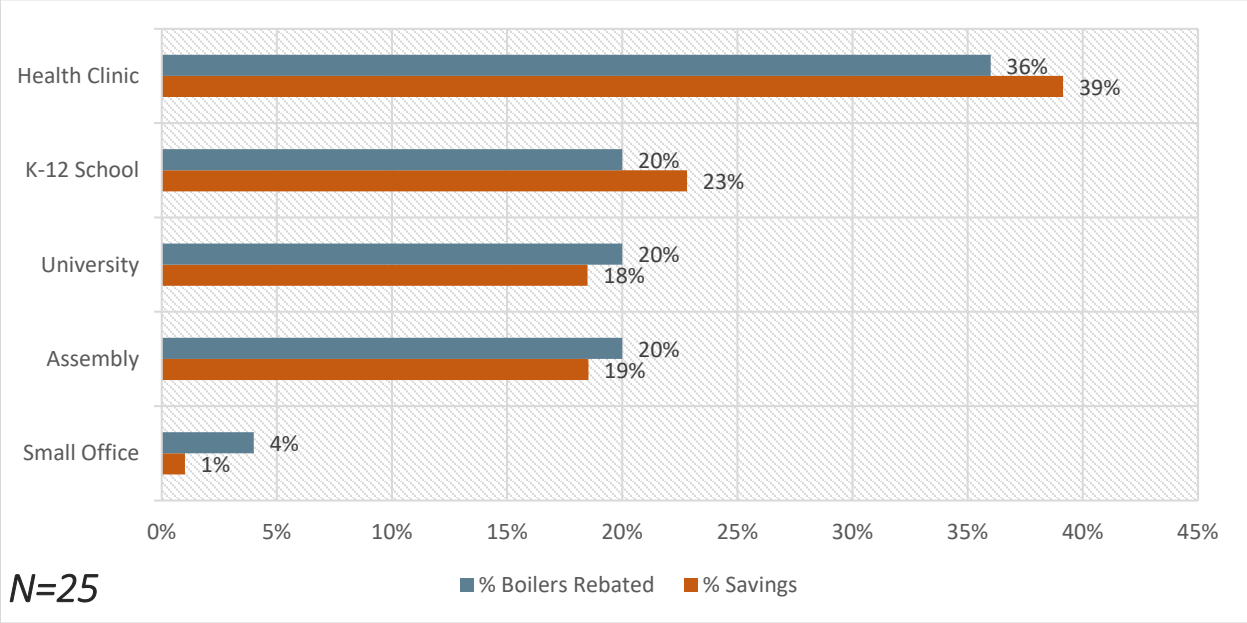


Figure 6-1 summarizes the Commercial Boiler Program participation by facility type.

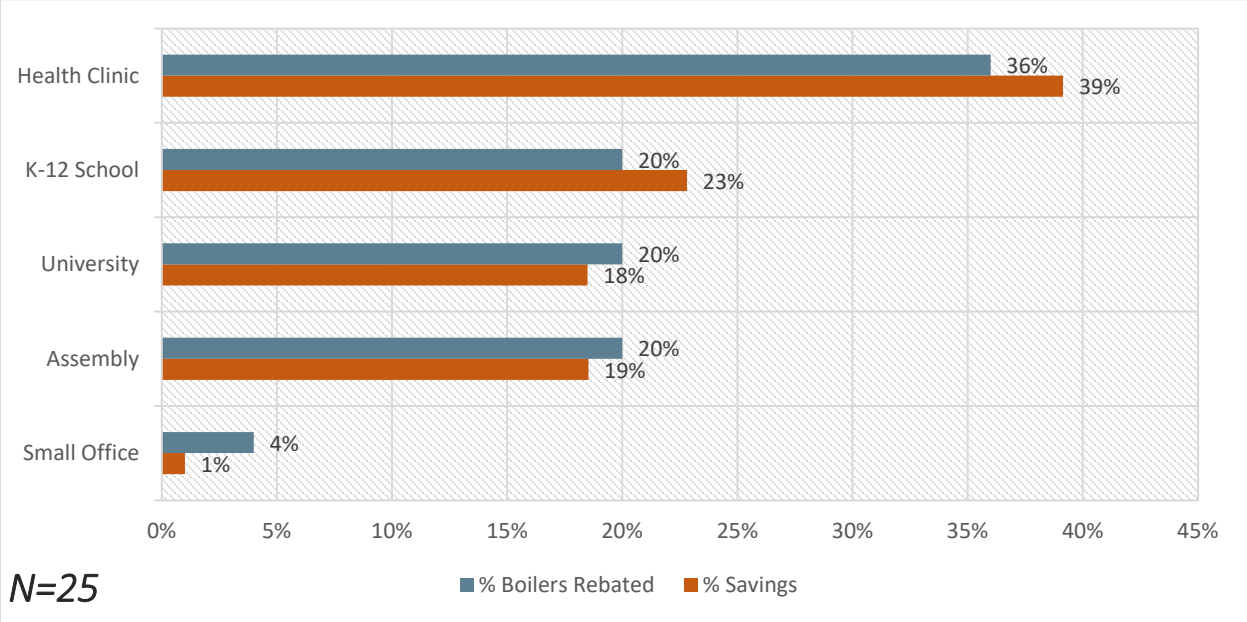


Figure 6-1: C&I Boiler Equipment Participation by Facility Type

Participants in the "Assembly" category included museums and country clubs. All rebates were boiler replacement. Seventy-nine percent of these rebated boilers were a minimum of 92% efficient, qualifying for the higher program incentive of $3,500/MMBtuh.

6.3 Commercial Boiler Program Process Evaluation

Table 6-2 and Table 6-3 summarize the Evaluators' review of the Commercial Boiler Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 6-2: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is implemented in the same manner as PY2020.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in 2012 and 2013, and process overviews in 2014, and 2020.
New Vendor or Contractor	No. The program has been run internally by CenterPoint since program inception in 2010.

Table 6-3: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No. The program exceeded goals in PY2020.
Are the educational or informational goals not meeting program goals?	No. The program has successfully engaged trade allies.
Are the participation rates lower or slower than expected?	No. The program exceeded goals in PY2020.

Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. Prior process evaluations found that operational and management structure to be up to speed and efficient in administering the program.
Is the program's cost-effectiveness less than expected?	No, the program's cost-effectiveness was within expected boundaries.
Do participants report problems with the programs or low rates of satisfaction?	No. Prior participant surveys found exceedingly high satisfaction levels.
Is the program producing the intended market effects?	No. There are several areas of this market not reached by the program.

The program received a limited process evaluation in PY2021.

6.3.1 Data Collection Activities

The process evaluation of the Commercial Boiler Program included the following data collection activities:

- *CenterPoint Program Staff Interviews*. The Evaluators interviewed staff at CenterPoint involved in the administration of the Commercial Boiler Program. These interviews were to collect information from program staff as to any changes or developments, as well as response to program recommendations.

Table 6-4 summarizes the data collection for this process evaluation effort. This includes the titles, role, sample sizes, timeframe of data collection.

Table 6-4: CenterPoint Commercial Boiler Program Data Collection Summary

Target	Component	Activity	N	Achieved Sample Precision	Role
CenterPoint Program Staff	Manager, Conservation Improvement Program Implementation	Interview	1	N/A	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with overall coordination of utility resources.
	Senior Energy Efficiency Consultant	Interview		N/A	The Energy Efficiency Consultant at CenterPoint is responsible for much of the

					day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.

6.3.2 Process Results & Findings

This section will present the results and key findings from the data collection activities. These findings are based upon interviews with utility staff, implementation staff, and surveys with participants, and a literature review.

6.3.3 Response to Program Recommendations

Table 6-5 summarizes the status of issues and recommendations identified in the PY2020 process evaluation.

Table 6-5: Commercial Boiler Response to PY2020 Recommendations

Recommendation	CenterPoint Response	Status of Issue
Consider an increased funding level for the program.	The boiler program has been oversubscribed in PY2020 and 2021 so increasing the rebate amount would only reduce the amount of potential participants. When program participation starts to decline, an increase in the rebate amount will be considered.	Rejected

6.3.4 Program Design Changes

No changes were made to the program in 2021.

6.3.5 Adherence to Protocol A

CenterPoint maintains an internal tracking system based on the SAP platform.

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM V8.2. The Evaluators previously reviewed program tracking data in PY2020 to assess its compliance with Protocol A of the AR TRM V8.2 which specifies that tracking data should be checked for:

- Participating Customer Information;
- Measure Specific Information;
- Vendor Specific Information;
- Program Tracking Information;
- Program Costs; and
- Marketing & Outreach Activities.

6.3.5.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for all projects.
- Projects contained complete information on the contractor that completed the installation.
- Weather zones were provided in the tracking data.
- All inputs needed to re-calculate savings according to TRM V8.2 protocols were present in the database.

6.3.5.2 Measure Specific Information

The content of tracking data was found to include sufficient information for all measures in PY2020. The Evaluators found the tracking data to contain all data needed to recreate TRM V8.2 deemed savings calculations.

6.4 Commercial Boiler Program Impact Evaluation

Savings calculations were reviewed to validate compliance with TRM V8.2 protocols. The Evaluators to verify energy savings through two ways: a desk review adhering to methods outlined in AR TRM V8.2; and through linear regression billing analysis.

6.4.1 Commercial Boiler Program Energy Savings Calculations

Therms savings calculations for commercial boilers require facility type, weather zone, and baseline efficiency. Baseline efficiency for boilers is detailed in Table 6-6.[24]

[24] Arkansas TRM V8.2 Pg. 255-260

Table 6-6: Commercial Boiler Minimum Efficiency Levels

Project Type	Size Category (BTU/hr.)	Subcategory	Minimum Efficiency
Replace-on-Burnout	< 300,000	Hot Water	82% AFUE
		Steam	80% AFUE
	> 300,000 and ≤ 2,500,000	Hot Water	80% E_t
		Steam	79% E_t
	>2,500,000	Hot Water	82% Ec
		Steam	79% E_t
Early Retirement	< 300,000	Hot Water	80% AFUE
		Steam	75% AFUE
	> 300,000 and ≤ 2,500,000	Hot Water	75% E_t
		Steam	75% E_t
	> 2,500,000	Hot Water	80% Ec
		Steam	79% E_t[25]

Savings for commercial boilers are calculated as[26]:

$$Therms\ Savings = \frac{BTU\ Capacity * EFLH_H * \left(\frac{1}{Effic_{pre}} - \frac{1}{Effic_{post}}\right)}{100{,}000\ Therms/BTU}$$

The EFLH for a facility is a function of facility type and weather zone. The EFLH values from TRM V8.2 are summarized in Table 6-7.

Table 6-7: Commercial EFLH Values

Building Type	Zone 6	Zone 7	Zone 8	Zone 9
Assembly	615	854	915	1,032
College/University	674	936	1,002	1,130
Fast Food Restaurant	287	439	472	549
Full Menu Restaurant	178	321	362	438
Grocery Store	692	941	1,001	1,129
Health Clinic	641	878	915	1,045
Lodging	391	589	637	722
Large Office (> 30k SqFt)	816	1,020	1,060	1,157

[25] Arkansas TRM V8.2, Pg. 257

[26] Ibid

Small Office (≤ 30k SqFt)	351	534	564	644
Religious Worship	575	798	854	963
Retail	781	1,043	1,133	1,287
School	777	1,030	1,094	1,236

For example, if a Grocery Store in Little Rock (Zone 7) installed an 800,000 BTU 96% efficient hot water boiler that was a replacement on burnout, the resulting Therms savings are calculated as:

$$Therms\ Saving = \frac{800{,}000\ BTU * 941\ EFLH * \left(\frac{1}{.80} - \frac{1}{.96}\right)}{100{,}000\ BTU/Therm} = 1{,}568\ Therms$$

CenterPoint correctly calculated energy savings in accordance with TRM V8.22protocols.

6.4.1.1 Commercial Boiler Program Commercial Free-Ridership

There were no significant changes in program delivery in PY2021, and as a result the Evaluators opted to apply the ex-ante NTGR of 80.28%.

6.4.2 Verified Therms

Table 6-8 and Table 6-9 present the gross and net savings results of the evaluation of the PY2021 Commercial Program.

Table 6-8: Commercial Boiler Program Extrapolated Therms Savings

Equipment Type	Expected Therms Savings	Verified Therms Savings	EUL	Realization Rate
Boiler	88,359	88,359	20	100.00%
Burner	0	0	12	-
Total	88,359	88,359	-	100.00%

Table 6-9: Commercial Boiler Program Extrapolated Therms Savings

Net-to-Gross Ratio		Net Annual Savings		Net Realization Rate	Net Lifetime Therms Savings
Ex-Ante	Ex-Post	Ex-Ante	Ex-Post		
80.28%	80.28%	70,934	70,934	100.00%	1,418,685

6.5 Conclusions

The program met its savings goal.	In PY2021, the Commercial Boiler CIP reached 139% of its net savings goal.
CenterPoint accurately calculates savings per TRM V8.2 protocols.	All projects at 100% gross realization. CenterPoint's tracking system accurately adjusts baseline to align with code requirements by size category and boiler type.
There was no participation in the lower efficiency tier.	As found in the prior two program years, there was no participation in the 85%-92% efficiency tier.

6.6 Recommendations

The Evaluators have no recommendations for this program.

7 Commercial and Industrial (C&I) Solutions Program

The C&I Solutions program is directed at developing and incenting custom energy efficiency projects for which deemed values are not applicable or feasible. It is implemented by CLEAResult Consulting on behalf of CenterPoint. CLEAResult handles program administration, marketing and outreach, direct install of water conservation measures and weather stripping, and technical review of custom efficiency projects. Program participants are provided:

- No-cost direct installation of low flow faucet aerators, showerheads, door air infiltration, pre-rinse spray valves (PRSVs), steam traps, and DrySmart controls;
- $.70 per therm for custom projects; and
- $.90 per therm for custom projects for customers using less than 200,000 Therms per year.

7.1 C&I Solutions Program Overview

The C&I Solutions program began in September 2011. The program is designed to provide no-cost direct installation of water saving and air infiltration measures, energy audits, and incentives for custom projects to large commercial and industrial customers. The C&I Solutions program's historical performance is summarized in Table 7-1.

Table 7-1: C&I Solutions Program Historical Performance against Goals

Program Year	Budget			Net Therms		
	Spent	Allocated	%	Achieved	Goal	%
2011	$1,047,763	$1,152,104	91%	500,906	451,808	111%
2012	1,102,780	$1,257,083	88%	549,005	521,072	105%
2013	$1,643,311	$1,811,073	91%	1,220,261	1,020,310	120%
2014	$1,788,563	$1,811,074	99%	1,019,296	1,020,310	100%
2015	$2,194,215	$2,211,074	99%	1,224,628	1,320,150	93%
2016	$1,989,847	$2,211,074	90%	1,273,739	1,320,150	97%
2017	$2,573,025	$2,688,568	96%	1,505,052	1,534,490	98%
2018	$2,874,811	$2,738,688	105%	1,589,563	1,604,492	99%
2019	$2,869,734	$2,744.123	105%	1,614,082	1,604,491	101%
2020	$2,928,574	$3,080,171	105%	1,696,653	1,528,450	111%
2021	$2,954,470	$3,079,053	104%	1,983,043	1,528,458	130%

The C&I Solutions program participants fall into one of three categories:

- Direct install;

- Custom audit recipients; and
- Closed custom projects.

In 2021, custom projects accounted for 71.8% of program savings and direct install accounted for 28.2%. These participants are detailed in the subsections to follow.

7.1.1 Direct Install Participation Summary

In PY2021, 81 facilities participated in the direct install component of C&I Solutions.

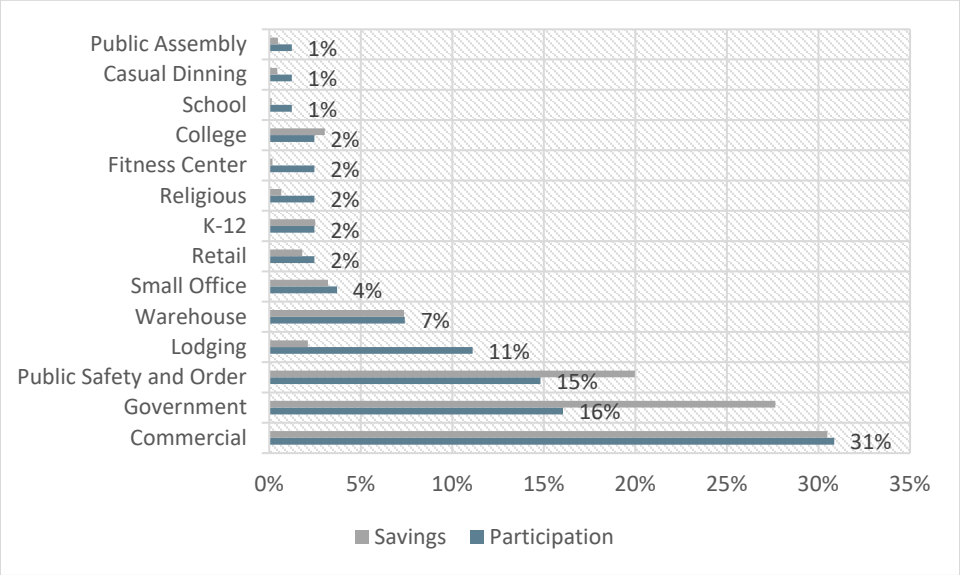


Figure 7-1 summarizes the participation by facility type, quantified in percent of participating facilities as well as percent of total savings.

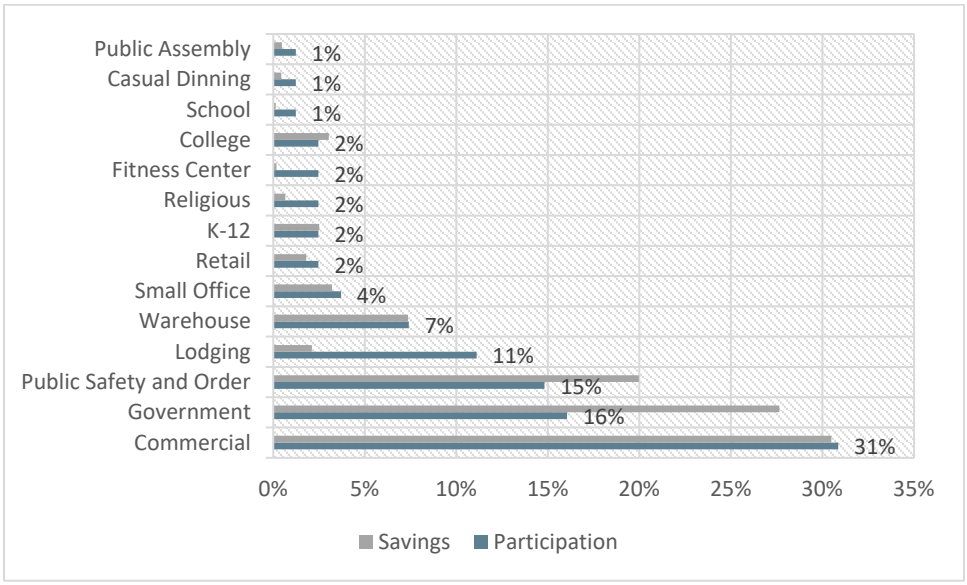


Figure 7-1: C&I Solutions Direct Install Participant Summary

The bulk of program savings were from Commercial facilities and Government buildings. These groups accounted for 58% of direct install savings.

7.1.2 Closed Custom Project Participation Summary

Table 7-2 summarizes completed custom projects for the PY2021 C&I Solutions program.

Table 7-2: Large Custom Project Participation Summary

Facility Type	Project ID	Measure	Therms Savings
Construction*	EA-0000369204	Regenerative Thermal Oxidizer	186,402
Medical	EA-0000362761	Insulation	214,574
Food Processing	EA-0000375753	Steam Trap Replacement	24,862
		Insulation	59,808
Food Processing	EA-0000370109	Steam Valve Controls	140,917
	EA-0000370109	Insulation	2,927
Food Processing	EA-0000442396	Insulation	17,462
Manufacturing	EA-0000362773	Boiler Replacement	160,097
		Steam Generator	348,141
		Boiler Economizer	397,257
Food Processing	EA-0000583141	Insulation	14,326
Multifamily	EA-0000367728	Aerators	1,112
		Showerheads	3,602
Religious Worship*	EA-0000362776	HVAC Controls	311
		HVAC Air Handling Units	325
Medical	EA-0000419516	Insulation	5,213
		Boiler Replacement	6,742
		Steam Trap Replacement	4,915
Denotes a partial savings claim that began in PY2020 and was finalized in PY2021			

Savings within the custom component are presented by facility type in Figure 7-2.

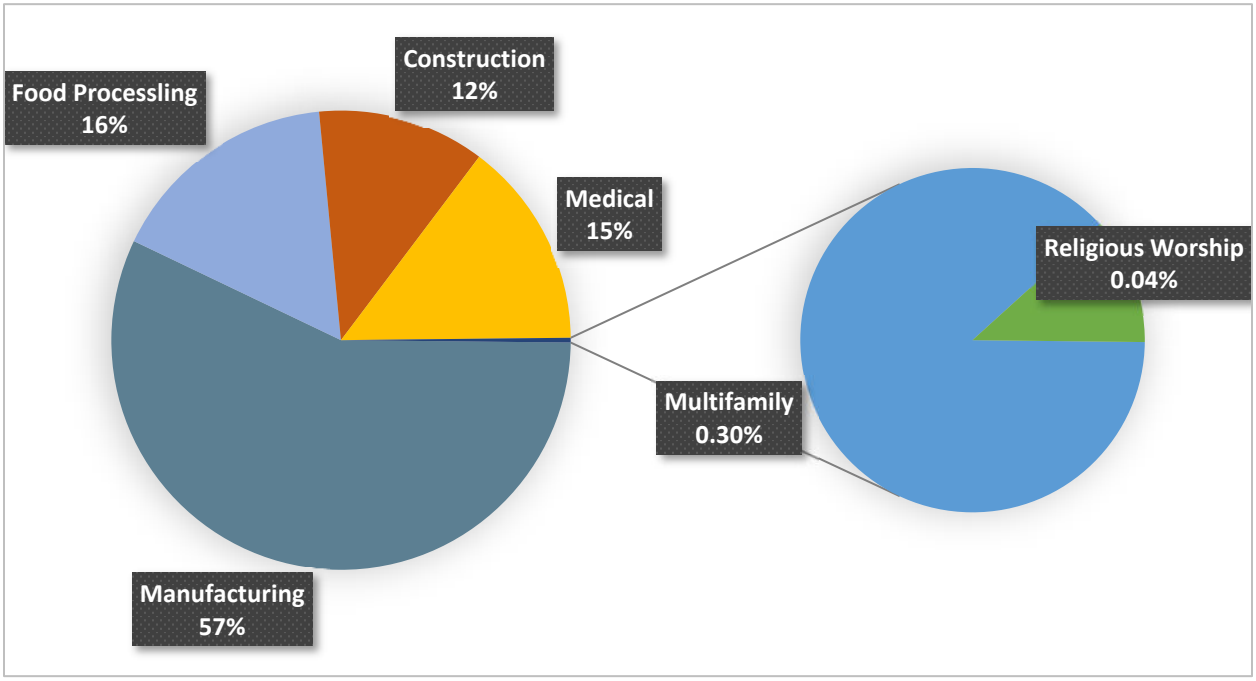


Figure 7-2: C&I Solutions Share Custom Savings by Facility Type

7.2 C&I Solutions Process Evaluation

The Evaluators conducted a formal process evaluation of the C&I Solutions Program in 2017 and found that the program was successful in meeting participation, savings, and satisfaction goals. Table 7-3 and Table 7-4 summarize the Evaluators' review of the C&I Solutions Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 7-3: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is unchanged from PY2020.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in the prior cycle and a partial process evaluation in PY2020.
New Vendor or Contractor	No. The program has been implemented by CLEAResult since 2011.

Table 7-4: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No. The program met savings goals in PY2020.
Are the educational or informational goals not meeting program goals?	No. The program has an established trade ally network.
Are the participation rates lower or slower than expected?	No. The program met participant goals in PY2020.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. Prior process evaluations found that operational and management structure to be up to speed and efficient in administering the program.
Is the program's cost-effectiveness less than expected?	No. The program's cost-effectiveness vastly exceeded expectations.
Do participants report problems with the programs or low rates of satisfaction?	No. Participant surveys found exceedingly high satisfaction levels.
Is the program producing the intended market effects?	Yes. Interviews with participants and trade allies have shown market transformation is occurring.

A partial process evaluation was conducted in for PY2020.

7.2.1 Data Collection Activities

The process evaluation of the C&I Solutions Program included the following data collection activities:

- *Program Actor In-Depth Interviews*. The Evaluators conducted in-depth interviews with a series of program actors. These interviews covered a range of topics, including marketing efforts, feedback on program delivery, an assessment of barriers to program implementation and success, and recommendations for program improvement. Program Actors interviewed include:
  - *CenterPoint Program Staff*. The Evaluators interviewed staff at CenterPoint involved in the administration of the C&I Solutions Program. These interviews built upon interviews conducted in PY2020, keeping apprised of CenterPoint's involvement as the C&I Solutions Program develops.
  - *Third Party Implementation Staff Interviews.* The Evaluators conducted interviews with CLEAResult involved with the C&I Solutions Program. These interviews addressed the development of the program over PY2021as well as CLEAResult's perspective on a variety of implementation issues, including

conversion of audits to completed projects and the process flow for direct install and custom projects.

- *Participant Surveying*. A census of custom participants and a sample of direct install participants were surveyed for this evaluation effort. These surveys included net-to-gross and process issues. The surveys provided valuable data for this process evaluation effort, providing participant feedback as to their program participation, recommendations for program improvement, and insight into the decision-making process of CenterPoint's commercial and industrial customers.

Table 7-5 summarizes the data collection for this process evaluation effort. This includes the titles, role, sample sizes, timeframe of data collection.

Table 7-5: CenterPoint C&I Solutions Data Collection Summary

Target	Component	Activity	n	Role
CenterPoint Program Staff	Manager, Conservation Improvement Program Implementation	Interview	1	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with the CIS Program in the overall coordination of utility resources.
	Senior Energy Efficiency Consultant	Interview	1	The Energy Efficiency Consultant at CenterPoint is responsible for much of the day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.
CLEAResult Staff	Program Manager	Interview	1	Program Manager oversees the program implementation for CenterPoint and AOG, handling cross-cutting issue. The Program Manager also handles day-to-day operations, including tracking of outreach and implementation activities, payments for direct installation, and interfacing with Evaluation staff.
Program Participants	Custom Participants	Project M&V & Interviews	13	Project M&V comprised validation of savings from custom projects using IPMVP options.

7.2.2 Process Results & Findings

This section will present the results and key findings from the data collection activities. These findings are based upon interviews with utility staff, implementation staff and surveys with participants.

7.2.2.1 Response to Program Recommendations

Evaluators did not provide any recommendations for the C&I Solutions Program in 2020.

7.2.2.2 Program Theory & Design

The C&I Solutions Program was designed to provide outreach in hard-to-reach sectors of the C&I markets. The main bullets below list program activities and their expected outcomes as determined through prior process evaluations.

- **Direct installation of high-return measures.** The C&I Solutions program provides no-cost direct installation of door sweeps, low flow faucet aerators, pre-rinse spray valves, showerheads, and steam traps. These measures have a high return of savings relative to their cost and as such can be provided free-of-charge and remain cost-effective. The provided savings are unlikely to occur absent the program; generally, if a respondent does not already have the equipment in place, the direct install activities induce an action that was not planned. It is also the intention that these activities will serve as an introductory teaser to energy efficiency for the recipients, and that they will then be further interested in participating in the custom component of the program.
- **Energy audits to medium and large customers.** These audits are conducted by CLEAResult staff, providing recommendations for energy efficiency improvements and an audit report. These audits are intended to generate the bulk of the program savings, yielding high-return custom projects.
- **Incentives for custom measures.** The C&I Solutions Program provides incentives of $0.70 per Therm for verified savings from custom projects completed by large commercial and industrial customers. Incentives for small businesses receive $0.90 per Therm. These projects may be driven by a program-funded audit, generated by a trade ally, or be customer-directed.
- **Referral to CenterPoint prescriptive programs.** There are instances where the CLEAResult audit identifies energy savings opportunities that qualify for a prescriptive incentive from one of the above-mentioned programs. In these instances, the project is referred to the appropriate program and savings are not credited to the C&I Solutions Program.

7.2.2.3 Program Administration

The C&I Solutions program is overseen by a Senior Energy Efficiency consultant at CenterPoint. This consultant's responsibilities primarily include interfacing with CLEAResult, who directly implements the program. Other activities by this consultant include providing updated customer lists to CLEAResult to better facilitate their implementation, review of custom applications, and at times assisting CLEAResult in customer interactions. This consultant also oversees CenterPoint's Commercial Boiler and Commercial Food Service CIPs.

Internally, this consultant is supported by Energy Efficiency Engineers from CenterPoint's Minnesota office. These engineers are responsible for custom program implementation in Minnesota and assist the Arkansas team by providing separate review of custom project M&V plans and reports. The program is further supported by rebate processing staff at CenterPoint who handles incentive payments and provide the rebate checks to custom participants at the close of the projects.

At CLEAResult's end, the program overall is led by the Senior Director, who oversees the implementation of the C&I Solutions Program for all three AR natural gas utilities. This director handles high-level issues across the programs, including regulatory compliance and reporting, as well as some level of intervention on the larger projects.

Much of the day-to-day activity is handled by the Program Manager, who reviews direct install and audit activity, and coordinates with the Evaluators in facilitating EM&V activities.

Audit activities are run by engineering staff at CLEAResult. Titles for staff that engage in this activity may vary depending upon the complexity of the facility[27]. These engineers conduct the energy audits. Additionally, their responsibilities include development of the audit report and recommendations. The Direct Install Program Manager oversees crews that perform direct installation. Further, the Senior Account Manager follows up with customers to gauge interest in completing a project.

7.2.2.4 Program Implementation and Delivery

CLEAResult provides the Evaluators with updates regarding their pipeline of custom projects. These updates listed the full scope of facility audits, expected savings with associated recommended measures, and what stage the project was in. These stages are:

[27] Examples include (but are not limited to) Energy Engineer, Senior Energy Engineer, and Senior Program Consultant.

- *Pipeline*. Projects listed as Pipeline are in the first phase of involvement in the CISP. These participants are customers that have discussed the possibility of a facility audit and indicated interest to CLEAResult. These facilities will receive a Pre-Inspection at a later date and have not signed a project application.
- *Pre-Inspected*. Projects listed as Pre-Inspected are in the phase where CLEAResult has completed a facility audit. During these audits, CLEAResult conducts a comprehensive review of the facility's systems and operational practices. On this basis, CLEAResult then formulates initial recommendations for energy efficiency improvements. These are discussed with facility staff during the audit in order to address the feasibility of recommended measures.
- *Pre-Installation Calculation*. At this phase, CLEAResult is compiling high-level data needed to provide an initial estimate of energy savings. This step of the process compiles the information collected in the site audit, which are then used in the development of an Audit Report.
- *Audit Report Complete*. In this phase, feasible measures from the Pre-Inspection are compiled into a formal audit report, providing the participant with further detail as to the scope of the project, initial savings estimates, associated incentives, expected project costs, and the payback period of the measure. Additionally, should the measure provide operational benefits to the facility (such as improved comfort or product reliability), these are included as well to provide the customer with a full scope of the benefits of the project. This report is provided at no cost to the participant.
- *Project Application*. At this point, the customer has informed CLEAResult and CenterPoint that they intend to install a program-recommended measure. When this occurs, CLEAResult then involves the Evaluators. CLEAResult provides the Evaluators with an M&V plan for the facility, detailing the project scope and proposed data collection and analysis. The Evaluators' engineering staff then reviews the M&V plan and makes recommendations for any changes needed. A project application is then signed, in which the reserved incentive amount is detailed and reflects the estimated savings in the MV plan.
- *Post-Inspection*. This phase marks the completion of post-inspection for an installed measure. CLEAResult has, at this point, post-inspected a measure and revised savings accordingly if the installed project differs from the proposed project. In some instances, the participant may then be paid out for 40% of the reserved incentive, with the remainder held in reserve to true-up the final incentive amount after M&V is completed. There are times when this may occur for a project with an M&V period at extends across the calendar year. This occurs for a small number of projects overall. Otherwise, 100% of the incentive is paid upon approval from the Evaluator.

- *M&V*. M&V marks the phase when post-installation data is collected for an installed project to allow for calculation of a final savings estimate, from which the remaining incentive to the customer is determined. There are some measures that do not require post-retrofit data; for such measures, the M&V phase is short and requires completion of calculations based upon inputs verified during the Post-Inspection. For facilities that require post-installation data, the data collection period can range from 30 days to 12 months.
- *Complete*. Facilities marked as Complete have received their full incentive. As stated previously, 60% of the reserved funds for the incentive are available to pay the remaining incentive amount or 100% of the reserved funds are available to pay the incentive amount owed to the customer. If the verified savings are below the Project Application savings, the customer's incentive is reduced accordingly, to keep incentive levels at $.70 or $.90/therm (with higher incentives offered if a customer's annual use is less than 200,000 therms). If the verified savings are higher than the Project Application amount, CLEAResult and CenterPoint then see if there are available incentive funds left for the program year. If the program has available funds, the customer receives a total incentive higher than the initial agreement. If the funds are not available, the customer's incentive is capped at the Project Application amount.

The process flow for the C&I Solutions Program is displayed in Figure 7-3.

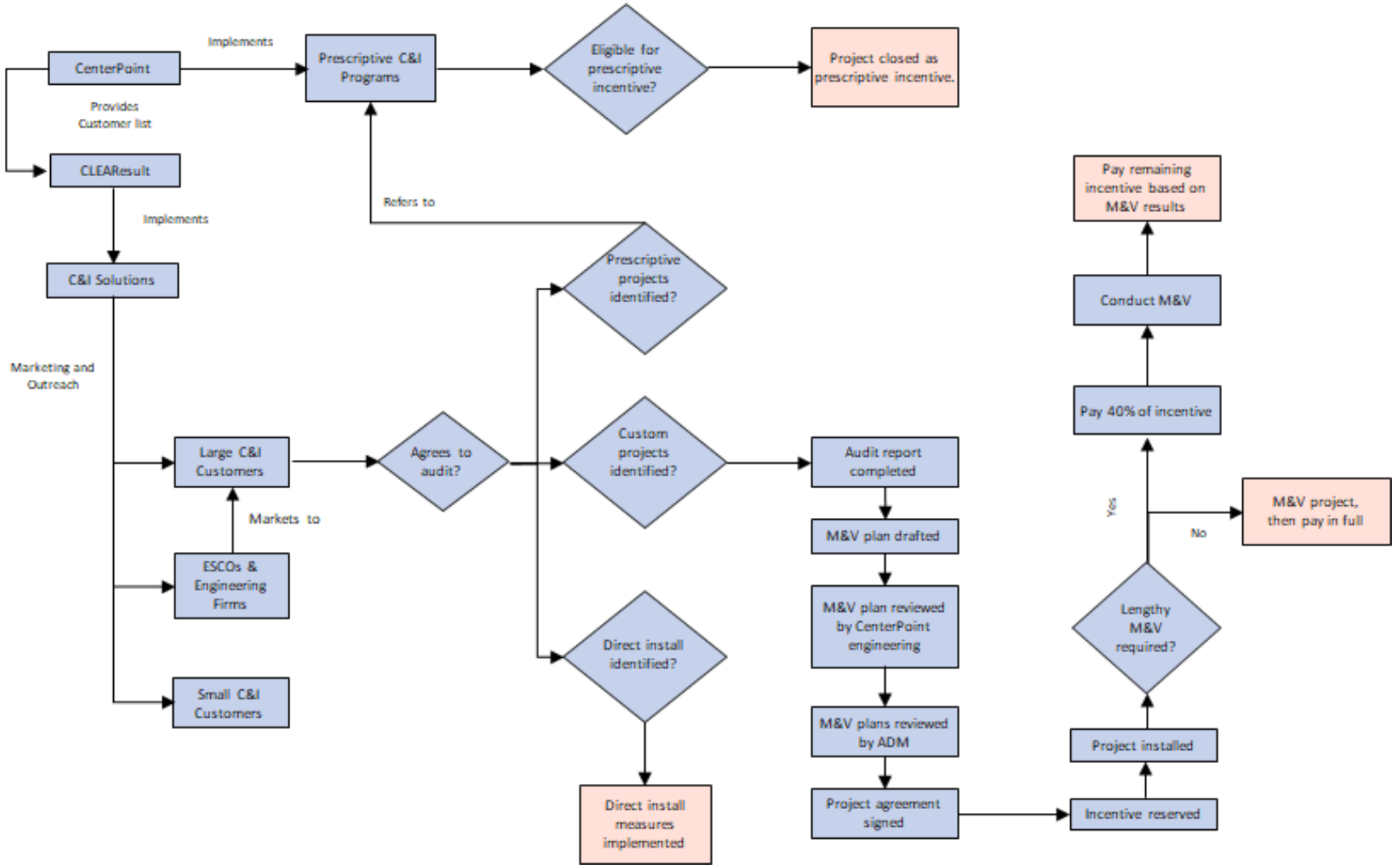


Figure 7-3: C&I Solutions Process Flow

7.2.3 Adherence to Protocol A

The CLEAResult tracking system contained full detail with project addresses, contact information, and measure inputs. Further, the tracking system provided the Therms savings for each line item.

