FirstEnergy

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September 29, 2023

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
400 North Street
Harrisburg, PA 17120

RE: Final Annual Report to the Pennsylvania Public Utility Commission and Act 129 Statewide Evaluator; Phase IV Program Period June 1, 2022, to May 31, 2023 for Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company and West Penn Power Company;

Docket Nos. M-2020-3020820, M-2020-3020821, M-2020-3020822, and M-2020-3020823

Dear Secretary Chiavetta:

Enclosed please find the Final Annual Report to the Pennsylvania Public Utility Commission in the above-captioned matter for Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company.

Should you have any questions regarding this matter, please do not hesitate to contact me.

Very truly yours,

Daniel A. Garcia

DG/mlr

Enclosure

cc: Certificate of Service

Final Annual Report to the Pennsylvania Public Utility Commission

Phase IV of Act 129

Program Year 14

(June 1, 2022 – May 31, 2023)

For Pennsylvania Act 129 of 2008

Energy Efficiency and Conservation Plan

Prepared by ADM Associates, Tetra Tech, and Ecometric Consulting

For

Metropolitan Edison Company M-2020-3020820

Pennsylvania Electric Company M-2020-3020821

Pennsylvania Power Company M-2020-3020822

West Penn Power Company M-2020-3020823

September 29, 2023

Contents

Acronyms

BOC	Building Operator Certification
C&I	Commercial and Industrial
CFL	Compact Fluorescent Lamp
CSP	Conservation Service Provider or Curtailment Service Provider
CV	Coefficient of Variation
DLC	Direct Load Control
DDR	Dispatchable Demand Response
EAP	Energy Association of Pennsylvania
EDC	Electric Distribution Company
EDT	Eastern Daylight Time
EE&C	Energy Efficiency and Conservation
EM&V	Evaluation, Measurement, and Verification
EMNC	Energy Management and New Construction
ER	Early Replacement
EUL	Effective Useful Life
GNI	Government, Non-Profit, Institutional
HER	Home Energy Report
HERS	Home Energy Rating System
HIM	High-Impact Measure
HPWP	Heat Pump Water Heater
HVAC	Heating, Ventilating, and Air Conditioning
ICSP	Implementation Conservation Service Provider
IDI	In-Depth Interview
IMP	Interim Measure Protocol
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light-Emitting Diode
LI	Low-Income
LIURP	Low-Income Usage Reduction Program
LLF	Line Loss Factor
M&V	Measurement and Verification
MW	Megawatt
MWh	Megawatt-hour
NPV	Net Present Value
NTG	Net-to-Gross
O&M	Operation and Maintenance
P4TD	Phase IV to Date
PA PUC	Pennsylvania Public Utility Commission
PSA	Phase IV to Date Preliminary Savings Achieved; equal to VTD + PYRTD
PSA+CO	PSA savings plus Carryover from Phase III
PY	Program Year: e.g., PY14, from June 1, 2022, to May 31, 2023
PYRTD	Program Year Reported to Date
PYVTD	Program Year Verified to Date
RCT	Randomized Control Trial
ROB	Replace on Burnout

RTD	Phase IV to Date Reported Gross Savings
RTO	Regional Transmission Organization
SO	Spillover
SWE	Statewide Evaluator
TRC	Total Resource Cost
TRM	Technical Reference Manual
VTD	Phase IV to Date Verified Gross Savings
WACC	Weighted Average Cost of Capital

Types of Savings

Gross Savings: The change in energy consumption and/or peak demand that results directly from program-related actions taken by participants in an EE&C program, regardless of why they participated.

Net Savings: The total change in energy consumption and/or peak demand that is attributable to an EE&C program. Depending on the program delivery model and evaluation methodology, the net savings estimates may differ from the gross savings estimate due to adjustments for the effects of free riders, changes in codes and standards, market effects, participant and nonparticipant spillover, and other causes of changes in energy consumption or demand not directly attributable to the EE&C program.

Reported Gross: Also referred to as *ex ante* (Latin for "beforehand") savings. The energy and peak demand savings values calculated by the EDC or its program Implementation Conservation Service Providers (ICSP) and stored in the program tracking system.

Unverified Reported Gross: The Phase IV Evaluation Framework allows EDCs and the evaluation contractors the flexibility to not evaluate each program every year. If an EE&C program is being evaluated over a multi-year cycle, the reported savings for a program year where evaluated results are not available are characterized as unverified reported gross until the impact evaluation is completed and verified savings can be calculated and reported.

Verified Gross: Also referred to as *ex post* (Latin for "from something done afterward") gross savings. The energy and peak demand savings estimates reported by the independent evaluation contractor after the gross impact evaluation and associated M&V efforts have been completed.

Verified Net: Also referred to as *ex post* net savings. The energy and peak demand savings estimates reported by the independent evaluation contractor after application of the results of the net impact evaluation. Typically calculated by multiplying the verified gross savings by a net-to-gross (NTG) ratio.

Annual Savings: Energy and demand savings expressed on an annual basis, or the amount of energy and/or peak demand an EE&C measure or program can be expected to save over the course of a typical year. Annualized savings are noted as MWh/year or MW/year. The Pennsylvania TRM provides algorithms and assumptions to calculate annual savings, and Act 129 compliance targets for consumption reduction are based on the sum of the annual savings estimates of installed measures or behavior change.

Lifetime Savings: Energy and demand savings expressed in terms of the total expected savings over the useful life of the measure. Typically calculated by multiplying the annual savings of a measure by its effective useful life. The TRC Test uses savings from the full lifetime of a measure to calculate the cost-effectiveness of EE&C programs.

Program Year Reported to Date (PYRTD): The reported gross energy and peak demand savings achieved by an EE&C program or portfolio within the current program year. PYTD values for energy efficiency will always be reported gross savings in a semi-annual or preliminary annual report.

Program Year Verified to Date (PYVTD): The verified gross energy and peak demand savings achieved by an EE&C program or portfolio within the current program year as determined by the impact evaluation findings of the independent evaluation contractor.

Phase IV to Date (P4TD): The energy and peak demand savings achieved by an EE&C program or portfolio within Phase IV of Act 129. Reported in several permutations described below.

> **Phase IV to Date Reported (RTD):** The sum of the reported gross savings recorded to date in Phase IV of Act 129 for an EE&C program or portfolio.
>
> **Phase IV to Date Verified (VTD):** The sum of the verified gross savings recorded to date in Phase IV of Act 129 for an EE&C program or portfolio, as determined by the impact evaluation finding of the independent evaluation contractor.
>
> **Phase IV to Date Preliminary Savings Achieved (PSA):** The sum of the verified gross savings (VTD) from previous program years in Phase IV where the impact evaluation is complete plus the reported gross savings from the current program year.
>
> **Phase IV to Date Preliminary Savings Achieved + Carryover (PSA+CO):** The sum of the verified gross savings from previous program years in Phase IV plus the reported gross savings from the current program year plus any verified gross carryover savings from Phase III of Act 129. This is the best estimate of an EDC's progress toward the Phase IV compliance targets.

Phase IV to Date Verified + Carryover (VTD + CO): The sum of the verified gross savings recorded to date in Phase IV plus any verified gross carryover savings from Phase III of Act 129.

1 Introduction

Pennsylvania Act 129 of 2008, signed on October 15, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania for Phases I (2008 through 2013), II (2013 through 2016) and III (2016 through 2021). In late 2020, each EDC filed a new energy efficiency and conservation (EE&C) plan with the PA PUC detailing the proposed design of its portfolio for Phase IV. These plans were updated based on stakeholder input and subsequently approved by the PUC in 2021.

Implementation of Phase IV of the Act 129 programs began on June 1, 2021. This report documents the progress and effectiveness of the Phase IV EE&C accomplishments in Program Year 14 (PY14) for Metropolitan Edison (Met-Ed), Pennsylvania Electric Company (Penelec), Pennsylvania Power Company (Penn Power), and West Penn Power Company (WPP), collectively referred to herein as the FirstEnergy PA Companies (Companies) or the four PA EDCs, as well as the cumulative accomplishments of the Phase IV programs since inception. This report additionally documents the energy savings carried over from Phase III. The Phase III carryover savings count towards EDC savings compliance targets for Phase IV.

This report details the participation, spending, reported gross, verified gross, and verified net impacts of the energy efficiency programs in PY14. Compliance with Act 129 savings goals are ultimately based on verified gross savings. This report also includes estimates of cost-effectiveness according to the Total Resource Cost test (TRC).[1] The Companies have retained ADM Associates, Tetra Tech, and Ecometric Consulting (the ADM team, or ADM) as an independent evaluation contractor for Phase IV of Act 129. The ADM team is responsible for the measurement, verification, and calculation of gross verified and net verified savings.

The ADM team also performed process evaluations to examine the design, administration, implementation, and market response to the EE&C program. This report presents the key findings and recommendations identified by the process evaluation and documents any changes to EE&C program delivery considered based on the recommendations.

[1] The Pennsylvania TRC Test for Phase I was adopted by PUC Order at Docket No. M-2009-2108601 on June 23, 2009 (2009 PA TRC Test Order). The TRC Test Order for Phase I later was refined in the same docket on August 2, 2011 (2011 PA TRC Test Order). The 2013 TRC Order for Phase II of Act 129 was issued on August 30, 2012. The 2016 TRC Test Order for Phase III of Act 129 was adopted by PUC Order at Docket No. M-2015-2468992 on June 11, 2015. The 2021 TRC Test Order for Phase IV of Act 129 was adopted by PUC Order at Docket No. M-2019-3006868 on December 19, 2019.

2 Summary of Achievements

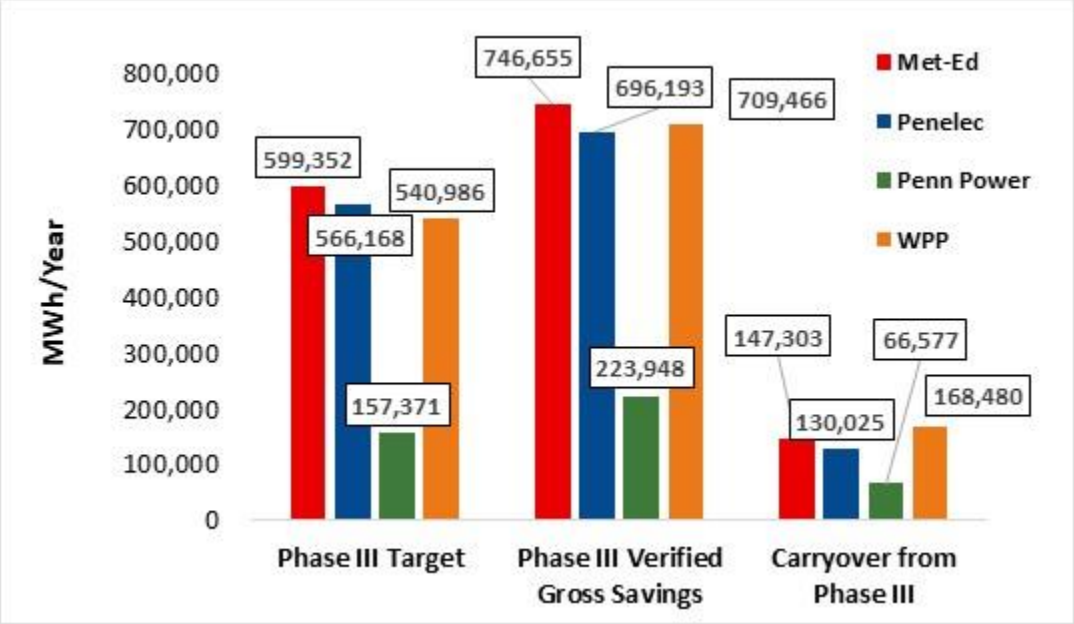
2.1 Carryover Savings from Phase III of Act 129

Table 1 shows total MWh/year carryover savings from Phase III for each of the FirstEnergy EDCs. Figure 1 compares Phase III verified gross savings total to the Phase III compliance target to illustrate the carryover calculation.