During PY2021, the Evaluators received monthly tracking data updates as well as final tracking exports. There were no major updates to the structure or content of program tracking data. The Evaluators reviewed program tracking data in PY2021 to assess its compliance with Protocol A of the AR TRM V8.2 which specifies that tracking data should be checked for:

- Participating Customer Information;
- Measure Specific Information;
- Vendor Specific Information;
- Program Tracking Information;
- Program Costs; and
- Marketing & Outreach Activities.

The Evaluators conducted a review of each of the above factors within PY2021 tracking data except for marketing and outreach activities as these are outside the scope of the tracking system's reporting.

7.2.3.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.22. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for nearly all participants.
- Custom and prescriptive projects contained complete information on the contractor that completed the installation. This was not needed for direct install as this is done in-house with CLEAResult staff.
- Tracking data included the measure and project costs for each project.
- Weather zones were provided in the tracking data.
- All inputs needed to re-calculate savings according to TRM V8.2 protocols were present in the direct install database.

7.2.3.2 Measure Specific Information

The content of tracking data was found to include enough information for all measures in PY2021.

7.3 C&I Solutions Impact Evaluation

The impact evaluation of the C&I Solutions Program included the following:

- *Custom Project M&V*. The Evaluators conducted project-specific M&V on 11 of 11 custom projects completed through the C&I Solutions program. Each project included an M&V plan and project-specific report. The reports are provided in Appendix A.
- *Free-Ridership Estimation.* A free ridership rate for custom participants was estimated through participant surveying.
- *Participant Spillover*. Spillover was addressed for two customer classes: Participants and Partial Participants. Participants were surveyed for free ridership and process evaluation, and over the course of that survey are asked a series of questions addressing whether the C&I Solutions Program induced them to install other energy efficient equipment without program incentive. Additionally, the Evaluators asked these customers for an estimate of savings that they expect from these measures. This was supplemented with Partial Participant Surveying. Partial Participants are defined as those which received a facility audit and measure recommendations (with associated savings estimates). Samples of these participants were interviewed, and over the course of these interviews were asked if they installed any measures recommended through the program without having singed a Project Application or receiving an incentive.
- *Partial Participant Spillover*. The Evaluators define Partial Participants as those that received a facility audit but did not complete any projects through the C&I Solutions Program. Further, they must be considered "cold leads" by CLEAResult; there are many participants who receive an audit that have not installed measures but are still in regular contact with CLEAResult. Such participants were not contacted for this interview effort in that the Evaluators did not want to interfere with what are considered by implementation staff to be ongoing projects. The "cold leads" interviewed were asked a variety of questions regarding their reason for not following through with any of the recommended measures. Additionally, they were asked if they did in fact install any of the recommended measures from their audit without having participated. If the customer indicated having learned of the measure from their audit, the installation was then credited to the program as spillover.

7.3.1 Summary of Non-Energy Benefits

Table 7-6 summarizes the non-energy benefits by measure that will be credited to the C&I Solutions Program.

Table 7-6: C&I Solutions Non-Energy Benefits

Measure	Electric Savings	Water Savings	Propane Savings	Deferred Replacement Cost
Steam Leak Repair		✓		
Faucet Aerators		✓		
Low Flow Showerheads		✓		
Low Flow PRSVs		✓		
Weather Stripping	✓			
Custom Steam Control		✓		

7.3.1.1 Water Savings Calculation Procedure

The TRM V8.2 provides detail for calculation of water savings for the following measures:

- Faucet Aerators (3.3.2);
- PRSVs (3.8.11); and
- Low Flow Showerheads (3.3.5).

The deemed savings procedures for these measures require calculation of water savings, and the water savings claims comply with TRM protocols.

7.3.1.2 Electric Savings Calculation Procedure

Electric savings were claimed for commercial weather stripping in facilities served by municipal utilities and co-ops. For these projects, CenterPoint is credited with the cooling savings from weather stripping specified in AR TRM V8.2 Section 3.2.11.

7.3.2 C&I Solutions Direct Install Impact Evaluation

7.3.2.1 Deemed Savings Calculations

For examples TRM calculations, see Appendix C.

7.3.2.2 Direct Install Free-Ridership

The methodology for DI Free-Ridership was focused on the participants' past experiences with the appropriate equipment and whether they had organizational policies in place to install such equipment. Respondents were asked:

Q22. Before to participating in the C&I Solutions Program, did you have plans to install [LIST MEASURE]?

Q23 Would you have gone ahead with this planned project even if you had not participated in the program?

Twenty percent of respondents stated that they were aware of the savings potential from such equipment.

Q27 If the [PROGRAM] program representative had not recommended installing the [PROJECT_DESCRIPTION], how likely is it that you would have installed it anyway?

1. Definitely would have installed
2. Probably would have installed
3. Probably would not have installed
4. Definitely would not have installed

98. Don't know

These are combined into the following factors:

A. **Prior Plans:** If the respondent indicated plans to install prior to participation, they receive a "1" for this metric.

B. **Installation counterfactual:** If they respondent states that they would have gone ahead with this project without the program, they receive a "1" for this factor.

C. **Program Influence:** If a respondent states that they "Definitely would have" or "probably would have" installed this equipment without the program, they receive a "1" for this factor.

To be found a free rider, a respondent must receive a "1" score for all three factors. The direct install channel was found to have 100% NTGR.

7.3.2.3 Direct Install Spillover

No instances of spillover were identified among the C&I Solutions DI survey respondents.

7.3.3 C&I Solutions Custom Project Impact Evaluation

The Evaluators opted for a census of custom projects in order to capture the full variability associated with these projects; the measures are often unique with idiosyncratic issues, and as such extrapolation from the M&V of other projects would be inappropriate. Table 7-7 summarizes the custom projects completed and evaluated in PY2021. In this table, "Reserved Savings" are the savings used to determine the amount of incentive funds reserved for the project at the time of signing a Project Application. 40% of this amount may paid at the time of verification of installation, with the remaining held in reserve until the M&V of the project is complete. "Expected Savings" is the value calculated by CLEAResult after M&V. "Verified Savings" is the savings calculation completed by the Evaluators.

Table 7-7: CenterPoint C&I Solutions Large Custom Project Summary

Facility Type	Project ID	Measure	Expected Savings	Verified Savings	Realization Rate
Construction*	EA-0000369204	Regenerative Thermal Oxidizer	187,800	186,402	99%
Medical	EA-0000362761	Insulation	214,687	214,574	100%
Food Processing	EA-0000375753	Steam Trap Replacement	24,862	24,862	100%
Food Processing	EA-0000375753	Insulation	59,487	59,808	100%
Food Processing	EA-0000370109	Steam Valve Controls	140,917	140,917	100%
Food Processing	EA-0000370109	Insulation	2,927	2,927	100%
Food Processing	EA-0000442396	Insulation	17,489	17,462	100%
Manufacturing	EA-0000362773	Boiler Replacement	160,097	160,097	100%
Manufacturing	EA-0000362773	Steam Generator	397,257	397,257	100%
Manufacturing	EA-0000362773	Boiler Economizer	334,449	348,141	100%
Food Processing	EA-0000583141	Insulation	14,418	14,326	99%
Multifamily	EA-0000367728	Aerators	1,112	1,112	100%
Multifamily	EA-0000367728	Showerheads	3,602	3,602	100%
Religious Worship	EA-0000362776	HVAC Controls	311	311	100%
Religious Worship	EA-0000362776	HVAC Air Handling Units	325	325	100%
Medical	EA-0000419516	Insulation	5,215	5,213	100%
Medical	EA-0000419516	Boiler Replacement	6,742	6,742	100%
Medical	EA-0000419516	Steam Trap Replacement	4,908	4,915	100%
*Indicates a project that had a partial claim in PY2020 and had final true-up in PY2021					

Individual site reports detailing these analyses are provided in Appendix A. All custom projects were post-inspected with M&V as described the site-level analyses.

7.3.3.1 Custom Project Free-Ridership Methodology

The custom project free ridership methodology is more complicated than that of the DI participants, owing to the more complex nature of the projects and the effects of the facility audit and project incentive. The methodology used by the Evaluators in determining the free ridership rates for custom projects examined the following factors:

- *Knowledge gained from program outreach*. If the project originated from program outreach (which may include program-sponsored training courses or facility audits), the respondent is asked if they had prior knowledge of the energy-saving opportunity recommended and eventually installed. If the respondent learned of the measure through the program audit or program–sponsored training, then they are considered to not have been free riders, in that in the absence of the program, the likelihood of the

facility receiving a similarly detailed audit are low. Questions used in evaluating this criteria include:

FI-1 Prior to participating in the C&I Solutions Program, did your organization install any equipment similar to [EQUIPMENT/MEASURE] at your facility without financial incentives or rebates?

- ❑ Yes
- ❑ No

FI-1a Did you learn of this measure through your participation in the Commercial & Industrial Solutions Program?

- ❑ Yes [IF YES, ASK FI-1b] Do you recall how you learned of the measure?
- ❑ No

- *Prior plans for a similar measure*. This component is examined in instances where the respondent knew of the measure prior to receiving and technical assistance through the C&I Solutions Program. Respondents are asked a series of questions related to whether they had plans for installing this equipment prior to having learned of the available financial incentives from the C&I Solutions program. Questions used in this component include:

FI-2 Did you have plans to install the [EQUIPMENT/MEASURE] that was upgraded through C&I Solutions before participating in the program?

- ❑ Yes
- ❑ No

If Yes: FI-2a Would you have gone ahead with this planned installation without the program rebates?

- ❑ Yes
- ❑ No

FI-2b Would this installation have included the same equipment without the program rebates?

- ❑ Yes
- ❑ No

- *Analysis of measure payback*. Respondents are asked to indicate what their required payback period is for energy efficiency improvements. This value is compared against the measure payback with and without the program incentive. If the financial incentive brings the project from over the threshold to under the threshold, then the project is considered to have been sufficiently influenced by the program incentive. This includes the following questions:

DM-5 Does your organization require a specific payback period in order to implement energy efficiency improvements?

- ❑ Yes [ASK DM-5A]
- ❑ No [SKIP TO DM-6]
- ❑ Don't know [DON'T READ]

DM-5a What **payback** *length of time* do you normally require in order to consider an energy investment cost effective?

___ Years

- ❑ Don't know

The stated payback requirement by the respondent is then compared against the payback of the recommended project with and without the program incentive.

- *Modification of the project*. Respondents are asked a series of questions addressing whether they modified the project as a result of their program participation. This includes changes in equipment quantity and/or efficiency level (where appropriate for the measure) and a change in project timing. Questions used to analyze this component include:

FI-5 If the C&I Solutions through C&I Solutions Program were not available, would you have installed the…

- ❑ Same quantity of energy efficient equipment,
- ❑ A lower quantity, or
- ❑ No energy efficient equipment at all?

[IF FI-5 = "Lower Quantity"]: FI-5a: By percentage, how much lower?

FI-6 If the C&I Solutions program were not available, would you have installed …

- ❑ The same equipment with the same efficiency level,
- ❑ The same equipment with a lower energy efficiency level, but still above minimum code, or
- ❑ standard efficiency equipment?

[IF FI-6 = "Lower efficiency level, but still above minimum code"]: FI-6a: By percentage, how much lower?

FI-7 Did the C&I Solutions rebate allow you to install [EQUIPMENT/MESURE] sooner than you otherwise would have?

- ❑ Yes

- ❑ No
- ❑ Don't know

IF YES: FI-7a When would you otherwise have installed the equipment? (READ IF NEEDED)

- ❑ In less than 6 months later
- ❑ In 6-12 months later
- ❑ In 1-2 years later
- ❑ In 3-5 years later
- ❑ In more than 5 years later
- ❑ No, did not affect timing of purchase and installation

The scoring mechanism for custom projects is presented in Figure 7-4.

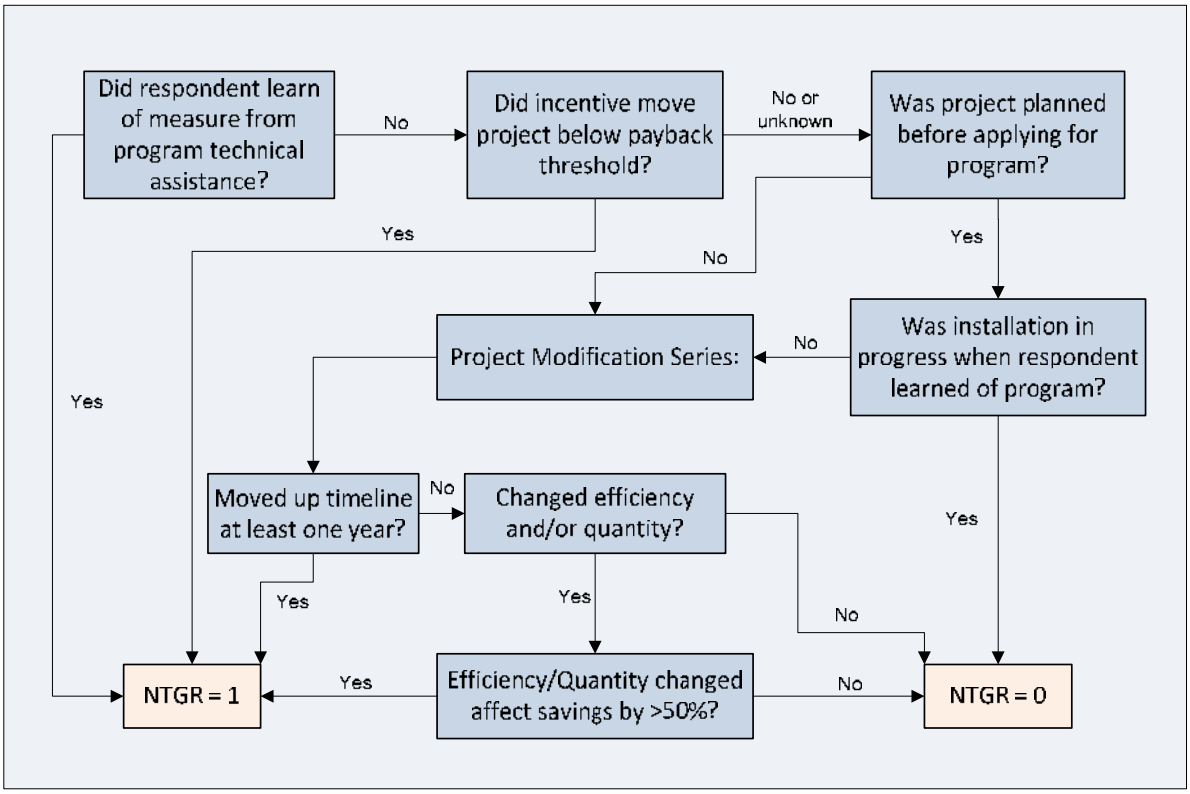


Figure 7-4: C&I Solutions Custom Project Free-Ridership Diagram

The projects reviewed by the evaluators had 100% NTGR. Projects were found to have been induced by-and-large by program-funded audits, and incentives were required bring projects within the participants' required payback period.

Given the small number of participants, the free rider assessments were a series of case studies as opposed to an extrapolated survey.

7.3.3.2 Participant Spillover

Participant spillover is defined as savings from program participants that was not incentivized by the CenterPoint programs. During participant surveying, both DI and Custom participants are asked questions addressing whether their participation had led to the installation of equipment that was not rebated by CenterPoint. The estimated savings from these projects are tallied and added to the program savings as Participant Spillover.

OS-3 Has your organization's participation in the C&I Solutions Program led you to buy any energy resulted in the installation of additional efficient equipment for which you did not apply for a financial incentive?

- ❑ Yes
- ❑ No
- ❑ Don't know

If Yes: OS-3a What type of equipment?

- ❑ [RECORD VERBATIM]
- ❑ Don't know

No participant spillover was identified.

7.3.3.3 Overall Program NTGR

The overall program NTGR for the C&I Solutions Program is defined as:

$$Program\ NTGR = \frac{Verefied\ Net\ Participant\ Savings + Particpant\ Spillover + PartialParticipant\ Spillover}{Gross\ DI\ Savings + Gross\ Steam\ Trap\ Savings + Gross\ Custom\ Savings}$$

7.3.4 Verified Savings

Table 7-8 presents the gross savings results of the evaluation of the PY2021 C&I Solutions Program. Total Gross Savings summarizes the savings calculations performed by TRM protocols and custom analyses.

Table 7-8 C&I Solutions Verified Therms Savings

Component	Measure	Expected Therms Savings	Verified Therms Savings	EUL	Lifetime Therms Savings
Direct Install	Faucet Aerators	2,852	2,852	10	28,523
	Weather stripping	385,068	385,068	11	4,235,744
	Low-Flow Showerheads	6,131	6,131	10	67,438
Custom	Varies	1,576,605	1,588,992	15.83	25,147,186
Total Gross Savings		**1,970,656**	**1,983,043**	**13.68**	**29,478,887**

Net savings for the C&I Solutions program were calculated using free ridership rates based on participant surveys for the direct install and custom components. The resulting net savings are presented in Table 7-9.

Table 7-9 C&I Solutions Net Savings Summary

Component	Free-Ridership Rate		Net Annual Savings		Net Realization Rate	Net Lifetime Therms Savings
	Ex Ante	Ex Post	Ex Ante	Ex Post		
Direct Install	0%	0%	394,051	394,051	100%	4,331,705
Custom	0%	0%	1,576,605	1,588,992	100.8%	25,147,186
Overall:	**0%**	**0%**	**1,970,656**	**1,983,043**	**100.6%**	**29,478,887**

Table 7-10: Commercial & Industrial Solutions Verified Net Water Savings

Component	Net Annual Water Saving (Gallons)	Lifetime Net Water Savings (Gallons)
Direct Install	2,310,109	24,670,081
Custom	2,946,860	47,136,500
Total	**5,256,969**	**71,806,581**

kWh and kW NEBs are summarized in Table 7-11

Table 7-11: Commercial & Industrial Solutions Verified Net Electric Savings

Component	Net kWh	Net kW	Net Lifetime kWh
Direct Install	48	0.03	527
Custom	0	0	0
Total	**48**	**0.03**	**527**

7.4 Conclusions

The program met savings goals and was highly cost-effective.	With 1,983,043 therms, the program has had its highest annual savings to-date, with 71.8% of this from custom projects.
	Savings increased by 16.9% compared to PY2020
	The program met 130% of its savings goal.
The program has seen a reduction in annual water savings	The water savings claimed in PY2021 have fallen compared to previous years. PY2019 projects saved 10,046,998 gallons of water annually, and in PY2020, water savings increased to 34,738,559 gallons, based off direct install, steam leak repair, condensate return, and custom low flow device projects. In PY2020, the custom program channel produced 30,415,468 gallons of water savings and in PY2021, the custom program only produced 2,946,860 gallons of water savings.

7.5 Recommendations

Estimate water impacts in customer audit report payback calculations/ROI for relevant projects.	Projects that save water can have significantly more rapid payback periods than just based solely on their gas savings. CLEAResult should factor this into audit report calculations when the opportunity presents itself (steam leak repair, condensate return, etc.).

8 Commercial Food Service Program

The Commercial Food Service Program provides incentives for a range of food service measures. In PY2021, eligible high-efficiency measures include:

- Combi ovens;
- Convection ovens;
- Conveyor ovens;
- Rotating rack ovens;
- Fryers;
- Conveyor broilers;
- Griddles; and
- Steamers.

Incentives range from $300 to $2,400 for eligible equipment, with an additional dealer/installer incentive ranging from $45 to $225 depending upon equipment type. The program added Third Tier Fryer and Conveyor Broilers incentives for the 2020-2022 Program.

8.1 Program Overview

The Commercial Food Service Program is primarily a vendor-driven program, with the marketing targeted at food service equipment distributors. These distributors are generally a primary point of contact and source of information in food service equipment purchases and are in a better position to influence the outcome of the transactions. Table 8-1 summarizes the historical performance of the Commercial Food Service Program.

Table 8-1: Commercial Food Service Program Historical Performance against Goals

Program Year	Budget			Net Therms		
	Spent	Allocated	%	Achieved	Goal	%
2010	$121,129	$294,054	41%	354,702	264,327	134%
2011	$215,900	$275,129	78%	144,465	209,341	69%
2012	$164,704	$293,854	56%	54,162	259,752	21%
2013	$180,476	$331,595	54%	59,515	385,040	15%
2014	$182,608	$331,594	55%	77,619	385,050	20%
2015	$152,485	$231,595	66%	85,891	60,210	143%
2016	$163,893	$231,595	71%	66,534	60,210	111%
2017	$199,189	$222,987	89%	83,289	62,260	134%
2018	$164,026	$229,403	71%	71,653	68,196	105%
2019	$155,205	$232,120	67%	53,123	69,951	76%
2020	$120,124	$172,491	70%	21,693	63,195	34%
2021	$150,488	$178,216	84%	50,469	62,873	80%

8.1.1 Participation Summary

In PY2021, the Commercial Food Service Program had 41 companies receive rebates for 108 pieces of kitchen equipment.

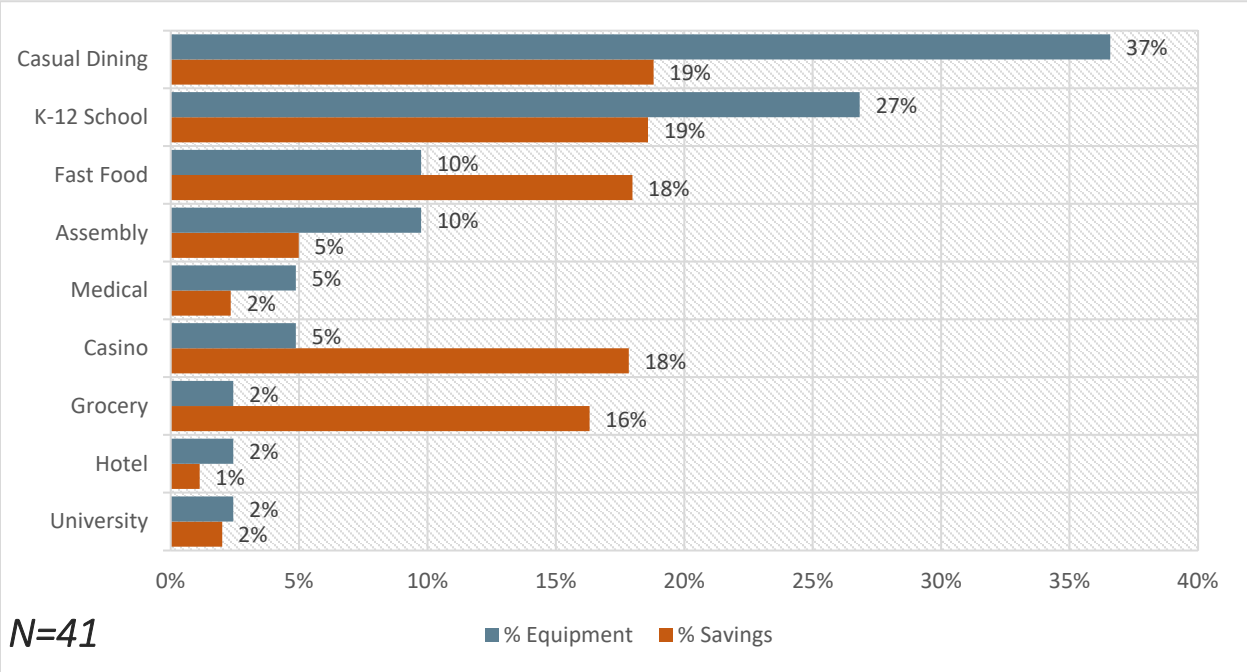


Figure 8-1 summarizes the Commercial Food Service Program participation by facility type.

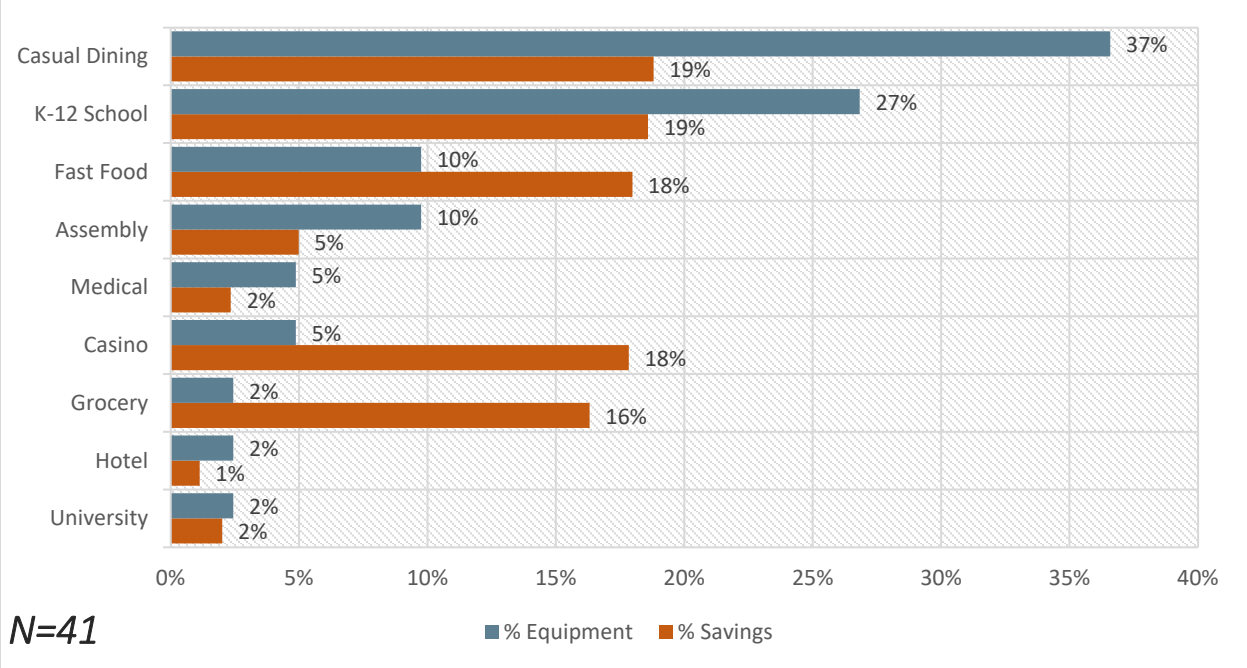


Figure 8-1: Commercial Food Service Program Participation by Facility Type

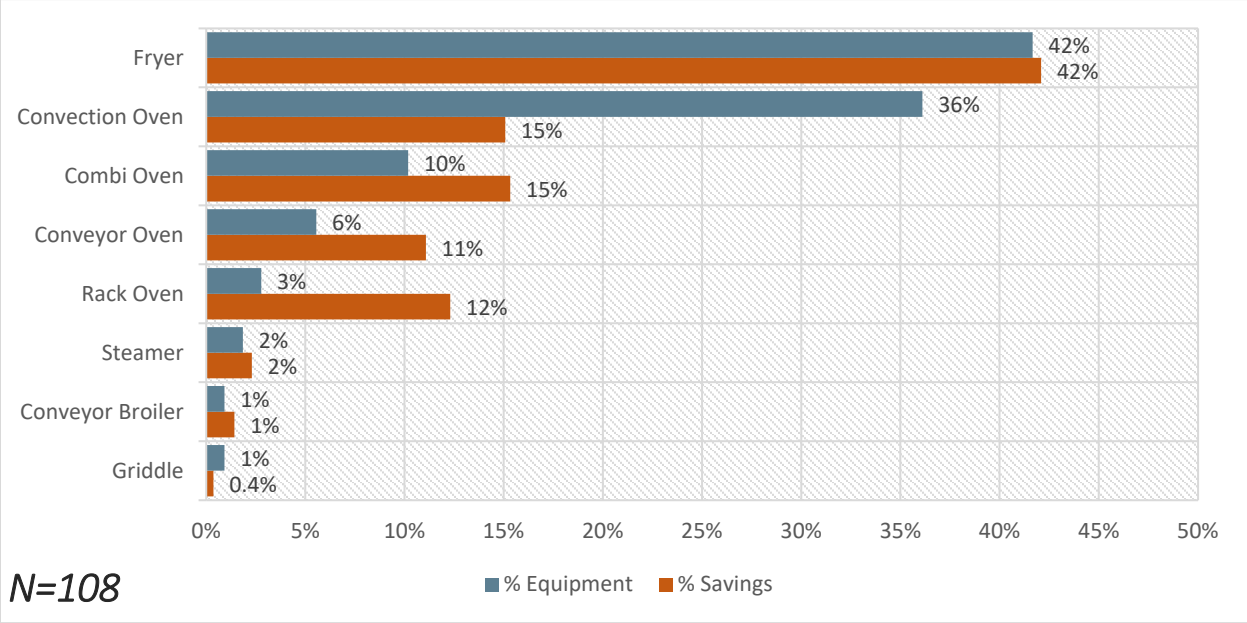


Figure 8-2 summarizes Commercial Food Service Program participation by measure category.

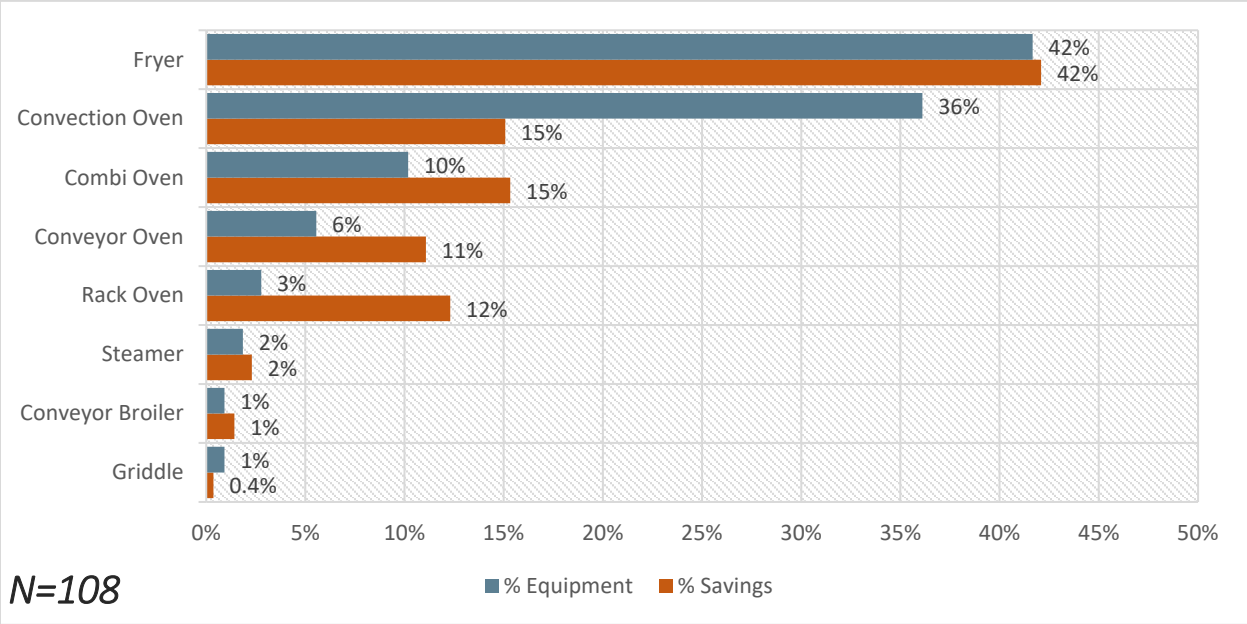


Figure 8-2: Participation by Measure Category

The program had increased diversity of equipment in PY2021, including the first ever rebates for rack ovens and conveyor broilers.

8.2 Commercial Food Service Program Process Evaluation

In following guidance from the TRM, Protocol C, we conducted limited process evaluation activities for PY2021, consisting of staff interviews, a participant survey, and a review of program materials. The program has not recognized any major program changes from PY2020 to PY2021.

Table 8-2 and Table 8-3 summarize the Evaluators' review of the Commercial Food Service Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 8-2: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in 2017.
New Vendor or Contractor	No. The program has been run internally by CenterPoint since program inception in 2010.

Table 8-3: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	Yes. The program did not meet goal in PY2020.
Are the educational or informational goals not meeting program goals?	No. The programs have had successful consumer and contractor outreach & education.
Are the participation rates lower or slower than expected?	Yes. The program did not meet its goal in PY2020.

Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. Past process evaluations found that operational and management structure to be up to speed and efficient in administering the program.
Is the program's cost-effectiveness less than expected?	No, the program's cost-effectiveness was within expected range.
Do participants report problems with the programs or low rates of satisfaction?	No. Participant surveys in past evaluations found exceedingly high satisfaction levels.
Is the program producing the intended market effects?	Yes. Interviews with participating vendors found that the program has caused a shift in their sales

8.2.1 Data Collection Activities

The process evaluation of the Commercial Food Service Program included the following data collection activities:

- *Program Actor In-Depth Interviews*. The Evaluators conducted in-depth interviews with a series of program actors. These interviews covered a range of topics, including marketing efforts, feedback on program delivery, an assessment of barriers to program implementation and success, and recommendations for program improvement. Program Actors interviewed include CenterPoint Program Staff and implementation contractor staff.
- *Participant Survey*. The primary purpose of the participant survey was to gather information on the type of equipment replaced, the current status and usage of the rebated measures, and each participant's decision making process.

Table 8-4 summarizes the data collection for this process evaluation effort. This includes the titles, role, sample sizes, and timeframe of data collection.

Table 8-4: CenterPoint Commercial Food Service Program Data Collection Summary

	Source	Activity	N	Role

CenterPoint Program Staff	Manager, Conservation Improvement Program Implementation	Interview	1	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with the Commercial Food Service Program in the overall coordination of utility resources.
	Senior Energy Efficiency Consultant	Interview		The Energy Efficiency Consultant at CenterPoint is responsible for much of the day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.
Participants		Surveys	7	The Evaluators conducted a telephone survey of program participants.

8.2.2 Process Results & Findings

This section will present the results and key findings from the data collection activities. These findings are based upon interviews with utility staff, implementation staff, and surveys with participants.

8.2.3 Response to Program Recommendations

Table 8-5 summarizes the status of issues and recommendations identified in the PY2020 process evaluation.

Table 8-5: Food Service Program Response to PY2020 Recommendations

Recommendation	CenterPoint Response	Status of Issue
Reevaluate ex ante assumptions used for		Adopted

convection ovens and steam cookers	
Conduct outreach to assess customer needs.	Adopted

8.2.4 Program Design Changes

No changes were made to the program in 2021. CenterPoint staff noted that 2021 was a particularly challenging year for the commercial food service program. In addition to major supply chain issues, restaurants struggled in 2021 due to labor shortages, food costs, and inflation. Staff explained that with less business coming in for service, their restaurant customers had to spend PPE loans on labor retention and supplies, and subsequently put energy efficiency improvements on the back burner. Staff indicated that this program was mostly kept afloat by a few school-district related food service projects.

8.2.5 Adherence to Protocol A

CenterPoint maintains an internal tracking system based on the SAP platform.

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM 8.1. The Evaluators previously reviewed program tracking data in PY2018 to assess its compliance with Protocol A of the AR TRM 8.2 which specifies that tracking data should be checked for:

- Participating Customer Information;
- Measure Specific Information;
- Vendor Specific Information;
- Program Tracking Information;
- Program Costs; and
- Marketing & Outreach Activities.

8.2.5.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for nearly all projects.
- Projects contained complete information on the contractor that completed the installation.
- All inputs needed to re-calculate savings according to AR TRM 8.12 protocols were present in the database.

8.2.5.2 Measure Specific Information

The content of tracking data was found to include enough information for all measures in PY2021.

8.2.6 Commercial Food Service Survey

CenterPoint customers that participated in the 2021 Commercial Food Service Program were surveyed to provide insight to the customer's experience with the program. Of the 38 food service program participants, eight participants completed a survey for an overall response rate of 21.1%. Respondents included a non-profit assembly, a school district, five restaurants (including one casino-based restaurant), and a wholesale store.

8.2.6.1 Measures

Respondents received convection ovens, fryers, and conveyor ovens. No one received a griddle (Figure 8-3).

- Five respondents received a convection oven: two needed new ovens to increase capacity at their facility and three needed ovens as part of a new construction project.
- Two respondents received a fryer: one replaced an old unit, and one was part of a new construction project.
- Two respondents received a conveyor oven: one replaced an old unit, and one was part of a new construction project.

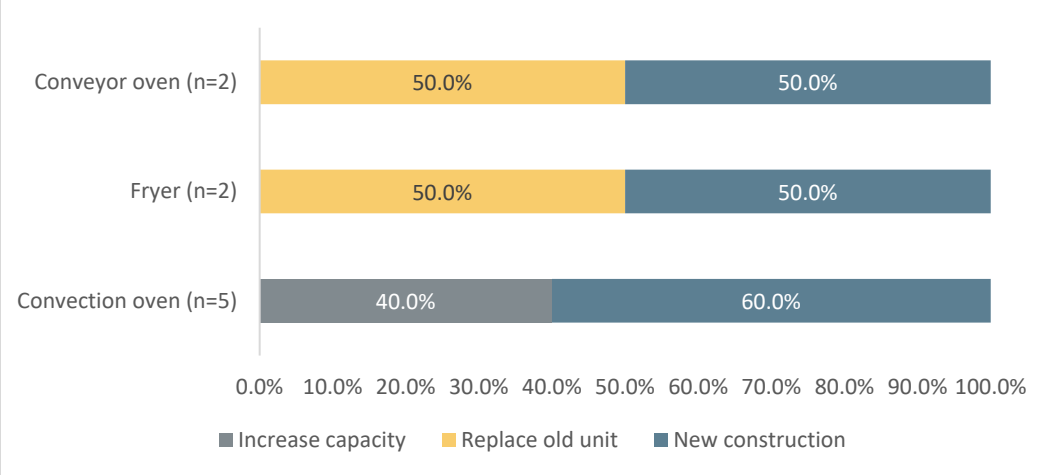


Figure 8-3: Reason for Installation

8.2.6.2 Motivation for Participation

Respondents explained they participated in the program to replace old/broken equipment, new construction, reduce energy use, equipment price, and functionality/reliability (Figure).

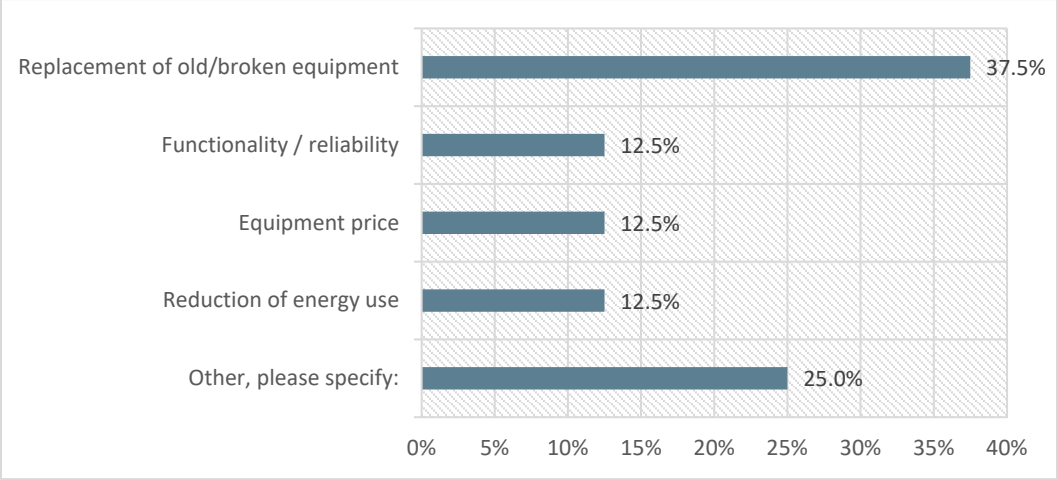


Figure 8-4: Motivation for Participation (n=8)

About half of respondents (52.5%, n=5) learned about the program either when they chose the equipment (25.0%, n=2) or after it had been installed (37.5%, n=3). Two respondents reported that the program allowed them to install high efficiency equipment they otherwise would not have been able to install. Only one respondent had previously participated in CNP's commercial food service program.

8.2.6.3 Decision Making Process

There was a fairly even split between food service facilities that were locally owned franchises and regional/national chains (52.9%, n=3), and independent facilities (57.1%, n=4). Less than half (37.5%, n=3) of facilities have a list of allowable equipment their company requires they adhere to, and all but one respondent (87.5%, n=7) is able to make decisions about purchasing energy efficient equipment without outside approval.

Half of respondents did not report any challenges in their decision to increase commercial and industrial energy efficiency (50.0%, n=4). Among those who did report challenges, high initial cost was the top challenge, followed by lack of awareness, and lack of staff dedicated to upgrades (Figure). Three respondents indicated higher incentives would help their organization overcome these challenges.

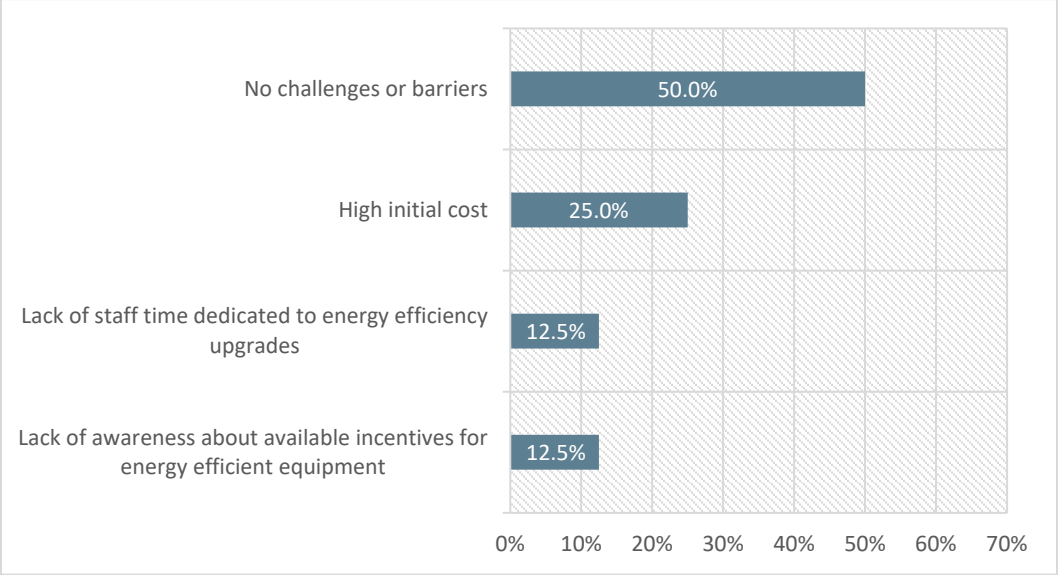


Figure 8-5: Challenges to Energy Efficiency Upgrades (n=8)

8.2.6.4 Impact of COVID-19

More than half of respondents (62.5%, n=5) indicated COVID-19 did not impact their decision to upgrade their equipment, however the same number of respondents (62.5%, n=5) reported some challenges as a result of COVID-19. The most frequent challenge was a decrease in business, sales, and production; one respondent also reported laying off staff. Respondents reported a variety of tactics in response to COVID-19 impacts, most notably removing lower selling-items from the menu (25.0%, n=2) (Figure 8-6).

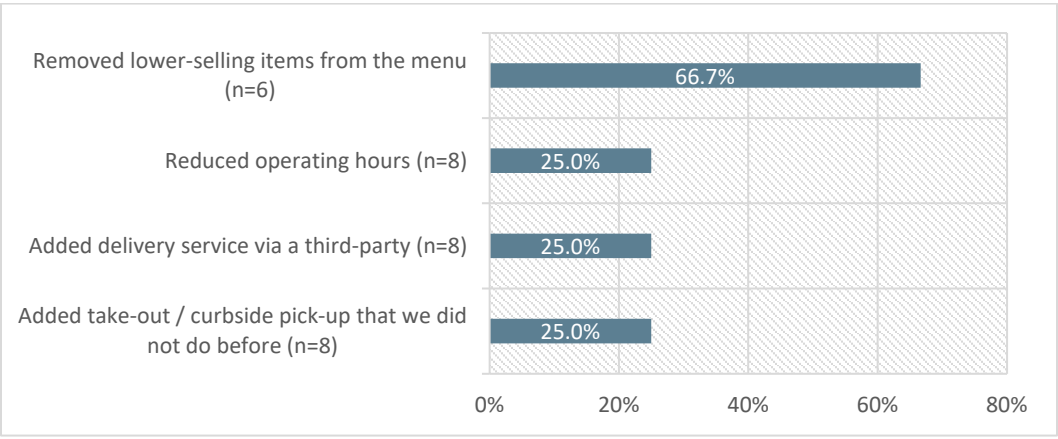


Figure 8-6: Response to COVID Impacts

8.2.6.5 Program Satisfaction

All respondents reported being satisfied or very satisfied with the program.

8.3 Commercial Food Service Program Impact Evaluation

The impact evaluation effort of the Commercial Food Service Program included the following:

- *Unit-Specific Savings Review.* The deemed parameters listed in the TRM V8.2 include assumptions of cooking efficiency, preheat BTU, and capacity. The Evaluators developed a lookup table for key parameters for units rebated through CenterPoint's program, using specific unit characteristics in TRM V8.2 algorithms.

8.3.1 Savings Calculation Methodologies

The Evaluators applied deemed savings algorithms from TRM V8.2 in calculating savings for measures included in the Commercial Food Service Program.

The Evaluators conducted a review of the key parameters contributing to savings for equipment rebated in the Commercial Food Service Program. From this, a table was developed allowing CenterPoint to update energy savings calculations using the characteristics of the equipment purchased. In the subsections to follow, the deemed savings tables will present:

- Baseline specifications from the TRM V8.2;
- Efficient specifications from the TRM V8.2; and
- Verified specifications from the Evaluators' review of units rebated in the program.

Beginning in PY2020 (with the adoption of AR TRM V8.2), the application of model-specific inputs is required in order to claim deemed savings. The Commercial Food Service Program has applied this approach since PY2016.

Most measures had 100% realization. The Evaluators found higher realization for two measure categories, with explanations as follows:

- **Fryers – 107.5% realization.** The Evaluators found that some cooking efficiencies were not updated to equipment-actual, and the increased cooking efficiency increased savings.
- **Combi Ovens – 171.0% realization.** The Evaluators found that baseline cooking efficiency was entered as "37" instead of "37%". This resulted in the cooking efficiency component of combi ovens having negative savings, and the only savings present for these measures was that from reduced idle BTU, pre-heat BTU, and improved capacity.

8.3.1.1 Free-Ridership

The PY2021 survey had too low of a response rate to update NTGRs. The Evaluators applied the NTGR developed in prior evaluations of 77.2%. This will be reassessed in PY2021.

8.3.2 Verified Savings

Table 8-6 presents the gross savings results of the evaluation of the PY2021 Commercial Food Service Program. Total Gross Savings summarizes the savings calculations performed by TRM 8.1 protocols for food service equipment.

Table 8-6: Commercial Food Service Program Verified Therms Savings

Measure Category	Expected Therms Savings	Verified Therms Savings	Gross Realization	EUL	Lifetime Therms Savings
Convection Oven	9,860	9,860	100.0%	12	84,614
Fryer	25,605	27,522	107.5%	12	254,960
Combi Oven	5,862	10,023	171.0%	12	92,851
Griddle	242	242	100.0%	12	2,244
Double-Rack Oven	8,046	8,046	100.0%	12	74,534
Conveyor Oven	7,244	7,244	100.0%	12	67,109
Conveyor Broiler	932	932	100.0%	12	8,632
Steamer	1,505	1,505	100.0%	12	13,946
Total	**59,296**	**65,374**	**110.3%**	**12**	**605,624**

The resulting net savings are presented in Table 8-7.

Table 8-7: Commercial Food Service Program Net Savings Summary

Free-Ridership Rate		Net Annual Savings		Net Realization Rate	Net Lifetime Therms Savings
Ex Ante	Ex Post	Ex Ante	Ex Post		
77.2%	77.2%	45,777	50,469	110.25%	605,624

Additionally, the Evaluators calculated measure-level, NEBs resulting from combi ovens. The TRM V8.2 does not specify water savings for these units, but these savings can be calculated using the updated combi oven tool from the Food Service Technology Center website[28]. This calculator is an updated version of the one currently cited in TRM V8.2 for therms and kWh

[28] https://caenergywise.com/calculators/natural-gas-combination-ovens/#calc

savings. Program-qualified combi ovens use on average 93% less water than baseline units. The water savings are derived from multiple design improvements:

- **Steam condensate recapture:** efficient combi ovens collect the condensate water after the cooking process is completed in a pan underneath the oven chamber and re-use this water (this has a secondary effect of improving cooking efficiency as this water is warmer than make-up water would be).
- **Reduced water load from avoided condensate drainage:** in a standard efficiency steamer, the hot water left over from cooking is drained to the sewer. In order to prevent damaging pipes with near-boiling temperature water, this hot condensate is mixed with make-up water to cool it down and make it safe for drainage.

Table 8-8 shows the total gallons of water saved from combi ovens and steamers.

Table 8-8: Commercial Food Service Program Non-Energy Benefits

Measure Category	Total Units	Gross Annual Water Savings (Gallons)	Net Annual Water Savings (Gallons)	Net Lifetime Water Savings (Gallons)
Combination Oven	11	1,174,035	904,007	10,848,079
Steamer	2	301,248	231,961	2,783,536
Total	**5**	**1,475,283**	**1,135,968**	**13,631,615**

8.4 Conclusions

Savings have more than doubled since PY2020	COVID-19 has affected this program more than most as the restaurant industry was hard-hit by the pandemic. Savings from PY2020 to PY2021 have increased from 21,693 to 50,469. Though still short of savings goal (meeting 73%), this may indicate an improvement in market conditions for the program.
CenterPoint accurately calculates savings per TRM V8.2 protocols.	All projects at 100% gross realization. CenterPoint's tracking system accurately adjusts baseline to align with code requirements by size category and boiler type.
Discrepancies were found in savings estimates for combi ovens.	Baseline efficiency was entered as "37" instead of "37%", erroneously underestimating impacts.

8.5 Recommendations

Set conditional formatting in the equipment specifications workbook with parameter boundaries that will flag unit of measurement errors.	Entering the myriad equipment inputs for each individual product is a manual process and could be subject to copy-paste or typographical errors. This occurred with Combi Oven cooking efficiencies being entered as "37" instead of "37%". Establishing conditional formatting in the columns with boundaries set to align with the unit of measurement could flag erroneous entries. Examples of conditional red-flagging include: ▪ Cooking efficiency: red-flagged when > 1.0 or < 0 ▪ Idle BTU: Red flag when < 1,000

9 Home Energy Reports

The Home Energy Reports Program is a behavioral energy efficiency program run by Oracle, a third-party implementer for CenterPoint. The program is delivered on an opt-out basis and provides a sample of CenterPoint's residential customers with personalized print and email reports that contain a normative comparison of their energy usage compared to similar households, tailored recommendations of ways to save energy, and promotions of other programs in CenterPoint's portfolio. The Home Energy Reports program also includes a web portal that answers frequently asked questions and allows customers to view their current and historical energy usage, update their home profile information via a home energy analysis survey, or remove themselves from the program. The program is designed to deliver energy savings by motivating behavior change and program participation by the recipients of the Home Energy Reports.

9.1 Program Overview

The Home Energy Reports Program began in September 2011. The program is designed to generate quantifiable behavioral savings that cannot be feasibly attained through standard EE efforts. The program differs from standard energy conservation marketing efforts in that it provides unique reports to each customer, comparing their gas bills against those of similar homes in their neighborhood. The program theory asserts that the normative comparison is a motivating force that drives energy-saving behaviors.

Over time, the population of recipients faces attrition. This occurs mostly due to members of the recipient group moving to a new residence. Table 9-1 summarizes the attrition that has occurred in each wave.

Table 9-1: Home Energy Reports Recipient Attrition

	Wave 1	Wave 2	Wave 3	Wave 4
Inception	50,000	52,498	24,732	NA
Current	26,984	30,161	16,383	18,393
Attrition %	46.0%	42.5%	33.8%	N/A

9.2 Savings Calculation Methodologies

Based on the opt-out program design, savings calculation can be conducted using a randomized controlled trial (RCT) in which the energy use of the program participants (treatment group) is compared to a statistically-equivalent control group. The post-program regression (PPR) model

combines both cross-sectional and time series data in a panel dataset. This model uses only the post-program data, with lagged energy use for the same calendar month of the pre-program period acting as a control for any small systematic differences between the participant and control customers. In particular, energy use in calendar month *t* of the post-program period is framed as a function of both the participant variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between participants and controls will be reflected in differences in their past energy use, which is highly correlated with their current energy use. The version we estimate includes monthly fixed effects and interacts these monthly fixed effects with the pre-program energy use variable. These interaction terms allow pre-program usage to have a different effect on post-program usage in each calendar month.

The model specification is as follows:

$$Usage_{it} = \alpha_0 + \beta * treatment_i$$
$$+\alpha_1 * PreUsage_i$$
$$+\alpha_2 * PreUsageSummer_i$$
$$+\alpha_3 * PreUsageWinter_i$$
$$+\gamma * mm_t$$
$$+\delta_1 * mm_t * PreUsage_i$$
$$+\delta_2 * mm_t * PreUsageSummer_i$$
$$+\delta_3 * mm_t * PreUsageWinter_i$$
$$+\varepsilon_{it}$$

Where

- *i* denotes the *i*th customer
- *t* denotes the first, second, third, etc. month of the post-treatment period
- $Usage_{it}$ is the average daily use for reading *t* for household *i* during the post-treatment period
- $PreUsage_i$ is the average daily usage across household *i's* available pre-treatment billing reads.
- mm_t is a vector of month-year dummies

And parameter definitions are:

- α_0 is an intercept term
- $\alpha_1, \alpha_2, \alpha_3$ are effects of control variables $PreUsage_i$, $PreUsageSummer_i$, and $PreUsageWinter_i$ on $Usage_{it}$ in the reference month.
- $\delta_1, \delta_2, \delta_3$ are the effect of the control variables $PreUsage_i$, $PreUsageSummer_i$, and $PreUsageWinter_i$ in each month-year (mm_t) of the post period.
- ε_{it} is an error term.

In this specification, savings are calculated by:

- Savings = ∑ (Treatment_Coeff * Number of recipients in month i * Number of days in month i)

Where,

- Treatment_Coeff = Coefficient for treatment parameter (daily use is the dependent variable, a negative value for treatment reflects the difference in Therms/day used by the recipient group after report delivery)
- Number of recipients in month i = Total recipients in the Wave, after accounting for attrition, for each month
- Number of days in month i = For month i, the number of days in the month

9.2.1 Home Energy Report Net Savings

The HER program uses a randomized controlled trial, comparing recipients to non-recipients. As a result, the savings estimates from the model are net savings estimates, and no further deduction of free-ridership is taken.

Table 9-2 shows the pre-period interval for each wave, based on the billing data. For each wave, the same interval was found for both recipient and control groups, which allows for a proper comparison of pre-usage.

Table 9-2: Pre-Period Interval

Wave	Start Year/Month	End Year/Month
1	2010-07	2011-09
2	2011-08	2012-10
3	2013-09	2014-11
4	2018-07	2019-09

9.2.1.1 Wave 1

Table 9-3 provides the model coefficients for the regression of customer billing data in the analysis of Wave 1.

Table 9-3: Regression Coefficients & Model Details – Wave 1

Variable Description	Regression Coefficient	Standard Error	T-Stat	PR > |T|
Intercept	0.64	0.02	26.45	<0.00001
Treatment	-0.04	0.00	-10.65	<0.00001
February	0.50	0.03	14.77	<0.00001
March	-0.17	0.03	-6.27	<0.00001
April	0.66	0.01	65.74	<0.00001
May	0.19	0.04	5.31	<0.00001
June	-0.71	0.03	-21.26	<0.00001
July	-0.46	0.03	-13.54	<0.00001
August	-0.70	0.03	-20.52	<0.00001
September	-0.61	0.04	-17.03	<0.00001
October	-0.61	0.03	-17.87	<0.00001
November	-0.62	0.03	-18.09	<0.00001
December	-0.65	0.03	-18.99	<0.00001
Pre-usage	-0.67	0.03	-19.80	<0.00001
Pre-summer	-0.31	0.03	-8.99	<0.00001
Pre-winter	-0.40	0.03	-11.41	<0.00001
Pre-usage: February	-0.69	0.05	-13.72	<0.00001
Pre-usage: March	-0.46	0.05	-9.99	<0.00001
Pre-usage: April	0.20	0.05	4.35	0.00
Pre-usage: May	-0.16	0.05	-3.42	0.00
Pre-usage: June	-0.47	0.05	-9.40	<0.00001
Pre-usage: July	-0.51	0.05	-10.61	<0.00001
Pre-usage: August	-0.49	0.05	-10.27	<0.00001
Pre-usage: September	-0.44	0.05	-9.26	<0.00001
Pre-usage: October	0.23	0.05	4.86	<0.00001
Pre-usage: November	0.66	0.05	13.79	<0.00001
Pre-usage: December	0.43	0.05	8.88	<0.00001
Pre-summer: February	0.36	0.04	8.67	<0.00001

Pre-summer: March	0.81	0.04	21.36	<0.00001
Pre-summer: April	0.13	0.04	3.43	0.00
Pre-summer: May	0.62	0.04	15.87	<0.00001
Pre-summer: June	0.83	0.04	20.28	<0.00001
Pre-summer: July	0.81	0.04	20.90	<0.00001
Pre-summer: August	0.79	0.04	20.18	<0.00001
Pre-summer: September	0.82	0.04	21.23	<0.00001
Pre-summer: October	0.36	0.04	9.41	<0.00001
Pre-summer: November	-0.36	0.04	-9.17	<0.00001
Pre-summer: December	-0.09	0.04	-2.22	0.03
Pre-winter: February	0.37	0.01	24.87	<0.00001
Pre-winter: March	-0.25	0.01	-18.18	<0.00001
Pre-winter: April	-0.67	0.01	-48.47	<0.00001
Pre-winter: May	-0.67	0.01	-47.45	<0.00001
Pre-winter: June	-0.65	0.02	-43.15	<0.00001
Pre-winter: July	-0.64	0.01	-45.14	<0.00001
Pre-winter: August	-0.65	0.01	-45.40	<0.00001
Pre-winter: September	-0.66	0.01	-46.68	<0.00001
Pre-winter: October	-0.77	0.01	-55.41	<0.00001
Pre-winter: November	-0.61	0.01	-42.63	<0.00001
Pre-winter: December	-0.46	0.01	-32.02	<0.00001
Adjusted R-Square: 0.765				

The resulting annual savings are:

- Annual Savings = ∑ (0.04290 * Number of recipients in month i * Number of days in month i) = 410,401 Therms
- 95% Confidence Interval: +/- 75,518 (18.4%)

9.2.1.2 Wave 2

Table 9-4 provides the model coefficients for the regression of customer billing data in the analysis of Wave 2.

Table 9-4: Regression Coefficients & Model Details – Wave 2

Variable Description	Regression Coefficient	Standard Error	T-Stat	PR > |T|
Intercept	1.13	0.01	83.68	<0.00001
Treatment	-0.02	0.00	-10.03	<0.00001
February	-0.40	0.05	-7.49	<0.00001
March	-0.01	0.04	-0.26	0.80
April	1.02	0.02	63.96	<0.00001
May	0.27	0.02	13.95	<0.00001
June	-0.75	0.02	-40.07	<0.00001
July	-0.90	0.02	-48.73	<0.00001
August	-1.02	0.02	-54.25	<0.00001
September	-1.04	0.02	-53.28	<0.00001
October	-1.03	0.02	-54.32	<0.00001
November	-1.04	0.02	-54.71	<0.00001
December	-1.03	0.02	-54.46	<0.00001
Pre-usage	-0.96	0.02	-51.53	<0.00001
Pre-summer	-0.70	0.02	-36.40	<0.00001
Pre-winter	-0.56	0.02	-29.33	<0.00001
Pre-usage: February	-0.73	0.08	-9.46	<0.00001
Pre-usage: March	-0.41	0.07	-5.58	<0.00001
Pre-usage: April	1.33	0.07	18.05	<0.00001
Pre-usage: May	0.79	0.08	10.49	<0.00001
Pre-usage: June	0.54	0.08	6.79	<0.00001
Pre-usage: July	0.38	0.08	4.97	<0.00001
Pre-usage: August	0.42	0.08	5.50	<0.00001
Pre-usage: September	0.47	0.08	6.21	<0.00001
Pre-usage: October	1.53	0.07	20.60	<0.00001
Pre-usage: November	2.30	0.08	29.91	<0.00001
Pre-usage: December	1.18	0.08	15.47	<0.00001
Pre-summer: February	0.44	0.06	7.26	<0.00001
Pre-summer: March	0.73	0.06	12.44	<0.00001
Pre-summer: April	-0.26	0.06	-4.50	<0.00001
Pre-summer: May	0.33	0.06	5.59	<0.00001
Pre-summer: June	0.58	0.06	9.35	<0.00001

Pre-summer: July	0.64	0.06	10.84	<0.00001
Pre-summer: August	0.59	0.06	9.99	<0.00001
Pre-summer: September	0.58	0.06	9.71	<0.00001
Pre-summer: October	-0.28	0.06	-4.88	<0.00001
Pre-summer: November	-1.23	0.06	-20.36	<0.00001
Pre-summer: December	-0.49	0.06	-8.16	<0.00001
Pre-winter: February	0.37	0.02	15.93	<0.00001
Pre-winter: March	-0.31	0.02	-14.06	<0.00001
Pre-winter: April	-1.06	0.02	-48.62	<0.00001
Pre-winter: May	-1.05	0.02	-46.95	<0.00001
Pre-winter: June	-1.05	0.02	-44.52	<0.00001
Pre-winter: July	-1.01	0.02	-44.91	<0.00001
Pre-winter: August	-1.02	0.02	-45.34	<0.00001
Pre-winter: September	-1.04	0.02	-46.15	<0.00001
Pre-winter: October	-1.24	0.02	-56.31	<0.00001
Pre-winter: November	-1.10	0.02	-48.34	<0.00001
Pre-winter: December	-0.71	0.02	-31.47	<0.00001
Adjusted R-Square: 0.745				

The resulting annual savings are:

- Annual Savings = ∑ (0.02250 * Number of recipients in month i * Number of days in month i) = 240,635 Therms
- 95% Confidence Interval: +/- 47,030 (19.54%)

9.2.1.3 Wave 3

Table 9-5 provides the model coefficients for the regression of customer billing data in the analysis of Wave 3.

Table 9-5: Regression Coefficients & Model Details – Wave 3

Variable Description	Regression Coefficient	Standard Error	T-Stat	PR > |T|
Intercept	0.70	0.02	32.07	<0.00001
Treatment	-0.03	0.00	-9.53	<0.00001
February	0.97	0.03	29.65	<0.00001
March	-0.55	0.02	-21.97	<0.00001
April	0.37	0.01	32.63	<0.00001
May	0.06	0.03	1.88	0.06
June	-0.52	0.03	-17.34	<0.00001
July	-0.53	0.03	-17.56	<0.00001
August	-0.70	0.03	-22.99	<0.00001
September	-0.58	0.03	-18.24	<0.00001
October	-0.59	0.03	-19.32	<0.00001
November	-0.60	0.03	-19.59	<0.00001
December	-0.64	0.03	-21.02	<0.00001
Pre-usage	-0.59	0.03	-19.30	<0.00001
Pre-summer	-0.33	0.03	-10.54	<0.00001
Pre-winter	-0.35	0.03	-11.23	<0.00001
Pre-usage: February	0.24	0.05	4.97	<0.00001
Pre-usage: March	-0.13	0.05	-2.92	0.00
Pre-usage: April	0.28	0.05	6.03	<0.00001
Pre-usage: May	-0.47	0.05	-10.09	<0.00001
Pre-usage: June	-0.91	0.05	-18.79	<0.00001
Pre-usage: July	-0.96	0.05	-20.80	<0.00001
Pre-usage: August	-0.95	0.05	-20.48	<0.00001
Pre-usage: September	-0.98	0.05	-21.41	<0.00001
Pre-usage: October	-0.99	0.05	-21.42	<0.00001
Pre-usage: November	0.04	0.05	0.95	0.34
Pre-usage: December	-0.30	0.05	-6.32	<0.00001
Pre-summer: February	-0.21	0.04	-5.80	<0.00001
Pre-summer: March	0.53	0.03	15.48	<0.00001
Pre-summer: April	0.22	0.03	6.26	<0.00001
Pre-summer: May	0.95	0.04	27.08	<0.00001
Pre-summer: June	1.10	0.04	30.15	<0.00001

Pre-summer: July	1.08	0.04	30.61	<0.00001
Pre-summer: August	1.06	0.04	29.99	<0.00001
Pre-summer: September	1.17	0.04	33.43	<0.00001
Pre-summer: October	1.07	0.03	30.56	<0.00001
Pre-summer: November	0.07	0.04	2.10	0.04
Pre-summer: December	0.37	0.04	10.31	<0.00001
Pre-winter: February	0.10	0.02	5.88	<0.00001
Pre-winter: March	-0.32	0.02	-20.34	<0.00001
Pre-winter: April	-0.62	0.02	-39.23	<0.00001
Pre-winter: May	-0.48	0.02	-29.91	<0.00001
Pre-winter: June	-0.38	0.02	-22.92	<0.00001
Pre-winter: July	-0.36	0.02	-23.00	<0.00001
Pre-winter: August	-0.37	0.02	-22.94	<0.00001
Pre-winter: September	-0.35	0.02	-22.29	<0.00001
Pre-winter: October	-0.28	0.02	-17.79	<0.00001
Pre-winter: November	-0.39	0.02	-24.11	<0.00001
Pre-winter: December	-0.20	0.02	-12.28	<0.00001
Adjusted R-Square: 0.793				

The resulting annual savings are:

- Annual Savings = ∑ (0.03379 * Number of recipients in month i * Number of days in month i) = 196,741 Therms
- 95% Confidence Interval: +/- 40,479 (20.58%)

9.2.1.4 Wave 4

Table 9-6 provides the model coefficients for the regression of customer billing data in the analysis of Wave 4.

Table 9-6: Regression Coefficients & Model Details – Wave 4

Variable Description	Regression Coefficient	Standard Error	T-Stat	PR > |T|
Intercept	0.55	0.02	27.35	<0.00001
Treatment	-0.03	0.00	-8.58	<0.00001
February	0.19	0.03	6.73	<0.00001
March	0.05	0.02	2.01	0.04
April	0.88	0.01	83.92	<0.00001
May	0.11	0.03	3.74	0.00
June	-0.51	0.03	-18.43	<0.00001
July	-0.43	0.03	-15.44	<0.00001
August	-0.62	0.03	-21.89	<0.00001
September	-0.59	0.03	-19.66	<0.00001
October	-0.51	0.03	-18.12	<0.00001
November	-0.51	0.03	-18.04	<0.00001
December	-0.60	0.03	-21.30	<0.00001
Pre-usage	-0.70	0.03	-24.77	<0.00001
Pre-summer	-0.39	0.03	-13.38	<0.00001
Pre-winter	-0.30	0.03	-10.30	<0.00001
Pre-usage: February	-0.08	0.04	-1.73	0.08
Pre-usage: March	0.78	0.04	19.78	<0.00001
Pre-usage: April	0.88	0.04	21.87	<0.00001
Pre-usage: May	0.58	0.04	14.29	<0.00001
Pre-usage: June	0.10	0.04	2.39	0.02
Pre-usage: July	-0.15	0.04	-3.72	0.00
Pre-usage: August	-0.16	0.04	-4.00	0.00
Pre-usage: September	0.03	0.04	0.70	0.49
Pre-usage: October	0.32	0.04	7.75	<0.00001
Pre-usage: November	0.55	0.04	13.18	<0.00001
Pre-usage: December	0.13	0.04	3.17	0.00
Pre-summer: February	0.05	0.04	1.37	0.17
Pre-summer: March	0.08	0.03	2.49	0.01
Pre-summer: April	0.02	0.03	0.56	0.57
Pre-summer: May	0.46	0.03	14.23	<0.00001
Pre-summer: June	0.73	0.03	21.47	<0.00001

Pre-summer: July	0.73	0.03	22.47	<0.00001
Pre-summer: August	0.72	0.03	21.95	<0.00001
Pre-summer: September	0.71	0.03	21.70	<0.00001
Pre-summer: October	0.42	0.03	12.87	<0.00001
Pre-summer: November	-0.14	0.03	-4.29	0.00
Pre-summer: December	0.16	0.03	4.67	<0.00001
Pre-winter: February	0.20	0.02	12.62	<0.00001
Pre-winter: March	-0.77	0.01	-52.90	<0.00001
Pre-winter: April	-1.06	0.01	-71.64	<0.00001
Pre-winter: May	-1.08	0.01	-72.16	<0.00001
Pre-winter: June	-0.96	0.02	-61.97	<0.00001
Pre-winter: July	-0.88	0.02	-58.81	<0.00001
Pre-winter: August	-0.88	0.02	-58.39	<0.00001
Pre-winter: September	-0.94	0.02	-62.40	<0.00001
Pre-winter: October	-0.91	0.02	-60.33	<0.00001
Pre-winter: November	-0.68	0.02	-44.55	<0.00001
Pre-winter: December	0.18	0.01	14.74	<0.00001
Adjusted R-Square: 0.813				

The resulting annual savings are:

- Annual Savings = ∑ (0.03257 * Number of recipients in month i * Number of days in month i) = 206,249 Therms
- 95% Confidence Interval: +/- 47,109 (22.84%)

9.3 Group Comparison

Figure 9-1 presents the monthly differences in consumption between the two groups. Reports were first delivered in October of 2011, and at that point, the magnitude of difference in consumption increases. Further, the difference in use between the recipient and control group increases every year thereafter.

Similar representations for Wave 2, Wave 3, and Wave 4 are presented in Figure 9-2, Figure 9-3, and Figure 9-4 respectively. The impact of the reports on Wave 2 and Wave 3 is lower than Wave 1. Wave 4, indicated in Figure 9-4, began the RCT period in September of 2019, therefore discernible trends have yet to occur.