Table 1: Carryover Savings from Phase III

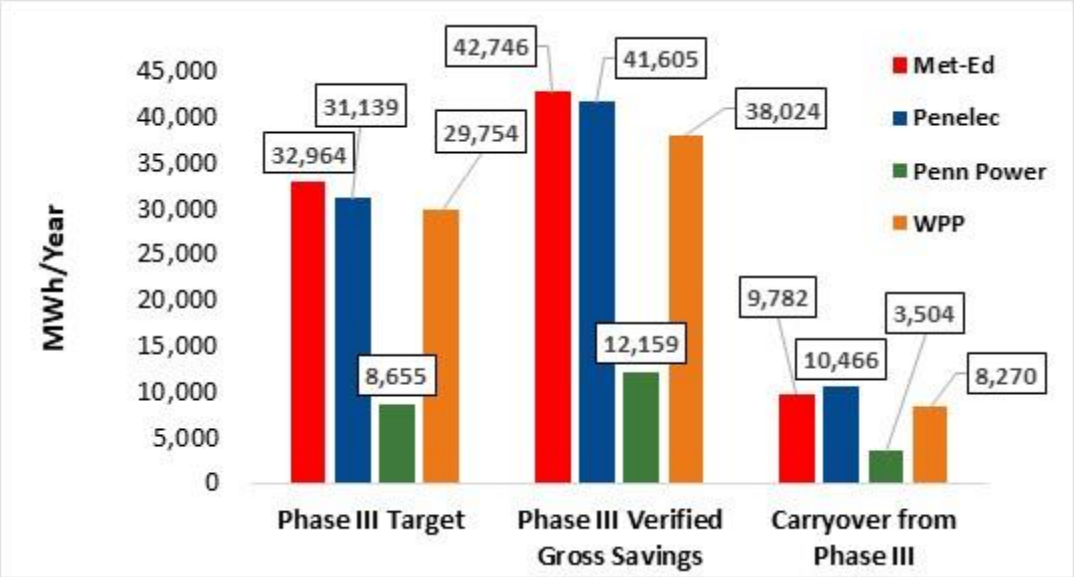
FirstEnergy EDC	Phase IV Carryover Savings (MWh/Year)	Phase IV Low-Income Carryover Savings (MWh/Year)
Met-Ed	147,303	9,782
Penelec	130,025	10,466
Penn Power	66,577	3,504
West Penn Power	168,480	8,270

Figure 1: Carryover Savings from Phase III of Act 129



The Commission's Phase IV Implementation Order[2] also allowed EDCs to carry over savings in excess of the Phase III Low-Income (LI) savings goal.[3] Figure 2 shows the calculation of carryover savings for the low-income customer segment.

Figure 2: Low-Income Carryover from Phase III



2.2 Phase IV Energy Efficiency Achievements to Date

Phase IV energy savings targets (MWh) were established at the meter level and peak demand reduction targets (MW) were set at the system level. Accordingly, the MWh totals in this report are presented at the meter level, while peak demand savings are adjusted for transmission and distribution losses to reflect system-level savings. Since the beginning of Program Year 14 on June 1, 2022, the four FirstEnergy PA EDCs reported and verified gross electric energy savings and gross peak demand savings are shown in Table 2 below.

[2] Pennsylvania Public Utility Commission, *Energy Efficiency and Conservation Program* Implementation Order, at Docket No. M-2020-3015228, (*Phase IV Implementation Order*), entered June 18, 2020.
[3] Proportionate to those savings achieved by dedicated low-income programs in Phase III.

Table 2: Gross Reported and Verified Electric and Demand Savings for PY14

EDC	PYRTD MWh	PYRTD MW	PYVTD MWh	PYVTD MW
Met-Ed	86,671	13.9	85,756	13.8
Penelec	69,661	12.9	72,345	12.3
Penn Power	19,512	4.0	18,284	3.5
West Penn Power	77,468	14.0	80,171	12.7

Since the beginning of Phase IV of Act 129 on June 1, 2021, the four FirstEnergy PA EDCs reported and verified gross electric energy savings and gross peak demand savings are shown in Table 3 below.

Table 3: Gross Reported and Verified Electric and Demand Savings since the beginning of Phase IV of Act 129

EDC	RTD MWh	RTD MW	VTD MWh	VTD MW
Met-Ed	135,858	21.8	132,211	20.89
Penelec	106,449	20.2	108,366	19.27
Penn Power	36,155	6.5	34,218	5.65
West Penn Power	123,806	21.2	123,808	18.57

Achievements toward Phase IV Energy Savings compliance, including carryover savings from Phase III, are shown in Table 4 below for the four PA EDCs.

Table 4: Phase IV Electric Savings including Phase III Carryover

EDC	VTD +CO MWh	MWh Compliance Target	Percent of Energy Target to Date	VTD MW	MW Compliance Target	Percent of Demand Target to Date
Met-Ed	279,514	463,215	60%	20.9	76	27%
Penelec	238,391	437,676	54%	19.3	80	24%
Penn Power	100,796	128,909	78%	5.7	20	28%
West Penn Power	292,288	504,951	58%	18.6	86	22%

Figure 3 and Figure 4 summarize progress towards the Phase IV MWh and MW portfolio compliance targets, respectively, for each of the four EDCs.

Figure 3: EE&C Plan Performance toward Phase IV Portfolio Compliance Target

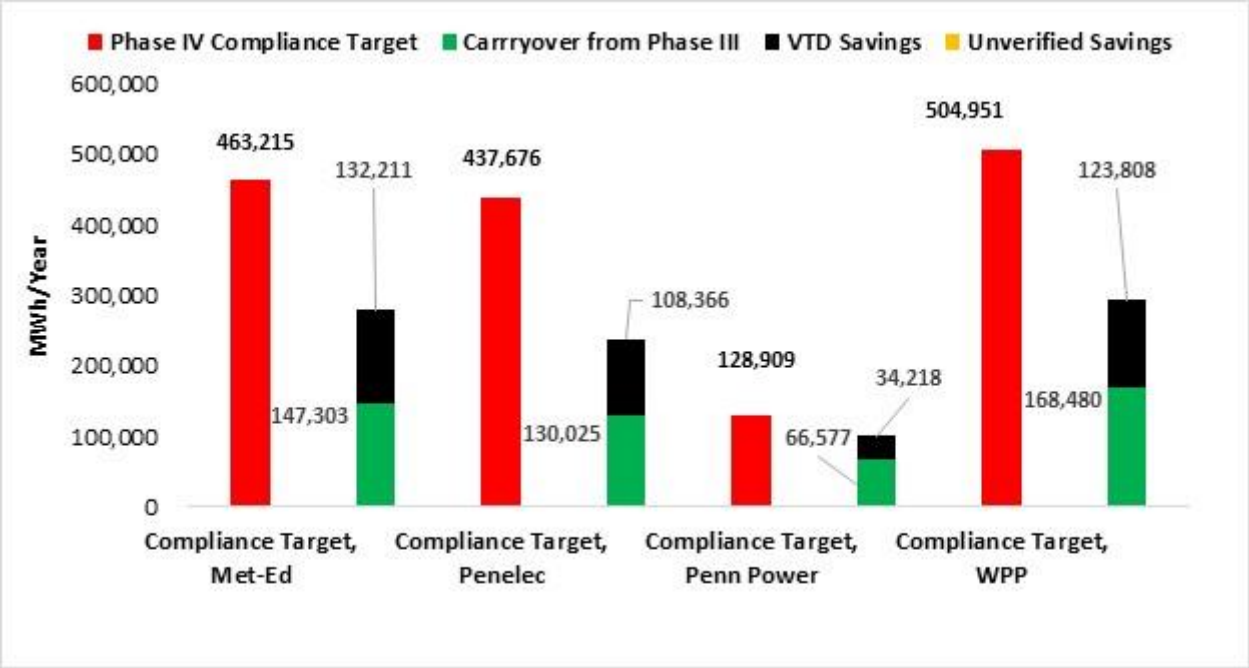
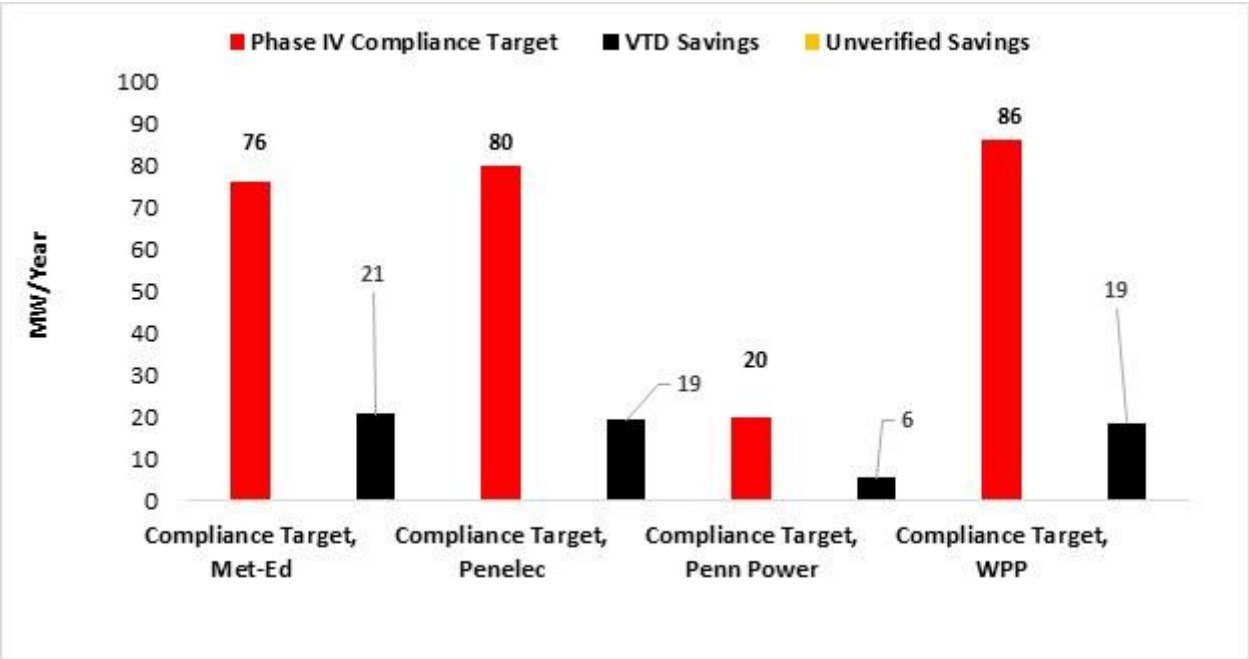


Figure 4: EE&C Plan Performance toward Phase IV Portfolio Compliance Target



2.2.1 Phase IV Prescription of Low-Income Measures and Carve-Out

The Phase IV Implementation Order directed EDCs to offer conservation measures to the low-income customer segment based on the proportion of electric sales attributable to low-income households. The proportionate number of measures targets for the EDCs are listed in the second column of Table 5. The total number of EE&C measures offered by each EDC to its residential and non-residential customer classes are shown in the third column. The fourth column shows the number of measures available to the low-income customer segment at no cost to the customer. The last column shows the percentages of total measures offered in the EE&C plan. These percentages exceed the proportionate number of measures targets for each EDC.

Table 5: Proportion of Measures Offered to Low-Income Customers

EDC	% Proportionate Number of Measures Target	Total Measures Offered	Number of Measures Available at No Cost	% Measures Offered
Met-Ed	9%	171	30	18%
Penelec	10%	171	30	18%
Penn Power	11%	171	30	18%
West Penn Power	9%	171	30	18%

The PA PUC also established a low-income energy savings target of 5.8% of the portfolio savings goal. The second column of Table 6 shows the low-income savings targets, based on verified gross savings, for each EDC. The third column of the table shows the verified low-income impacts, inclusive of Phase III carryover. The percentages of the Phase IV low-income energy savings targets achieved to date are shown in the last column of the table.