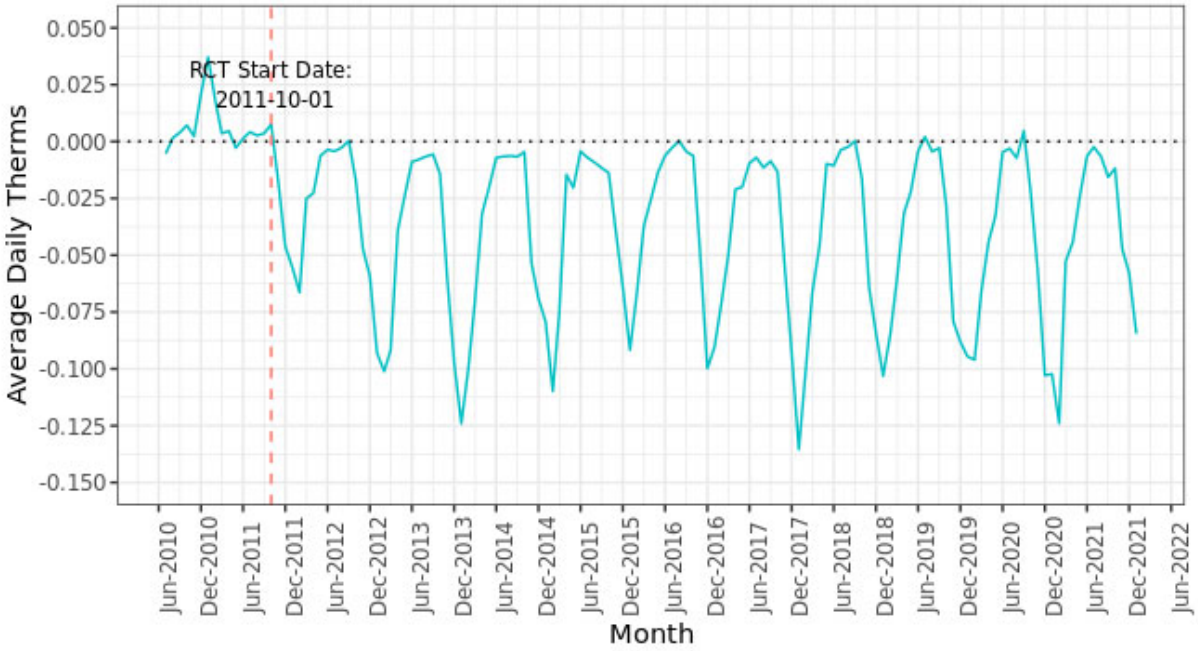


Figure 9-1: Difference in Daily Consumption between Treat. & Control Group – Wave 1

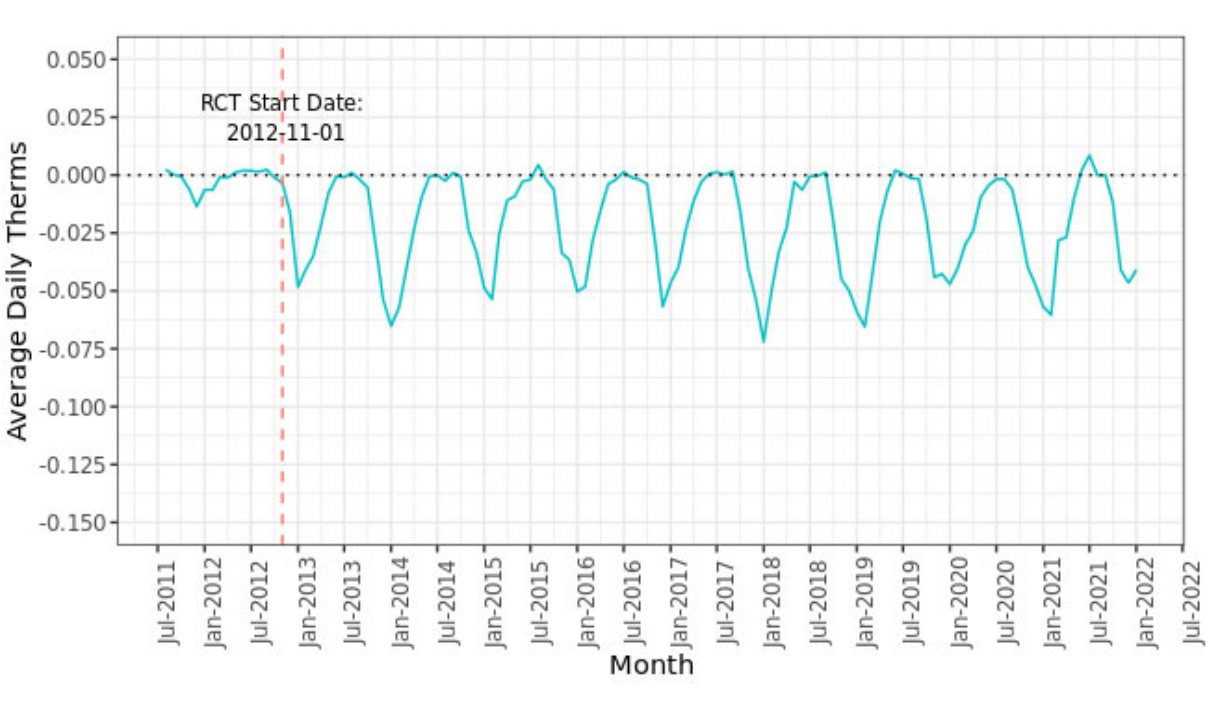


Figure 9-2: Difference in Daily Consumption between Treat. & Control Group – Wave 2

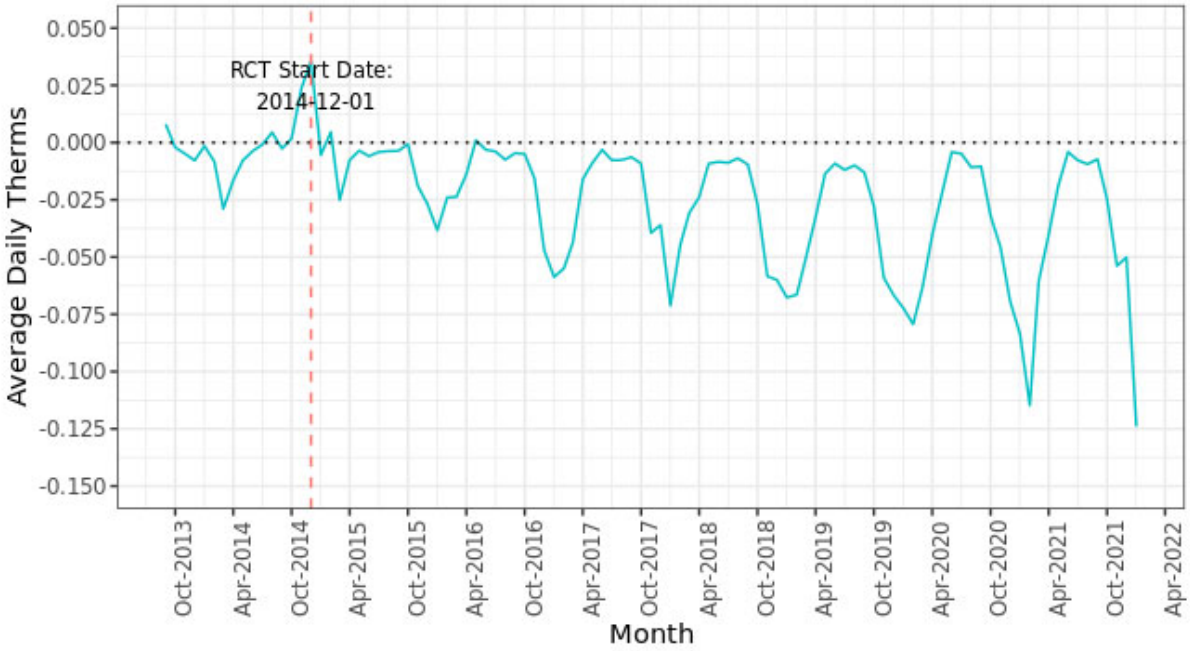


Figure 9-3: Difference in Daily Consumption between Treat. & Control Group – Wave 3

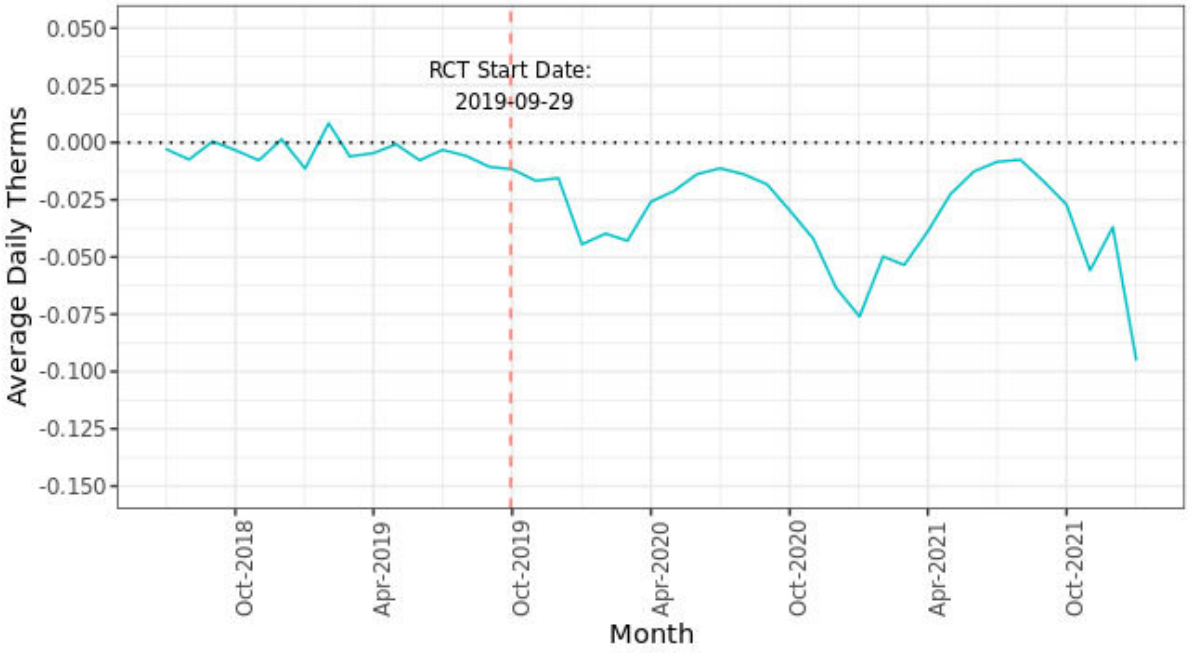


Figure 9-4: Difference in Daily Consumption between Treat. & Control Group – Wave 4

9.4 Per-Customer Performance

The change in annual savings per-recipient is summarized in Figure 9-5. Waves 2 and 4 show an upward trend from PY2020 to PY20201, while Wave 1 shows a downward trend from PY2019 to PY2021. Wave 1 had the highest savings at 15.7 therms per recipient. Wave 3 had the second highest savings at 12.3 therms per recipient. Wave 4 had the next highest savings at 11.9 therms per recipient, which is a strong showing for the second year of effective and measurable program treatment (past waves have trended upwards in impact during the first three years of treatment).

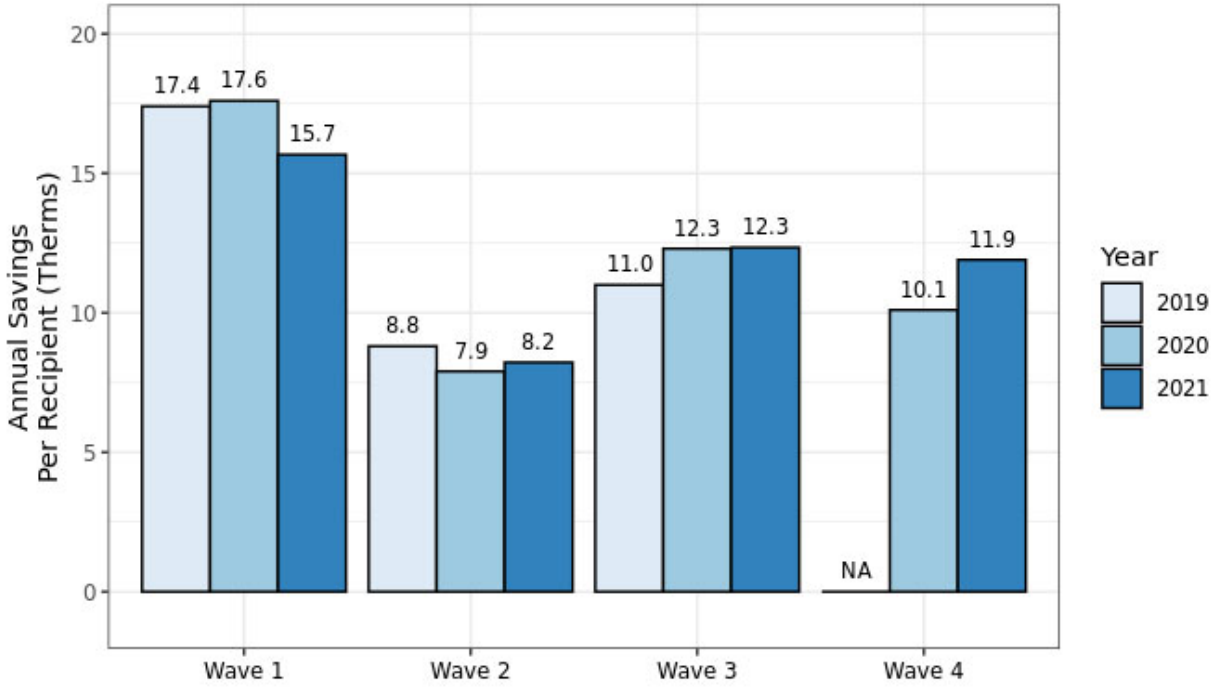


Figure 9-5: Savings per Recipient by Year

Table 9-7 shows the savings per recipient for each wave at the both the lower and upper boundaries of the 95% confidence interval. Additionally, the annual pre-period usage per recipient and the percent of annual usage is provided below. The savings for each wave were calculated in the 1.28 – 1.82% range, consistent with expected general program performance and program performances in previous years.

Table 9-7: Pre-Period Usage per Recipient and Percent of Annual

Wave	Annual Savings per Recipient	Annual Savings (Lower 95% CI)	Annual Savings (Upper 95% CI)	Annual Pre-Period Usage per Recipient	Percent Weight of Total Participants	Percent of Annual Therms
1	15.67	12.78	18.55	1,008.05	29.51%	1.55%
2	8.22	6.61	9.82	452.19	33.00%	1.82%
3	12.34	9.80	14.88	871.02	17.96%	1.42%
4	11.90	9.18	14.61	929.92	19.53%	1.28%
All	**11.88**	**9.51**	**14.24**	**778.11**	-	**1.53%**

9.5 Double Counting Analysis

Protocol J in TRM V8.2 specifies double counting as the difference in per-participant other-program savings.

Double counted savings is the difference in other-program-savings for the recipient and control groups, and this difference is subtracted from a behavioral program estimate to avoid double counting. If a program has more recipients than non-recipients in the analysis, then taking the straight sum of savings from other-program-savings would dramatically inflate the double counting effect.

Table 9-8 shows the calculated PY2021 program savings after adjusting for double-counting.

Table 9-8: PY2021 Program Savings Before and After Double Counting

PY	Ex-post Therms Before Double Counting	Percent Difference	Ex-post Therms After Double Counting
2021	1,054,027	-0.63%	1,047,335

9.6 Verified Savings

With the model output results and double count analysis, the Home Energy Reports Program has 1,047,335 annual Therms savings. Table 9-9 summarizes the results of the program analysis.

Table 9-9: Overall PY2021 HER Program Savings

Ex-ante Therms	Ex-post Therms After Double Counting	Ex-post Therms Before Double Counting	Realization Rate	95% Confidence	Precision
1,043,726	1,047,335	1,054,027	100.3%	56,989	±5.4%

The overall program realization rate for PY2021 is 100.3%.

Additionally, the overall program savings are shown on a per-wave basis in Table 9-10 where the lower and upper bounds at the 95% confidence interval are calculated.

Table 9-10: PY2021 HER Program Savings at 95% Confidence

Wave	Weighted Number of Participants	Ex-post Therms (Before Double Counting)	Double Counted Savings (Therms)	Ex-post Therms (After Double Counting)	Ex-post Therms After Double Counting (Lower 95% CI)	Ex-post Therms After Double Counting (Upper 95% CI)
1	26,194	410,401	-2,605	407,796	332,757	482,835
2	29,287	240,635	-1,528	239,108	192,376	285,839
3	15,943	196,741	-1,249	195,492	155,270	235,715
4	17,336	206,249	-1,309	204,939	158,129	251,750
All	**88,760**	**1,054,027**	**-6,691**	**1,047,335**	**838,532**	**1,256,139**

Table 9-11 summarizes the annual gross and net savings by wave.

Table 9-11: Therms Savings Summary by Wave

Wave	Number of Total Participants	Annual Therms Usage	Ex-post Savings	Savings as a Percent of Annual
1	26,984	26,404,991	410,401	1.55%
2	30,161	13,243,313	240,635	1.82%
3	16,383	13,886,340	196,741	1.42%
4	18,393	16,121,242	206,249	1.28%
All	**91,921**	**69,655,887**	**1,054,027**	**1.53%**

When aggregating the savings and confidence intervals, the Evaluators found that the overall 95% confidence interval was ± 5.41% of program savings. In addition, across all waves, savings were 1.53% of annual usage.

9.7 Conclusions

The program continues to provide reliable savings as a percent of billed use but faces ongoing issues with customer attrition.	Wave 1 is responsible for 38.9% of program savings. This wave has had 46.0% attrition overall.
Savings per customer increased for Wave 2 and Wave 4 compared to prior program years.	Savings increased from 7.9 to 8.2 therms per customer for Wave 2, and from 10.1 to 11.9 therms per customer for Wave 4. As a result, the Home Energy Reports program significantly outperformed compared to program plan savings.
Although Wave 4 was recently launched in September 2019, impact trends are continuing to develop.	Wave 4 outperformed in PY2021 compared to PY2020, achieving a 17.7% increase in savings per customer (11.9 compared to 10.1). Wave 4 in PY2021 is responsible for 19.6% of overall program savings compared to 17.4% in PY2020

9.8 Recommendations

The Evaluators' have no recommendations at this time.

10 Low Flow Showerhead & Faucet Aerator Program

The Low Flow Showerhead & Faucet Aerator Program provides no-cost mailer kits to CenterPoint residential customers. These kits may contain:

- Up to three 1.5 gallons per minute (GPM) low flow showerheads, available in chrome and ivory finish; and
- Up to three faucet aerators, with options including 1.5 GPM kitchen aerators (with a shutoff valve) and 1.0 GPM bathroom aerators (without a shutoff valve).

10.1 Program Background

The Low Flow Showerhead & Faucet Aerator Program began in 2010. The program is designed to provide no-cost kits containing low flow showerheads and faucet aerators to CenterPoint residential customers. These kits are then self-installed. The program has been markedly popular among CenterPoint customers and exceeded the participation goal most years from 2011 to 2017. Over the past four years there has been a declining participation trend.

The history of program performance and expenditures is presented in Table 10-1.

Table 10-1: Low Flow Showerhead & Faucet Aerator Program Historical Performance Against Goals

Program Year	Budget			Net Therms		
	Spent	Allocated	%	Achieved	Goal	%
2010	$114,947	$181,404	63%	112,422	414,151	27%
2011	$212,460	$167,117	127%	124,042	120,904	103%
2012	$379,048	$379,048	100%	215,295	129,136	167%
2013	$401,061	$165,227	243%	148,589	169,920	87%
2014	$282,502	$415,227	68%	154,562	147,440	105%
2015	$286,121	$415,227	69%	163,181	147,440	111%
2016	$299,572	$415,227	72%	147,948	147,440	100%
2017	$344,483	$290,732	118%	168,409	165,900	102%
2018	$277,558	$290,487	95%	100,396	165,898	61%
2019	$231,713	$290,362	80%	108,933	165,898	66%
2020	$198,760	$288,292	69%	69,336	167,600	41%
2021	$157,244	$290,596	54%	25,098	161,622	16%

10.1.1 Low Flow Showerhead & Faucet Aerator Program Participation Summary

In PY2021, CenterPoint distributed 3242 kits to their residential customers. Table 10-2 presents a summary of the composition of the kits installed. There were three types of kits given to participants categorized as a one, two, or three bathroom bundle.

Table 10-2: Low Flow Kit Composition

Bathroom Bundle Type	Showerhead Quantity	Kitchen Aerator Quantity	Bathroom Aerator Quantity	% Selected
1	1	1	1	15.71%
2	2	1	2	44.36%
3	3	1	2	39.93%

10.2 Low Flow Showerhead & Faucet Aerator Program Process Evaluation

The Evaluators conducted a formal process evaluation of the Low Flow Showerhead & Faucet Aerator Program PY2020 and found that the program was successful in meeting participation, savings, and satisfaction goals. Table 10-3 and

Table 10-4 summarize the Evaluators' review of the Low Flow Showerhead & Faucet Aerator Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 10-3: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in PY2020.
New Vendor or Contractor	No. The program has been run internally by CenterPoint with support from EFI since program inception in 2010.

Table 10-4: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	Yes. The program fell short of goal in PY2020.
Are the educational or informational goals not meeting program goals?	No. The programs have had successful consumer outreach & education.
Are the participation rates lower or slower than expected?	Yes. The program has fallen short of participation goals in recent program years.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. Prior process evaluations found that operational and management structure to be up to speed and efficient in administering the program.
Is the program's cost-effectiveness less than expected?	No, the program's cost-effectiveness exceeded expectations.
Do participants report problems with the programs or low rates of satisfaction?	No. Prior participant surveys found exceedingly high satisfaction levels.
Is the program producing the intended market effects?	Yes. The program is generating transactions and installations that would not occur otherwise.

A process evaluation was conducted in PY2020. The process evaluation in PY2021 was limited.

10.2.1 Response to Recommendations

Table 10-5: Low Flow Program Response to PY2020 Recommendations

Recommendation	***CenterPoint Response***	***Status of Issue***
Reevaluate early participants for new kit delivery		Adopted

10.2.2 Data Collection Activities

The process evaluation of the Low Flow Showerhead & Faucet Aerator Program included the following data collection activities:

- *CenterPoint Program Staff Interviews*. The Evaluators interviewed staff at CenterPoint involved in the administration of the Low Flow Showerhead & Faucet Aerator Program. This interview was used to validate that there were no program changes in PY2021 to warrant process evaluation activities.
- *Desk Review*. The Evaluators reviewed calculations provided by CenterPoint to validate that they used prior-year M&V findings for in-service-rates (ISRs) and natural gas water heating rates.

10.2.3 Adherence to Protocol A

CenterPoint maintains an internal tracking system based on the SAP platform.

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM V8.2. The Evaluators previously reviewed program tracking data in PY2018 to assess its compliance with Protocol A of the AR TRM V8.2 which specifies that tracking data should be checked for:

- Participating customer information;
- Measure specific information;
- Vendor specific information;
- Program tracking information; and
- Program costs

10.2.3.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for nearly all participants.
- Weather zones were provided in the tracking data.
- All inputs needed to re-calculate savings according to TRM V8.2 protocol were present.

10.2.3.2 Measure Specific Information

The content of tracking data was found to include sufficient information for all measures in PY2021.

10.2.4 Declining Savings & Participation

The Low Flow Program has had declining participation in recent years. The program has struggled to fully expend its budget and meet participant goals, and at the same time the NTG for kit measures has declined. CenterPoint staff have concerns related to market saturation as the program has reached the majority of their eligible customers. Though the service territory of course sees new entrants that are thus newly eligible, it is unlikely that the program will reach the scale it had in its earlier years of operation.

CenterPoint had rescaled this program in the past; for the 2017-2019 program cycle, its budget was reduced from $415,000 to $290,000 per year due to lack of expenditure. This should be examined for the next program cycle as remaining market potential for the program may warrant a lower funding level.

10.3 Low Flow Showerhead & Faucet Aerator Program Impact Evaluation

10.3.1 Energy Savings Calculations

Savings from low flow showerheads are calculated by the following process:

- First, the Evaluators total the per-unit savings as determined by TRM V8.2 algorithms which incorporate weather-zone specific ground water temperatures.
- Further, based upon PY2021 survey results, these values are scaled down by the verified *in-service rate*. This is the percent of distributed equipment installed. This is determined separately for each item in the kit (showerheads, kitchen aerators, and bathroom aerators).
- The Evaluators then parse out the savings based on the percent of electric vs. gas water heating as determined through the participant surveys. This serves to provide a weighted average value of energy savings based upon the electric and natural gas savings algorithms for each measure as indicated in TRM V8.2.

10.3.2 Unit Energy Savings

Unit energy savings is summarized in Appendix C: Sample TRM Calculations.

10.3.3 Net-to-Gross

The Evaluators applied the NTG developed in PY2020 participant surveying. The resulting NTG is 50.33%.

10.4 Verified Savings

Table 10-6 summarizes the total gross savings for the Low Flow Showerhead & Faucet Aerator Program.

Table 10-6: Low Flow Showerhead & Faucet Aerator Program Verified Gross Savings

Measure Category	Annual Therms Savings		EUL	Lifetime Therms Savings		Gross Realization Rate
	Ex Ante	Ex Post		Ex Ante	Ex Post	
Faucet aerators	5,851	5,220	10	58,508	52,201	89.2%
Showerheads	50,695	44,647	10	506,946	446,471	88.1%
Total gross savings	**56,545**	**49,687**	-	**565,455**	**498,672**	**87.9%**

Table 10-7: Low Flow Showerhead & Faucet Aerator Program Verified Net Savings

Measure Category	Free Ridership Rate		Annual Therms Savings		EUL	Lifetime Therms Savings	
	Ex Ante	Ex Post	Ex Ante	Ex Post		Ex Ante	Ex Post
Kit savings	49.67%	49.67%	28,459	25,098	10	284,593	250,982
Total Net Savings					**-**	**284,593**	**250,982**

Table 10-8 summarizes the net non-energy benefits from the PY2021 Low Flow Showerhead & Faucet Aerator Program.

Table 10-8: Low Flow Showerhead & Faucet Aerator Net Non-Energy Benefits Summary

Non-Energy Benefit	Annual	Lifetime
kWh	89,635	896,353
kW	9.32	-
Water savings (gallons)	7,014,506	70,145,055

CenterPoint performs cost-effectiveness testing internally. As a result, monetization of these benefits was not completed by the Evaluators and is not presented here.

10.5 Conclusions

The program is cost-effective but has had continuously declining participation and savings.	The program expended only 54% of its budget and met 16% of its savings goal. Much of this decline in savings is due to revised NTG findings, but at the prior (higher) NTG, the program still significantly over-expended relative to participation volume.

10.6 Recommendations

Consider a reduction in program funding for the next cycle.	CenterPoint should consider a reduction in funding for the next program cycle and redirect this budget to higher incentive levels in other programs or to new programs.

11 Saving Homes Program

The Saving Homes Program is a weatherization program launched by CenterPoint Energy in PY2016. The program is designed to train contractors and home energy consultants to analyze the energy use for single and multifamily homes and identify specific energy efficiency improvements which may be undertaken by the customer.

The program corresponds to the Consistent Weatherization Approach and provides two tiers of energy assessments, along with direct installation of low-cost measures and pre-qualification for building envelope improvements.

Direct install measures include:

- Faucet aerators;
- Low flow showerheads;
- Water heater pipe insulation; and
- Water heater wrap.

Weatherization measures include:

- Air sealing;
- Duct sealing; and
- Ceiling insulation.

The program is implemented by CLEAResult.

11.1 Program Background

The Saving Homes Program (SHP) is intended to be primarily vendor-driven program, with the marketing targeted at contractors in the CenterPoint Energy service territory. Table 11-1 summarizes the historical performance of the Saving Homes Program.

Table 11-1: SHP Historical Performance against Goals

Program Year	Budget			Net Therms		
	Spent	Allocated	%	Achieved	Goal	%
2016	$598,379	$503,910	119%	142,741	87,820	163%
2017	$1,754,790	$1,652,646	106%	386,648	432,000	90%
2018	$1,820,720	$1,733,415	105%	438,656	466,200	94%
2019	$1,849,180	$1,803,822	103%	339,781	495,000	69%
2020	$1,717,720	$1,612,521	107%	410,663	428,074	99%
2021	$1,671,364	$1,692,627	101%	436,278	425,180	103%

11.2 Participation Summary

The SHP had 1,158 distinct participants in PY2021. Ninety-eight percent of participants installed at least one measure. 26 participants had an assessment completed but did not complete subsequent projects.

Figure 11-1 summarizes the share of program savings contributed by each measure. Most savings came from duct sealing, air sealing, and ceiling insulation.

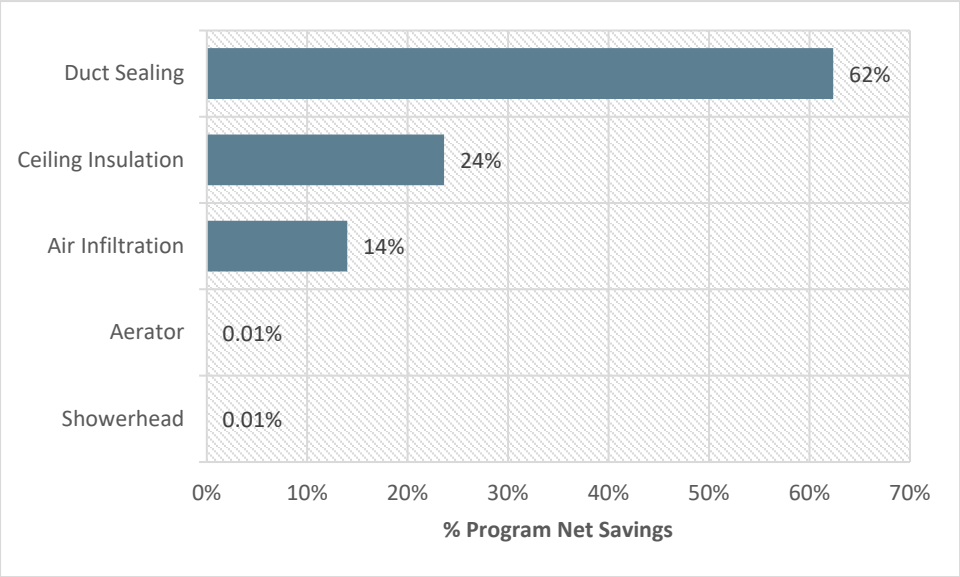


Figure 11-1: Program Savings Share by Measure

In addition, incentives were provided for 971 Assessments.

11.2.1 Contractor Participation

In PY2021, the SHP had five registered trade allies. This trade ally list was published on the program website, along with a summary of services provided and regions served. All trade allies were active in the program in PY2021. Project volume by trade ally ranged from 14% to 29% of program savings.

11.3 SHP Process Evaluation

The Evaluators conducted a process evaluation of the SHP in PY2021. Table 11-2 and

Table 11-3 summarize the Evaluators' review of the Saving Homes Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 11-2: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and Innovative Components	No. The program is designed in a manner consistent with similar programs elsewhere and applies deemed savings values from the TRM.
No Previous Process Evaluation	No. The program received a comprehensive process evaluation in 2020.
New Vendor or Contractor	No. CLEAResult has implemented the program since program inception.

Table 11-3: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No. The program met goal in PY2020.
Are the educational or informational goals not meeting program goals?	No. The programs have had successful consumer and contractor outreach & education.
Are the participation rates lower or slower than expected?	No. The program met participant goals in PY2020.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	No. The prior process evaluations found that operational and management structure to be up to speed and efficient in administering the program.
Is the program's cost-effectiveness less than expected?	No, the program's cost-effectiveness was within expected boundaries.
Do participants report problems with the programs or low rates of satisfaction?	No. 2020 participant surveys found high satisfaction levels.
Is the program producing the intended market effects?	Yes. The program has engaged contractors in completing weatherization projects that would not otherwise occur.

The program received a full process evaluation in PY2020. The Evaluators conducted a limited process evaluation for PY2021 to address response to recommendations.

11.3.1 Recommendation Tracking

The status of PY2020 recommendations is provided in the table below.

Table 11-4: SHP Response to PY2020 Recommendations

Recommendation	***CenterPoint Response***	***Status of Issue***
Make envelope improvements for upcoming program cycles.	CenterPoint is working with other AR based utilities to align programmatically.	In progress

11.3.2 Data Collection Activities

The process evaluation of Saving Homes Program included the following activities:

- *Program Actor In-Depth Interviews*. The Evaluators conducted in-depth interviews with a series of program actors. These interviews covered a range of topics, including marketing efforts, feedback on program delivery, an assessment of barriers to program implementation and success, and recommendations for program improvement. Program Actors interviewed include:
  - *CenterPoint energy program staff*. The Evaluators interviewed staff at CenterPoint involved in the administration of the Saving Homes Program.
  - *Third party implementation staff interviews.* The Evaluators conducted interviews with CLEAResult involved with the Saving Homes Program.
  - *Participant surveying.* The Evaluators surveyed 103 participants in the SHP, collecting feedback on their experiences with the program.

Table 11-5 summarizes the data collection for this process evaluation effort. This includes the titles, role, and sample sizes for data collection.

Table 11-5: CenterPoint SHP Data Collection Summary

Target	Component	Activity	n	Precision	Role
CenterPoint Energy Program Staff	Manager of Energy Efficiency	Interview	1	N/A	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with the SHP Program and in the overall coordination of utility resources.
	Senior Energy Efficiency Consultant	Interview	1	N/A	The Energy Efficiency Consultant at CenterPoint is responsible for much of the day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.
CLEAResult Staff	Senior Program Manager	Interview	1	N/A	Handles day-to-day operations, including mass market outreach, application review, billing, and logistics
Program Participants	Single Family Owner-Occupants	Survey	103	±7.8%	This survey was conducted on a sample of single-family owner-occupants who participated in the program.
		Field Data Collection	37	±13.4%	The Evaluators conducted duct blaster and blower door testing as well as measurement of ceiling insulation at a sample of program participant homes.

11.3.3 Adherence to Protocol A

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM V8.2. The Evaluators

reviewed program to assess its compliance with Protocol A of the AR TRM V8.2 which specifies that tracking data should be checked for:

- Participating customer information;
- Measure specific information;
- Vendor specific information;
- Program tracking information;
- Program costs; and
- Marketing & outreach activities.

The Evaluators conducted a review of each of the above factors within PY2021 tracking data except for marketing and outreach activities as these are outside the scope of the tracking system's reporting.

11.3.3.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for most participants.
- Weather zones were provided in the tracking data.

11.3.3.2 Model Specific Information

Measure-specific information in SHP tracking was sufficient to calculate savings per AR TRM V8.2 protocols.

11.3.4 Program Administration

The SHP was overseen by the Senior Energy Efficiency Consultant at CenterPoint. This Consultants' responsibilities primarily include interfacing with CLEAResult, who directly implements the program. Other activities by this Consultant include providing updated customer lists to CLEAResult to better facilitate their implementation, participation in outreach events, and at times assisting CLEAResult in customer interactions.

11.3.5 Program Implementation & Delivery

There are two program channels for the SHP, *assessment* and *install-only*.

- **Assessment.** The *assessment* is a comprehensive audit which includes conducting duct blast and blower door testing. This testing is needed to pre-qualify a home for duct sealing and air sealing improvements. Before a home may receive an *assessment*, program trade allies are required to calculate the gas intensity of the residence. In this,

the contractor must take the customer's highest winter natural gas bill and divide it by the heated square feet of the home. Figure 11-2 summarizes the calculation process.

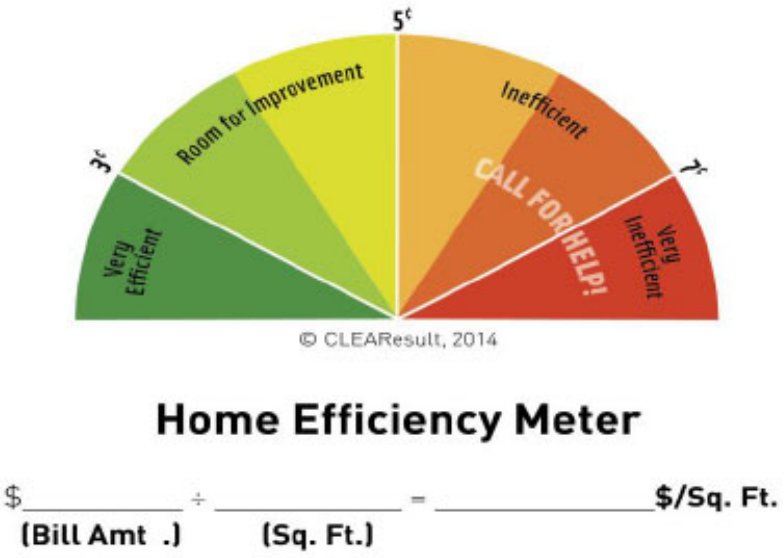


Figure 11-2 Home Efficiency Meter Graphic

A home must have use above $0.05 per square foot during a winter season month to qualify for an *assessment*.

- **Install-only.** Further, residential customers may opt to do directly through a contractor to install eligible measures without receiving an *assessment*. This is allowed if the contractor is a registered trade ally with the program.

The criteria of $0.05/square foot of use on a customer's highest bill is used to ensure that program funds go towards project which will produce enough savings to be cost-effective. Further, all participating residences are required to have central natural gas space heating to receive an assessment and rebates for building envelope measures and natural gas water heating to be eligible for direct install measures.

Residential customers may enter the program either by contacting the Energy Efficiency Solutions Center (EESC) to request an assessment or by working through a participating contractor who initiates the assessment and coupon process.

11.3.6 CWA Metrics Summary

They key CWA metrics are presented in Table 11-6.

Table 11-6: CWA Program Metrics Summary

Metric	Value
Program name	Saving Homes Weatherization Program
CWA implementation	The CWA is implemented using a third-party contractor (CLEAResult) with a network of pre-approved trade allies that market the program. The program coordinates with SWEPCO and Entergy
Total audits completed	971
Total submitted projects	1,132 (187 projects completed without assessment)
Conversion rate	97.3% (945 of 971 assessments yielded projects)
Measures installed per-project	Including projects with no measures: 1.74 Excluding projects with no measures: 1.78
Cost per participant	No customer co-pay. CNP paid $769/home
Percent of contractors promoting program	100%

Table 11-7: Alignment with CWA Requirements

Requirement	Alignment with Requirement	Percent of Participants Receiving
Includes Applicable DI Measures	Yes	1.2%
Aerators	Yes	1.0%
Showerheads	Yes	0.2%
Efficient lighting	Yes	N/A
Smart strips	Yes	N/A
Prequalifies homes based on year of construction or energy costs	Yes, the customer must have had a bill in the last twelve months that exceeded ten cents per square foot or the home's age is 10 years or greater.	Not in tracking data
TRC is used to assess program cost-effectiveness	Yes	N/A
Measures screened using SIR or comparable metric	Program uses TRC	N/A
Includes Core No Cost Measures	Yes	100.0%
Audit (walk through)	Yes	83.9%
Audit (virtual)		N/A
Ceiling insulation	Yes	48.7%
Duct sealing	Yes	70.3%
Air infiltration reduction	Yes	54.2%
Safety testing and/or measures	Yes	Not in tracking data
Offers other utility measures	Yes	N/A

Contractors are certified BPI Building Analyst or RESNET HERS Rater	Yes, for duct sealing, air infiltration, and assessments. Insulation requires Arkansas Home Improvement Specialty License.	N/A

11.3.7 Marketing

Recognizing that trade allies are the face of the program, CenterPoint staff rely heavily on their trade allies to get the word about the residential programs to the public. Staff provide trade allies with the materials needed to promote the programs and then trade allies go out and make the connections with customers. Although CenterPoint does not focus on co-branding, as they do not want to appear as though they favor one trade ally over another, they do provide trade allies with flyers, brochures, and other informational materials. CenterPoint also does some of its own marketing including email blasts, mailers, radio ads, etc., but they are more expensive and not as fruitful as word of mouth. To improve its marketing strategies, CenterPoint tracks marketing materials and online behavior to better understand what methods are most effective; they have also recruited an advertisement agency to help with this endeavor.

11.3.8 Quality Assurance

CenterPoint staff did not express any issues with quality control and assurance. Staff at CLEAResult conducts post inspections at a minimum of 10% of the projects completed by each trade ally. Post inspections are conducted by a quality assurance specialist. The post-inspection procedure includes designations of *major violations* and *minor violations* for each measure.

- *Major violations* require immediate resolution which may include charging the contractor back for the rebate amount.
- *Minor violations* may be resolved without chargeback.

The definition of *major* and *minor* violations by measure are summarized in Table 11-8.

Table 11-8: QA Violation Definitions by Measure

Measure	***Definitions***
Direct Install	Major violation examples: ▪ Verified devices installed does not match claimed devices installed. ▪ Device installed on an appliance of non-eligible fuel type ▪ Installation of direct install equipment results in damage or inoperability of existing equipment Minor violation examples: ▪ None
Insulation	Major violation examples: ▪ Stated existing R-value: error > 1 step difference in R-value range chart on the coupon. ▪ Stated finished R-value: error of > 10% in R-value ▪ Stated square footage: error of >10% in square feet Minor violation examples: ▪ Improper installation of new insulation (such as varying depths) ▪ Bag count card not properly displayed ▪ Depth markers not properly displayed
Duct Sealing/Air Sealing	Major violation examples: ▪ Starting vs. finished air leakage rate: verification reveals discrepancy > 20% ▪ Minimum Ventilation Requirement (MVR): failure to identify correct MVR or take proper action in the event of the MVR not being met ▪ Duct / air sealing materials: use of improper materials ▪ Combustion Safety Test (CST): not performing the CST or failing to take proper action on the results. Minor violation examples: ▪ None

11.3.9 Impact of Home Assessments

The Evaluators reviewed the measure installations energy savings for participants in the SHP. The Evaluators key findings from this review were as follows:

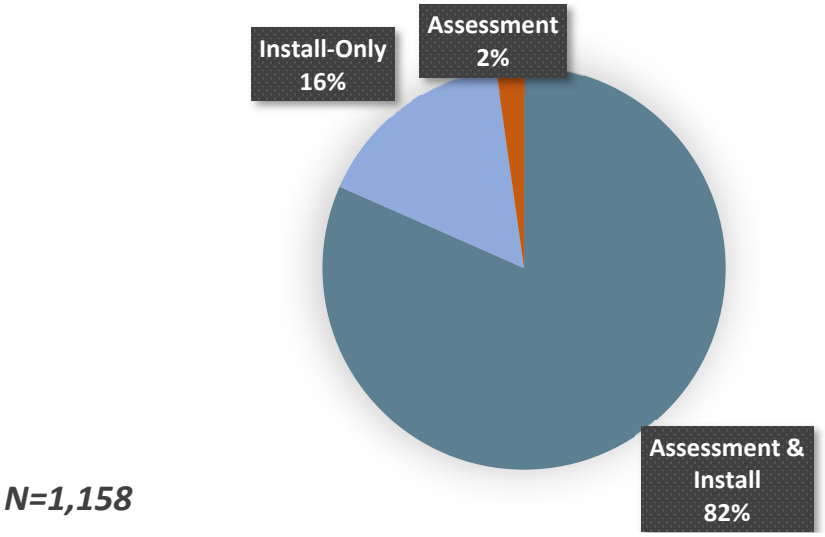


Figure 11-3: Measure Installation

The differences in measure installation by participant class are presented in Figure 11-4. There is a statistically significant difference in quantity and net savings of measures installed between the *assessment* & *install* and the *install-only* groups. Install-only participants displayed lower savings and measure totals than *assessment* & *install* projects.

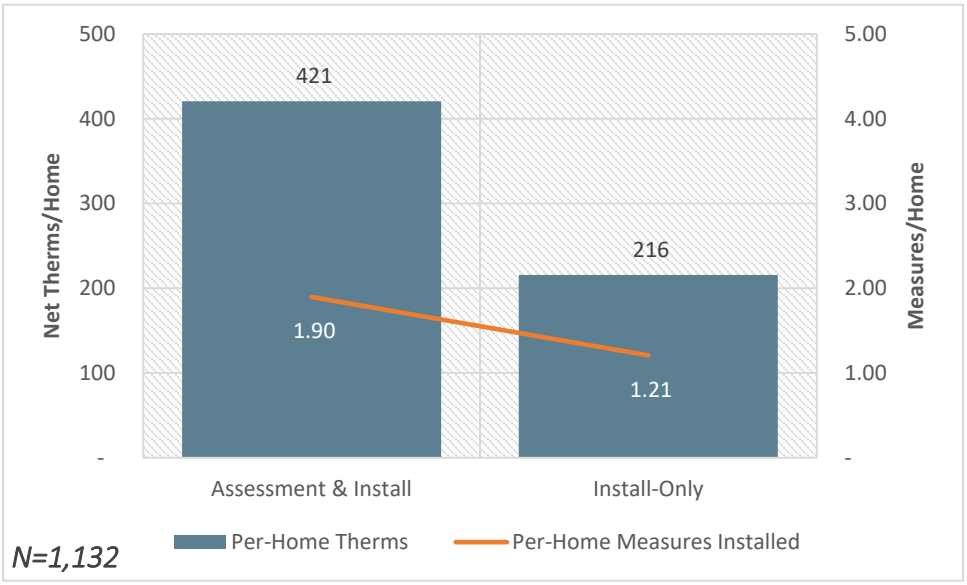


Figure 11-4: Per-Home Measure Installation

11.3.10 Trade Ally Outreach

In PY2021, the SHP had five registered trade allies. The Home Energy Consultant (HEC) trade allies can provide *assessments* through the program, which receive rebates of $100[29] from CenterPoint (split evenly in instances of joint implementation with an overlapping electric IOU). When the home overlaps with a participating electric utility and has equipment that qualifies for both programs, the incentive cost is split equally. HECs must attend program training sessions held by CLEAResult in a classroom setting as well as in the field before being certified and allowed to perform Surveys and *assessments*. Other requirements for HECs include:

- Must have at least one employee with certification as either a Building Performance Institute Building Analyst (BPI-BA) or a RESNET Home Energy Rater (this rater is required to be present on all jobs in progress);
- If the staff member with the appropriate certification leaves the company, the trade ally must hire a replacement or obtain a certification for another employee within 30 days (though this is extended if the needed courses are not available in that time frame).
- Must own and maintain a Blower Door, Duct Blaster, combustion safety testing tools, energy modeling software (provided by the program), and all appropriate hand tools.

CLEAResult allocates incentive funds across the five trade allies at the beginning of the year and prescribe a burn rate they need to meet. In order to meet goals, the five trade allies can work together or independently. During their interview, CLEAResult staff noted that the contractors do not struggle to spend their allocations, and often spend before the end of the year. Typically, contractors will put customers on a waitlist if they run out of allocations early. CLEAResult prefers this allocation model as it allows contractors to plan out their year and budget more efficiently.

11.3.11 Participant Survey Response

The Evaluators surveyed 103 participants in the SHP. These surveys were to collect data on participant experience with the program including sources of program awareness, motivations

[29] The incentive is reduced to $150 if the home is 700 ft.^{2} or less.

for participating, and satisfaction with the program. Of the 2694 residential participants, 103 participants completed a survey for an overall response rate of 3.4%.

11.3.11.1 Program Awareness

Respondents' awareness and use of energy saving tips and incentive program information on the CNP website were mixed, though most respondents stated that their visit to the site was a non-specific search for energy saving information.

The majority of respondents (68.0%, n=70) were aware that CNP provides energy saving tips and information about their incentive programs on their website, however just under half of those respondents (47.1%, n=33) had looked at the website to learn how to save energy. Among these 33 website viewers, the most popular reasons for their visits were to get energy saving information and tips and to learn about information on CNP's energy efficiency incentive programs (**Error! Reference source not found.**). 12.6% of respondents filled out an online energy assessment (n=13).

Table 11-9: Reasons for Website Visit (n=33)

	% Respondents
Get energy saving info and tips	60.6%
Learn about CNP's incentive program	24.2%
Energy efficiency newsletter	12.1%
Other	6.1%
*Sum greater than 100% as respondents could select multiple reasons	

Respondents first learned about CNP's Residential Weatherization program through a variety of avenues, including word of mouth from friends and family (59.4%, n=57) and social media (14.6%, n=14) (Figure 11-5). Just under a quarter of respondents (24.3%, n=25) reported seeing social media posts about the energy efficiency programs and energy saving tips.

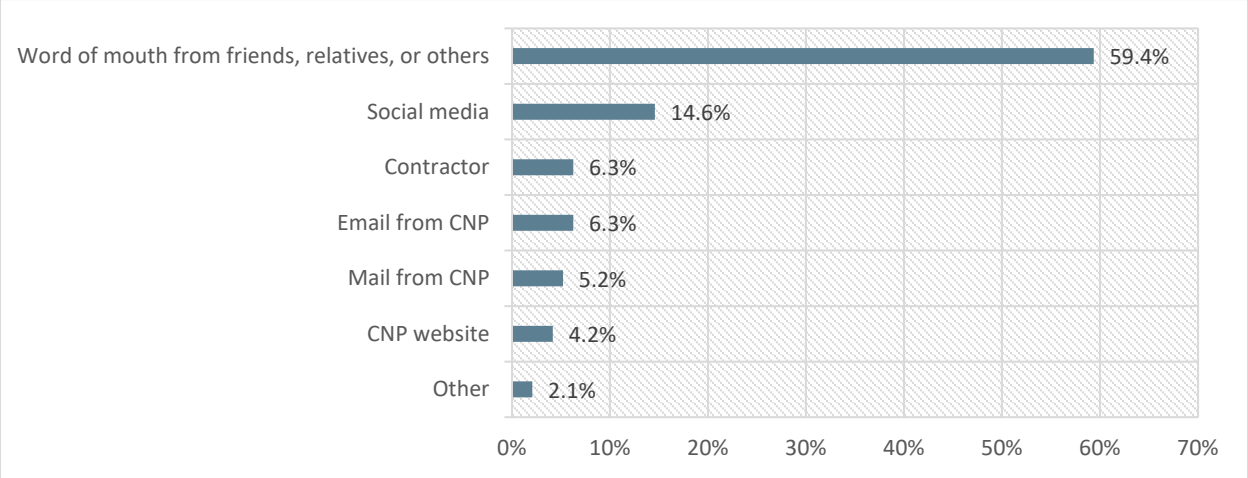


Figure 11-5: Initial Program Awareness Method (n=96)

More than a third of respondents wanted to participate in the program to reduce their monthly utility bill (38.3%, n=18).

Other popular reasons included to save energy, to improve the value of their home, and program paid for improvements (Figure 11-6)

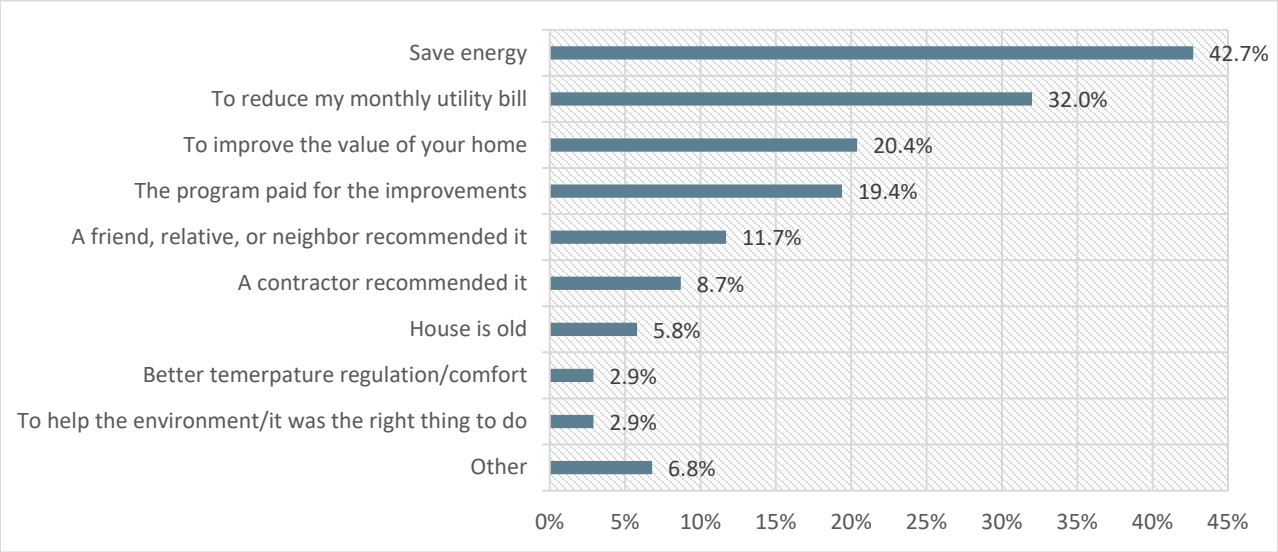


Figure 11-6: Motivation for Participation (n=103)

11.3.11.2 Home Energy Assessment

The majority of respondents received a home energy assessment (84.5%, n=87). 80.5% of those respondents scheduled their home energy assessment (n=70) and almost all of them

found it somewhat easy (18.6%, n=13) or very easy (78.6%, n=55) to schedule. The majority of respondents were home during the home assessment (89.5%, n=68) and many received some information from the assessor during the assessment (Figure 11-7).

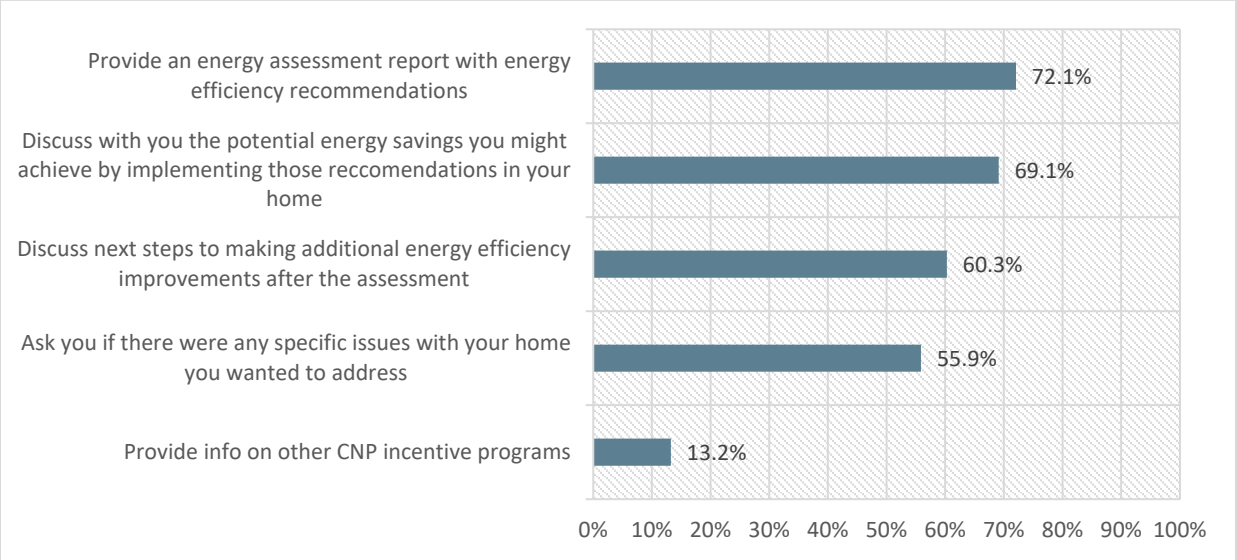


Figure 11-7: Interactions with Home Assessor (n=68)

Among those thirty-eight respondents who reported receiving a home energy assessment report, almost three-quarters found the report to be helpful or very helpful (Figure 11-8). A suggestion for how to improve the home energy assessment report was to provide more information and recommendations about the problem and how to fix it.

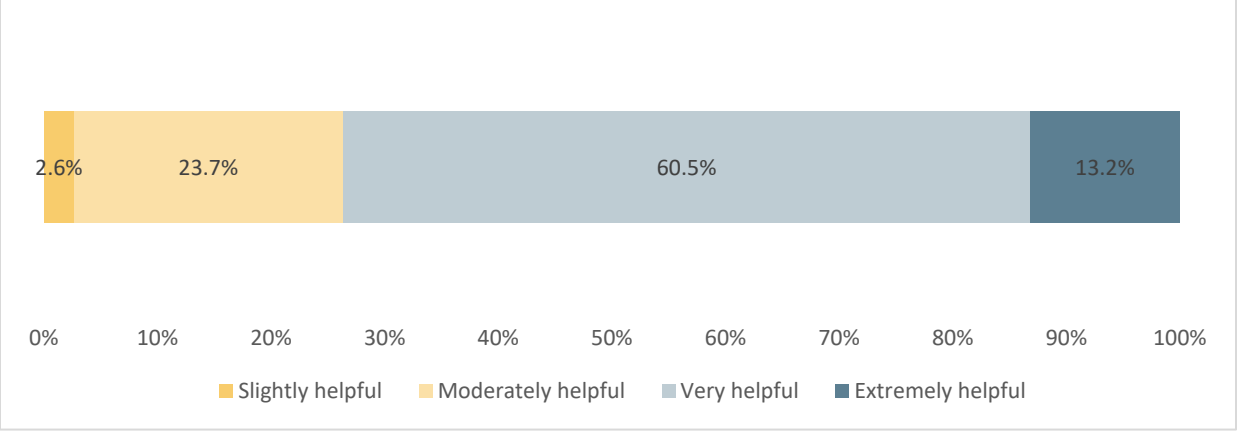


Figure 11-8: Utility of Home Assessment Report (n=38)

11.3.11.3 Program Satisfaction

Just under one-third of respondents indicated the energy savings from the program are about what they expected (30.1%, n=31) (Figure 11-9). Two respondents reached out to CNP during program participation with issues and questions; both respondents noted the response was thorough.

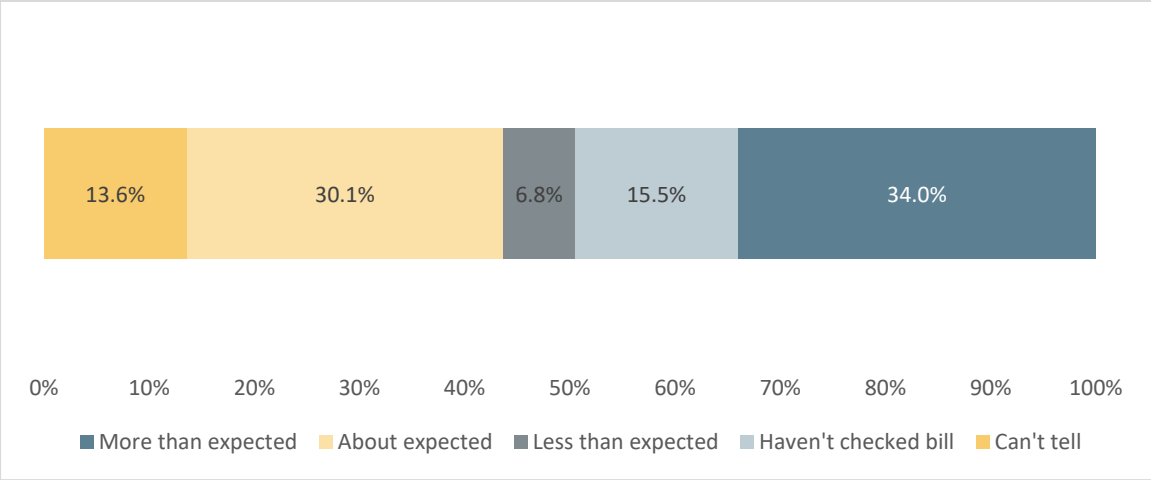


Figure 11-9: Energy Savings from Bill (n=47)

In general, respondents were satisfied with CNP as their natural gas provider as well as the residential weatherization program.

The majority all respondents were very satisfied with the overall program experience (82.2%, n=83) and just under three-quarters were very satisfied with the performance of the equipment installed (72.2%, n=70) (Figure 11-10). Respondents who were unsatisfied expressed frustration that no or not all of the improvements were made, as well as disappointment with their high energy bill.

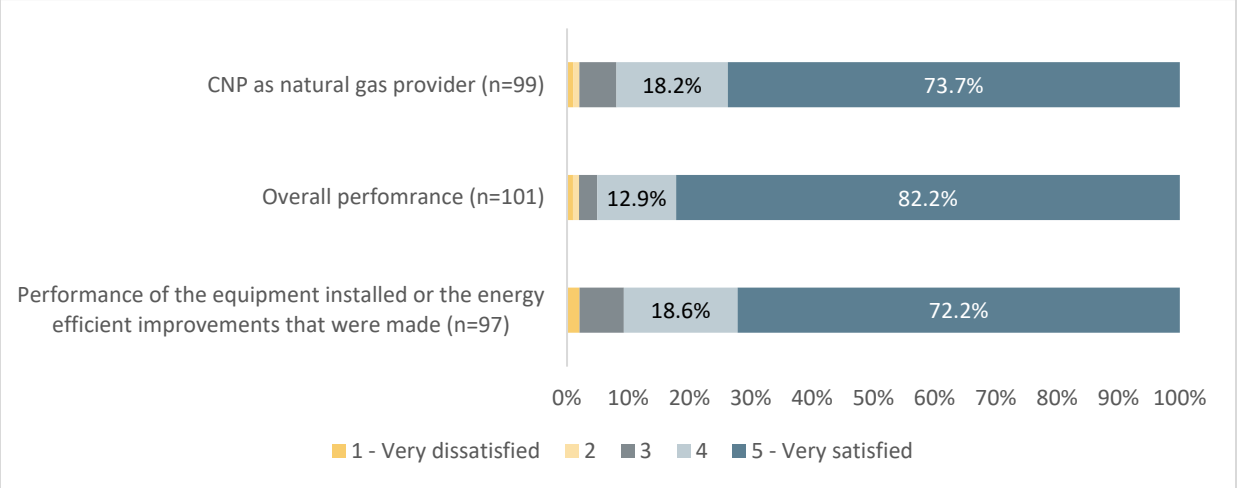


Figure 11-10: Utility & Program Satisfaction

Many respondents provided positive feedback about CNP and the SHP.

More than half (67.3%, n=68) indicated that they consider CNP a trusted recourse for energy saving and 80.2% (n=81) noted they would recommend CNP's programs and services to others. More than two-thirds (68.7%, n=68) of respondents strongly agreed that participating in the weatherization program increased their satisfaction with the utility and a little less than half have taken additional energy savings steps since participation (41.5%, n=39) (Figure 11-11). Over three-quarters indicated they are somewhat likely or very likely to complete an energy efficiency home improvement project in the future (77.9%, n=74).

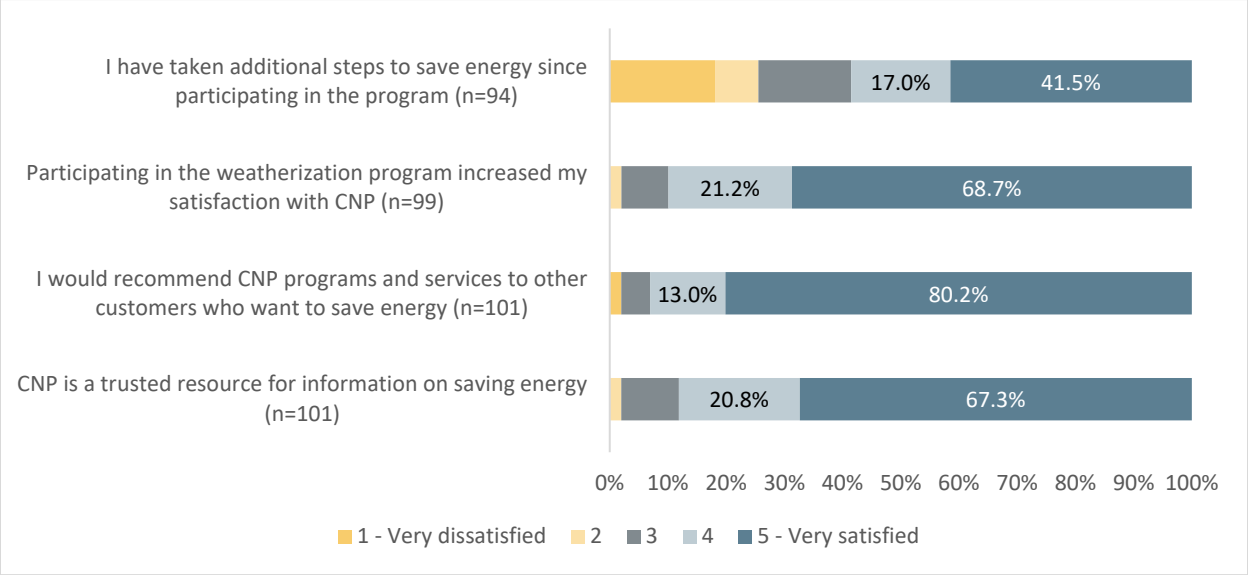


Figure 11-11: Additional Satisfaction Questions

11.4 SHP Impact Evaluation

The evaluation effort of the SHP included the following:

- *Desk Review of Residential Calculations.* The Evaluators utilized TRM V8.2 values in assessing savings from measures included in the program.
- *Field Verification.* The Evaluators conducted field verification at 37 homes representing 74 measures in PY2021.

11.4.1 Tracking Review

The impact evaluation began with a review of program tracking data. The tracking data included a separate row for each measure installed. Every premise in the program had a unique rebate identifier, and thus one premise would have multiple rows to reflect the different measures completed. Table 11-10 summarizes ex ante savings by measure for the SHP.

Table 11-10 SHP Ex Ante Summary

Measure	Ex Ante Therms
Duct Sealing	272,861
Air Infiltration	61,215
Ceiling Insulation	103,412
Showerhead	25
Water Heater Jacket	0
Aerators	30
Pipe Insulation	0
Total	437,544

The tracking data provided measured values for duct pressurization testing and blower door tests, allowing for the recreation of ex ante calculations based on leakage reduction.

11.4.2 Field Verification Procedures

The Evaluators conducted field verification at 37 homes in the SHP. Measures included in this sample were as follows:

- Air Infiltration: 25 homes
- Ceiling Insulation: 14 homes
- Duct Sealing: 30 homes, 35 HVAC systems

The Evaluators conducted duct blast and blower door tests at all homes that received duct sealing and air sealing (respectively).

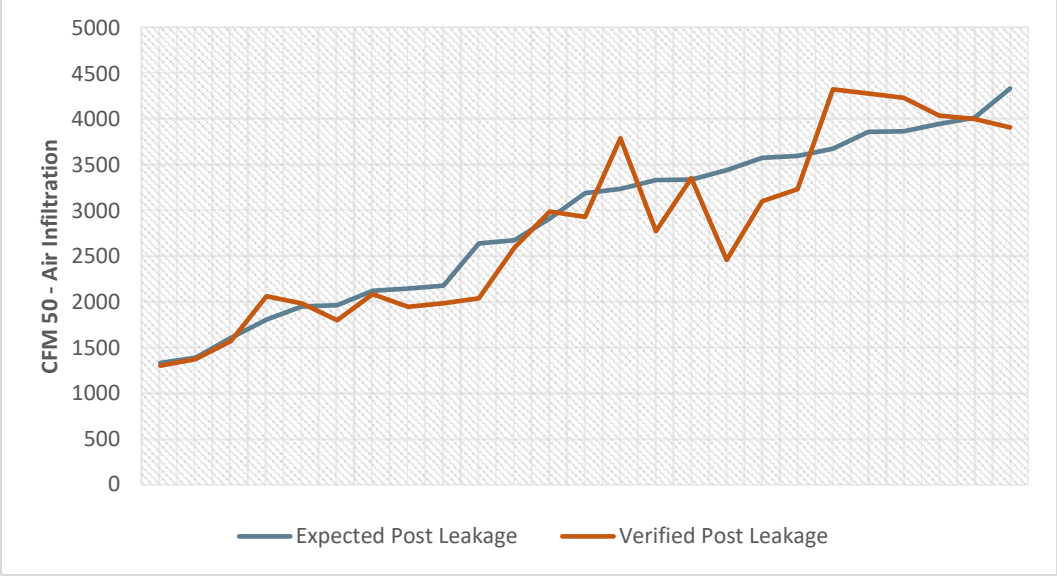


Figure 11-12: Air Infiltration Field Data Collection Results (n=25)

The Evaluators lower infiltration than shown in ex ante estimates. This resulted in an overall in-service rate (ISR) of 105.2%.

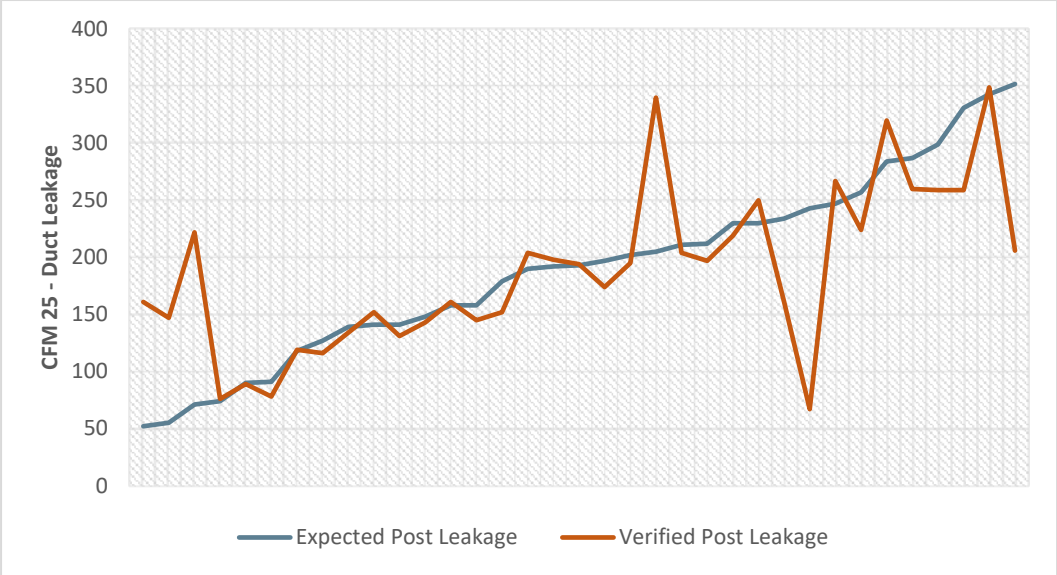


Figure 11-13: Duct Sealing Field Data Collection Results (n=35)

Field results for duct sealing very closely aligned with expected results, and there was an overall ISR of 101.7%.

Ceiling insulation projects showed minor square footage discrepancies, and final FVR was 92.9%.

11.4.3 Net Savings Estimates

The overall free ridership score for participants with the financial ability to install the measures was based on the average of the prior plans and the likelihood scores. The free ridership scoring is summarized in Figure 11-14.

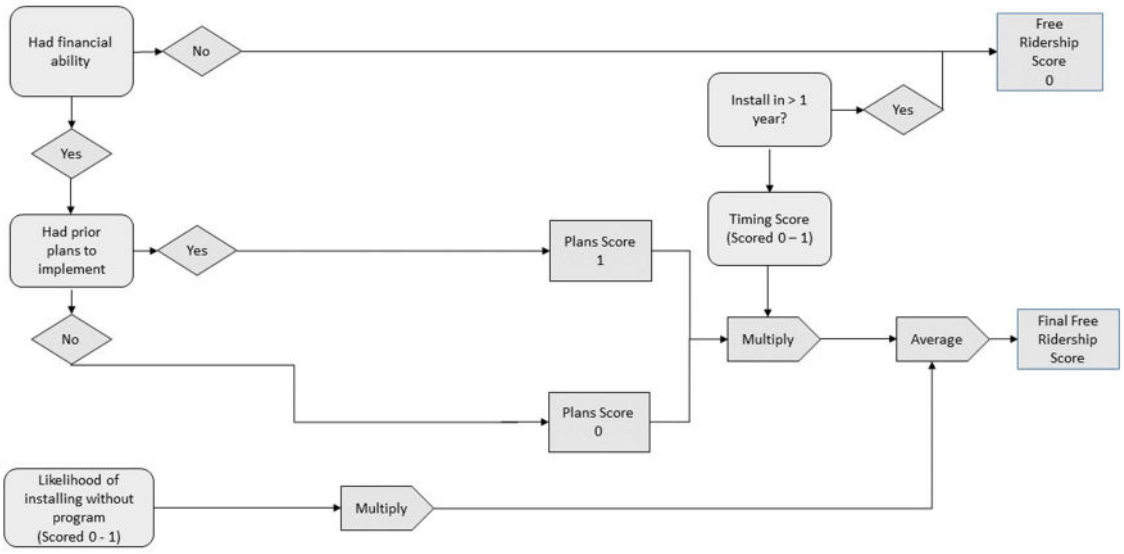


Figure 11-14: Major Measure Free ridership

To assess the program's influence on major measures (i.e., duct sealing, air sealing, and insulation), program participants were asked questions regarding:

- If they could afford to install the equipment if it had not been provided for free through the program;
- If they had plans to complete the project;
- The likelihood of installing the equipment if it had not been provided for free; AND
- The timing of the project in the absence of the program.

In this methodology, financial ability is essentially a gateway value, in that if a participant does not have the financial ability to purchase energy efficient equipment absent a rebate, the other components of free ridership become moot. Respondents that reported they could have afforded to implement the improvements were assigned an overall free ridership score based on a prior plan score, a likelihood of installing the measure in the absence of the program, and a timing score.

11.4.3.1 Prior Plans and Deferred Free ridership

The prior plans score was based on a response to a question regarding the presence of plans. Specifically, respondents were considered to have had prior plans if they answered "Yes" to the following question:

- Prior to learning about the program, did you have plans to implement the [Measure]?

The program influence on the timing of the project was incorporated into the estimation of free ridership in one of two ways. First, consistent with the Arkansas TRM definition of free ridership, respondents who indicated that the project would have been completed in more than one year if the program were not available were assigned a free ridership score of 0. For all other respondents, the plans score was factored by the program impact on timing. Specifically,

- If the respondent stated that they would have installed the measure in 6 months to one year, then the prior plans score was reduced by one-half.
- If the respondent stated that they would have installed the measure at the same time or within 6 months of when it was installed, the prior plans score was not adjusted.

11.4.3.2 Likelihood of Implementing Measure without Program

A likelihood of installing the measure in the absence of the program was developed based on respondents stated likelihood of installing a measure if the financial support was not provided or if the measure had not been recommended through the energy assessment. Specifically, responses to this question were scored as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely nor unlikely: .5
- Somewhat unlikely: .25
- Very unlikely: 0

The likelihood score was based on the lower value of the likelihood of installing the measure if the program financial support was not available or if the measure was not recommended through the energy assessment.

The resulting NTGR was 97.33%. This was appl.

11.4.3.3 Direct Install Measures Free Ridership Methodology

Due to the low volume of direct install measures (which accounted for .02% of verified savings) the Evaluators did not develop a separate NTGR. DI measures received the 97.33% NTGR developed for the weatherization measures.

11.4.4 Verified Savings

Table 11-11 presents the gross savings results of the evaluation of the PY2021 Saving Homes Program. Total Gross Savings summarizes the savings calculations performed by TRM protocols for program measures.

Table 11-11: SHP Verified Savings Summary

Measure	Ex Ante Therms	Ex Post Therms	Gross Realization	EUL	Lifetime Therms
Duct Sealing	272,861	278,727	102.1%	18	5,017,256
Air Infiltration	61,215	65,807	107.5%	11	723,901
Ceiling Insulation	103,412	96,026	92.9%	20	1,920,579
Showerhead	25	25	100.0%	10	254
Aerators	30	10	33.3%	10	100
Total	**437,544**	**440,595**	**100.7%**	#	**7,662,090**

Table 11-12: SHP Net Savings Summary

Free-Ridership Rate		Net Annual Savings		Net Realization Rate	EUL	Net Lifetime Therms Savings
Ex Ante	Ex Post	Ex Ante	Ex Post			
0%	2.67%	437,544	436,278	99.7%	17.09	7,457,512

11.4.5 Water & Electric NEBs

Table 11-13: SHP Verified Net Water Savings

Measure	Net Annual Water Saving (Gallons)	Lifetime Net Water Savings (Gallons)
Aerators	2,446	24,460
Showerhead	5,943	59,432
Total	**8,389**	**83,892**

Table 11-14: SHP Verified Net Electric Savings

Measure	Net Annual kWh	Net Peak kW	Lifetime Net kWh
Duct Sealing	1,463,083	770.68	26,335,492
Air Infiltration	137,105	103.47	1,508,160
Ceiling Insulation	498,263	545.90	9,965,257
Total	**2,098,451**	**1,420.05**	**37,808,909**

11.5 Conclusions

Satisfaction has increased from PY2020 to PY2021.	The percent of SHP survey respondents noting that they are "very satisfied' has increased from 70% to 80%.
Realization rates were high overall.	The overall realization rate was 100.7%.
Program implementation contractors have been responsive to recommendations.	The Evaluators issued multiple recommendations in PY2020 and all have been addressed or are in progress.
Project comprehensiveness has declined.	The average measures per-project has declined from 2.95 to 1.78 from PY2020 to PY2021. CenterPoint and CLEAResult staff have noted that this was attributable to insulation materials shortages in PY2021.

11.6 Recommendations

Address declines in project comprehensiveness	Program implementation staff should review the causes of declining comprehensiveness and address if homes should be revisited to install weatherization measures that were not completed in PY2021.