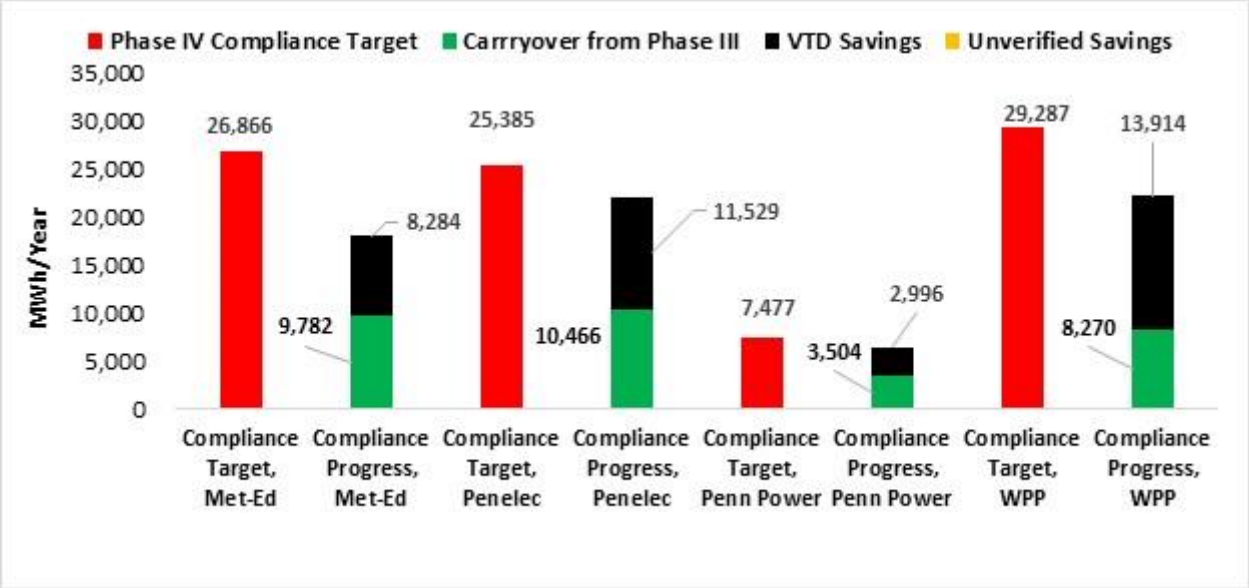
Table 6: Low-Income Program Energy Savings and Targets[4]

EDC	Compliance Target	LI VTD +CO MWh	Percent of Target to Date
Met-Ed	26,866	18,066	67%
Penelec	25,385	21,994	87%
Penn Power	7,477	6,500	87%
West Penn Power	29,287	22,184	76%

Figure 5 compares the VTD performance for the low-income customer segment to the Phase IV savings target.

[4] The sum of the LI VTD + CO in this table may differ by ±1 MWh from the sum of the VTD and CO reported in Figure 2 due to rounding. The values in Table 6 result from adding unrounded elements, and then rounding to the nearest MWh.

Figure 5: EE&C Plan Performance toward Phase IV Low-Income Compliance Target



2.2.2 Phase IV Performance, Multifamily Housing

The first and second column of Table 7 respectively show verified gross electric energy savings (PYVTD) in the multifamily sector and for low-income customers within that sector. based on verified gross savings, for each EDC. The third and fourth columns of the table show Phase IV verified gross electric energy savings (VTD) in the multifamily sector and for low-income customers within that sector.

Table 7: Energy Savings in the Multifamily Sector

EDC	PYVTD MF MWh	PYVTD MF LI MWh	VTD MF MWh	VTD MF LI MWh
Met-Ed	368	290	922	458
Penelec	633	589	1,324	1,256
Penn Power	50	50	174	174
West Penn Power	703	634	2,055	1,985

2.3 Phase IV Performance by Customer Segment

Table 8 presents the participation[5], savings, and spending by customer sector for PY14. The residential, small C&I, and large C&I sectors are defined by EDC tariff and the residential low-income and governmental/educational/non-profit sector were defined by statute (66 Pa. C.S. §

[5] The definition of participant is discussed in Section 2.4 below.

2806.1). The residential low-income segment is a subset of the residential customer class and the GNI segment will include customers who are part of the Small C&I or Large C&I rate classes. The savings, spending, and participation values for the LI and GNI segments have been removed from the parent sectors in Table 8.

Table 8: Program Year 14 Summary Statistics by Customer Segment

EDC	Parameter	Residential (Non-LI)	Low Income	Small C&I (Non-GNI)	Large C&I (Non-GNI)	GNI	Total
Met-Ed	# participants	161,702	32,437	641	189	25	194,994
	PYVTD MWh/yr	27,941	4,348	17,447	35,559	461	85,756
	PYVTD MW/yr	5.18	0.79	3.09	4.65	0.08	13.79
	Incentives ($1000)	$4,810	$1,497	$2,808	$1,215	$61	$10,391
Penelec	# participants	154,682	20,534	1,033	138	21	176,408
	PYVTD MWh/yr	27,536	4,646	20,893	18,906	364	72,345
	PYVTD MW/yr	4.79	0.64	3.93	2.92	0.06	12.33
	Incentives ($1000)	$3,547	$1,685	$4,134	$691	$56	$10,113
Penn Power	# participants	48,804	7,084	205	34	14	56,141
	PYVTD MWh/yr	9,488	1,160	4,909	1,673	1,054	18,284
	PYVTD MW/yr	1.87	0.22	0.97	0.29	0.19	3.55
	Incentives ($1000)	$1,457	$524	$1,255	$120	$147	$3,503
West Penn Power	# participants	172,254	22,741	1,047	174	14	196,230
	PYVTD MWh/yr	26,300	6,314	26,605	20,152	799	80,171
	PYVTD MW/yr	4.70	0.91	4.29	2.68	0.14	12.71
	Incentives ($1000)	$4,182	$2,198	$4,064	$1,071	$139	$11,653

Table 9 summarizes plan performance by sector since the beginning of Phase IV.

Table 9: Phase IV Summary Statistics by Customer Segment

EDC	Parameter	Residential (Non-LI)	Low Income	Small C&I (Non-GNI)	Large C&I (Non-GNI)	GNI	Total
Met-Ed	# participants	237,999	43,594	778	204	47	282,622
	VTD MWh/yr	47,910	8,110	22,048	52,657	1,486	132,211
	VTD MW	8.5	1.3	4	7	0	20.9
	Incentives ($1000)	8,281	2,485	3,167	1,833	288	16,055
Penelec	# participants	215,560	38,376	1,191	151	30	255,308
	VTD MWh/yr	42,174	10,588	34,097	20,788	720	108,366
	VTD MW	7.0	1.3	8	3	0	19.3
	Incentives ($1000)	5,688	3,189	5,388	863	90	15,217
Penn Power	# participants	69,606	11,491	260	41	21	81,419
	VTD MWh/yr	15,203	2,877	5,994	8,939	1,206	34,218
	VTD MW	2.8	0.4	1	1	0	5.7
	Incentives ($1000)	2,411	935	1,490	577	155	5,569
West Penn Power	# participants	248,954	35,441	1,218	186	17	285,816
	VTD MWh/yr	45,946	12,131	33,467	31,395	869	123,808
	VTD MW	7.7	1.5	5	4	0	18.6
	Incentives ($1000)	7,302	3,242	5,765	1,729	152	18,189

2.4 SUMMARY OF PARTICIPATION BY PROGRAM

Participation is defined differently for certain programs depending on the program delivery channel and data tracking practices. The nuances of the participant definition vary by program and are summarized by program in the bullets below. Table 10 provides the current participation totals for PY14 and Phase IV.

- For the Appliance Recycling components of the Energy Efficient Products, Low-Income Energy Efficiency Program, and Energy Solutions for Business – Small Program, participation is the count of rebate applications, which corresponds to appliance pick-up events. If a homeowner recycles two refrigerators on one occasion, that counts as one participant.
- For the Home Energy Reports and Online Audit components of the Energy Efficient Homes and Low-Income Energy Efficiency Programs, the number of participants is taken as the maximum number of participants in the treatment group during the year. This definition of participant is selected because it aligns with the gross impact evaluation protocol for Home Energy Reports.
- For the Conservation Kits components of the Energy Efficient Homes Program and Low-Income Energy Efficiency Programs, the participant counts are equal to the overall count of kits distributed by each program. In nearly all cases, one kit is sent to a household.
- For the Residential New Construction components of the Energy Efficient Homes Program and Low-Income Energy Efficiency Programs, the participant count is equal to the number of houses (or in the case of multifamily housing, the number of dwelling units).

- For the Direct Install component of the Energy Efficient Homes Program, the participant count is equal to the number of rebate homes treated in the program.
- For Midstream Appliances component of the Energy Efficient Products Program, the participant count is equal to the appliances sold.
- For the Upstream Electronics component of the Energy Efficient Products Program, the participant count is equal to the number of electronics equipment sold.
- For the HVAC component of the Energy Efficient Products Program, the participant count is equal to the sum of HVAC units and HVAC tune-ups rebated by the program. If a customer purchases multiple HVAC units or tune-ups, then the customer counts as two participants. The majority of rebate applications, however, are for a single HVAC system or service.
- For the Appliances components of the Energy Efficient Products Program and the Low-Income Energy Efficiency Program, the participant count is equal to the sum of rebate applications. If a customer purchases multiple appliances and submits one application for them all, then the customer counts as one participant. If a customer submits multiple rebate applications, then they count as multiple participants.
- For the Direct Install component of the Low-Income Energy Efficiency Program, the participant count is equal to the number of homes treated in the program.
- For the downstream and midstream rebates in all nonresidential energy efficiency programs, the participant count is equal to the number of unique account numbers associated with rebate applications for the program year.

Table 10: EE&C Portfolio Participation by Program

Utility	Program	PY14 Participation	P4TD Participation
Met-Ed	Energy Efficient Homes	130,469	185,924
	Energy Efficient Products	31,233	52,075
	Low Income Energy Efficiency	32,437	43,594
	C&I Energy Solutions for Business - Small	656	813
	C&I Energy Solutions for Business - Large	199	216
	Portfolio Total	**194,994**	**282,622**
Penelec	Energy Efficient Homes	126,524	170,938
	Energy Efficient Products	28,158	44,622
	Low Income Energy Efficiency	20,534	38,376
	C&I Energy Solutions for Business - Small	1,053	1,219
	C&I Energy Solutions for Business - Large	139	153
	Portfolio Total	**176,408**	**255,308**
Penn Power	Energy Efficient Homes	37,975	51,569
	Energy Efficient Products	10,829	18,037
	Low Income Energy Efficiency	7,084	11,491
	C&I Energy Solutions for Business - Small	214	275
	C&I Energy Solutions for Business - Large	39	47
	Portfolio Total	**56,141**	**81,419**
West Penn Power	Energy Efficient Homes	142,303	201,027
	Energy Efficient Products	29,951	47,927
	Low Income Energy Efficiency	22,741	35,441
	C&I Energy Solutions for Business - Small	1,059	1,233
	C&I Energy Solutions for Business - Large	176	188
	Portfolio Total	**196,230**	**285,816**

2.5 Summary of Impact Evaluation Results

During PY14 the ADM team completed gross impact evaluations for all the energy efficiency programs in the portfolio, and net impact evaluation for the New Homes, C&I Energy Management and New Construction (EMNC), C&I Prescriptive, and C&I Custom initiatives. Table 11 and Table 12 summarize the realization rates and net-to-gross ratios by program. Initiative-level evaluation detail is available in the Appendices to this report. Note that net-to-gross studies for most initiatives are scheduled for subsequent program years. The net-to-gross ratios shown in the tables, other than for the initiatives evaluated for net-to-gross in PY14 and PY13 (Appliance Recycling), derive from comparable programs and initiatives offered by the Companies in Phase III of Act 129.