12 Low-Income Savings Home Program

The Low-Income Saving Homes Program (LISHP) began in PY2020 and was designed to comply with Act 1102. LISHP is an extension of the Consistent Weatherization Approach (CWA) targeted to customers who meet the income eligibility requirements of the Low-Income Home Energy Assistance Program (LIHEAP). The program is designed to train contractors and home energy consultants to analyze the energy use for single and multifamily homes and identify specific energy efficiency improvements which may be undertaken by the customer.

The program provides energy assessments, along with direct installation of low-cost measures and pre-qualification for building envelope improvements.

Direct install measures include:

- Faucet aerators;
- Low flow showerheads;
- Pipe wrap;
- Tank wrap; and
- Smart thermostats.

Weatherization measures include:

- Air sealing;
- Duct sealing; and
- Ceiling insulation.

The program is implemented by CLEAResult.

12.1 Program Background

Table 11-1 summarizes the historical performance of the Low-Income Saving Homes Program.

Table 12-1: LISHP Historical Performance against Goals

Program Year	Budget			Net Therms		
	Spent	Allocated	%	Achieved	Goal	%
2020	$299,846	$292,567	102%	45,902	45,871	100%
2021	$301,038	$304,168	99%	47,516	47,243	101%

12.2 Participation Summary

The LISHP had 140 participants in PY2021. Ninety-eight percent of participants installed at least one measure, and a total of 297 energy efficiency improvements were installed overall.

Figure 12-1 summarizes the share of program savings contributed by each measure. Most savings came from duct sealing, ceiling insulation, and air sealing.

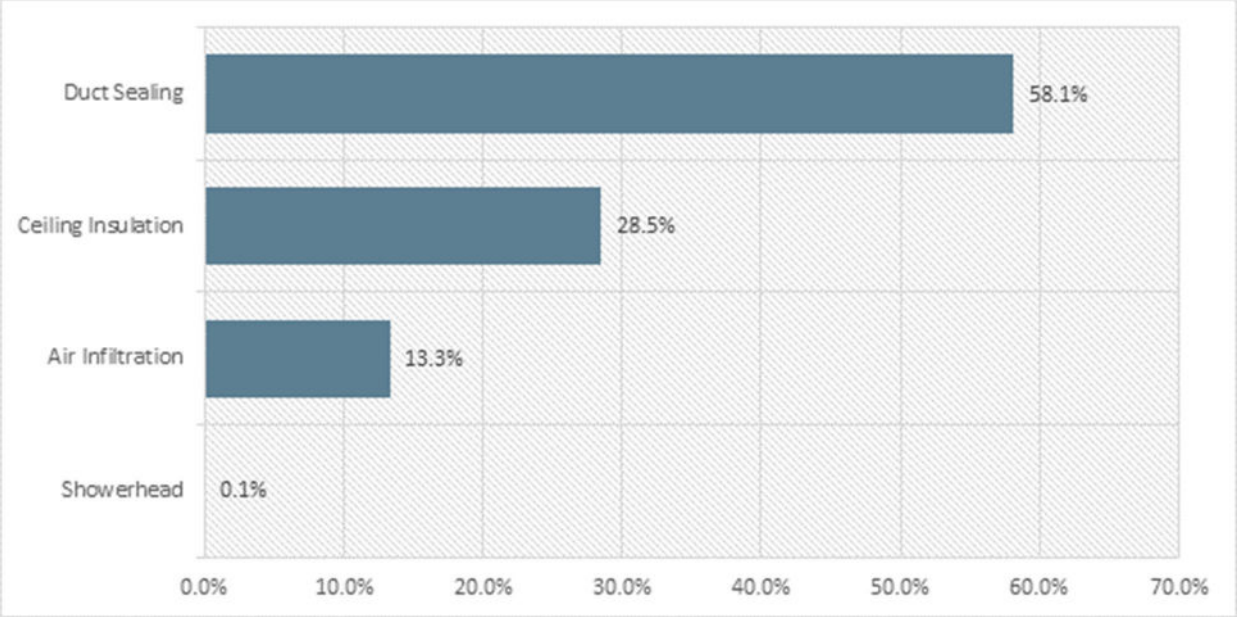


Figure 12-1: Program Savings Share by Measure

In addition, incentives were provided for 106 assessments.

12.2.1 Contractor Participation

In PY2021, the LISHP had five registered trade allies. All trade allies were active in the program in PY2021. The top three performing trade allies were responsible for89% of program net savings.

12.2.2 Participation Timing

Figure 12-2 summarizes the premises by month as determined by the date of rebate delivery as well as the cumulative savings from the program.

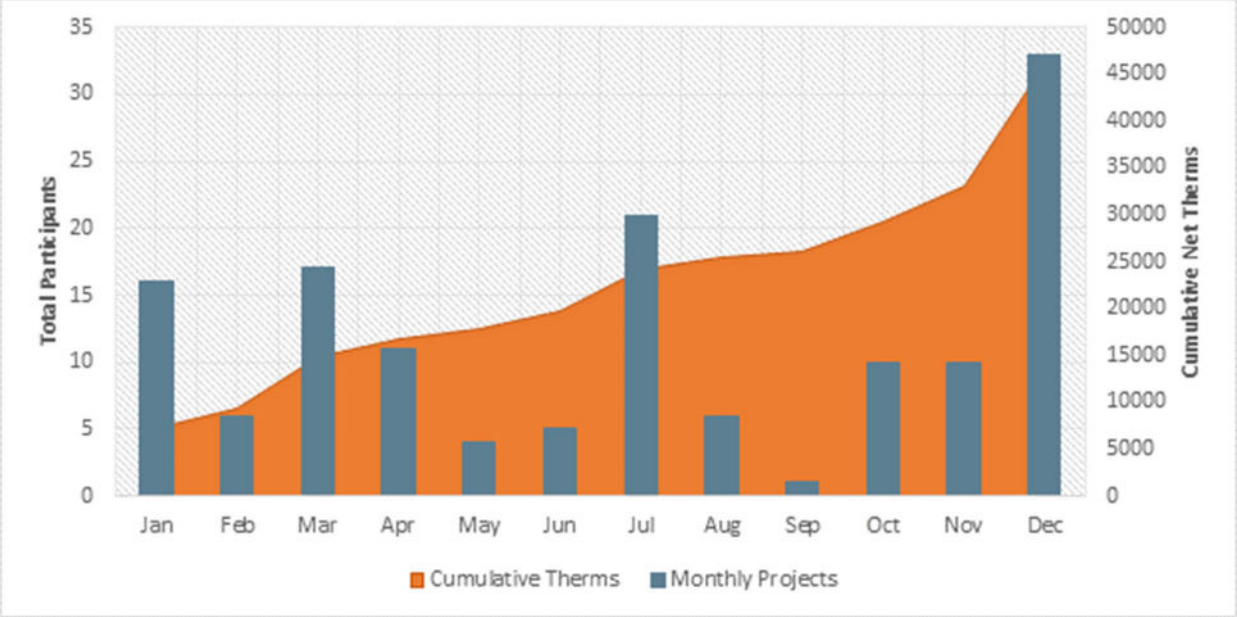


Figure 12-2: LISHP Premises by Month & Cumulative Therms Savings

12.3 LISHP Process Evaluation

Error! Reference source not found. and **Error! Reference source not found.** summarize the Evaluators' review of the Low-Income Saving Homes Program in comparison to TRM V8.2 Protocol C for timing and conditions of conducting a process evaluation.

Table 12-2: Determining Appropriate Timing to Conduct a Process Evaluation

Component	Determination
New and innovative components	No. Program design is unchanged from PY2020
No previous process evaluation	No. The program received a process evaluation in PY2020
New vendor or contractor	No. CLEAResult implements this program and uses contractors from the Savings Home Program.

Table 12-3: Determining Appropriate Conditions to Conduct a Process Evaluation

Component	Determination
Are program impacts lower or slower than expected?	No. The program met PY2020 savings goals.
Are the educational or informational goals not meeting program goals?	Yes. The program failed to install adequate health & safety measures in PY2020.
Are the participation rates lower or slower than expected?	No. The program met PY2020 participant goals.
Are the program's operational or management structure slow to get up and running or not meeting program administrative needs?	Partial. The program's operations were found to be adequate to ensure savings but did not address all Act 1102 requirements.
Is the program's cost-effectiveness less than expected?	No. The program was cost-effective in PY2020.
Do participants report problems with the programs or low rates of satisfaction?	No satisfaction issues found.
Is the program producing the intended market effects?	No. The program did not adequately address health and safety measures in in PY2020.

The Evaluators conducted a limited process evaluation for LIPP due to small program size and budget. This evaluation focused on issues pertaining to health and safety measures identified in the PY2020 evaluation.

12.3.1 Recommendation Tracking

The status of PY2020 recommendations is provided in the table below.

Table 12-4: LI-SHP Response to PY2020 Recommendations

Recommendation	***CenterPoint Response***	***Status of Issue***
Develop a health and safety measure documentation system mirroring that used by BHE	In the BHE LIPP, common health and safety improvements have a pre-set incentives and are designated in program tracking. Tracking in this manner will enable CenterPoint, CLEAResult, the Evaluators and the IEM to review the types of health and safety improvements completed in LISHP homes and ensure that the program is operating in a manner consistent with the legislative intent of Act 1102. The Evaluators note that while the H&S activities of the LISHP improved significantly in PY2021, program tracking did not identify specific H&S measures in PY2021 and that spending levels remained below regional benchmarks.	In progress.

12.3.2 CWA Metrics Summary

They key CWA metrics are presented in Table 12-5.

Table 12-5: CWA Program Metrics Summary

Metric	Value
Program name	Low Income Saving Homes Weatherization Program
CWA implementation	The LISP is implemented using a third-party contractor (CLEAResult) with a network of pre-approved trade allies. The program coordinates with SWEPCO and Entergy
Total audits completed	106
Total submitted projects	140 (34 projects completed without assessment)
Conversion rate	100.0% (all assessments yielded projects)
Measures installed per-project	Projects with no assessment: 1.54 Projects with assessment: 1.91
Cost per participant	No customer co-pay. CNP paid $936/home
Percent of contractors promoting program	100%

12.3.3 Data Collection Activities

The process evaluation of Low-Income Saving Homes Program included:

- *Program actor in-depth interviews*. The Evaluators conducted in-depth interviews with a series of program actors. These interviews covered a range of topics, including marketing efforts, feedback on program delivery, an assessment of barriers to program implementation and success, and recommendations for program improvement. Program actors interviewed include:
  - *CenterPoint Energy program staff*. The Evaluators interviewed staff at CenterPoint involved in the administration of the Saving Homes Program.
  - *Third party implementation staff interviews.* The Evaluators conducted interviews with CLEAResult involved with the Saving Homes Program.

Table 12-6 summarizes the data collection for this process evaluation effort. This includes the titles, role, and sample sizes for data collection.

Table 12-6: CenterPoint LISHP Data Collection Summary

Target	Component	Activity	n	Role
CenterPoint Energy program staff	Manager of energy efficiency	Interview	1	Overall administration of CenterPoint EE programs. This manager is involved in the larger strategic decisions associated with the EE portfolio, and is involved with the LISHP and in the overall coordination of utility resources.
	Senior Energy Efficiency Consultant	Interview	1	The Energy Efficiency Consultant at CenterPoint is responsible for much of the day-to-day operation of the program on the part of CenterPoint. This individual's responsibilities include regular interaction with third party implementation staff and assisting in outreach and marketing efforts of the program.
CLEAResult staff	Senior Program Manager	Interview	1	Handles day-to-day operations, including mass market outreach, application review, billing, and logistics.

12.3.4 Adherence to Protocol A

During PY2021, the Evaluators received quarterly tracking data updates as well as final tracking exports. The tracking system includes necessary inputs as per AR TRM V8.2, which specifies that tracking data should be checked for:

- Participating customer information;
- Measure specific information;
- Vendor specific information;
- Program tracking information;
- Program costs; and
- Marketing & outreach Activities.

The Evaluators conducted a review of each of the above factors within PY2021 tracking data except for marketing and outreach activities as these are outside the scope of the tracking system's reporting.

12.3.4.1 Customer, Premise, Cost, and Vendor Information

Each of these factors was assessed individually based on the guidelines stated in AR TRM V8.2. Overall, the Evaluators conclude the following regarding tracking data completeness:

- Participating customer information was complete for nearly all participants.
- Weather zones were provided in the tracking data.
- All inputs for energy savings calculations were present.

12.3.4.2 Model Specific Information

Health & safety measures were not fully documented. They were identified as "Health & Safety" with no further description.

12.3.5 Program Administration

The LISHP is overseen by the Senior Energy Efficiency Consultant at CenterPoint. This Consultants' responsibilities primarily include interfacing with CLEAResult, who directly implements the program. Other activities by this Consultant include providing updated customer lists to CLEAResult to better facilitate their implementation, participation in outreach events, and at times assisting CLEAResult in customer interactions.

12.3.6 Program Implementation & Delivery

The program is driven by home assessments. The assessment is a comprehensive audit which includes conducting duct blast and blower door testing. This testing is needed to pre-qualify a home for duct sealing and air sealing improvements. Before a home may receive an assessment, program trade allies are required to calculate the gas intensity of the residence. In this, the contractor must take the customer's highest winter natural gas bill and divide it by the heated square feet of the home. Figure 12-3 summarizes the calculation process.

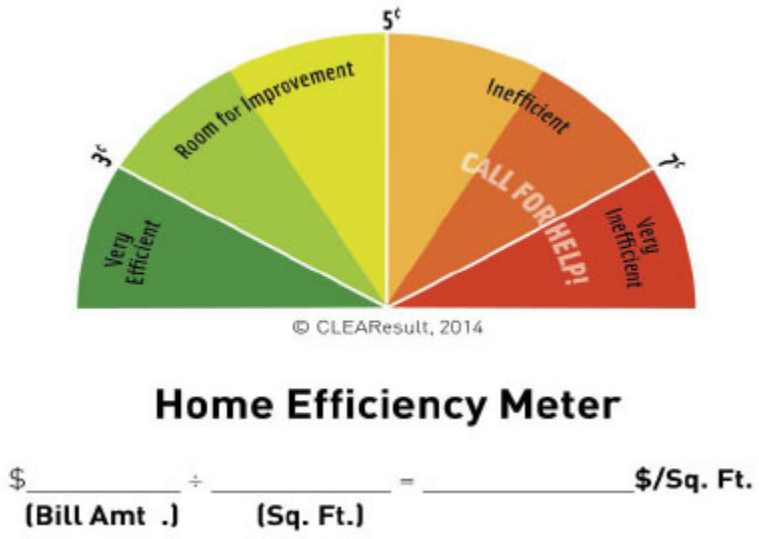


Figure 12-3: Home Efficiency Meter Graphic

A home must have use above $0.05 per square foot during a winter season month to qualify for an assessment.

The criteria of $0.05/square foot of use on a customer's highest bill is used to ensure that program funds go towards project which will produce enough savings to be cost-effective. Further, all participating residences are required to have central natural gas space heating to receive an assessment and rebates for building envelope measures and natural gas water heating to be eligible for direct install measures.

12.3.7 Program Changes

Based on recommendations from the Evaluators in PY2020, CLEAResult staff made changes to the low-income program in PY2021. Strengthening their focus on the health and safety measures aspect of the program. Staff encouraged trade allies to thoroughly vet homes for potential upgrades and opened up eligibility for what could be considered a health and safety measure, allowing trade allies to better serve customers. Health and safety measures expanded past carbon monoxide and smoke detectors to include other potential hazards like gas leaks, wall gaskets, and night lights. Staff are also working on developing a health and safety leave behind kit that includes night lights and wall gaskets.

The Evaluators note that while program tracking indicates marked increase in H&S spending, the details of the H&S improvements are not shown in program tracking.

12.3.8 Marketing

The LISHP is marketed alongside the SHP. Eligible customers are referred from the SHP to the LISHIP when identified.

12.3.9 Quality Assurance

Quality assurance procedures align with those established for the SHP.

12.3.10 Impact of Home Assessments

The Evaluators reviewed the measure installations energy savings for participants in the LISHP. The Evaluators key findings from this review were as follows:

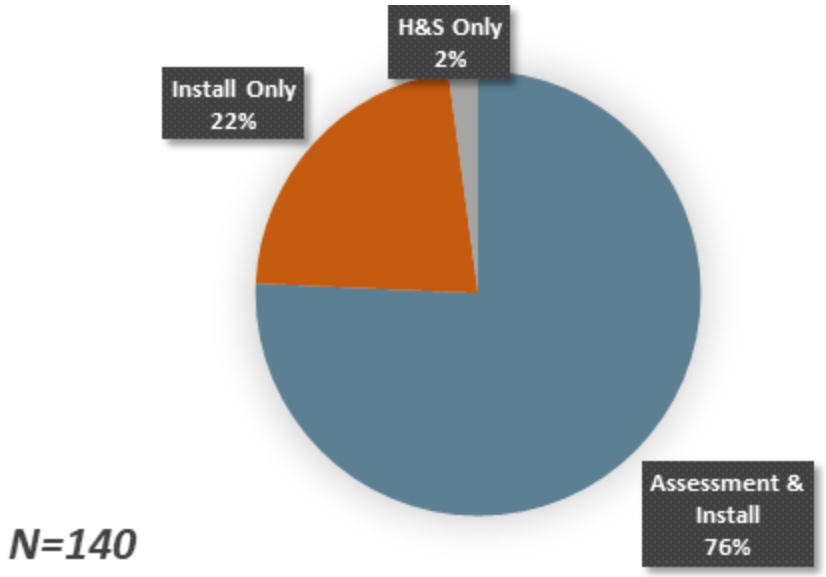


Figure 12-4: Measure Installation

The differences in measure installation by participant class are presented in Figure 12-4. There is a statistically significant difference in quantity and gross savings of measures installed between the *assessment & install* and the *install-only* groups. *Install-only* participants displayed lower savings than *assessment & install* participants, as shown in Figure 12-5.

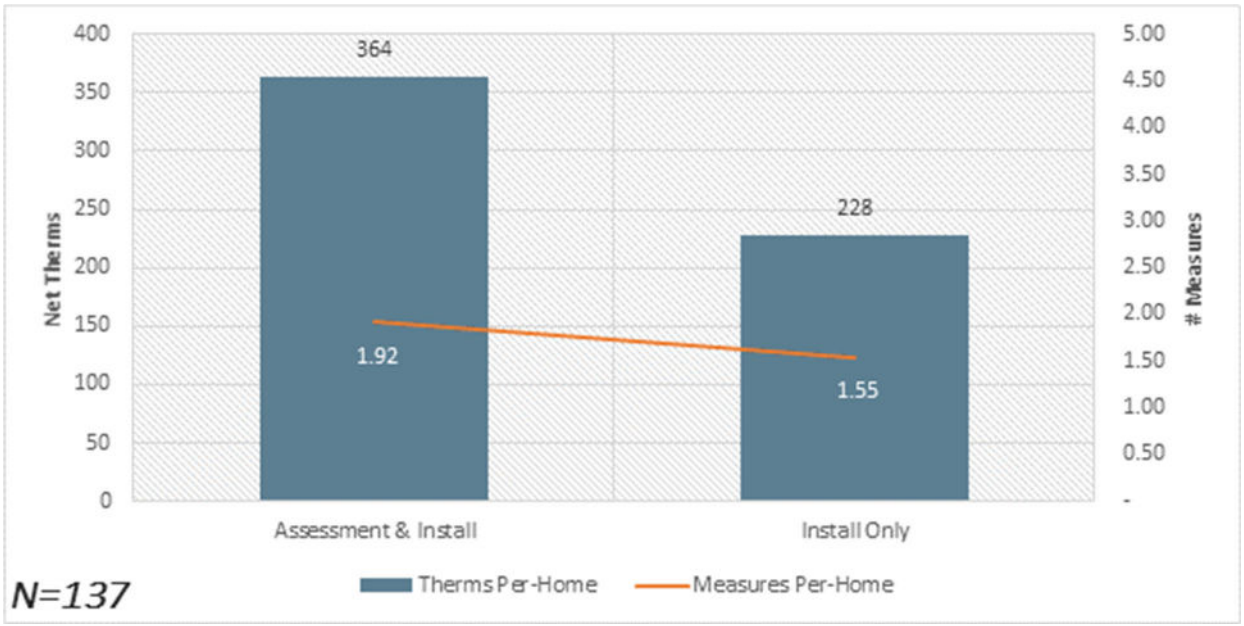


Figure 12-5: Per-Home Measures & Savings

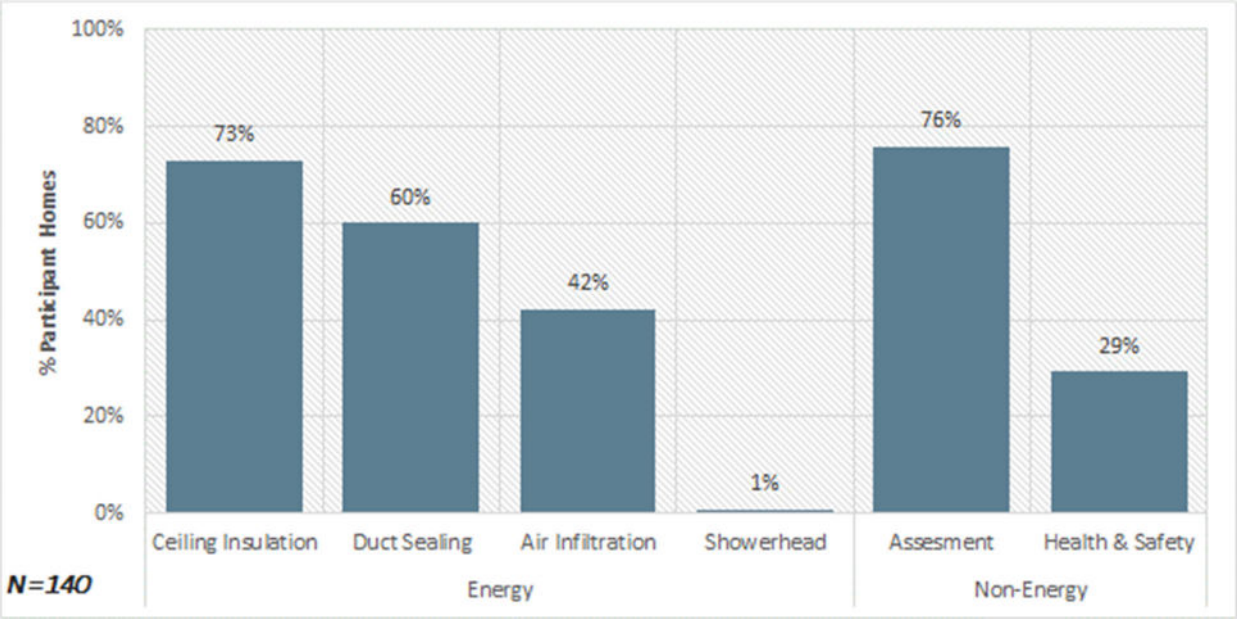


Figure 12-6: Percent of Participant Homes with Each Measure

12.3.11 Trade Ally Outreach

In PY2021, the LISHP had five registered trade allies. The registered trade allies have all been active in the SHP for several years, and refer customers to the LISHP when eligible.

12.3.12 Trade Ally Performance

The Evaluators compared trade ally performance on the following *key performance indicators* (KPIs):

- Total projects completed;
- Average measures per home;
- Average net therms per project;
- Percent of projects with positive savings that began with an audit;
- Audit conversion rate; and
- Percent of homes with health and safety measures.

These KPIs are summarized in Table 12-7.

Table 12-7: CenterPoint LISHP Data Collection Summary

ID	# Projects	Therms / Project	Measures / Project	% Energy-saving Projects with Audit	Audit Conversion Rate	% Homes with Health & Safety Measures
TA#1	43	283.62	2.12	86%	100%	40%
TA#2	15	312.75	1.27	47%	100%	53%
TA#3	28	421.10	1.93	71%	100%	25%
TA#4	2	155.15	1.00	0%	N/A	0%
TA#5	52	335.60	1.73	81%	100%	17%

TA#4 is notable for having no assessments and low savings per project, as well as only two projects in it the program.

Health and safety spending is higher than in PY2020, with four of five trade allies engaging in some level of H&S installation.

12.3.13 Health & Safety

The program plan for the LISHP specifies up to $500 per home in health and safety spending. CenterPoint spent an average of $60.54 per home on health and safety measures, increased from $3.43 per home in PY2020. Forty-one homes received H&S spending, compared to five in PY2020. This is reasonable progress but is not yet up to the level of effort expected out of Act 1102 programs.

CenterPoint and CLEAResult should endeavor to increase health and safety spending with tracking of spending by improvement type in a manner that aligns with BHE's system. The transparency of the spending as a result of the "H&S" measure categorizations allows for transparent and readily auditable health and safety efforts.

CenterPoint H&S measures include carbon monoxide detectors, smoke alarms, gas leak repair, and night lights. The LISHP should expand this effort to include:

- Bathroom ventilation fans / exhaust fans
- Air Cyclers
- Furnace filters
- Air purifiers
- Re-flue water heaters
- Gutter downspout repair

The Evaluators note that the program expended 99% of its budget to meet 101% of the filed net savings target. From this, the Evaluators conclude that the current program budget is

inadequate to support both energy savings and H&S goals. Using BHE's Low Income Pilot Program as a benchmark, the figure below diagrams the changes required to meet Act 1102 energy savings and H&S goals.

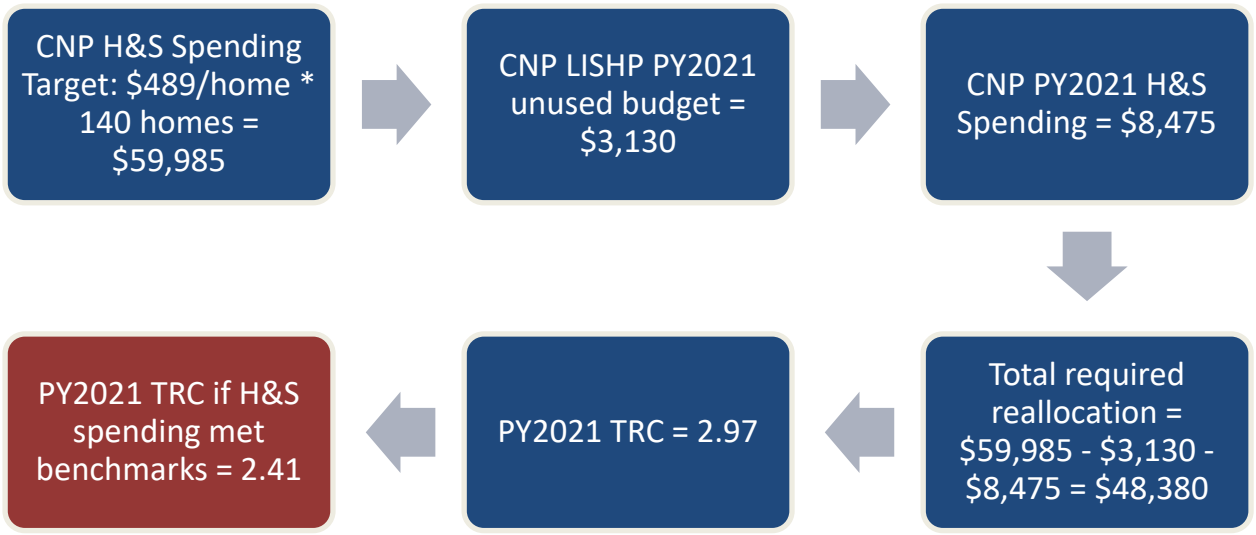


Figure 12-7: LISHP H&S Roadmap

The program has adequate margin on its TRC score to accommodate H&S spending per Act 1102 goals while remaining highly cost-effective.

12.4 LISHP Impact Evaluation

The evaluation effort of the LISHP included:

- *Desk review of residential calculations.* The Evaluators utilized TRM V8.2 values in assessing savings from measures included in the program.

12.4.1 Tracking Review

The impact evaluation began with a review of program tracking data. The tracking data included a separate row for each measure installed. Every premise in the program had a unique rebate identifier, and thus one premise would have multiple rows to reflect the different measures completed. Table 12-8 summarizes ex ante savings by measure for the LISHP.

Table 12-8: LISHP Ex Ante Summary

Measure	Ex Ante Therm
Duct sealing	27,283
Ceiling insulation	13,556
Air infiltration	5,510
Aerators	25
Total	46,374

The tracking data provided measured values for duct pressurization testing and blower door tests, allowing for the recreation of ex ante calculations based on leakage reduction. Further, the tracking data was found to include detailed parameters for all measures, such as baseline R-value for insulation.

12.4.2 Field Verification Procedures

The Evaluators applied FVRs developed for the SHP (see Section 11.4).

12.4.3 Net Savings Estimates

The Evaluators assigned a NTG of 100% to the LISHP, keeping with industry best practices for low-income weatherization programs as-specified in the Department of Energy Uniform Methods Project[30].

12.4.4 Verified Savings

Table 12-9 presents the gross savings results of the evaluation of the PY2021 LISHP.

Table 12-9: LISHP Verified Savings Summary

Measure	Ex Ante Therms	Ex Post Therms	Gross Realization	EUL	Lifetime Therms
Duct sealing	27,283	27,610	101.2%	18	496,979
Ceiling insulation	13,556	13,556	100.0%	20	271,114
Air infiltration	5,510	6,325	114.8%	11	69,576
Aerators	0	0	N/A	10	0
Showerheads	25	25	100.0%	1	25
Pipe insulation	0	0	N/A	11	0
Water heater jacket	0	0	N/A	13	0
Total	**46,374**	**47,516**	**102.5%**		**837,694**

[30] https://www.energy.gov/sites/prod/files/2015/02/f19/UMPChapter23-estimating-net-savings_0.pdf

Table 12-10 SHP Net Savings Summary

Free-Ridership Rate		Net Annual Savings		Net Realization Rate	EUL	Net Lifetime Therms Savings
Ex Ante	Ex Post	Ex Ante	Ex Post			
0.0%	0.0%	46,374	47,516	102.5%	17.6	837,694

12.4.5 Water & Electric NEBs

Table 12-11 LISHP Verified Net Water Savings

Measure	Net Annual Water Saving (Gallons)	Lifetime Net Water Savings (Gallons)
Showerheads	6,106	61,060
Total	**6,106**	**61,060**

Table 12-12 LISHP Verified Net Electric Savings

Measure	Net Annual kWh	Net Peak kW	Lifetime Net kWh
Duct sealing	80,545	43.65	1,449,812
Air infiltration	10,400	7.98	114,395
Ceiling insulation	36,019	38.30	720,378
Total	**126,964**	**89.93**	**2,284,585**

12.5 Conclusions

The program met savings goals and was highly cost-effective.	The program met 101% of its net savings goal and had a 2.97 TRC.
Progress was made on H&S measures, but the program is not yet meeting Act 1102 requirements.	H&S spending increased from $3.43 to $60.54 per participant, and the percent of homes with any H&S spending increased from 3.5% to 29.3%. In contrast, BHE spent $489.01 per home, with 87.2% of participants receiving any H&S spending.
	H&S measures have been expanded from smoke alarms and carbon monoxide detectors to also include gas leak repair and night lights. However, the H&S measure list is less comprehensive that offered by BHE elsewhere in Arkansas.
The program budget is inadequate to meet both savings and H&S goals	The program spent 99% of its budget to meet 101% of the filed savings goal. To meet Act 1102 H&S benchmarks set elsewhere in Arkansas while maintaining this rate of savings, a budget reallocation of $50,000 would be required.

12.6 Recommendations

Expand the H&S measure offerings.	HS measures should be expanded to include: ▪ Bathroom ventilation fans / exhaust fans ▪ Air Cyclers ▪ Furnace filters ▪ Air purifiers ▪ Re-flue water heaters ▪ Gutter downspout repair
Increase budget to fund H&S measures.	The Evaluators estimate that a $50,000 budget increase is required to fund H&S up to regional benchmarks while maintaining success in meeting the filed savings goal. If done, this budget should be earmarked as not usable for energy-saving measures. The most likely candidate for this reallocation is the Low Flow Program, which had $133,353 in unused budget in PY2021.
Impose H&S performance targets as part of trade ally agreements.	Trade allies need to have further H&S requirements placed upon them. Program staff could impose a framework where a trade ally must meet H&S benchmarks to maintain their program budget allocation.
Delineate between H&S measures in program tracking	Current tracking denotes “Health & Safety” without indicating what work is performed. The H&S framework used in BHE’s Act 1102 program should be applied for CenterPoint’s program, in which common individual H&S measures are noted in tracking.

13 Recommendations for TRM Updates

The Evaluators have the following recommendations for updates to the TRM.

14 Appendix A: Site Reports

This appendix contains the individual site reports for C&I Solutions.

Program	C&I Solutions
Project ID	EA-0000375753
Facility SIC Code	311615 - Poultry Processing
Measures	Steam Trap Replacement Pipe Insulation
Annual Consumption	1,564,400 therms

Project Background

The participant is a Poultry Feed mill that received incentives from CenterPoint Energy for implementing the following energy conservation measures (ECMs):

- ECM #1 – Steam Trap Replacement
- ECM #2 – Pipe Insulation

The steam produced from the system boilers goes to a large shell and tube heat exchanger to produce the hot water needed for the production processes.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM verified the savings associated with this project with a desk review.

Steam Trap Replacement

The following table shows relevant failed steam traps parameters required for annual energy savings.

Steam Trap Replacement Parameters

Steam Trap #	Orifice Size (in.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Service (Drip/Process)	Feedwater Temperature (°F)	Boiler Efficiency	Operating Hours	Therms Savings
1	1/8	114	0.01	Tracer/Drip	230	85%	8,760	2,850
2	1/6	114	0.01	Tracer/Drip	230	85%	8,760	10,874
3	1/8	114	0.01	Tracer/Drip	230	85%	8,760	5,701
4	1/6	114	0.0	Tracer/Drip	230	85%	8,760	5,437
Total								**24,862**

Calculations for the annual therms savings use the following equation:

Equation 1. Steam Trap Replacement Annual Energy Savings

$$Annual\ \ therms\ Savings = \frac{Steam\ Trap\ Discharge\ Rate \times OpHrs \times h_{fg}}{EC_{Base} \times Therm\ Conversion\ Factor}$$

Where:

Steam Trap Discharge Rate = steam loss from the system (lb./hr.)

OpHrs = annual hours the system is pressurized (hrs./yr.)

H_{fg} = latent heat of evaporation (BTU/lb.) found in **Error! Reference source not found.**

EC_{Base} = combustion efficiency of boiler (%), 85.0%

Therm Conversion Factor = 100,000 (BTU/therm)

The discharge rate (lb./hr.) was calculated using Armstrong's "Steam Loss Through Failed Trap Calculator" (found here: https://www.armstronginternational.com/knowledge/resources-library/calculators/steam-loss)

Insulation

Savings from this ECM are calculated with the help of 3E Plus software. This was used to calculate heat loss (btu/hr./ft) for bare piping (pre-retrofit) and piping with 2 in insulation (post-retrofit). The software required these inputs: process temperature, ambient temperature, pipe size, base metal, insulation, and jacket material. Annual therms savings was calculated using the following equation:

Equation 2. Pipe Insulation Installation Annual Energy Savings

$$Annual\ Therms\ Savings = \frac{Heat\ Loss\ \left(\frac{Btu}{hr}\right)\ x\ Annual\ Operating\ Hours\ \left(\frac{hrs}{yr}\right)}{Boiler\ Efficiency\ x\ 100{,}000\ \left(\frac{BTU}{CCF}\right)}$$

Where:

Annual Operating Hours = number of hours facility operates annually

Boiler Efficiency

100,000 Btu/CCF = conversion factor (BTU/yr. to CCF/yr.)

Pipe/Valve Insulation Parameters

Entry #	Pipe or Valve	Quantity	Pipe Length / Valve Equivalent Length (ft)	Pre Heat Lost	Post Heat Loss	Gas Savings
1	Pipe	1	21	1360.0	101.4	2,724
2	Pipe	1	66	1253.0	91.6	7,900
3	Pipe	1	6	1477.0	106.1	848
4	Pipe	1	182	730.9	60.8	12,570
5	Pipe	1	105	164.7	17.6	1,592
6	Pipe	1	100	164.7	17.6	1,516
7	Pipe	1	129	401.7	39.0	4,822
8	Pipe	1	6	326.9	29.1	184
9	Pipe	1	6	118.9	14.9	64
10	Pipe	1	48	65.0	10.2	271
11	Pipe	1	150	815.1	42.3	11,946
12	Pipe	1	12	166.2	20.4	180
13	Valve or Fitting	8	3.95	1360.0	101.4	4,099
14	Valve or Fitting	5	4.19	1253.0	91.6	2,508
15	Valve or Fitting	15	3.47	730.9	60.8	3,595
16	Valve or Fitting	8	3	164.7	17.6	364
17	Valve or Fitting	27	3	164.7	17.6	1,228
18	Valve or Fitting	6	3	401.7	39.0	673
19	Valve or Fitting	2	2.75	326.9	29.1	169
20	Valve or Fitting	5	2.5	118.9	14.9	134
21	Valve or Fitting	4	1.5	65.0	10.2	34
22	Valve or Fitting	5	3	815.1	42.3	1,195
23	Valve or Fitting	3	2.25	166.2	20.4	101
24	Pipe	1	60	164.7	24.9	864
25	Pipe	1	20	136.0	25.9	227

Measure Life

Estimated Useful Life by Measure

Measure	*EUL*
Steam Trap Replacement	5 years
Pipe Insulation	20 Years

Calculated Savings:

Steam Trap Replacement

Steam Trap Replacement Savings

Steam Trap #	*Therms Savings*
1	2,850
2	10,874
3	5,701
4	5,437
Total	**24,862**

Pipe/Valve Insulation Savings

Entry #	*Therms Savings*
1	2,724
2	7,900
3	848
4	12,570
5	1,592
6	1,516
7	4,822
8	184
9	64
10	271
11	11,946
12	180
13	4,099
14	2,508
15	3,595
16	364
17	1,228
18	673
19	169
20	134
21	34
22	1,195
23	101
24	864
25	227
Total	**24,862**

Overall Project Savings

Measure	*Expected Annual therms Savings*	*Realized Annual therms Savings*	*Realization Rate*	*Lifetime therms Savings*
Steam Trap Replacement	24,862	24,862	100.00%	124,309
Pipe Insulation	59,487	59,808	100.54%	1,196,150
TOTAL	**84,349**	**84,669**	**100.38%**	**1,320,459**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $55,000. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
84,669	0.57	$37,738	$55,000	$54,403	$59,268.30	0.6	1.46

Program	C&I Solutions
Project ID	EA-0000362776
Facility SIC Code	8661
Measures	HVAC Controls AHU Replacement
Annual Consumption	16,235 therms

Project Background

The participant is a religious worship and gathering facility that received incentives from CenterPoint Energy for:

- ECM #1 – HVAC Controls
- ECM #2 – AHU Replacement

The measures installed aim to upgrade and selectively replace the existing building automated system to create a fully automatic, user friendly, small building management system with web-based access.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option C – Whole Facility.

Measurement and verification activities are based on the following assumptions:

- Facility operates year-round
- Facility operates during business hours Monday through Friday, each Friday evening, and Saturday and Sunday until 1:00 PM.
- Assume CCF and Therms are equal.
- During the project monitoring period, non-incentivized improvements were made to the steam systems, these savings were excluded from the overall project savings.

Energy Savings

Two years of monthly billing data was provided for this site. One year of billing from the pre-retrofit period and one year of billing data from the post retrofit period. The billing data and actual weather data was then used to create regression models of the pre-retrofit conditions and then post-retrofit conditions. The two regression models were then normalized to TMY3 weather data for the facilities location. In regression analysis, the coefficient of determination, R^2, is a measure of the extent to variations in the dependent variables are explained by the regression model. The Regression model equations and coefficients are shown below:

Therms Savings Regression Model

$$Therms = Coef_{HDD} * HDD + Coef_{Flag} * Flag(0,1) + Coef_{Flag\ x\ HDD} * (Flag\ x\ HDD) + Intercept$$

Equation. 3 Annual Therms Savings

$$kWh_{baseline} = Coef_{HDD} * HDD + Intercept$$

$$kWh_{post} = (Coef_{HDD} + Coef_{Flag\ x\ HDD}) * HDD + Intercept + Coef_{Flag}$$

$$kWh_{savings} = kWh_{baseline} - kWh_{post}$$

Coefficients of the Regression Model

HDD	Flag	Flag x HDD	Intercept
4.98	507.57	-2.26	87.63

Measure Life

Estimated Useful Life by Measure

Measure	EUL
HVAC Controls	15 years
AHU Replacements	20 years

Calculated Savings:

This project was split up into two phases. The initial phase was closed out at 56.29% of the projected savings in PY2019, and the second phase would account for the remaining 43.71% savings. The savings for each year of the project as well as the overall project savings are listed below.

Y2019 Closeout Project Savings

Measure	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate
HVAC Controls	400.08	400.08	100%
AHU Replacements	418.92	418.92	100%
Total	819	819	**100%**

PY2021 Closeout Project Savings

Measure	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate
HVAC Controls	311	311	100%
AHU Replacements	325	325	100%
Total	**636**	**636**	**100%**

Total Project Savings

Measure	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate	Lifetime Savings
HVAC Controls	710.84	710.84	100%	5,208.70
AHU Replacements	744.31	744.31	100%	7,614.30
Total	1,455.15	1,455.15	100%	12,823.00

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $46,646.68. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
1,455	$0.82	$1,194.56	$46,643.68	$1,309.50	$1,309.50	35.5 years	36.5 years

Program	C&I Solutions
Project ID	EA-0000362761
Facility SIC Code	621491 - HMO Medical Centers
Measures	Pipe Insulation
Annual Consumption	1,141,880 Therms

Project Background

The participant is a medical center that received incentives from CenterPoint Energy for implementing the following:

- ECM #1 – Pipe Insulation

The site uses steam throughout the facility primarily for two process needs: space heating and in some cases, domestic water heating. Savings will come from properly insulating sections of pipe throughout the facility's pipework.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM verified savings associated with this project were verified during a desk review.

Measurement and verification activities are based on the following assumptions:

- Annual operating hours for the on-site steam system are 5,800 hours based on steam trap survey.
- Combustion efficiency is 82.88% (for both pre-retrofit and post-retrofit condition)

Pipe Insulation

For this measure, energy savings are calculated using key data and through the North American Insulation Manufacturers Association's 3E Plus software:

(http://www.pipeinsulation.org/).

Measurement and verification activities are based on the following assumptions:

- Hours of operation: 5,800 hours for pipe, tank, valve and fitting.

- Insulation thickness: 2.0 in
- Insulation material type: 850°F Min. Fiber Pipe and Tank, Type IIIB, C1393-14 and 850F MF BLANKET, Type IV, C553-13
- Boiler Efficiency: 82.88%
- Process temperatures: various temperatures
- Ambient air temperature: 75°F

The 3E Plus software was used to calculate heat loss (btu/hr./ft) for bare piping (pre-retrofit) and piping with 2.0 inch insulation (post-retrofit). The software required these inputs: process temperature, ambient temperature, pipe size, base metal, insulation, and jacket material. Annual therms savings was calculated using the following equation:

Equation 4. Pipe Insulation Installation Annual Energy Savings

$$Annual\ Therms\ Savings = \frac{Heat\ Loss\ \left(\frac{Btu}{hr}\right)\ x\ Annual\ Operating\ Hours\ \left(\frac{hrs}{yr}\right)}{Boiler\ Efficiency\ x\ 100{,}000\ \left(\frac{BTU}{CCF}\right)}$$

Where:

Annual Operating Hours = number of hours facility operates annually

Boiler Efficiency = 82.88%

100,000 Btu/CCF = conversion factor (BTU/yr. to CCF/yr.)

Typically, a table detailing the inputs into pipe insulation savings calculations would be included below. However, this ECM includes over 400-line items. The table can be provided upon request.

Measure Life

Estimated Useful Life by Measure

Measure	*EUL*
Pipe Insulation	20 years

Calculated Savings:

Pipe Insulation

Typically, a table detailing pipe insulation savings calculation would be included below. However, this ECM includes over 400-line items. The table can be provided upon request.

Overall, project savings are as follows:

Overall Project Savings

Measure	*Expected Annual therms Savings*	*Realized Annual therms Savings*	*Realization Rate*	*Lifetime therms Savings*
Pipe Insulation	214,687	214,574	99.9%	4,291,471
TOTAL	**214,687**	**214,574**	**99.9%**	**4,291,471**

This facility installed insulation on valves that's equivalent length is not listed in published reference tables. ADM created a logarithmic regression model to determine the equivalent lengths of the non-published valve sizes. ADM only used this model to calculate the equivalent lengths for the non-listed valve sizes. The implementer used a third order polynomial regression model to calculate the equivalent lengths for all valve sizes rather than just the non-listed valve sizes. This difference caused the slightly lower realization rate.

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $200,000. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
214,574	$0.47	$100,849.78	$200,000	$150,281	$150,201.80	1.25	2

Program	C&I Solutions
Project ID	EA-0000370109
Facility SIC Code	2047 – Dog and Cat Food
Measures	Steam Cooker Control Valves
Annual Consumption	2,558,200 therms

Project Background

The participant is a pet food manufacturer that received incentives from CenterPoint Energy for:

- ECM #1 – Steam Cooker Control Valves

The control valves were installed on the facilities two protein cookers to better regulate the steam flow and have the steam flow regulated by the cookers temperature to reduce steam usage.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option C – Whole Facility. ADM evaluated the savings associated with this site during a desk review. The implementers provided 28 days of pre and post therm usage and production data.

The following formulas were used to calculate an adjusted pre and post gas usage for the facility.

Pre Usage Regression Formula

$$Adj.PRE\ Usage\ \left(\frac{CCF}{day}\right) = Production\ Coefficient\ x\ Post\ Production_i\ \left(\frac{lbs}{day}\right) + Intercept$$

Post Usage Regression Formula

$$Adj.POST\ Usage\ \left(\frac{CCF}{day}\right) = \left((Production\ Coefficient + FlagxProduction)x\ Post\ Production_i\ \left(\frac{lbs}{day}\right)\right) + (Intercept + Flag)$$

The regression model statistics and coefficients are shown in the table below:

Regression Model Statistics

Regression Statistics	
Multiple R	0.88
R Square	0.78
Standard Error	1,130.67
Coefficients	
Intercept	1,892.54
Production (lbs.)	0.01
Pre Post Flag	-926.71
Flag x Production	0.00

The adjusted daily pre and post usage was then annualized using the below formulas:

Annualized Pre Gas Usage Formula

$$Annual\ Usage\ PRE\ \left(\frac{CCF}{yr}\right) = PRE\ Usage\ \left(\frac{CCF}{pd}\right) x \left(\frac{\frac{Days}{yr}}{\#\ of\ Days}\right)$$

Equation 5: Annualized Post Gas Usage Formula

$$Annual\ Usage\ POST\ \left(\frac{CCF}{yr}\right) = POST\ Usage\ \left(\frac{CCF}{pd}\right) x \left(\frac{\frac{Days}{yr}}{\#\ of\ Days}\right)$$

During the time of this project, the facility also completed another improvement project, the savings associated with this other project were factored out in the final savings for this project. The final savings associated with the steam control vales were calculated using the formula below:

Equation 6: Final Savings

$$Annual\ Savings\ \left(\frac{CCF}{yr}\right) = \left(Annual\ Usage\ PRE\ \left(\frac{CCF}{yr}\right) - Annual\ Usage\ POST\ \left(\frac{CCF}{yr}\right)\right) - Boiler\ Insulation\ Savings\ \left(\frac{CCF}{yr}\right)$$

Measure Life

Estimated Useful Life by Measure

Measure	EUL
Control Valves	15 years

Calculated Savings:

Overall, project savings are as follows:

Overall Project Savings

Measure	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate	Lifetime therms Savings
Control Valves	140,917	140,917	100%	2,113,752
TOTAL	**140,917**	**140,917**	**100%**	**2,113,752**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $87,065. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	Cost per Therm	Annual Energy Cost Savings	Incremental Cost	Base Incentive	Adjusted Incentive	Payback w/Incentive	Payback w/o Incentive
140,917	$0.4	$56,367	$87,065	$98,642	$98,642	0.56	1.5

Program	C&I Solutions
Project ID	EA-0000370109
Facility SIC Code	2047 – Dog and Cat Food
Measures	Boiler Insulation
Annual Consumption	2,558,200 therms

Project Background

The participant is a protein rendering plant for pet food that received incentives from CenterPoint Energy for:

- ECM #1 –Boiler Insulation

The steam system serves in the facility's production processes. One of the four steam boilers was not insulated. The boiler insulation measure saved energy by reducing the heat loss from uninsulated boiler, thus reducing gas consumption.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM evaluated the savings associated with this site during a desk review.

Measurement and verification activities are based on the following assumptions:

- Annual operating hours for the site are 7,110 hours
- Combustion efficiency is 84% (for both pre-retrofit and post-retrofit condition)
- The bare surface temperature of the boiler varied so the average of all temperature readings (227°F) was used for calculating the uninsulated heat loss.

Pipe Insulation

Through this method, energy savings are calculated using key data and through the North American Insulation Manufacturers Association's 3E Plus software:

(http://www.pipeinsulation.org/).

Measurement and verification activities are based on the following assumptions:

- Insulation thickness: 2 in
- Insulation material type: Enerwrap MA 960

- Process temperature is 343°F
- The average annual ambient air temperature is 75°F

The 3E Plus software was used to calculate heat loss (btu/hr./ft) for bare piping (pre-retrofit) and piping with 2 in insulation (post-retrofit). The software required these inputs: process temperature, ambient temperature, pipe size, base metal, insulation, and jacket material. Annual therms savings was calculated using the following equation:

Pipe Insulation Installation Annual Energy Savings

$$Annual\ Therms\ Savings = \frac{Heat\ Loss\ \left(\frac{Btu}{hr}\right)\ x\ Annual\ Operating\ Hours\ \left(\frac{hrs}{yr}\right)}{Boiler\ Efficiency\ x\ 100{,}000\ \left(\frac{BTU}{CCF}\right)}$$

Where:

Annual Operating Hours = number of hours facility operates annually

Boiler Efficiency

100,000 Btu/CCF = conversion factor (BTU/yr. to CCF/yr.)

Boiler Insulation Parameters

Entry #	Description	Quantity	Surface Area (ft^2)
1	Boiler	1	326.56

Measure Life

Estimated Useful Life by Measure

Measure	EUL
Insulation	20 years

Calculated Savings:

Pipe Insulation

Pipe Insulation Annual Energy Savings

Entry #	Description	Shape	Temperature (°F)	Pre Heat Loss	Post Heat Loss	Therms Savings
1	Boiler	Tank	227	140.04	34.16	2,927
					Total:	**2,927**

Overall, project savings are as follows:

Overall Project Savings

Measure	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate	Lifetime therms Savings
Pipe Insulation	2,927	2,927	100.0%	58,536
TOTAL	**2,927**	**2,927**	**100.0%**	**58,536**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $15,800. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	Cost per Therm	Annual Energy Cost Savings	Incremental Cost	Base Incentive	Adjusted Incentive	Payback w/Incentive	Payback w/o Incentive
2,927	$0.61	$1,758	$15,800	$2,049	2,049	7.8	8.9

Program	C&I Solutions
Project ID	EA-0000442396
Facility SIC Code	2077- Animal and Marine Fats and Oils
Measures	Pipe Insulation
Annual Consumption	1,511,540 therms

Project Background

The participant is a Fat Rendering Plant that received incentives from CenterPoint Energy for implementing the following energy conservation measures (ECMs):

- ECM #1 – Insulation

The steam produced from the system boilers goes to a large shell and tube heat exchanger to produce the hot water needed for the production processes.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM verified the savings associated with this project with a desk review.

Insulation

Savings from this ECM are calculated with the help of 3E Plus software. This was used to calculate heat loss (btu/hr./ft) for bare piping (pre-retrofit) and piping with 2 in insulation (post-retrofit). The software required these inputs: process temperature, ambient temperature, pipe size, base metal, insulation, and jacket material. Annual therms savings was calculated using the following equation:

Pipe Insulation Installation Annual Energy Savings

$$Annual\ Therms\ Savings = \frac{\left[Pre\ Heat\ Loss\ \left(\frac{Btu}{hr}\right) - Post\ Heat\ Loss\ \left(\frac{Btu}{hr}\right)\right]\ xPipe\ Length\ (ft)\ x\ Annual\ Operating\ Hours\ \left(\frac{hrs}{yr}\right)}{Boiler\ Efficiency\ x\ 100{,}000\ \left(\frac{BTU}{CCF}\right)}$$

Where:

Annual Operating Hours = number of hours facility operates annually

100,000 Btu/CCF = conversion factor (BTU/yr. to CCF/yr.)

Pipe/Valve Insulation Parameters

Entry #	*Object Insulated*	*Quantity*	Pipe Length / Valve Equivalent Length (ft)/Surface Area (ft^2)	*Pre Heat Lost*	*Post Heat Loss*	*Gas Savings*
1	Pipe	1	10.00	263.30	26.69	244
2	Pipe	1	6.00	377.50	34.86	212
3	Pipe	1	3.00	1,817.00	131.40	522
4	Cylindrical Tank	1	439.82	377.10	24.95	15,995
5	Valve or Fitting	1	3.39	478.10	41.58	153
6	Valve or Fitting	2	6.32	377.50	34.86	224
7	Valve or Fitting	1	3.16	377.50	34.86	112

Measure Life

Estimated Useful Life by Measure

Measure	*EUL*
Insulation	20 Years

Calculated Savings:

Overall, project savings are as follows:

Overall Project Savings

Measure	*Expected Annual therms Savings*	*Realized Annual therms Savings*	*Realization Rate*	*Lifetime therms Savings*
Insulation	17,453	17,462	100%	349,246
TOTAL	**17,453**	**17,462**	**100%**	**349,246**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $12,500. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
17,462	0.59	$10,319	$12,500	$12,242	$12,242	0.03	1.21

Program	C&I Solutions
Project ID	EA-0000362773
Facility SIC Code	2493 – Reconstituted Wood Products
	Oil Cooler/Steam Generator
Measures	Boiler Upgrade
	Economizer
Annual Consumption	333,527 therms

Project Background

The participant is a facility that produces Medium-Density Fiberboard that received incentives from CenterPoint Energy for:

- ECM #1 – Oiler Cooler/Steam Generator
- ECM #2 – Boiler
- ECM #3 - Economizer

Customer upgraded controls and burner on their asphalt kiln and replacing the damper controls on the kiln's blower with a VFD. New controls allow for tighter temperature regulation while the new burners are more efficient using less natural gas for the same BTU output.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM evaluated the savings associated with this site during a desk review. The implementer provided a year of pre and post monitoring data that was used in the desk review process.

The below equations were used to calculate the energy savings for each measure:

Oil Cooler/Steam Generator

Steam Generator Energy Savings

$$Steam\ Generator\ Energy\ Savings\left(\frac{CCF}{yr}\right) = \frac{Annual\ Energy\left(\frac{BTU}{yr}\right)}{100{,}000\frac{BTU}{CCF} \times 80\%\ Efficiency}$$

Boiler

Pre Boiler Energy Consumption

$$Annual\ Energy\left(\frac{CCF}{yr}\right)_{Pre} = \frac{Annual\ Energy\left(\frac{BTU}{yr}\right)_{Pre}}{100{,}000\frac{BTU}{CCF} \times 80\%\ Efficiency}$$

Post Boiler Energy Consumption

$$Annual\ Energy\left(\frac{CCF}{yr}\right)_{Post} = \frac{Annual\ Energy\left(\frac{BTU}{yr}\right)_{Post}}{100{,}000\frac{BTU}{CCF} \times 80\%\ Efficiency}$$

Boiler Energy Savings

$$Boiler\ Energy\ Savings\left(\frac{CCF}{yr}\right) = Annual\ Energy\left(\frac{CCF}{yr}\right)_{Post} - Annual\ Energy\left(\frac{CCF}{yr}\right)_{Pre}$$

Economizer

Economizer Enthalpy Savings

$$Economizer\ Enthalpy\ Savings\left(\frac{BTU}{lb}\right) = Economizer\ Outlet\ Enthalpy\left(\frac{BTU}{lb}\right) - Economizer\ Inlet\ Enthalpy\left(\frac{BTU}{lb}\right)$$

Economizer Energy Savings

$$Economizer\ Energy\ Savings\left(\frac{BTU}{yr}\right) = Economizer\ Enthalpy\ Savings\left(\frac{BTU}{lb}\right) \times Annual\ Feedwater\ Flow\left(\frac{lbs}{yr}\right)$$

Economizer Energy Savings

$$Economizer\ Energy\ Savings\ \left(\frac{CCF}{yr}\right) = \frac{Economizer\ Energy\ Savings\left(\frac{BTU}{yr}\right)}{100{,}000\frac{BTU}{CCF} \times 80\%\ Efficiency}$$

Equation 7: Total Project Energy Savings

$$Total\ Energy\ Savings\ \left(\frac{CCF}{yr}\right) = Steam\ Generator\ Energy\ Savings\left(\frac{CCF}{yr}\right) + Boiler\ Energy\ Savings\left(\frac{CCF}{yr}\right) + Economizer\ Energy\ Savings\ \left(\frac{CCF}{yr}\right)$$

Measure Life

Estimated Useful Life by Measure

Measure	*EUL*
Steam Generator	20 years
Boiler Energy	20 years
Economizer	15 years

Calculated Savings:

Overall, project savings are as follows:

Overall Project Savings

Measure	*Expected Annual therms Savings*	*Realized Annual therms Savings*	*Realization Rate*	*Lifetime therms Savings*
Steam Generator	348,141	348,141	100%	6,962,820
Boiler Energy	160,097	160,097	100%	3,201,940
Economizer	397,257	397,257	103%	5,958,855
TOTAL	**905,495**	**905,495**	**101%**	**16,123,615**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $1,078,000. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
905,495	$0.42	$380,307	$1,078,000	$624,261	$891,454	0.75	2.0

Program	C&I Solutions
Project ID	EA-0000369204
Facility SIC Code	2671 – Packaging Paper and Plastics Films
Measures	Regenerative Thermal Oxidizer
Annual Consumption	1,111,202 therms

Project Background

The participant is a flexible packaging manufacturing plant that received incentives from CenterPoint Energy for:

- ECM #1 – Regenerative Thermal Oxidizer

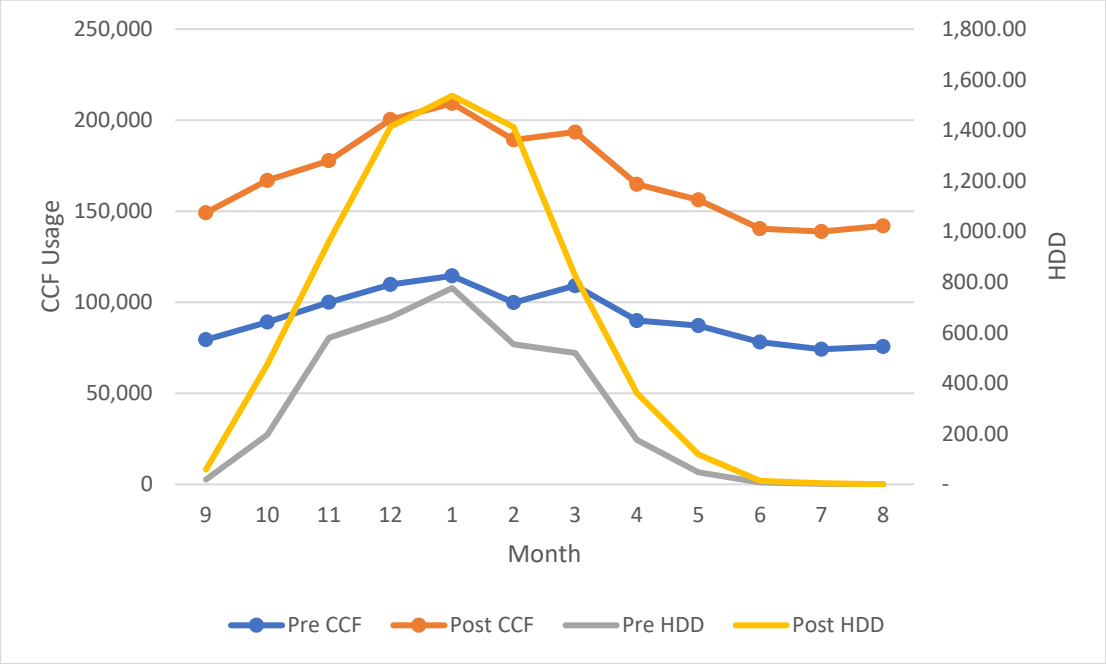
The participant uses natural gas at their facility to run catalytic incinerators to destroy volatile organic compounds (VOC). These two catalytic incinerators were replaced with a regenerative thermal oxidizer. The energy savings from this project are due to the regenerative thermal oxidizer being much more efficient than the existing incinerators.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option C – Whole Facility. ADM evaluated the savings associated with this site during a desk review. The implementers provided a year of pre and post monthly billing data that was used in the desk review process.

During the desk review, it was found that there was a correlation between gas consumption and heating degree days (HDD). The below figure shows the correlation between the two variables:

HDD vs CCF Usage



Since there is a correlation between CCF and HDD, these variables were used to create a regression model.

The HDD was calculated using the below equation using NOAA hourly weather data for the facility's location as well as the TMY3 weather data for the facility's location.

HDD Calculation

$$HDD = IF\left(Dry\ Bulb\ (°F) < Balance\ Point_{HDD}, \frac{Balance\ Point_{HDD} - Dry\ Bulb\ (°F)}{24\frac{hr}{day}}, 0\right)$$

The regression formulas used in the analysis are listed below:

Pre Monthly CCF Model

$$Adj.Baseline\ Usage\ \left(\frac{CCF}{mth}\right) = A\ \times\ HDD + B$$

Post Monthly CCF Model

$$Post\ Usage\ \left(\frac{CCF}{mth}\right) = (A + Flag\ HDD) \times HDD + (B + Flag)$$

The pre and post models were then normalized to TMY3 weather data to represent the energy usage in a typical year if the Regenerative Thermal Oxidizer had and hadn't been installed. The below equation was used to calculate the total savings associated with this project:

Equation 8: Annual Savings

$$Annual\ Savings\ \left(\frac{CCF}{yr}\right) = Pre\ Annual\ Energy\ Usage\ \left(\frac{CCF}{yr}\right) - Post\ Annual\ Energy\ Use\ \left(\frac{CCF}{yr}\right)$$

Measure Life

Estimated Useful Life by Measure

Measure	EUL
Regenerative Thermal Oxidizer	20 years

Calculated Savings:

This project received an initial 40% payment earlier in PY2022. The below table shows the project savings for the two phases:

Partial Project Close Out

Percent Close Out	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate
40% Close Out	70,960	70,960	100%
60% Close Out	116,840	115,442	99%
TOTAL	**187,800**	**186,402**	**99%**

Overall, project savings are as follows:

Overall Project Savings

Measure	*Expected Annual therms Savings*	*Realized Annual therms Savings*	*Realization Rate*	*Lifetime therms Savings*
Regenerative Thermal Oxidizer	187,800	186,402	99%	3,728,033
TOTAL	**187,800**	**186,402**	**99%**	**3,728,033**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $754,500. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
186,402	$0.68	$126,753	$764,500	$131,460	$130,481	2.9	6.0

Program	C&I Solutions
Project ID	EA-0000419516
Facility SIC Code	8062 – General Medical and Surgical
Measures	Pipe Insulation, Steam Traps, Boiler Replacement & Hour Reduction
Annual Consumption	194,350 therms

Project Background

The participant is a Surgical Hospital that received incentives from CenterPoint Energy for implementing the following energy conservation measures (ECMs):

- ECM #1 – Insulation
- ECM #2 – Boiler Replacement and Hour Reduction
- ECM #3 – Steam Traps

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM verified the savings associated with this project with a desk review.

Insulation

Savings from this ECM are calculated with the help of 3E Plus software. This was used to calculate heat loss (btu/hr./ft) for bare piping (pre-retrofit) and piping with 2 in insulation (post-retrofit). The software required these inputs: process temperature, ambient temperature, pipe size, base metal, insulation, and jacket material. Annual therms savings was calculated using the following equation:

Pipe Insulation Installation Annual Energy Savings

$$Annual\ Therms\ Savings = \frac{\left[Pre\ Heat\ Loss\ \left(\frac{Btu}{hr}\right) - Post\ Heat\ Loss\ \left(\frac{Btu}{hr}\right)\right]\ xPipe\ Length\ (ft)\ x\ Annual\ Operating\ Hours\ \left(\frac{hrs}{yr}\right)}{Boiler\ Efficiency\ x\ 100{,}000\ \left(\frac{BTU}{CCF}\right)}$$

Where:

Annual Operating Hours = number of hours facility operates annually

100,000 Btu/CCF = conversion factor (BTU/yr. to CCF/yr.)

Pipe/Valve Insulation Parameters

Entry #	*Object Insulated*	*Quantity*	Pipe Length / Valve Equivalent Length (ft)/Surface Area (ft^2)	*Pre Heat Lost*	*Post Heat Loss*	*Gas Savings*
1	Pipe	1	84	501	65	2,416
2	Pipe	1	51	599	57	1,823
3	Valve of Fitting	2	2.84	501	65	816

Boiler Replacement

The savings from the boiler replacement were calculated using the following equations:

$$Energy\ Savings_{Boiler\ Replacement}\left(\frac{CCF}{yr}\right) = \frac{Capacity\ \times\ EFLH_H\ \times\left(1-\frac{Boiler\ \eta_{Baseline}}{Boiler\ \eta_{Post\ Retrofit}}\right)}{Therm\ Conversion\ Factor}$$

Where:

$Capacity = Rated\ equipment\ output\ heating\ capacity, BTU/hr$

$EFLH_H = Equivalent\ full\ load\ hours\ for\ heating\ per\ formula\ below.$

$Boiler\ \eta_{Baseline} = Baseline\ boiler\ efficiency$

$Boiler\ \eta_{Post\ Retrofit} = Post\ Retrofit\ boiler\ efficiency$

$Therm\ Conversion\ Factor\ =\ 100{,}000\ BTU/therm$

$EFLH_H$

$$EFLH_h = \frac{\text{Annual Energy Consumption}_{Boiler}\left(\frac{\text{CCF}}{\text{yr}}\right)}{Boiler\ Capacity\left(\frac{BTU}{hr}\right)}\ \text{x}\ 100{,}000\left(\frac{\text{BTU}}{\text{CCF}}\right)$$

Boiler AOH Reduction

$$Energy\ Savings_{Boiler\ AOH}\left(\frac{CCF}{yr}\right) = Boiler\ Usage_{Baseline\ Hours} - Boiler\ Usage_{Post-Retrofit\ Hours}$$

$$Boiler\ Usage_{Baseline\ Hours}\left(\frac{CCF}{yr}\right) = Production\ \ Usage_{Baseline}\left(\frac{CCF}{yr}\right) + Non\ Production\ \ Usage_{Baseline}\left(\frac{CCF}{yr}\right) + Annual\ Startup\ \ Usage_{Baseline}\left(\frac{CCF}{yr}\right)$$

$$Production\ \ Usage_{Baseline}\left(\frac{CCF}{yr}\right) = Production\ Utilization * Input\ Therms * Baseline\ Weekly\ Prod.Hours * 52$$

$$Non\ Production\ \ Usage_{Baseline}\left(\frac{CCF}{yr}\right) = Standby\ Firing\ Rate * Diversity\ Rate * Input\ Therms * Baseline\ Weekly\ Non\ Prod.Hours * 52$$

$$Annual\ Startup\ \ Usage_{Baseline}\left(\frac{CCF}{yr}\right) = Boiler\ Startup\ Load * Input\ Therms * Baseline\ Weekly\ Startup\ Hours * 52$$

$$Boiler\ Usage_{Post\ Retrofit\ Hours}\left(\frac{CCF}{yr}\right) = Production\ \ Usage_{Post\ Retrofit}\left(\frac{CCF}{yr}\right) + Annual\ Startup\ \ Usage_{Post\ Retrofit}\left(\frac{CCF}{yr}\right)$$

$$Production\ \ Usage_{Post\ Retrofit}\left(\frac{CCF}{yr}\right) = Production\ Utilization * Input\ Therms * Post\ Retrofit\ Weekly\ Prod.Hours * 52$$

$$Annual\ Startup\ \ Usage_{Post\ Retrofit}\left(\frac{CCF}{yr}\right) = Boiler\ Startup\ Load * Input\ Therms * Post\ Weekly\ Startup\ Hours * 52$$

. Boiler Replacement Parameters

Capacity (Btu/hr.)	Pre-retrofit efficiency	Post retrofit efficiency	Annual Boiler usage (CCF)	EFLH	Annual energy savings (Therms/yr.)
2,010,000	79%	85%	77,250	3,843	5,170

Boiler Savings

Boiler Usage	
Baseline	6,640,739
Post	6,639,167
Savings	**1,572**

Steam Trap Replacement

The following table shows relevant failed steam traps parameters required for annual energy savings.

Steam Trap Replacement Parameters

Steam Trap #	Orifice Size (in.)	Inlet Pressure (psig)	Outlet Pressure (psig)	Service (Drip/Process)	Feedwater Temperature (°F)	Boiler Efficiency	Operating Hours
1	10/51	100	0.01	Process	140	85%	2,112
2	10/51	100	0.01	Process	140	85%	2,112
3	1/8	100	0.01	Process	140	85%	2,112
4	1/8	100	0.01	Process	140	85%	2,112

Calculations for the annual therms savings use the following equation:

Steam Trap Replacement Annual Energy Savings

$$Annual\ \ therms\ Savings = \frac{Steam\ Trap\ Discharge\ Rate \times OpHrs \times h_{fg}}{EC_{Base} \times Therm\ Conversion\ Factor}$$

Where:

Steam Trap Discharge Rate = steam loss from the system (lb./hr.)

OpHrs = annual hours the system is pressurized (hrs./yr.)

H_{fg} = latent heat of evaporation (BTU/lb.) found in **Error! Reference source not found.**

EC_{Base} = combustion efficiency of boiler (%), 84.0%

Therm Conversion Factor = 100,000 (BTU/therm)

The discharge rate (lb./hr.) was calculated using Armstrong's "Steam Loss Through Failed Trap Calculator" (found here: https://www.armstronginternational.com/knowledge/resources-library/calculators/steam-loss)

Measure Life

Estimated Useful Life by Measure

Measure	*EUL*
Insulation	20 Years
Boiler Replacement	20 Years
Steam Traps	5 years

Calculated Savings:

Overall, project savings are as follows:

Overall Project Savings

Measure	*Expected Annual therms Savings*	*Realized Annual therms Savings*	*Realization Rate*	*Lifetime therms Savings*
Insulation	5,213	5,213	100%	104,267
Boiler	6,742	6,742	100%	134,842
Steam Traps	4,908	4,915	100%	24,574
TOTAL	**16,865**	**16,870**	**100%**	**263,684**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $18,793. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	*Cost per Therm*	*Annual Energy Cost Savings*	*Incremental Cost*	*Base Incentive*	*Adjusted Incentive*	*Payback w/Incentive*	*Payback w/o Incentive*
16,870	0.90	$15,183	$18,793	$13,152	$12,242	0.5	1.23

Program	C&I Solutions
Project ID	EA-0000583141
Facility SIC Code	2047 – Dog and Cat Food
Measures	Pipe Insulation
Annual Consumption	2,558,200 therms

Project Background

The participant is a pet food manufacturer that received incentives from CenterPoint Energy for:

- ECM #1 – Pipe and Tank Insulation

The Pipe insulation measure saved energy by reducing the heat loss from tanks, the piping, and joints/values, thus reducing the gas consumption.

M&V Methodology

The M&V effort for this project follows the guidelines of the 2012 International Performance Measurement and Verification Protocol (IPMVP) Option A - Retrofit Isolation: Key Parameter Measurement. ADM evaluated the savings associated with this site during a desk review.

Measurement and verification activities are based on the following assumptions:

- Annual operating hours for the site are 7,110 hours
- Combustion efficiency is 85% (for both pre-retrofit and post-retrofit condition)

Pipe Insulation

Through this method, energy savings are calculated using key data and through the North American Insulation Manufacturers Association's 3E Plus software:

(http://www.pipeinsulation.org/).

Measurement and verification activities are based on the following assumptions:

- Insulation thickness: 2 in
- Insulation material type: 850F MF Pipe and Tank, Type IIIB, C1393-14
- Process temperature is 240°F and 350°F
- The average annual ambient air temperature is 75°F
- The average wind speed is 7.09 mph

The 3E Plus software was used to calculate heat loss (btu/hr./ft) for bare piping (pre-retrofit) and piping with 2 in insulation (post-retrofit). The software required these inputs: process temperature, ambient temperature, pipe size, base metal, insulation, and jacket material. Annual therms savings was calculated using the following equation:

Pipe Insulation Installation Annual Energy Savings

$$Annual\ Therms\ Savings = \frac{Heat\ Loss\ \left(\frac{Btu}{hr}\right)\ x\ Annual\ Operating\ Hours\ \left(\frac{hrs}{yr}\right)}{Boiler\ Efficiency\ x\ 100{,}000\ \left(\frac{BTU}{CCF}\right)}$$

Where:

Annual Operating Hours = number of hours facility operates annually

Boiler Efficiency

100,000 Btu/CCF = conversion factor (BTU/yr. to CCF/yr.)