Table 11: Impact Evaluation Results Summary for Met-Ed and Penelec

Program/ Initiative	Parent Program	Met-Ed			Penelec		
		Energy Realization Rate	Demand Realization Rate	Net to Gross Ratio	Energy Realization Rate	Demand Realization Rate	Net to Gross Ratio
EE Kits	Energy Efficient Homes	71.3%	77.6%	82.0%	109.9%	114.3%	83.5%
Home Energy Reports	Energy Efficient Homes	102.6%	138.7%	100.0%	95.9%	82.3%	100.0%
Direct Install	Energy Efficient Homes	109.2%	73.6%	95.0%	114.5%	71.3%	103.0%
New Homes	Energy Efficient Homes	102.3%	69.3%	72.0%	100.2%	43.4%	72.0%
Multifamily	Energy Efficient Homes	109.4%	84.3%	81.0%	120.7%	97.1%	84.0%
Online Audits	Energy Efficient Homes	62.2%	106.2%	100.0%	23.4%	34.1%	100.0%
Appliance Recycling	Energy Efficient Products	116.4%	112.7%	39.0%	105.8%	101.5%	65.0%
Upstream Electronics	Energy Efficient Products	0.0%	0.0%	58.3%	0.0%	0.0%	58.3%
HVAC	Energy Efficient Products	135.2%	113.1%	50.7%	96.7%	145.3%	52.3%
Appliances	Energy Efficient Products	116.5%	118.5%	67.0%	101.2%	103.0%	48.0%
Midstream Appliances	Energy Efficient Products	104.6%	93.6%	47.2%	102.2%	95.8%	53.1%
Appliances	Low Income Program	116.5%	118.5%	100.0%	101.2%	103.0%	100.0%
Appliance Turn-In	Low Income Program	121.5%	122.2%	100.0%	112.9%	98.4%	100.0%
Direct Install	Low Income Program	101.4%	101.8%	100.0%	99.1%	98.9%	100.0%
Home Energy Reports	Low Income Program	136.6%	998.2%	100.0%	381.9%	105.4%	100.0%
Kits	Low Income Program	97.2%	103.1%	100.0%	106.1%	108.8%	100.0%
New Homes	Low Income Program	102.3%	69.3%	100.0%	100.2%	43.4%	100.0%
Online Audits	Low Income Program	372.1%	574.1%	100.0%	319.0%	427.3%	100.0%
CI Prescriptive	C&I Solutions for Business Programs - Small and Large	102.5%	100.0%	69.4%	105.7%	96.3%	66.0%
CI Custom	C&I Solutions for Business Programs - Small and Large	102.8%	100.2%	57.1%	101.4%	101.8%	52.1%
CI EMNC	C&I Solutions for Business Programs - Small and Large	97.6%	97.0%	97.8%	85.0%	71.6%	83.8%
CI Multifamily	C&I Solutions for Business Program - Small	91.6%	92.3%	100.0%	90.2%	90.2%	100.0%
Appliance Recycling	C&I Solutions for Business Program - Small	116.4%	112.7%	39.0%	105.8%	101.5%	65.0%

Table 12: Impact Evaluation Results Summary for Penn Power and WPP

Program/ Initiative	Parent Program	Penn Power			West Penn Power		
		Energy Realization Rate	Demand Realization Rate	Net to Gross Ratio	Energy Realization Rate	Demand Realization Rate	Net to Gross Ratio
EE Kits	Energy Efficient Homes	95.9%	91.4%	84.0%	89.1%	92.1%	110.6%
Home Energy Reports	Energy Efficient Homes	110.1%	128.3%	100.0%	90.9%	71.8%	100.0%
Direct Install	Energy Efficient Homes	109.7%	77.9%	100.0%	111.8%	83.8%	104.0%
New Homes	Energy Efficient Homes	102.0%	59.8%	72.0%	105.1%	60.0%	72.0%
Multifamily	Energy Efficient Homes	0.0%	0.0%	81.0%	111.6%	83.9%	80.0%
Online Audits	Energy Efficient Homes	36.9%	58.4%	100.0%	43.9%	71.9%	100.0%
Appliance Recycling	Energy Efficient Products	103.6%	102.3%	38.0%	106.2%	105.8%	70.0%
Upstream Electronics	Energy Efficient Products	0.0%	0.0%	58.3%	0.0%	0.0%	58.3%
HVAC	Energy Efficient Products	142.6%	130.7%	54.8%	134.4%	102.1%	52.0%
Appliances	Energy Efficient Products	109.6%	113.8%	50.8%	108.3%	109.0%	50.6%
Midstream Appliances	Energy Efficient Products	102.8%	97.6%	44.0%	102.6%	97.1%	50.8%
Appliances	Low Income Program	109.6%	113.8%	100.0%	108.3%	109.0%	100.0%
Appliance Turn-In	Low Income Program	110.6%	103.2%	100.0%	122.5%	114.5%	100.0%
Direct Install	Low Income Program	102.1%	102.4%	100.0%	100.2%	100.5%	100.0%
Home Energy Reports	Low Income Program	52.5%	139.0%	100.0%	96.3%	119.2%	100.0%
Kits	Low Income Program	95.9%	91.4%	100.0%	89.1%	92.1%	100.0%
New Homes	Low Income Program	102.0%	59.8%	100.0%	105.1%	60.0%	100.0%
Online Audits	Low Income Program	344.5%	543.1%	100.0%	343.4%	496.8%	100.0%
CI Prescriptive	C&I Solutions for Business Programs - Small and Large	85.2%	72.3%	82.8%	111.8%	89.1%	65.9%
CI Custom	C&I Solutions for Business Programs - Small and Large	101.4%	97.9%	100.0%	92.3%	87.3%	49.1%
CI EMNC	C&I Solutions for Business Programs - Small and Large	90.6%	88.0%	97.3%	89.1%	88.6%	110.0%
CI Multifamily	C&I Solutions for Business Program - Small	100.0%	100.0%	100.0%	81.5%	60.2%	100.0%
Appliance Recycling	C&I Solutions for Business Program - Small	103.6%	102.3%	38.0%	106.2%	105.8%	70.0%

2.6 Summary of Energy Impacts by Program

Act 129 compliance targets are based on annualized savings estimates (MWh/year). Each program year, the annual savings achieved by EE&C program activity are recorded as incremental annual, or “first-year”, savings and added to an EDC’s progress toward compliance. Incremental annual savings estimates are presented in Section 2.6.1. Lifetime energy savings incorporate the Effective Useful Life (EUL) of installed measures and estimate the total energy savings associated with EE&C program activity. Lifetime savings are used in the TRC test, by program participants when assessing the economics of upgrades, and by the SWE when calculating the emissions benefits of Act 129 programs. Section 2.6.2 presents the lifetime energy savings by program.

2.6.1 Incremental Annual Energy Savings by Program

Table 13, Table 14, Table 15, and Table 16 present a summary of the Program Year 14 and Phase IV to date energy savings by program for Met-Ed, Penelec, Penn Power, and WPP respectively. The energy impacts in this report are presented at the meter level and do not

reflect adjustments for transmission and distribution losses, while the demand impacts do reflect those losses. The verified gross savings are adjusted by the energy recent realization rate and the verified net savings are adjusted by both the realization rate and the net-to-gross ratio.

Table 13: Incremental Annual Energy Savings by Program - Met-Ed

Program	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	19,048	15,153	12,882	33,053	25,419	21,367
Energy Efficient Products	11,331	12,788	5,925	20,629	22,491	10,177
Low Income Program	4,009	4,348	4,348	8,069	8,110	8,110
C&I Solutions for Business Program - Small	17,544	17,805	13,348	22,787	23,368	16,838
C&I Solutions for Business Program - Large	34,740	35,662	21,883	51,319	52,824	31,514
Portfolio Total	**86,671**	**85,756**	**58,386**	**135,858**	**132,211**	**88,006**

Table 14: Incremental Annual Energy Savings by Program - Penelec

Program	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	18,700	19,408	17,004	27,107	26,982	23,340
Energy Efficient Products	7,887	8,128	4,681	14,370	15,192	8,851
Low Income Program	3,876	4,646	4,646	9,796	10,588	10,588
C&I Solutions for Business Program - Small	21,200	21,243	14,911	35,029	34,649	26,521
C&I Solutions for Business Program - Large	17,999	18,920	12,510	20,148	20,956	14,102
Portfolio Total	**69,661**	**72,345**	**53,752**	**106,449**	**108,366**	**83,402**

Table 15: Incremental Annual Energy Savings by Program – Penn Power

Program	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	6,279	6,169	5,282	10,192	9,304	7,939
Energy Efficient Products	3,128	3,319	1,441	5,677	5,899	2,552
Low Income Program	1,387	1,160	1,160	3,125	2,877	2,877
C&I Solutions for Business Program - Small	6,089	5,366	4,834	7,239	6,528	5,785
C&I Solutions for Business Program - Large	2,629	2,271	1,953	9,922	9,611	6,662
Portfolio Total	**19,512**	**18,284**	**14,670**	**36,155**	**34,218**	**25,814**

Table 16: Incremental Annual Energy Savings by Program - WPP

Program	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	17,244	15,509	16,019	31,929	26,885	27,811
Energy Efficient Products	9,994	10,791	6,463	17,788	19,061	11,538
Low Income Program	5,802	6,314	6,314	11,199	12,131	12,131
C&I Solutions for Business Program - Small	26,034	27,313	20,828	33,302	34,246	25,786
C&I Solutions for Business Program - Large	18,394	20,243	13,397	29,588	31,486	20,223
Portfolio Total	**77,468**	**80,171**	**63,022**	**123,806**	**123,808**	**97,488**

The previously reported VTD savings from prior years have not changed.

2.6.2 Lifetime Energy Savings by Program

Table 17, Table 18, Table 19, and Table 20 present the PYTD and P4TD lifetime energy savings by program for Met-Ed, Penelec, Penn Power, and WPP respectively. Lifetime savings are calculated by using expected useful lives (EULs) listed in the PA TRM for each measure, subject to a 15-year cap. For commercial and industrial projects, the measure lives are first determined for each sampled project during gross impact evaluation. The measure lives are then weighted by sampling initiative and EDC as the ratio between verified lifetime energy savings and program-year verified savings. This step is conducted in part because measure lives, as determined post-verification, may differ from ex-ante measure lives in the tracking database[6], and in part to maintain consistency between verified impacts, measure lives, and incremental costs for all sampled projects. For cases that involve early replacement, the measure life is adjusted to replicate the effect of a dual-baseline benefits stream. This involves calculating a discounted lifetime savings for the measure with the first period corresponding to the remaining useful life (RUL) of the supplanted equipment (taken to be 1/3 of the measure life) and using the supplanted equipment as the baseline, and with the second period using the prevailing code or standard at the end of the RUL as the baseline. The adjustment factor for measure life is the ratio of the discounted lifetime savings with the dual-baseline approach compared to the discounted lifetime savings as calculated by using the first-year savings for the duration of the nominal measure life.

Table 17: Lifetime Energy Savings by Program for Met-Ed

Program	PYVTD Gross Lifetime (MWh)	PYVTD Net Lifetime (MWh)	VTD Gross Lifetime (MWh)	VTD Net Lifetime (MWh)
Energy Efficient Homes	161,454	131,179	285,480	230,271
Energy Efficient Products	115,006	55,526	195,472	92,288
Low Income Energy Efficiency	38,582	38,582	74,285	74,285
C&I Energy Solutions for Business - Small	254,096	189,656	334,045	239,890
C&I Energy Solutions for Business - Large	531,705	325,961	780,650	465,835
Portfolio Total	**1,100,843**	**740,904**	**1,669,932**	**1,102,569**

[6] For example, a project may consist of various measures with different lifetimes can have different realization rates by measure.

Table 18: Lifetime Energy Savings by Program for Penelec

Program	PYVTD Gross Lifetime (MWh)	PYVTD Net Lifetime (MWh)	VTD Gross Lifetime (MWh)	VTD Net Lifetime (MWh)
Energy Efficient Homes	199,715	168,414	295,690	248,284
Energy Efficient Products	71,820	39,678	129,927	72,566
Low Income Energy Efficiency	40,207	40,207	95,948	95,948
C&I Energy Solutions for Business - Small	307,867	214,393	500,606	381,302
C&I Energy Solutions for Business - Large	273,738	180,902	304,003	204,588
Portfolio Total	**893,347**	**643,595**	**1,326,173**	**1,002,688**

Table 19: Lifetime Energy Savings by Program for Penn Power

Program	PYVTD Gross Lifetime (MWh)	PYVTD Net Lifetime (MWh)	VTD Gross Lifetime (MWh)	VTD Net Lifetime (MWh)
Energy Efficient Homes	67,940	55,838	103,099	84,402
Energy Efficient Products	30,431	13,684	53,455	23,960
Low Income Energy Efficiency	8,810	8,810	25,703	25,703
C&I Energy Solutions for Business - Small	76,556	68,892	93,302	82,618
C&I Energy Solutions for Business - Large	33,020	28,328	142,647	98,669
Portfolio Total	**216,757**	**175,553**	**418,207**	**315,352**

Table 20: Lifetime Energy Savings by Program for WPP

Program	PYVTD Gross Lifetime (MWh)	PYVTD Net Lifetime (MWh)	VTD Gross Lifetime (MWh)	VTD Net Lifetime (MWh)
Energy Efficient Homes	178,559	183,866	306,288	316,366
Energy Efficient Products	91,341	51,187	159,319	90,353
Low Income Energy Efficiency	58,165	58,165	105,771	105,771
C&I Energy Solutions for Business - Small	397,837	300,572	496,691	370,667
C&I Energy Solutions for Business - Large	297,255	196,512	463,386	297,335
Portfolio Total	**1,023,157**	**790,302**	**1,531,455**	**1,180,492**

The previously reported VTD lifetime savings from prior years have not changed.

2.7 Summary of Demand Impacts by Program

Act 129 defines peak demand savings from energy efficiency as the average expected reduction in electric demand from 2:00 p.m. to 6:00 p.m. EDT on non-holiday weekdays from June through August. The peak demand impacts from energy efficiency in this report are presented at the system level, meaning they have been adjusted to account for transmission and distribution losses. Table 21 lists the line loss multipliers by EDC and by sector.

Table 21: Line Loss Multipliers by EDC and Customer Sector

Sector	Met-Ed	Penelec	Penn Power	WPP
Residential	1.0945	1.0945	1.0949	1.0943
Small C&I	1.0720	1.0720	1.0545	1.0790
Large C&I	1.0720	1.0720	1.0545	1.0790

Summaries of the peak demand impacts by energy efficiency program through the current reporting period are presented in Table 22, Table 23, Table 24, and Table 25 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 22: Peak Demand Savings by Energy Efficiency Program for Met-Ed

Program	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	2.74	2.33	1.98	4.92	3.65	3.01
Energy Efficient Products	2.72	2.85	1.28	4.66	4.84	2.14
Low Income Energy Efficiency	0.56	0.79	0.79	1.09	1.29	1.29
C&I Energy Solutions for Business - Small	3.18	3.16	2.35	4.13	4.10	2.94
C&I Energy Solutions for Business - Large	4.66	4.66	2.92	6.98	7.02	4.26
Portfolio Total	**13.85**	**13.79**	**9.32**	**21.79**	**20.89**	**13.64**

Table 23: Peak Demand Savings by Energy Efficiency Program for Penelec

Program	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	2.84	2.67	2.42	3.71	3.48	3.08
Energy Efficient Products	2.11	2.11	1.23	3.48	3.56	2.09
Low Income Energy Efficiency	0.59	0.64	0.64	1.33	1.28	1.28
C&I Energy Solutions for Business - Small	4.35	3.99	2.75	8.21	7.72	6.02
C&I Energy Solutions for Business - Large	3.05	2.92	1.93	3.42	3.23	2.18
Portfolio Total	**12.95**	**12.33**	**8.97**	**20.15**	**19.27**	**14.65**

Table 24: Peak Demand Savings by Energy Efficiency Program for Penn Power

Program	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	1.24	1.10	0.97	2.00	1.51	1.29
Energy Efficient Products	0.75	0.77	0.33	1.27	1.30	0.56
Low Income Energy Efficiency	0.18	0.22	0.22	0.42	0.40	0.40
C&I Energy Solutions for Business - Small	1.31	1.05	0.95	1.48	1.20	1.07
C&I Energy Solutions for Business - Large	0.53	0.41	0.35	1.37	1.24	0.90
Portfolio Total	**4.02**	**3.55**	**2.82**	**6.55**	**5.65**	**4.21**

Table 25: Peak Demand Savings by Energy Efficiency Program for WPP

Program	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	2.65	2.10	2.09	4.92	3.46	3.45
Energy Efficient Products	2.53	2.60	1.59	4.13	4.21	2.58
Low Income Energy Efficiency	0.80	0.91	0.91	1.61	1.50	1.50
C&I Energy Solutions for Business - Small	4.99	4.42	3.30	6.22	5.49	4.06
C&I Energy Solutions for Business - Large	3.02	2.69	1.80	4.33	3.92	2.55
Portfolio Total	**14.00**	**12.71**	**9.70**	**21.20**	**18.57**	**14.15**

The previously reported VTD savings from prior years, for the following programs, have changed since the PY13 final annual report was submitted:

- Energy Efficient Homes Program – SWE audit activities recommended an adjustment of 0.07, 0.06, 0.01, and 0.09 MW/year for Met-Ed, Penelec, Penn Power, and West Penn Power respectively to the PY13 gross verified savings to correct for misapplied line loss values. Adjustments for net impacts were 0.05, 0.05, 0.01, and 0.09 for Met-Ed, Penelec, Penn Power, and West Penn Power respectively.
- Energy Efficient Homes Program – SWE audit activities recommended an adjustment of 0.01, 0.00, 0.00, and 0.01 MW/year for Met-Ed, Penelec, Penn Power, and West Penn Power respectively to the PY13 gross verified savings to correct for misapplied line loss values. Adjustments for net impacts were 0.00, 0.00, 0.00, and 0.00 MW for Met-Ed, Penelec, Penn Power, and West Penn Power respectively.
- Low Income Energy Efficiency Program – SWE audit activities recommended an adjustment of 0.02, 0.03, 0.01, and 0.03 MW/year for Met-Ed, Penelec, Penn Power, and West Penn Power respectively to the PY13 gross verified savings to correct for misapplied line loss values. Adjustments for net impacts were 0.02, 0.03, 0.01, and 0.03 MW for Met-Ed, Penelec, Penn Power, and West Penn Power respectively.

2.7.1 Peak Demand Savings Nominated to PJM Forward Capacity Market (FCM)

Table 26, Table 27, Table 28, and Table 29 summarize the potential PJM Phase IV peak demand savings by Act 129 program year and PJM delivery year for Met-Ed, Penelec, Penn Power, and West Penn Power. All values shown below represent installed capacity as defined in PJM Manual 18. Note that the only PY14 contributions reflected below are those that have been verified in time for the 2023/24 Post-Install report, which was due in early May 2023. The PY15 Annual Report will contain the full PJM contribution from PY14.

Table 26: Met-Ed Potential FCM Nominations by PY & PJM Delivery Year

Act 129 Program Year	Estimated MW Acquisition for FCM	DY 23/24 MW Range	DY 24/25 MW Range	DY 25/26 MW Range	DY 26/27 MW Range	DY 27/28 MW Range	DY 28/29 MW Range	DY 29/30 MW Range
PY13	3.8	3.8	3.6 to 4	3.6 to 4				
PY14	2.5	2.5	2.4 to 4.2	2.4 to 4.2	2.4 to 4.2			
PY15	2.4 to 4.2		2.4 to 4.2	2.4 to 4.2	2.4 to 4.2	2.4 to 4.2		
PY16	2.4 to 4.2			2.4 to 4.2	2.4 to 4.2	2.4 to 4.2	2.4 to 4.2	
PY17	2.4 to 4.2				2.4 to 4.2	2.4 to 4.2	2.4 to 4.2	2.4 to 4.2
Phase IV Total	**12.0 to 21.0**	**6.3**	**7.2 to 12.6**	**9.6 to 16.8**	**9.6 to 16.8**	**7.2 to 12.6**	**4.8 to 8.4**	**2.4 to 4.2**

Table 27: Penelec Potential FCM Nominations by PY & PJM Delivery Year

Act 129 Program Year	Estimated MW Acquisition for FCM	DY 23/24 MW Range	DY 24/25 MW Range	DY 25/26 MW Range	DY 26/27 MW Range	DY 27/28 MW Range	DY 28/29 MW Range	DY 29/30 MW Range
PY13	2.5	2.5	2.3 to 2.6	2.3 to 2.6				
PY14	1.8	1.8	2.8 to 4.2	2.8 to 4.2	2.8 to 4.2			
PY15	2.8 to 4.2		2.8 to 4.2	2.8 to 4.2	2.8 to 4.2	2.8 to 4.2		
PY16	2.8 to 4.2			2.8 to 4.2	2.8 to 4.2	2.8 to 4.2	2.8 to 4.2	
PY17	2.8 to 4.2				2.8 to 4.2	2.8 to 4.2	2.8 to 4.2	2.8 to 4.2
Phase IV Total	**14.0 to 21.0**	**4.2**	**8.4 to 12.6**	**12.0 to 18.0**	**12.0 to 18.0**	**8.4 to 12.6**	**5.6 to 8.4**	**2.8 to 4.2**

Table 28: Penn Power Potential FCM Nominations by PY & PJM Delivery Year

Act 129 Program Year	Estimated MW Acquisition for FCM	DY 23/24 MW Range	DY 24/25 MW Range	DY 25/26 MW Range	DY 26/27 MW Range	DY 27/28 MW Range	DY 28/29 MW Range	DY 29/30 MW Range
PY13	0.8	0.8	0.7 to 0.8	0.7 to 0.8				
PY14	0.4	0.4	0.8 to 1.2	0.8 to 1.2	0.8 to 1.2			
PY15	0.8 to 1.2		0.8 to 1.2	0.8 to 1.2	0.8 to 1.2	0.8 to 1.2		
PY16	0.8 to 1.2			0.8 to 1.2	0.8 to 1.2	0.8 to 1.2	0.8 to 1.2	
PY17	0.8 to 1.2				0.8 to 1.2	0.8 to 1.2	0.8 to 1.2	0.8 to 1.2
Phase IV Total	**4.0 to 6.0**	**1.2**	**2.4 to 3.6**	**3.2 to 4.8**	**3.2 to 4.8**	**2.4 to 3.6**	**1.6 to 2.0**	**0.8 to 1.2**

Table 29: WPP Potential FCM Nominations by PY & PJM Delivery Year

Act 129 Program Year	Estimated MW Acquisition for FCM	DY 23/24 MW Range	DY 24/25 MW Range	DY 25/26 MW Range	DY 26/27 MW Range	DY 27/28 MW Range	DY 28/29 MW Range	DY 29/30 MW Range
PY13	3.3	3.3	3.2 to 3.5	3.2 to 3.5				
PY14	2.6	2.6	2.3 to 4.1	2.3 to 4.1	2.3 to 4.1			
PY15	2.3 to 4.1		2.3 to 4.1	2.3 to 4.1	2.3 to 4.1	2.3 to 4.1		
PY16	2.3 to 4.1			2.3 to 4.1	2.3 to 4.1	2.3 to 4.1	2.3 to 4.1	
PY17	2.3 to 4.1				2.3 to 4.1	2.3 to 4.1	2.3 to 4.1	2.3 to 4.1
Phase IV Total	**11.5 to 20.5**	**6**	**6.9 to 12.3**	**9.2 to 16.4**	**9.2 to 16.4**	**6.9 to 12.3**	**4.6 to 8.2**	**2.3 to 4.1**

The values in the tables above remain consistent with the original estimated ranges of the PJM Summer and Winter MW EE potential for each PJM delivery year as shown in Appendix C, Table C-3 based on the MWh savings as projected in the EE&C Plan, based on the following assumptions and modifications:

- Identified and removed energy savings of all measures not eligible for PJM including:
  - appliance recycling;
  - building lighting controls and occupancy sensors;
  - smart thermostats, energy management systems or smart homes;
  - behavioral and educational programs;
- Excluded some low-volume measures for which PJM-required M&V activities would likely cost more than the associated PJM revenues.
- The EDCs retain all Phase IV Plan program Capacity Rights to support their offered EE resources and to ensure no double counting of EE resources by third parties;
- Assigned an initial savings load shape to each PJM eligible EE measure; Estimated the potential kW savings values for each measure for the PJM defined Summer and Winter periods using the appropriate load shape curve; and
- Included T & D line losses to adjust retail kW values to wholesale kW values.

Offers associated with PY13 and PY14 reflect preliminary measurement and verification results from the DY 23/24 Post-Install Measurement and Verification report, although additional savings for PY14 will be verified and presented in the DY 24/25 report.

Actual EE offer values in future years may vary from the values provided above to reflect any anticipated performance variability from impacts such as COVID-19, supply chain issues, baseline changes from code changes as well as PJM capacity market rule changes.

Revenues from PJM's FCM will be used to offset cost recovery on a per customer class basis. PJM revenues will be treated as program cost reductions, and market participation costs or deficiency charges (if any), will be treated as program cost increases.

2.8 Summary of Fuel Switching Impacts

Act 129 allows EDCs to achieve electric savings by converting electric equipment to non-electric equipment. Table 30 summarizes for each EDC, key fuel switching metrics to date in Phase IV. Combined Heat and Power (CHP) and solar water heating are the only fuel switching measures

offered by the Companies in Phase IV. There was one rebate approved by Penelec for a CHP project in PY14.