Pipe/Valve/Tank Insulation Parameters

Entry #	Description	Pipe or Valve	Quantity	Pipe Length / Valve Equivalent Length (ft)	Diameter (in)
1	1.5 Pipe	Pipe	1	12.0	1.5
2	.5 Pipe	Pipe	1	24.0	0.5
3	2 Pipe	Pipe	1	40.0	2.0
4	1.25 pipe	Pipe	1	12.0	1.3
5	Fitting	Valve or fitting	1	2.6	1.5
6	2" Pipe	Pipe	1	50.0	2.0
7	6" Pipe	Pipe	1	5.0	6.0
8	DA Tank	Tank	1	246.3 (ft^2)	

Measure Life

Estimated Useful Life by Measure

Measure	EUL
Pipe and Tank Insulation	20 years

Calculated Savings:

Pipe Insulation

Pipe Insulation Annual Energy Savings

Entry #	Description	Pipe or Valve	Temperature (°F)	Pre Heat Loss	Post Heat Loss	Therms Savings
1	1.5" Pipe	Pipe	220	478.20	21.61	458.
2	0.5" Pipe	Pipe	220	289.70	14.47	553
3	2" Pipe	Pipe	220	551.90	25.13	1,763
4	1.25" pipe	Pipe	220	439.10	21.25	419
5	Fitting	Valve or fitting	220	478.20	21.61	1,493
6	2" Pipe	Pipe	320	957.90	46.22	3,813
7	6" Pipe	Pipe	320	1,968.00	97.93	782
8	DA Tank	Tank	179	246.5	16.33	4,743
					Total:	**14,024**

Overall, project savings are as follows:

Overall Project Savings

Measure	Expected Annual therms Savings	Realized Annual therms Savings	Realization Rate	Lifetime therms Savings
Pipe and Tank Insulation	14,418	14,326	99%	280,481
TOTAL	**14,418**	**14,326**	**99%**	**280,481**

Measure Cost, Incentive, & Payback

The Evaluators reviewed the invoices associated with this project and verified a cost of $13,800. Measure payback is summarized in the table below.

Cost, Incentive, and Payback

Annual Therms Savings	Cost per Therm	Annual Energy Cost Savings	Incremental Cost	Base Incentive	Adjusted Incentive	Payback w/Incentive	Payback w/o Incentive
14,326	$0.446	$6,254.7	$13,800	$10,092	$9,817	0.85	2.2

15 Appendix B: Deferred Replacement Cost Calculations

This appendix presents the calculations of deferred replacement costs for residential and commercial tankless water heaters.

The two calculations are based off of a full-install cost of $614 for a baseline storage tank unit and an incremental cost of $605 for a tankless unit. These values cite the Illinois TRM.

	Inputs		
Measure Type=	Res Tankless (ROB + NC)		
Nominal Discount Rate=	5.66%		
Inflation Rate=	1.9%		
Real Discount Rate=	3.7%		
	Program		**Baseline**
Equipment Type=	Tankless WH		Storage WH
Effective UsefulLife=	20		11
Remaining Useful Life=			
PW(EUL)=	13.97		8.91
PW(RUL)=			
Installed Cost=	$1,219		$614
Deferred Replacement Cost=		$	348.90
PWF Formula=		$	348.90
Incremental Cost=	$ 256.10		

Assumptions:	**Tech Cost**	**Labor**	**Total Cost**
Tankless Year 1 Full Cost	$1,219		$1,219
Storage Tank 2018 Cost	$614		$614
Source: Illinois TRM			

Figure 15-1 Residential Tankless WH Deferred Replacement Cost Calculation

	Inputs	
Measure Type=	C&I Tankless (ROB + NC)	
Nominal Discount Rate=	5.66%	
Inflation Rate=	1.9%	
Real Discount Rate=	3.7%	
	Program	**Baseline**
Equipment Type=	Tankless WH	Storage WH
Effective UsefulLife=	20	15
Remaining Useful Life=		
PW(EUL)=	13.97	11.36
PW(RUL)=		
Installed Cost=	$1,219	$614
Deferred Replacement Cost=		$ 140.91
PWF Formula=		$ 140.91
Incremental Cost=	$ 464.09	

Assumptions:	**Tech Cost**	**Labor**	**Total Cost**
Tankless Year 1 Full Cost	$1,219		$1,219
Storage Tank 2018 Cost	$614		$614
Source: Illinois TRM			

Figure 15-2 C&I Tankless WH Deferred Replacement Cost Calculation

	Inputs	
Measure Type=	Furnace Early Replacement	
Nominal Discount Rate=	5.66%	
Inflation Rate=	1.9%	
Real Discount Rate=	3.7%	
	Program	**Baseline**
Equipment Type=	HE Furnace	SE Furnace
Effective UsefulLife=	20	20
Remaining Useful Life=		5
PW(EUL)=	20.00	20.00
PW(RUL)=		$4.49
Installed Cost=	$ 2,548	$ 2,011
Deferred Replacement Cost=		$ 1,364.59
PWF Formula=		$ 1,559
	$ 1,183.41	

Figure 15-3 C&I Furnace early Retirement Deferred Replacement Cost Calculation

16 Appendix C: Sample TRM Calculations

16.1.1 Residential Furnaces (TRM V8.2 Section 2.1.3)

According to Arkansas TRM V8.2, savings for residential furnaces are calculated as follows:[31]

$$Annual\ Therm\ Savings\ =\ Heat\ load\ \times \left({}^{1}/_{AFUE_{base}}\ -\ {}^{1}/_{AFUE_{eff}}\right)$$

$$Heat\ load\ =\ {}^{therms}/_{site\ area}/year \times site\ area$$

Site area = ft.^{2} of the project site. If unknown, use installed capacity (BTUh)/30 (BTUh/ft^2).

$AFUE_{base}$ = baseline efficiency of the furnace, 80% AFUE.

$AFUE_{eff}$ = efficiency of the new furnace installed, in AFUE.

Table 16-1 summarizes the heating load multipliers per square foot from the TRM V8.2.

Table 16-1: TRM V8.2 Annual Furnace Heating Load

Vintage	Heating Load (Therms/Ft.2/Year			
	Zone 9 – Fayetteville	Zone 8 – Fort Smith	Zone 7 – Little Rock	Zone 6 – El Dorado
1979 & Earlier	.404	.360	.336	.296
1980-1989	.303	.270	.252	.222
1990-1999	.202	.180	.168	.148
2000 & Later	.152	.135	.126	.111

Example savings calculations for a home in Zone 8 are as follows:

- Retrofit – 90,000 Input BTU furnace, 95% AFUE
- Output BTU = 90,000 x .95 = 85,500
- Square Feet = 85,500 / 30 = 2,450
- Year built: 1986

$$Retrofit\ Therms\ Savings = 2{,}450 ft.^2 \times .270 \frac{Therms}{ft.^2} \times \left(\frac{1}{.80} - \frac{1}{.95}\right) = 130.56\ Therms$$

The same furnace in a new construction project would save:

$$NC\ Therms\ Savings = 2{,}850 ft.^2 \times .135 \frac{Therms}{ft.^2} \times \left(\frac{1}{.80} - \frac{1}{.95}\right) = 75.94\ Therms$$

[31] Arkansas TRM V8.2 Volume 2, Page 44

16.1.2 Residential Water Heater Replacement (TRM V8.2 Section 2.3.1)

Energy savings values for storage tank water heaters were developed using installed Energy Factor ratings as determined by the Gas Appliance Manufacturers Association Directory of Certified Water Heating Products. Tank sizing must follow AHRI standards.

In TRM V8.2 Savings are calculated as:[32]

$$therm_{Savings} = \frac{\rho \times C_p \times V \times (T_{SetPoint} - T_{Supply}) \times \left(\frac{1}{EF_{pre}} - \frac{1}{EF_{post}}\right)}{Conversion\ Factor}$$

ρ = Water density, 8.33 lbs./gal.
C_p = Specific heat of water, 1 BTU/lb·°F
V = Estimated annual hot water use (gal per year)
$T_{SetPoint}$ = Water heater set point, if unavailable, use 120°F
T_{Supply} = Average supply water temperature
EF_{pre} = Baseline value
EF_{post} = Energy Factor of new water heater
$Conversion\ Factor$ = 100,000 BTU = 1 therm

Baseline energy factors are summarized in Table 16-2.

Table 16-2: Residential Water Heating Baseline Uniform Energy Factors

Draw Pattern	Equivalent Gallons	Baseline UEF
Very Small	20	.3056
Low	30	.5412
Medium	40	.5803
High	50	.6270

Volume estimates are provided in Table 16-3.

Table 16-3: TRM V8.2 Estimated Annual Hot Water Use

Weather Zone	40 Gal.	50 Gal.	65 Gal.	80 Gal.
9	18,401	20,911	25,093	30,111
8	18,331	20,831	24,997	29,996
7	18,267	20,758	24,910	29,892
6	17,815	20,245	24,293	29,152

[32] Arkansas TRM V8.2, Volume 2. Pg. 122-135

Supply water temperatures are presented in Table 16-4

Table 16-4: Residential Water Supply Inlet Temperatures

Weather Zone		Supply Water Temp
9	Fayetteville	65.6
8	Fort Smith	66.1
7	Little Rock	67.8
6	El Dorado	70.1

Example savings calculations are as follows:

- Retrofit – 199,000 Input BTU Tankless Water Heater, 96% UEF
- High Draw Pattern
- Location: Fort Smith, Zone 8.

$$Therms\ Savings = \frac{1 \times 8.33 \times 20{,}831 \times (120 - 66.1) \times \left(\frac{1}{.627} - \frac{1}{.96}\right)}{100{,}000} = 51.74\ Therms$$

16.1.3 Smart Thermostats (TRM V8.2 Section 2.1.12)

The savings multipliers for smart thermostats are shown in Table 16-5[33].

Table 16-5: Smart Thermostat Deemed Savings Factors

Baseline	Therms/Ft.2	kWh/Ft.2
Manual	.037	.450
Programmable	.009	.113
Default	.033	.399

16.1.4 Commercial Furnaces (TRM V8.2 Section 3.1.9)

Therms savings calculations for commercial furnaces apply more facility-specific information than the residential methodology. Savings were calculated as follows:[34]

$$Therms\ Savings = \frac{BTU\ Capacity * EFLH_H * \left(\frac{1}{Effic_{pre}} - \frac{1}{Effic_{post}}\right)}{100{,}000\ Therms/BTU}$$

[33] AR TRM V8.2 Vol 2.0 Pg. 83

[34] Arkansas TRM V8.2, Pg. 252

The TRM V8.2 EFLH values are summarized in Table 16-6.

Table 16-6: EFLH Values[35]

Building Type	Zone 6	Zone 7	Zone 8	Zone 9
Assembly	615	854	915	1032
College/University	674	936	1002	1130
Fast Food Restaurant	287	439	472	549
Full Menu Restaurant	178	321	362	438
Grocery Store	692	941	1001	1129
Health Clinic	641	878	915	1045
Lodging	391	589	637	722
Large Office (>30k Ft^2)	816	1020	1060	1157
Small Office (<30k Ft^2)	351	534	564	644
Religious Worship	575	798	854	963
Retail	781	1043	1133	1287
School	777	1030	1094	1236

For example, if a Small Office in Fort Smith (Zone 8) installed a 70,000 BTU 96% AFUE Furnace, the resulting therms savings are calculated as:

$$Therms\ Savings = \frac{70{,}000\ BTU * 564\ EFLH * \left(\frac{1}{.80} - \frac{1}{.96}\right)}{100{,}000\ BTU/Therm} = 82.24\ Therms$$

16.1.5 Commercial Water Heaters (TRM V8.2 Section 3.3.1)

Therms savings for commercial water heaters are calculated as:[36]

$$therms\ Savings = \frac{\rho * C_P * V * \left(T_{SetPoint} - T_{Supply}\right) * \left(\frac{1}{EF_{pre}} - \frac{1}{EF_{post}}\right) * Days/Year}{Conversion\ Factor}$$

P = Water Density, 8.33 lbs./Gallon

C_P = Specific Heat of Water, 1 BTU/Lb. F

V = Average daily hot water use (gallons)

$T_{setpoint}$ = Water Heater setpoint, 140 deg. F

[35] Arkansas TRM V8.2 Volume 2, Table 478. Pg. 526.

[36] Arkansas TRM V8.2, Volume 2. Pg. 357-368

T_{supply} = Supply water temperature, 58 deg. F
EF_{pre} = Energy factor of existing water heater (.62 - .0019V)
EF_{post} = Energy factor of installed water heater
Days/Year = Days per year of operation
Conversion Factor = 100,000 BTU = 1 therm
Table 16-7 presents the volume and days of usage values for a facility by square footage.[37]

Table 16-7: Hot Water Requirements by Facility Size

Building Type	Gallons / Unit / Day	Unit	Units / 1,000 ft.2	Applicable Days / Year	Gallons / 1,000 ft.2 / Day
Small Office	1	Person	2.3	250	2.3
Large Office	1	Person	2.3	250	2.3
Fast Food Rest.	.7	Meal/Day	784.6	365	549.2
Sit-down Rest.	2.4	Meal/Day	340	365	816
Retail	2	Employee	1	365	2.0
Grocery	2	Employee	1.1	365	2.2
Warehouse	2	Employee	.5	250	1.0
Elementary School	.6	Person	9.5	200	5.7
Jr. High/High School	1.8	Person	9.5	200	17.1
Health	90	Patient	3.8	365	342.0
Motel	20	Unit (Room)	5	365	100.0
Hotel	14	Unit (Room)	2.2	365	30.8
Other	1	Employee	.7	250	.7

Table 16-8 presents the volume and days of usage values by unit produced or person served.

[37] Ibid

Table 16-8: Hot Water Requirements by Unit or Person

Building Type	Size Factor	Average Daily Demand
Dormitories	Men	13.1 Gal. per Man
	Women	12.3 Gal. per Woman
Hospitals	Per Bed	90.0 Gal. per Patient
Hotels	Single Room with Bath	50.0 Gal. per Unit
	Double Room with Bath	80.0 Gal. per Unit
Motels	# Units:	
	Up to 20	20.0 Gal. per Unit
	21 to 100	14.0 Gal. per Unit
	101 and Up	10.0 Gal. per Unit
Restaurants	Full Meal Type	2.4 Gal. per Meal
	Dive-in Snack Type	0.7 Gal. per Meal
Schools	Elementary	0.6 Gal. Per Student
	Secondary and High School	1.8 Gal. Per Student

16.1.6 Commercial Faucet Aerators (TRM V8.2 Section 3.3.2)

Savings are calculated as follows:[38]

$$Annual\ Therms\ = [(F_B * U_B) - (F_P * U_P) * Days * (T_H - T_C) * C_H * C_G / Eff_G]$$

The inputs for this equation are defined in Table 16-9.

[38] Arkansas TRM V8.2, Volume 2. Pg. 369-372

Table 16-9: DI Aerator Savings Calculation Parameters

Parameter	Description	Value
F_B	Baseline Flow Rate (GPM)	2.2
F_P	Post Flow Rate (GPM)	≤ 1.5
Days	Annual operating days for the facility[39]	
	Prison	365
	Hospital, Nursing Home	365
	Dormitory	274
	Multifamily	365
	Lodging	365
	Commercial	250
	School	200
T_C	Average supply (cold) water temperature (deg. F)	Zone 9: 65.6
		Zone 8: 66.1
		Zone 7: 67.8
		Zone 6: 70.1
T_H	Average mixed hot water temperature (deg. F)	105
U_B	Baseline water Usage Duration	
	Prison	30 min/day/unit
	Hospital, Nursing Home	3 min/day/unit
	Dormitory	30 min/day/unit
	Multifamily	3 min/day/unit
	Lodging	3 min/day/unit
	Commercial	30 min/day/unit
	School	30 min/day/unit
U_P	Post Water Usage Duration (assumed)	= U_B
C_H	Unit Conversion: 8.33 BTU/Gallons/deg. F	8.33
C_G	Unit Conversion: 1 Therm/100,000 BTU	1/100,000
Eff_G	Efficiency of Gas Water Heater	.8

These values translate into per-faucet savings values by facility type, detailed in Table 16-10 and Table 16-11 for 1.0 and 0.5 GPM aerators, respectively.[40]

[39] For facilities that operate year-round: conservatively assume operating days of 360/year; for schools open weekdays except summer: 360 x (5/7) x (9/12) = 193; for dormitories with few occupants in the summer: 360 x (9/12) = 270; and for normal commercial buildings: 360 x (5/7) = 257

[40] Table values interpolated based on data in Arkansas TRM V8.2, Volume 2. Pg. 369-372

Table 16-10: 1.0 GPM Commercial Aerator Savings

Facility Type	Fayetteville (Zone 9)	Fort Smith (Zone 8)	Little Rock (Zone 7)	El Dorado (Zone 6)
Prison	53.91	53.22	50.90	47.75
Hospital / Nursing Home	5.35	5.32	5.09	4.78
Dormitory	40.47	39.95	38.21	35.85
Multifamily	5.35	5.32	5.09	4.78
Lodging	5.35	5.32	5.09	4.78
Commercial	36.92	3645	34.86	32.71
School	29.54	29.16	27.89	26.16

Table 16-11: 0.5 GPM Commercial Aerator Savings

Facility Type	Fayetteville (Zone 9)	Fort Smith (Zone 8)	Little Rock (Zone 7)	El Dorado (Zone 6)
Prison	76.37	75.40	72.10	67.65
Hospital / Nursing Home	7.64	7.54	7.21	6.76
Dormitory	57.33	56.60	54.13	50.78
Multifamily	7.64	7.54	7.21	6.76
Lodging	7.64	7.54	7.21	6.76
Commercial	52.31	51.64	49.39	46.33
School	41.85	41.31	39.51	37.07

16.1.7 Pre-Rinse Spray Valves (TRM V8.2 Section 3.8.11)

Low-flow pre-rinse spray valves PRSVs were also direct-installed at a wide range of facility types with food service applications. The savings per unit for these were calculated as follows:[41]

$$Annual\ Therms = [(F_B * U_B) - (F_P * U_P)] * Days * (T_H - T_C) * C_H * C_G / Eff_G$$

$$Peak\ Therms = P * [(F_B * U_B) - (F_P * U_P)] * (T_H - T_C) * C_H * C_G / Eff_G$$

Table 16-12 presents the definition of these parameters.[42]

[41] Arkansas TRM V8.2, Volume 2. Pg. 514-517

[42] Ibid

Table 16-12: Pre-Rinse Spray Valves Savings Calculation Parameters

Parameter	Description	Value
F_B	Baseline Flow Rate (GPM)	2.25
F_P	Post Flow Rate (GPM)	1.28
Days	Annual operating days for the facility43	
	Fast Food Restaurant	365
	Casual Dining Restaurant	365
	Institutional	365
	Higher Education	274
	School / K-12	200
TC	Average supply (cold) water temperature (deg. F)	Zone 9: 65.6
		Zone 8: 66.1
		Zone 7: 67.8
		Zone 6: 70.1
TH	Average mixed hot water temperature (deg. F)	120
U_B	Baseline water Usage Duration	
	Fast Food Restaurant	45 min/day/unit
	Casual Dining Restaurant	105 min/day/unit
	Institutional	210 min/day/unit
	Higher Education	210 min/day/unit
	School / K-12	105 min/day/unit
U_P	Post Water Usage Duration (assumed)	= U_B
C_H	Unit Conversion: 8.33 BTU/Gallons/deg. F	8.33
C_G	Unit Conversion: 1 Therm/100,000 BTU	1/100,00
Eff_G	Efficiency of Gas Water Heater	.8

16.1.8 Commercial Low Flow Showerheads (TRM V8.2 Section 3.3.5)

Savings are calculated as follows:[44]

[43] For facilities that operate year-round: conservatively assume operating days of 360/year; for schools open weekdays except summer: 360 x (5/7) x (9/12) = 193; for dormitories with few occupants in the summer: 360 x (9/12) = 270; and for normal commercial buildings: 360 x (5/7) = 257

[44] Arkansas TRM V8.2, Volume 2. Pg. 381-388

$$Annual\ therms\ = \frac{8.33 * C_p * \Delta V * \left(T_{HW} - T_{Suppy}\right) * \left(\frac{1}{E_t}\right)}{100{,}000\ BTU/therm} * \frac{days}{year}$$

In this formula, ΔV is calculated as follows:

$$\Delta V = U * N * \left(Q_b - Q_p\right) * F_{HW}$$

U = average shower duration (7.8 minutes)

N = Number of showers per showerhead per day

Q_b = Baseline flow rate (2.5 GPM);

Q_p = Installed flow rate (in GPM); and

F_{HW} = Hot Water Fraction (share of water which is from the water heater)

The inputs for this equation are defined in Table 16-13

Table 16-13: DI Showerhead Savings Calculation Parameters

Parameter	Description	Value
F_B	Baseline Flow Rate (GPM)	2.2
F_P	Post Flow Rate (GPM)	≤ 1.5
Days	Annual operating days for the facility	
	Hospital, Nursing Home	365
	Lodging	365
	Commercial	250
	24 Hour Fitness Center	365
	School	200
T_C	Average supply (cold) water temperature (deg. F)	Zone 9: 65.6
		Zone 8: 66.1
		Zone 7: 67.8
		Zone 6: 70.1
T_H	Average mixed hot water temperature (deg. F)	120
U_P	Post Water Usage Duration (assumed)	= U_B
C_G	Unit Conversion: 1 Therm/100,000 BTU	1/100,00
E_T	Efficiency of Gas Water Heater	.8

Table 16-14: Daily Hot Water Reduction

Installed Flow Rate	Weather Zone	Hospital / Nursing	Lodging	Commercial Employee Shower	24 Fitness Center	Schools
2.0 GPM	9	2.5	3.5	1.9	56.3	2.0
	8	2.5	3.5	1.9	56.1	2.0
	7	2.5	3.5	1.8	55.4	2.0
	6	2.4	3.4	1.8	54.4	2.0
1.75 GPM	9	3.8	5.3	2.8	84.4	3.1
	8	3.8	5.3	2.8	84.1	3.1
	7	3.7	5.2	2.8	83.1	3.0
	6	3.6	5.1	2.7	81.5	3.0
1.5 GPM	9	5.0	7.1	3.8	112.6	4.1
	8	5.0	7.0	3.7	112.2	4.1
	7	4.9	6.9	3.7	110.8	4.0
	6	4.9	6.8	3.6	108.7	.9

16.1.9 Commercial Door Air Infiltration (TRM V8.2 Section 3.2.11)

Savings are calculated as follows[45]:

$$Annual\ therms = \frac{\left(CFM_{pre,day} * Hours_{day} + CFM_{pre,night} * Hours_{night}\right)\left(CFM_{reduction} * 1.08 * \Delta T * \frac{1.0kW}{ton}\right)}{80\%\ AFUE * \frac{100{,}000Btu}{therm}}$$

$$Peak\ therms = Annual\frac{therms}{ELFH_H}$$

The inputs for this equation are defined in Table 16-15.

[45] Arkansas TRM V8.2, Volume 2. Pg. 350-356

Table 16-15: DI Door Infiltration Savings Calculation Parameters

Parameter	Description	Value
CFM_{pre}	Calculated pre-retrofit air infiltration rate (ft^3/min)	
CFMreduction	Average infiltration reduction	79%
ΔT	Change in temperature across gap barrier	
$Hours_{day}$	12-hour cycles per day, per month	4,380 hours
$Hours_{night}$	12-hour cycles per day, per month	4,380 hours
$EFLH_H$	Equivalent full-load hours	See table below

Table 16-16: $EFLH_H$ By Weather Zone

Building Type	*Zone 6*	*Zone 7*	*Zone 8*	*Zone 9*
Assembly	575	798	855	824
College/University	630	874	936	902
Fast Food Restaurant	288	440	474	455
Full Menu Restaurant	181	328	370	336
Grocery Store	688	935	995	965
Health Clinic	646	885	922	895
Lodging	389	587	635	605
Large Office (>30k $ft.^2$)	811	1,014	1,054	1,036
Small Office (≤30k $ft.^2$)	353	538	568	538
Religious Worship	537	745	798	769
Retail	780	1,041	1,131	1,099
School	774	1,026	1,089	1,064

These values translate into per linear foot savings values by weather zone, detailed in the table below.

Table 16-17: Deemed Annual Therm Savings per Linear Foot

Weather Zone	*Gap Width (inches)*			
	1/8	*1/4*	*1/2*	*3/4*
Zone 9	5.34	10.80	21.43	32.16
Zone 8	4.64	9.38	18.62	27.96
Zone 7	3.91	7.92	15.71	23.58
Zone 6	2.89	5.86	11.62	17.44

APPENDIX B – ARKANSAS MARKETING MATERIALS

Kirk's Corner

Goodbye winter, hello spring & summer

Now that we're free of the brutal winter this heating season brought, we're reminded once again about the benefit of having natural gas to heat our homes.

"Our safe and reliable natural gas withstood the deep freeze this winter, with no outages for our customers," said Kirk Pierce, Energy Efficiency Consultant.

In addition to reliability, your customers can also count on the affordability natural gas provides with prices that will continue to stay low in the foreseeable future.

A helpful reminder

If you're replacing a condensate line and want to prevent future freezing, use a condensate pump to push water out of the lines and use heat tape to promote drainage.

Looking Ahead

Lastly, make sure you're giving your customers the best possible deal—by double-checking with your manufacturers to see if they have rebates available in addition to our great high-efficiency rebates!

If you have any questions on helping your customers, please reach out to me at Timothy.Pierce@centerpointenergy.com or visit CenterPointEnergy.com/RebateScoop.

For more information about natural gas, visit CenterPointEnergy.com/NaturalGasBenefits.

Job number/name:	210224-03 AR March 18 Kirk email to trade allies_ Mail Merge
Subject:	Heating system upgrades help customers save $$

Hello,

As we come to the end of a brutal winter this heating season, now is a great time to remind your customers about the benefit of upgrading their heating system while updating an AC unit to ensure peak performance. In fact, according to the AGA, customers who use natural gas to heat their homes could expect to see bills up to 71% lower this winter.

Help your customers receive a rebate of **up to $600** for forced-air furnaces and an additional **$50 rebate** when you install a qualifying smart thermostat at the same time.

Rebates to help you sell

Our rebates help your customers save on the price of high-efficiency equipment and help you close sales. By submitting a qualifying residential rebate, you'll receive a **$50** dealer incentive.

It's never too early to begin submitting rebates!

Save time and get your rebates more quickly by having your customer's CenterPoint Energy Account number readily available when you submit your rebates online using our easy-to-use application: CenterPointEnergy.com/RebateScoop.

Before you submit your online application, we will need the following information from your invoice:

- Customer name
- Installation address
- Equipment brand
- Model number
- Serial number

Lastly, as many of you may know, Karen Murph recently retired from CenterPoint Energy. I want to thank her for her years of service, as we would not be where we are today without her. Please do not hesitate to contact me with any questions that you might have addressed to her.

As always, if you have questions, please reach out.

Best,

T. Kirk Pierce

Can your heating system handle another cold winter?

Now is a great time to take advantage of our rebates on high-efficiency home heating furnaces and boilers.

- Replace an aging heating system with an energy-efficient forced-air furnace and receive up to a **$600 rebate**
- Ask your dealer to install a qualifying, smart thermostat when replacing your heating system for an additional **$50 rebate**

To get started, click the button below.

Learn more

Terms and conditions apply.

CenterPoint Energy

Jose Laboy

From: CenterPoint Energy <DoNotReply@marketing.CenterPointEnergy.com>
Sent: Tuesday, March 16, 2021 3:44 PM
To: Dahlke, Jason R
Subject: Is your DIY toolkit ready to go?

Giving YOU Tools for your DIY Toolkit

Have you added our no-cost or low-cost DIY products to your home toolkit?

We have easy-to-install products to help you increase your energy and money-savings!

Check out our **free** or **low-cost** products below:

- Contemporary showerheads available in chrome or ivory
- Aerators available for both kitchen and bathroom faucets
- Hot water temperature gauges to help you better understand what your water heater is set to and adjust for more savings

Order today!

Please have your CenterPoint Energy account number available before checking out. You can find your account number on your current bill or by logging into My Account.

CenterPoint Energy

Terms and conditions apply. Limit of 3 showerheads and 3 aerators per customer/household. All other products have a limit of 1 per customer/household per lifetime. To qualify for any product, a natural gas water heater must be your water heater source.

If you wish to contact us, please go to: centerpointenergy.com/about/contact/ and we will be happy to assist you. Replies to this message will not be read or receive a response.

This email was sent by:

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1111 Louisiana, Houston, Texas 77002

CenterPoint Energy
505 Nicollet Mall, Minneapolis, Minnesota, 55402

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Jose Laboy

From: CenterPoint Energy <DoNotReply@marketing.CenterPointEnergy.com>
Sent: Monday, February 1, 2021 9:30 PM
To: Dahlke, Jason R
Subject: * TEST * Make 2021 your year... * TEST *

New Year Savings for YOU

Wishing you an abundance of savings this new year

Raise a glass to the start of 2021 as we toast to the money and energy-saving offerings available to you. Wash 2020 away with our easy-to-install showerheads or faucet aerators for **free** or at a **low-cost**. Kick this new year off right by checking out the products below:

- Contemporary showerheads available in chrome or ivory
- Aerators available for both kitchen and bathroom faucets
- Hot water temperature gauges to help you better understand what your water heater is set to and adjust for more savings

I want spectacular savings

Please have your CenterPoint Energy account number available prior to check out.

CenterPoint Energy

Terms and conditions apply. Limit of 3 showerheads and 3 aerators per customer/household. All other products have a limit of 1 per customer/household per lifetime. To qualify for any product, natural gas must be your primary heat source.

If you wish to contact us, please go to: centerpointenergy.com/about/contact/ and we will be happy to assist you. Replies to this message will not be read or receive a response.

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1111 Louisiana, Houston, Texas 77002

CenterPoint Energy
505 Nicollet Mall, Minneapolis, Minnesota, 55402

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Delivering Rebate Savings to YOU

Natural gas heating and water heating rebates — up to $1,500

HEATING SYSTEM AND WATER HEATER REBATES

Help offset the initial purchase costs of high-efficiency natural gas heating and water heating equipment with a cash rebate. Not only will you have a safe and reliable heating system or water heater for your home or business, you will also lower your energy bills, which will be better for your budget.

PROGRAM BASICS

- Program dates: Jan. 1 – Dec. 31
- In order to secure your rebate, submit all paperwork by Dec. 31 in the calendar year of installation.
- **Replacing electric equipment for natural gas equipment is not eligible for a rebate.**

CenterPoint Energy

Always There.®

Natural gas heating systems

Rebate	Efficiency rating
Combination unit (forced-air furnace and tankless water heater – residential only)	
$1,500	≥95% AFUE (furnace) ≥.80 UEF (tankless water heater)
Forced-air furnace	
$600	≥95% AFUE
$400	90-94.9% AFUE
Condensing Combination Boiler (residential only)	
$1,500	≥95% AFUE
ENERGY STAR® Smart thermostat*	
$50	Installed with any qualifying heating system

**See back of rebate form or ask an associate for specific requirements.*

Note: For rebate to apply, the new equipment must be listed and AFUE verified on the current Air-Conditioning, Heating and Refrigeration Institute (AHRI) or ENERGY STAR® websites. See **ahridirectory.org** or **energystar.gov/products**.

For more information, contact the retailer or heating dealer of your choice.

CenterPointEnergy.com/HeatingRebate

Natural gas water heaters

Rebate	Thermal efficiency/Uniform Energy Factor
Tankless water heater	
$500	≥.80 UEF
Tank water heater (≥75,000 Btu/hr)	
$200 per 100,000 Btuh input not to exceed 25% of equipment cost	≥88% thermal efficiency
Tank water heater (< 75,000 Btu/hr)	
$75	≥.70 UEF

Note: For rebate to apply, the new equipment must be listed and Uniform Energy Factor (UEF) verified on the current Air-Conditioning, Heating and Refrigeration Institute (AHRI) or ENERGY STAR® websites. See **ahridirectory.org** or **energystar.gov/products**.

For more information, contact the retailer or plumber of your choice.

CenterPointEnergy.com/WaterHeaterRebate

Get to know these symbols
< Less than
≤ Less than or equal to
> Greater than
≥ Greater than or equal to

CenterPoint Energy
Always There®

Grow your rebate knowledge this scoop season

Kirk Pierce and Lance Orton

Scoop is a great opportunity for you and your team to learn details on new and future programs, ask questions, and a lot more.

- *Rebate processing update*
- *Tips for submitting rebates online*
- *Rebate program updates and opportunities*
- *2022 program preview*
- *And more!*

During these uncertain times, your health and safety remain our top priority—that's why we'll follow local masking guidelines.

Event date and information coming soon!

CenterPointEnergy.com/ARScoopMeetings
or contact Sarah Lyra at 501-377-4877.

CenterPoint® Energy

Ofrecemos ahorros con reembolsos para

TI

Reembolsos de hasta $1,500 para la calefacción y el calentamiento del agua con gas natural

Ayuda a compensar los costos iniciales de compra de los equipos de calefacción y de calentamiento de agua de gas natural de alta eficiencia con un reembolso en efectivo. No sólo tendrás un sistema de calefacción o un calentador de agua seguro y fiable para tu casa o negocio, sino que también reducirás tus facturas de energía, lo que supondrá una mejora para tu presupuesto.

CONCEPTOS BÁSICOS DEL PROGRAMA

- Fechas del programa: 1 de enero a 31 de diciembre
- A fin de asegurar tu reembolso, presenta toda la documentación antes del 31 de diciembre del año calendario en que se realizó la instalación.
- **El reemplazo de equipos eléctricos por equipos de gas natural no es elegible para un reembolso.**

CenterPoint Energy

Always There.®

Sistemas de calefacción de gas natural

Reembolso	Calificación de eficiencia
Unidad combinada (horno de aire forzado y calentador de agua sin tanque – sólo para uso residencial)	
$1,500	≥95% AFUE (horno) ≥.80 UEF (calentador de agua sin tanque)
Horno de aire forzado	
$600	≥95% AFUE
$400	90-94.9% AFUE
Caldera combinada de condensación (rsólo para uso residencial)	
$1,500	≥95% AFUE
Termostato inteligente ENERGY STAR® *	
$50	Instalado con cualquier sistema de calefacción que cumpla los requisitos

**Consulte el reverso del formulario de reembolso o pregúntele a un asociado cuáles son los requisitos específicos.*

Nota: Para que pueda aplicar el reembolso, el nuevo equipo debe figurar en la lista que se encuentra en los sitios web actuales del "Air-Conditioning, Heating and Refrigeration Institute" (AHRI) o de ENERGY STAR®, y en los cuales se haya verificado el AFUE correspondiente. Consulta **ahridirectory.org** o **energystar.gov/products**.

Para más información, ponte en contacto con el distribuidor o minorista de equipos de calefacción de tu preferencia.

CenterPointEnergy.com/HeatingRebate

Calentadores de agua de gas natural

Reembolso	Eficiencia térmica/Factor de Energía Uniforme
Calentador de agua sin tanque	
$500	≥.80 UEF
Calentador de agua con tanque (≥75,000 Btu/hr)	
$200 por cada 100,000 Btuh de entrada sin superar el 25% del costo del equipo	≥88% eficiencia térmica
Calentador de agua con tanque (< 75,000 Btu/hr)	
$75	≥.70 UEF

Nota: Para que pueda aplicar el reembolso, el nuevo equipo debe figurar en la lista que se encuentra en los sitios web actuales del "Air-Conditioning, Heating and Refrigeration Institute" (AHRI) o de ENERGY STAR®, y en los cuales se haya verificado el Factor de Energía Uniforme (UEF) correspondiente. Consulta **ahridirectory.org** o **energystar.gov/products**.

CenterPointEnergy.com/WaterHeaterRebate

Familiarízate con estos símbolos
< Menos que
≤ Menos que o igual a
> Mayor que
≥ Mayor que o igual a

CenterPoint Energy
Always There®

Preparing YOU for Summer Savings

Get your home ready for summer with our money and energy-saving products!

Save money and energy with these great free and low-cost products!

Did you know that hot water is the second-largest energy user in your home, accounting for 15% of your total energy use? By using our easy-to-install showerheads and faucet aerators, you can reduce hot water use and extend the life of your water heater without sacrificing comfort.

Please have your CenterPoint Energy account number available prior to ordering.

FREE

1.5 gpm Multi-Function Chrome Showerhead

FREE

1.5 gpm Multi-Function Ivory Showerhead

FREE

1.0 gpm Bath Aerator

ONLY $6

1.5 gpm Handheld Chrome Showerhead

Terms and conditions apply. Limit of 3 showerheads and 3 aerators per customer/household. All other products have a limit of one per customer/household per lifetime. To qualify for any product, natural gas must be your primary water heating source.

Order today at CenterPointEnergy.com/FreeShowerheads

CenterPoint Energy

ALWAYS THERE.®

Savings for

YOU

Enjoy this season of savings with our money-saving products!

Save money and energy with these great free and low-cost items!

These easy-to-install showerheads and faucet aerators are designed to reduce your hot water use without sacrificing comfort, and best of all, they lower your energy costs.

- Contemporary showerheads available in chrome or ivory
- Aerators available for both kitchen and bathroom faucets

1.5 gpm Multi-Function
Ivory Showerhead

1.5 gpm Handheld
Chrome Showerhead

1.0 gpm
Bath Aerator

Order today at CenterPointEnergy.com/FreeShowerheads or call 866-422-8409.

Please have your CenterPoint Energy account number ready upon ordering.

Terms and conditions apply. Limit of 3 showerheads and 3 aerators per customer/household per lifetime. To qualify, natural gas must be primary water heater source.

CenterPoint Energy

ALWAYS THERE.®

210903-05_AR

CERTIFICATE OF SERVICE

I, Stephanie Hammons, do hereby certify that a true and correct copy of the foregoing has been delivered to all Parties of Record by electronic mail via the Electronic Filing System this 29th day of April 2022.

/s/ Stephanie Hammons
Stephanie Hammons