Table 30: Phase IV to Date Fuel Switching Summary

	Met-Ed	Penelec	Penn Power	WPP
Fuel Switching Measures Offered	CHP, Solar Water Heaters			
Fuel Switching Measures Implemented in PY13	None	CHP	None	None
Fuel Switching Measures Implemented in Phase IV	None	CHP	None	None
PY14 Energy Savings Achieved via Fuel Switching (MWh/yr)	19,144	0	0	0
PY14 Increased Fossil Fuel Consumption Due to Fuel Switching Measures (MMBTU/yr)	114,366	0	0	0
PY14 Incentive Payments for Fuel Switching Measures ($1000)	670	0	0	0
VTD Energy Savings Achieved via Fuel Switching (MWh/yr)	19,144	2,878	0	0
P4TD Increased Fossil Fuel Consumption Due to Fuel Switching Measures (MMBTU/yr)	114,366	92,381	0	0
P4TD Incentive Payments for Fuel Switching Measures ($1000)	670	399	0	0

2.9 Summary of Cost-Effectiveness Results

A detailed breakdown of portfolio finances and cost-effectiveness is presented for Met-Ed, Penelec, Penn Power, and West Penn Power in Table 31, Table 32, Table 33, and Table 34. TRC benefits in these tables were calculated using gross verified impacts. Net present value (NPV) PY14 costs and benefits are expressed in 2022 dollars. Net present value costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 31: Summary of Program Finances – Met-Ed

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)	
1	**IMCs**	24,443		38,796	
2	Rebates to Participants and Trade Allies	5,489		7,827	
3	Upstream / Midstream Incentives	1,343		1,887	
4	Material Cost for Self-Install Programs (EE&C Kits)	2,551		4,351	
5	Direct Installation Program Materials and Labor	1,528		1,990	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	13,533		22,741	
		EDC	CSP	EDC	CSP
7	Program Design	0	14	4	35
8	Administration and Management	912	3,218	1,898	5,769
9	Marketing	51	525	84	1,049
10	Program Delivery	62	265	125	424
11	EDC Evaluation Costs	1,087		1,597	
12	SWE Audit Costs	253		495	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	6,387		11,481	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**30,831**		**50,277**	
15	Total NPV Lifetime Electric Energy Benefits	32,075		46,772	
16	Total NPV Lifetime Electric Capacity Benefits	16,801		24,792	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	-1,738		-1,211	
18	Total NPV Lifetime Fossil Fuel Impacts	-5,117		-5,146	
19	Total NPV Lifetime Water Impacts	4,348		7,181	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**46,369**		**72,388**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.50**		**1.44**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 32: Summary of Program Finances – Penelec

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)	
1	**IMCs**	19,233		28,125	
2	Rebates to Participants and Trade Allies	5,166		6,501	
3	Upstream / Midstream Incentives	896		1,248	
4	Material Cost for Self-Install Programs (EE&C Kits)	2,550		4,326	
5	Direct Installation Program Materials and Labor	2,008		3,142	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	8,614		12,908	
		EDC	CSP	EDC	CSP
7	Program Design	0	13	4	32
8	Administration and Management	860	2,827	1,805	5,254
9	Marketing	50	517	81	1,025
10	Program Delivery	56	192	114	332
11	EDC Evaluation Costs	1,009		1,469	
12	SWE Audit Costs	230		448	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	5,753		10,564	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**24,986**		**38,689**	
15	Total NPV Lifetime Electric Energy Benefits	26,290		37,361	
16	Total NPV Lifetime Electric Capacity Benefits	14,280		22,801	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	2,050		2,370	
18	Total NPV Lifetime Fossil Fuel Impacts	-860		-4,353	
19	Total NPV Lifetime Water Impacts	5,713		8,792	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**47,473**		**66,971**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.90**		**1.73**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 33: Summary of Program Finances – Penn Power

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)	
1	**IMCs**	7,077		16,921	
2	Rebates to Participants and Trade Allies	2,125		3,046	
3	Upstream / Midstream Incentives	303		474	
4	Material Cost for Self-Install Programs (EE&C Kits)	657		1,153	
5	Direct Installation Program Materials and Labor	593		897	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	3,399		11,352	
		EDC	CSP	EDC	CSP
7	Program Design	0	4	1	9
8	Administration and Management	313	1,038	638	1,939
9	Marketing	15	167	24	331
10	Program Delivery	21	84	42	160
11	EDC Evaluation Costs	302		434	
12	SWE Audit Costs	71		139	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	2,014		3,718	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**9,091**		**20,639**	
15	Total NPV Lifetime Electric Energy Benefits	6,771		12,450	
16	Total NPV Lifetime Electric Capacity Benefits	2,696		4,258	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	438		4,747	
18	Total NPV Lifetime Fossil Fuel Impacts	-149		-78	
19	Total NPV Lifetime Water Impacts	1,042		1,814	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**10,799**		**23,191**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.19**		**1.12**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 34: Summary of Program Finances – WPP

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)	
1	**IMCs**	22,263		34,498	
2	Rebates to Participants and Trade Allies	6,581		8,625	
3	Upstream / Midstream Incentives	838		1,179	
4	Material Cost for Self-Install Programs (EE&C Kits)	2,493		4,509	
5	Direct Installation Program Materials and Labor	2,323		3,875	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	10,027		16,309	
		EDC	CSP	EDC	CSP
7	Program Design	0	14	4	34
8	Administration and Management	884	3,608	1,865	6,266
9	Marketing	58	526	96	1,016
10	Program Delivery	55	269	113	440
11	EDC Evaluation Costs	1,056		1,534	
12	SWE Audit Costs	238		464	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	6,707		11,831	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**28,970**		**46,330**	
15	Total NPV Lifetime Electric Energy Benefits	31,633		45,462	
16	Total NPV Lifetime Electric Capacity Benefits	9,284		12,986	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	1,704		1,962	
18	Total NPV Lifetime Fossil Fuel Impacts	-1,311		-1,356	
19	Total NPV Lifetime Water Impacts	5,548		8,800	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**46,857**		**67,853**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.62**		**1.46**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

TRC benefit-cost ratios are calculated by comparing the total NPV TRC benefits and the total NPV TRC costs. It is important to note that TRC costs are materially different from the EDC spending and rate recovery tables presented later in the report. TRC costs include estimates of the full cost incurred by program participants to install efficient equipment, not just the portion covered by the EDC rebate. Appendix D shows the TRC ratios by program and for the portfolio.

2.10 Comparison of Performance to Approved EE&C Plan

Table 35 presents PY14 expenditures compared to the budget estimates set forth in the EE&C plan for PY13 and P4TD. PY14 values are presented in 2022 dollars and P4TD values are presented in 2021 dollars. Program-level comparisons of expenditures to plans are presented in Appendix D.

Table 35: Comparison of Expenditures to Phase IV EE&C Plan ($1,000)

EDC	Expenditures	Budget from EE&C Plan	Actual Expenditures	Ratio (Actual/Plan)
Met-Ed	PY14 Portfolio	$ 25,106.00	$ 17,297.70	0.69
Met-Ed	P4TD	$ 48,956.00	$ 28,359.17	0.58
Penelec	PY14 Portfolio	$ 23,209.00	$ 16,371.94	0.71
Penelec	P4TD	$ 45,227.00	$ 26,560.29	0.59
Penn Power	PY14 Portfolio	$ 6,716.00	$ 5,692.31	0.85
Penn Power	P4TD	$ 13,175.00	$ 9,558.14	0.73
West Penn Power	PY14 Portfolio	$ 23,585.00	$ 18,943.19	0.80
West Penn Power	P4TD	$ 46,751.00	$ 30,922.31	0.66

Table 36 and Table 37 compare PY14 and P4TD verified gross program savings and demand reductions compared to the energy savings projections set forth in the EE&C plan. Program-level comparisons of expenditures to plans are presented in Appendix D.

Table 36: Comparison of Actual Portfolio Savings to Plan Projections

EDC	Savings	EE&C Plan Projections	Gross MWh Savings	Ratio (Actual/Plan)
Met-Ed	PY14 Portfolio MWh	95,283	85,756	0.90
Met-Ed	P4TD MWh	181,518	132,211	0.73
Penelec	PY14 Portfolio MWh	91,345	72,345	0.79
Penelec	P4TD MWh	175,238	108,366	0.62
Penn Power	PY14 Portfolio MWh	26,558	18,284	0.69
Penn Power	P4TD MWh	50,849	34,218	0.67
West Penn Power	PY14 Portfolio MWh	95,569	80,171	0.84
West Penn Power	P4TD MWh	184,239	123,808	0.67

Table 37: Comparison of Actual Portfolio Demand Reductions to Plan Projections

EDC	Savings	EE&C Plan Projections	Gross MW Savings	Ratio (Actual/Plan)
Met-Ed	PY14 Portfolio MW	17.2	13.8	0.80
Met-Ed	P4TD MW	33.0	20.9	0.63
Penelec	PY14 Portfolio MW	16.6	12.3	0.74
Penelec	P4TD MW	32.0	19.3	0.60
Penn Power	PY14 Portfolio MW	5.1	3.5	0.70
Penn Power	P4TD MW	9.8	5.7	0.58
West Penn Power	PY14 Portfolio MW	18.1	12.7	0.70
West Penn Power	P4TD MW	35.0	18.6	0.53

PY13 included significant challenges related to program startup and launch. The Companies rolled out many new offerings and program elements and onboarded new ICSPs. The transition to new programs and ICSPs, though started as soon as plans and contracts were approved,

necessarily required more time than continuing with the same programs and ICSPs as Phase III. Ongoing supply chain and labor shortages persisted into PY14 and impeded program implementation rates. As a result, both savings and expenditures are lower than the EE&C plan projections. In PY14, residential-sector programs that have lower labor-to-energy savings ratios tended to meet or exceed EE&C plan projections, while labor-intensive programs – particularly C&I programs that depend on significant equipment retrofits, tended to fall short of EE&C projections. The Companies reiterate their concern about the combined effects of inflation, supply chain shortages, and labor shortages.

2.11 FINDINGS AND RECOMMENDATIONS

The impact and process evaluation activities completed by the ADM team led to recommendations for program improvement. Table 38 lists the overarching recommendations that affect more than one program, the evaluation activity(ies) that uncovered the finding, and the ADM team's recommendation(s) to the Companies to address the finding. All the overarching recommendations are intended to reduce noncompliance risks for Phase IV.

Table 38: Summary of Evaluation Recommendations

Evaluation Activity	Finding	Recommendation
General Evaluation	Several participant surveys suggested that there is no one primary way customers learned of EE&C programs.	Continue using a variety of outreach methods to increase customer awareness and encourage participation.
C/I Midstream Lighting	Most of the distributors that participate in the midstream lighting and appliances programs felt that the rebates helped to increase their sales, and they could get quick delivery on all the eligible equipment for the program. Moreover, gross impact evaluation found that the midstream lighting program had slightly higher demand to energy savings ratios than downstream lighting.	Consider expanding the midstream lighting program through increasing incentives and/or enrolling more distributors.
EE Kits Program	The PY14 evaluation again found lower in-service rates for "New Mover" kits than for "Opt-In" kits.	Consider expanding the opt-in kit program through enhanced marketing. Also consider enhanced educational and marketing materials and potentially, follow-up communications, designed to boost ISRs for kit components.

3 Evaluation Results by Program

This section documents the gross impact, net impact, and process evaluation activities conducted in PY14 along with the outcomes of those activities. Not every program receives an evaluation every year. Planned evaluation activities for Phase IV are shown in Figure 6. Each row shows how savings from the initiative will be presented in that year's final annual report, where:

- V = verified using the results of the impact evaluation completed that year.
- H = verified using the results of a historic impact evaluation.
- U = unverified until the results of the impact evaluation are available.
- NA = the initiative is not offered in that program year.

The evaluation team plans on single-year sampling and data collection for any given evaluation effort denoted by the letter "V" in the table below.

Figure 6: Evaluation Activity Matrix

Sector	Initiative	Sub-Initiative	PY13	PY14	PY15	PY16	PY17
Residential	EE Kits	EE Kits	V	V	V	V	V
Residential	Home Energy Reports	Home Energy Reports	V	V	V	V	V
Residential	Home Energy Reports	LI - Home Energy Reports	V	V	V	V	V
Residential	LI Direct Install	LI Direct Install	V	V	V	V	H
Residential	Multifamily - Res	Multifamily - Res	V	V	H	V	H
Residential	New Homes	New Homes	V	V	V	V	H
Residential	Online Audits	LI - Online Audit	V	V	V	V	H
Residential	Online Audits	On-Line Audit	V	V	V	V	H
Residential	Residential Audit and DI	Residential Audit and DI	V	V	H	V	H
Residential	Residential Downstream Appliances	Downstream Appliances	V	V	V	V	H
Residential	Residential Downstream HVAC	Downstream HVAC	V	V	V	V	H
Residential	Residential Midstream Appliances	Midstream Appliances	V	V	V	V	H
Residential	Residential Midstream Electronics	Midstream Electronics	NA	NA	V	V	H
Nonresidential	CI Custom	CI Custom	V	V	V	H	V
Nonresidential	CI EMNC	Building Improvements	V	V	V	V	H
Nonresidential	CI EMNC	Building Operations Training	V	V	V	V	H
Nonresidential	CI EMNC	Building Tune-Ups	V	V	V	H	V
Nonresidential	CI EMNC	Commissioning	NA	V	V	H	V
Nonresidential	CI EMNC	New Construction	V	V	H	V	H
Nonresidential	CI Multifamily	CI Multifamily	V	V	H	V	H
Nonresidential	CI Prescriptve	Downstream Lighting	V	V	V	H	V
Nonresidential	CI Prescriptve	Midstream Lighting	V	V	V	V	V
Nonresidential	CI Prescriptve	Downstream Nonlighting	V	V	V	V	H
Nonresidential	CI Prescriptve	Midstream Nonlighting	V	V	H	V	H
Cross-Cutting	Appliance Recycling	Appliance Recycling	V	V	V	H	V
Cross-Cutting	Appliance Recycling	Midstream Appliance Recycling	NA	V	V	H	V

3.1 ENERGY EFFICIENT HOMES PROGRAM

Energy Efficiency Homes Program has seven distinct components: Energy Efficiency Kits, School Education (with kits), Online Audits, Home Energy Reports, Residential Energy Audits and Direct Install, Multifamily Direct Install, and New Homes. ADM evaluates the program through six initiatives by combining the similar (from an impact evaluation perspective) Energy Efficiency Kit and School Education program components into one initiative.

AM Conservation Group (AMCG) administers the School Education and Energy Efficiency Kits program components. In the Energy Efficiency Kits program component, participants receive energy conservation kits which include energy efficiency measures As with Phase III, there are two kits aimed at homes with electric water heating and non-electric water heating. This program allows customers to receive one EE Kit per new account number at the time of move-in or eligible customers can request a kit for their home, with the water heat fuel source reported by the customer. In the School Education Program Component, students participate in a classroom-based presentation around energy conservation. Teachers also use a corresponding curriculum to continue to teach about energy conservation topics. New in Phase IV, all students receive a kit filled with energy-savings measures to install in their homes and are encouraged to continue discussions regarding energy conservation in the home.

The Home Energy Reports program component is administered by Oracle (formerly Opower). Home energy reports provide customers with comparative electric energy usage data and offer tips and advice on behavioral and low-cost energy saving measures. The number of participants for this program component is taken as the maximum number of participants in the treatment group during the year.

The Online Audit program component is also administered by Oracle and provides a web portal where customers can enter information about their home's envelope, HVAC systems, and plug loads to receive customized advice regarding their energy usage and ways to increase energy efficiency.

The Companies have retained CLEAResult to administer the Direct Install (branded as the Residential Energy Audit Program) component in Phase IV. Through this program component, customers receive free diagnostic assessments, followed by the direct installation of low-cost measures or incentivized installation of building shell measures. The participant count for this program component is equal to the number of rebate homes treated in the program.

CLEAResult also administers the Multifamily Audit program, which provides measures like those offered in the Residential Energy Audit Program to participants in individually metered multifamily dwellings.

The New Homes component is again administered by Performance System Development (PSD). The New Homes program component provides incentives to builders that choose to build new homes to higher efficiency standards through the installation of efficient building shell measures, HVAC systems, appliances, lighting, smart thermostats, and other features. The participant count for the New Homes program component is equal to the number of houses (or in the case of multifamily housing, the number of dwelling units).

3.1.1 Participation and Reported Savings by Customer Segment

Table 39 presents the participation counts, reported energy and demand savings, and incentive payments for the Energy Efficient Homes Program in PY14 by EDC. This program serves only the residential customer segment. The EE&C portfolios include separate and corresponding program components, administered by the same ICSPs, to serve the low-income residential customer segment.

Table 39: EEH Program Participation and Reported Impacts

Parameter	Met-Ed Residential (Non-LI)	Penelec Residential (Non-LI)	Penn Power Residential (Non-LI)	WPP Residential (Non-LI)
PYTD # Participants	130,469	126,524	37,975	142,303
PYRTD MWh/yr	19,048	18,700	6,279	17,244
PYRTD MW/yr	2.74	2.84	1.24	2.65
PYTD Incentives ($1000)	2,826	2,327	999	2,739

3.1.2 Gross Impact Evaluation

Each program component is treated as a separate evaluation initiative. The impact evaluation of the HER Initiative is described in Appendix B. The impact evaluation of the EE Kits Initiative is described in Appendix E. The impact evaluation of the Res DI Initiative is described in Appendix F. The impact evaluation of the Res NC Initiative is described in Appendix G. The impact evaluation of the Res MF initiative is described in Appendix H. The impact evaluation of the Online Audit initiative is described in Appendix I. Table 40 summarizes program verified impacts and realization rates for each EDC.

Table 40: EEH Program Gross Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	Gross Verified MW	MWh Realization Rate	MW Realization Rate
Met-Ed	EE Kits	9,288	1.09	71.3%	77.6%
Met-Ed	Home Energy Reports	2,900	0.55	102.6%	138.7%
Met-Ed	Direct Install	360	0.05	109.2%	73.6%
Met-Ed	New Homes	2,054	0.54	102.3%	69.3%
Met-Ed	Multifamily	32	0.00	109.4%	84.3%
Met-Ed	Online Audits	519	0.10	62.2%	106.2%
Met-Ed Total		**15,153**	**2.33**	**80%**	**85%**
Penelec	EE Kits	14,088	1.46	109.9%	114.3%
Penelec	Home Energy Reports	4,677	1.12	95.9%	82.3%
Penelec	Direct Install	197	0.02	114.5%	71.3%
Penelec	New Homes	281	0.05	100.2%	43.4%
Penelec	Multifamily	45	0.00	120.7%	97.1%
Penelec	Online Audits	120	0.02	23.4%	34.1%
Penelec Total		**19,408**	**2.67**	**104%**	**94%**
Penn Power	EE Kits	3,564	0.37	95.9%	91.4%
Penn Power	Home Energy Reports	1,275	0.43	110.1%	128.3%
Penn Power	Direct Install	136	0.02	109.7%	77.9%
Penn Power	New Homes	1,132	0.28	102.0%	59.8%
Penn Power	Multifamily	0	0.00	0.0%	0.0%
Penn Power	Online Audits	63	0.01	36.9%	58.4%
Penn Power Total		**6,169**	**1.10**	**98%**	**89%**
WPP	EE Kits	10,654	1.25	89.1%	92.1%
WPP	Home Energy Reports	1,966	0.26	90.9%	71.8%
WPP	Direct Install	299	0.04	111.8%	83.8%
WPP	New Homes	2,121	0.47	105.1%	60.0%
WPP	Multifamily	166	0.02	111.6%	83.9%
WPP	Online Audits	303	0.05	43.9%	71.9%
WPP Total		**15,509**	**2.10**	**90%**	**79%**

The gross realization rates for energy savings were driven primarily by the two largest components: Home Energy Reports and EE Kits. Realization rates for kits were lower than 100% due to lower in-service rates than planning estimates. Home Energy Reports energy savings varied from reported values due to differences in data validation, modeling, and the cross-participation corrections.

3.1.2.1 Evaluation Adjustments in Response to the COVID-19 Pandemic

Evaluation, measurement, and verification of the Energy Efficient Homes Program was not impacted by the COVID-19 pandemic. The majority of energy savings were verified through participant surveys and billing analyses. On-site visits occurred in support of the New Homes program component, but the homes were not yet sold or occupied at the time of the site visits.

3.1.3 Net Impact Evaluation

The impact evaluation of the HER Initiative is described in Appendix B. The impact evaluation of the EE Kits Initiative is described in Appendix E. The impact evaluation of the Res DI Initiative is described in Appendix F. The impact evaluation of the Res NC Initiative is described in Appendix G. The impact evaluation of the Res MF initiative is described in Appendix H. The impact evaluation of the Online Audit initiative is described in Appendix I. The NTG for the HER program is estimated to be 1.0, which is a feature of the randomized control trial gross impact evaluation approach. Note that only the New Homes initiative was evaluated for NTG in PY14. The impact evaluation methods for the Home Energy Reports and Online Audits initiatives result in NTG values of 1.0. Historical NTG values from research in Phase III were applied to the EE Kits, Direct Install, and Multifamily initiatives. Table 41 summarizes program verified gross and net energy impacts and net-to-gross ratios for each EDC.

Table 41: EEH Program Net Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	NTG	Net Verified MWh	Net Verified MW
Met-Ed	EE Kits	9,288	82.0%	7,616	0.89
Met-Ed	Home Energy Reports	2,900	100.0%	2,900	0.55
Met-Ed	Direct Install	360	95.0%	342	0.04
Met-Ed	New Homes	2,054	72.0%	1,479	0.39
Met-Ed	Multifamily	32	81.0%	26	0.00
Met-Ed	Online Audits	519	100.0%	519	0.10
Met-Ed Total		**15,153**	**85.0%**	**12,882**	**1.98**
Penelec	EE Kits	14,088	83.5%	11,764	1.22
Penelec	Home Energy Reports	4,677	100.0%	4,677	1.12
Penelec	Direct Install	197	103.0%	203	0.02
Penelec	New Homes	281	72.0%	203	0.04
Penelec	Multifamily	45	84.0%	38	0.00
Penelec	Online Audits	120	100.0%	120	0.02
Penelec Total		**19,408**	**87.6%**	**17,004**	**2.42**
Penn Power	EE Kits	3,564	84.0%	2,994	0.31
Penn Power	Home Energy Reports	1,275	100.0%	1,275	0.43
Penn Power	Direct Install	136	100.0%	136	0.02
Penn Power	New Homes	1,132	72.0%	815	0.20
Penn Power	Multifamily	0	81.0%	0	0.00
Penn Power	Online Audits	63	100.0%	63	0.01
Penn Power Total		**6,169**	**85.6%**	**5,282**	**0.97**
WPP	EE Kits	10,654	110.6%	11,779	1.38
WPP	Home Energy Reports	1,966	100.0%	1,966	0.26
WPP	Direct Install	299	104.0%	311	0.04
WPP	New Homes	2,121	72.0%	1,527	0.34
WPP	Multifamily	166	80.0%	132	0.02
WPP	Online Audits	303	100.0%	303	0.05
WPP Total		**15,509**	**103.3%**	**16,019**	**2.09**

3.1.3.1 High-Impact Measure Research

No Initiatives from this program have been designated as high-impact measures for PY14.

3.1.4 Verified Savings Estimates

In Table 42 the realization rates and net-to-gross ratios determined by the ADM and Tetra Tech team are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for the Energy Efficient Homes Program in PY14. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 42: PYTD and P4TD Savings Summary

	Met-Ed		Penelec		Penn Power		WPP	
Savings Type	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	19,048	2.74	18,700	2.84	6,279	1.24	17,244	2.65
PYVTD Gross	15,153	2.33	19,408	2.67	6,169	1.10	15,509	2.10
PYVTD Net	12,882	1.98	17,004	2.42	5,282	0.97	16,019	2.09
RTD	33,053	4.92	27,107	3.71	10,192	2.00	31,929	4.92
VTD Gross	25,419	3.65	26,982	3.48	9,304	1.51	26,885	3.46
VTD Net	21,367	3.01	23,340	3.08	7,939	1.29	27,811	3.45

3.1.5 Process Evaluation

Process evaluation activities were conducted for various components of this program in Phase IV, as summarized in in Table 43 below. PY14 process evaluation activities focused on the Home Energy Reports, Online Audits, In-Home Audits, New Homes, and Multifamily program components.

Table 43: EEH Program Process Evaluation Sample Design

EDC / Measure	Latest Activity	Sample Target	Achieved Sample Size	Response Rate
ME - Home Energy Reports	Participant Surveys (PY13/14)	140	200	11%
PN - Home Energy Reports	Participant Surveys (PY13/14)	140	178	9%
PP - Home Energy Reports	Participant Surveys (PY13/14)	140	200	11%
WP - Home Energy Reports	Participant Surveys (PY13/14)	140	191	10%
ALL EDCs - In-Home Audits	Implementer and Subcontractor Interviews (PY14)	4	4	100%
All EDCs - New Homes	Builder Surveys (PY13/14)	15	14	41%
	Rater Surveys (PY13/14)	5	5	45%
Program Total		**584**	**792**	**10.4%**

3.1.5.1 Home Energy Reports

The PY14 process evaluation included a quantitative survey of households that were randomly assigned to the treatment or control group. The survey design was informed by qualitative research completed in PY13; specifically, interviews with the FirstEnergy program manager (December 16, 2021, and May 26, 2022) and representatives from Oracle (January 19 and June 6, 2022). These interviews reviewed program design and any changes in Phase IV, discussed the details of program implementation, and captured evaluation priorities. The interview objectives and findings were reported in PY13 and guided the PY14 evaluation activities. The

survey aimed to measure customers' awareness of energy efficiency programs and their own actions or efforts to reduce energy use. For control group customers, the survey effort sought to determine whether customers are aware of FirstEnergy/EDC-sponsored energy efficiency programs and actions they take to reduce their energy use. The survey was administered by web with telephone follow-up to maximize response. The survey was conducted from November 14, 2022, through January 10, 2023, at Tetra Tech's in-house Survey Research Center in its Madison, Wisconsin office, and hosted on a secure website. The target objective was to complete 70 interviews per stratum (participant type) and EDC for treatment and control groups. Related results and recommendations are included in Section 3.3.5.4.

3.1.5.2 School Education Program

This program was not the focus of process evaluation activities in PY14. A process evaluation will be conducted in PY15.

3.1.5.3 In-Home Audits

In PY14, Tetra Tech completed focused process evaluation activities to provide the program manager with early feedback on program performance. The team reviewed participant tracking data and conducted in-depth interviews by telephone with energy auditors. The interviews included all three subcontractors that deliver services through the program and energy auditors with CLEAResult, the ICSP, which also conducts energy audits. The interviews and data review indicate program participation has increased since the introduction of design changes in Phase IV. A comprehensive process and NTG evaluation will be conducted in PY15.

3.1.5.4 New Homes

Tetra Tech's combined process and net impact evaluation effort included both rater and builder interviews in early 2023. Tetra Tech developed a sample frame in December 2022 of the 34 most active builders who, together accounted for 95% of program impacts in the prior 12 months. Tetra Tech interviewed 14 of those 34 builders as well as six active HERS raters in the program. The outreach effort started in March 2023 and included notifications from the program implementer to homebuilders followed by emails and calls from Tetra Tech. Tetra Tech also conducted a benchmarking study for the program, which compared incentive structures, outreach methods, and eligibility requirements for ten other new construction programs.

3.1.5.5 Multifamily Program

In PY14 Tetra Tech conducted a benchmarking study for all four multifamily programs offered by the Companies:

- Energy Efficient Homes—Residential Multifamily (EE Homes Multifamily),
- Low-Income Energy Efficiency—Multifamily—Res (LI Res Multifamily),
- C&I Energy Solutions for Business—Multifamily—Small (C&I ESB Multifamily SCI), and
- C&I Energy Solutions for Business—Multifamily—Large (C&I ESB Multifamily LCI).

All four programs are implemented by CLEAResult, and together provide comprehensive coverage of both the low-income and market-rate multifamily sector, including common areas and master-metered and individually-metered dwelling units. The benchmarking reviewed various program aspects including overall program designs, incentive levels and structure,

coordination with local community agencies, and marketing strategies. Findings from the benchmarking study are summarized in Section 3.1.7.5.

3.1.5.6 Behavioral Online Audits

Tetra Tech completed a two-phase customer survey in PY14. Tetra Tech conducted an initial (Phase 1) survey soon after customers completed the audit to maximize recall of the online audit and any immediate energy-saving actions. A follow-up (Phase 2) survey, a few months later, assessed energy-saving actions since the online audit, awareness of energy-efficiency programs, and other program participation. Tetra Tech reached out to the census of PY14 participants to garner sufficient responses for the two-phase effort (there is attrition involved between the two phases due to response rates and selection criteria for eligibility in the second phase). The participation numbers shown in Table 43 reflect the first phase of the survey, since Phase 2 respondents are a subset of Phase 1 respondents.

3.1.6 Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented Table 44, Table 45, Table 46, and Table 47 for Met-Ed, Penelec, Penn Power, and WPP respectively. The last two columns of the tables show benefits as calculated with net verified impacts, along with net participant costs (if applicable). The third and fourth columns show results as calculated on a gross basis. PYTD costs and benefits are net present values (NPV) expressed in 2022 dollars. NPV costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 44: Summary of Program Finances – Met-Ed

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	3,635		6,892		3,239		5,731	
2	Rebates to Participants and Trade Allies	601		1,232		601		1,232	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	2,175		3,617		2,175		3,617	
5	Direct Installation Program Materials and Labor	192		200		192		200	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	667		1,842		271		682	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	2	1	6	0	2	1	6
8	Administration and Management	158	559	330	1,064	158	559	330	1,064
9	Marketing	22	140	29	252	22	140	29	252
10	Program Delivery	11	130	23	188	11	130	23	188
11	EDC Evaluation Costs	238		304		238		304	
12	SWE Audit Costs	42		81		42		81	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,303		2,278		1,303		2,278	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**4,938**		**9,170**		**4,542**		**8,009**	
15	Total NPV Lifetime Electric Energy Benefits	4,837		8,275		3,934		6,673	
16	Total NPV Lifetime Electric Capacity Benefits	3,035		5,190		2,432		4,101	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-57		-62		-48		-52	
19	Total NPV Lifetime Water Impacts	3,562		5,526		2,921		4,531	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**11,377**		**18,929**		**9,239**		**15,253**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**2.30**		**2.06**		**2.03**		**1.90**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 45: Summary of Program Finances – Penelec

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	2,455		3,882		2,444		3,695	
2	Rebates to Participants and Trade Allies	85		144		85		144	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	2,240		3,435		2,240		3,435	
5	Direct Installation Program Materials and Labor	119		116		119		116	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	11		187		0		0	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	2	1	5	0	2	1	5
8	Administration and Management	131	289	279	543	131	289	279	543
9	Marketing	21	124	28	194	21	124	28	194
10	Program Delivery	9	73	20	112	9	73	20	112
11	EDC Evaluation Costs	192		241		192		241	
12	SWE Audit Costs	33		65		33		65	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	875		1,487		875		1,487	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**3,330**		**5,369**		**3,319**		**5,182**	
15	Total NPV Lifetime Electric Energy Benefits	6,042		8,570		5,099		7,199	
16	Total NPV Lifetime Electric Capacity Benefits	2,509		3,537		2,139		2,983	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-146		-230		-123		-194	
19	Total NPV Lifetime Water Impacts	4,893		7,141		4,087		5,964	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**13,298**		**19,018**		**11,201**		**15,952**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**3.99**		**3.54**		**3.38**		**3.08**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 46: Summary of Program Finances – Penn Power

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	1,718		2,845		1,423		2,282	
2	Rebates to Participants and Trade Allies	327		526		327		526	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	639		993		639		993	
5	Direct Installation Program Materials and Labor	83		91		83		91	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	669		1,235		374		672	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	1	0	2	0	1	0	2
8	Administration and Management	70	210	139	410	70	210	139	410
9	Marketing	7	50	9	77	7	50	9	77
10	Program Delivery	5	35	10	71	5	35	10	71
11	EDC Evaluation Costs	80		104		80		104	
12	SWE Audit Costs	15		29		15		29	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	473		851		473		851	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**2,191**		**3,696**		**1,896**		**3,133**	
15	Total NPV Lifetime Electric Energy Benefits	2,168		3,179		1,786		2,605	
16	Total NPV Lifetime Electric Capacity Benefits	737		1,102		601		884	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-67		-45		-57		-38	
19	Total NPV Lifetime Water Impacts	966		1,532		812		1,287	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**3,804**		**5,769**		**3,142**		**4,738**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.74**		**1.56**		**1.66**		**1.51**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 47: Summary of Program Finances – WPP

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	4,011		7,136		3,521		6,417	
2	Rebates to Participants and Trade Allies	592		985		592		985	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	2,020		3,634		2,020		3,634	
5	Direct Installation Program Materials and Labor	264		270		264		270	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	1,136		2,248		645		1,529	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	3	1	7	0	3	1	7
8	Administration and Management	176	663	379	1,219	176	663	379	1,219
9	Marketing	23	123	30	210	23	123	30	210
10	Program Delivery	13	138	28	201	13	138	28	201
11	EDC Evaluation Costs	276		350		276		350	
12	SWE Audit Costs	47		91		47		91	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,461		2,516		1,461		2,516	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**5,473**		**9,652**		**4,982**		**8,933**	
15	Total NPV Lifetime Electric Energy Benefits	5,638		9,318		5,815		9,612	
16	Total NPV Lifetime Electric Capacity Benefits	1,600		2,697		1,583		2,666	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	46		6		54		10	
19	Total NPV Lifetime Water Impacts	4,325		6,582		4,781		7,270	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**11,609**		**18,603**		**12,232**		**19,557**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**2.12**		**1.93**		**2.46**		**2.19**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

3.1.7 Status of Recommendations

The process evaluation activities in PY14 led to the following findings and recommendations from Tetra Tech to the Companies along with a summary of how the Companies plan to address the recommendation in program delivery.

3.1.7.1 Home Energy Reports

Finding #1: *Customers express high satisfaction with FirstEnergy, and the program raises satisfaction for many.* Two-thirds of treatment and control customers are *very satisfied* or *extremely satisfied* with the overall quality of service provided by their EDC. About one in five treatment customers say their opinion of their EDC has improved since they have been receiving Home Energy Reports (HER).

Finding #2: *Readership of the HERs is high and steady throughout the year*. Among treatment customers who were surveyed, one-half say that "someone (in the household) reads the entire

paper report." Less than one percent say "no one reads the paper report." Of those who receive electronic HERs (eHER), which are sent monthly, almost two-thirds read "all or almost all" of the twelve reports in the past year.

Finding #3: *Most treatment customers understand general energy-saving guidance from the reports, but a smaller proportion remember specific tips.* Survey participants report a long list of energy-saving ideas that are broadly consistent with tips promoted through the HERs. However, fewer customers accurately recall more specific recommendations. Over one-half of the survey participants responded "do not recall" or were not able to provide a specific response when asked to name a HER recommendation.

Finding #4: *Recall of recommended thermostat settings from the summer- and winter-themed HERs is low, especially for the summer cooling season.* Slightly over one-half accurately recall a recommended winter setting of 68 degrees; only 14 percent correctly cited the recommended summer setting of 78 degrees.

Finding #5: *Most participants find information in the HERs useful.* Almost 80 percent find the charts and other information *somewhat useful*, and about one in three say they are either *very* or *extremely useful*. The report's comparison of one's own energy use now with the same time a year prior received the highest share of useful ratings, followed by hours of the day with the most energy use.

Finding #6: *Cost continues to be a barrier to saving energy for most customers.* Almost two-thirds of the treatment customers and one-half of the control customers selected the "cost of doing things to save energy" as a reason for not taking action to save energy.

Finding #7: *Awareness of energy efficiency offerings is relatively low for both treatment and control customers.* Across five survey questions referencing different FirstEnergy offerings, no more than 60 percent were aware of the program. Less than one-half knew of rebates for purchasing eligible appliances, and only 20 percent were aware of discounted prices on qualifying appliances at selected stores.

Recommendation #1: *Continue sending the HERs and eHERs to low-income and residential participants.* While some customers do not read the reports or express doubts about the neighbor comparisons, a majority find them useful. Many focus on the content they find most helpful in managing their energy consumption, such as the historical comparisons with their own energy use.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *Continue to use HERs and eHERs to promote FirstEnergy energy efficiency offerings and explore ways to increase awareness of those programs.* Awareness of energy efficiency offerings for treatment customers was similar to control customers, except for a slight difference among low-income customers. FirstEnergy can work with its conservation service provider to identify new ways to increase awareness and engagement through the HERs or other marketing tools such as new graphic designs, postcards, and inserts.

EDC Status Report #2: Recommendation accepted.

3.1.7.2 In-Home Audits

Finding #1: *Energy auditors have positive experiences with program processes and communication.* The subcontractors report they receive responsive communication from CLEAResult when they need anything, and the program process is easy to follow.

Finding #2: *The workload for completing audits and direct installs is split between CLEAResult and subcontractors. CLEAResult, the CSP, delivers a larger proportion of projects for Comprehensive Audits.* They delivered more than 60 percent of the projects in PY14, up from 47 percent in PY13. However, CLEAResult continues recruiting subcontractors, adding two new subcontractors in PY14 and increasing workloads for the existing subcontractors.

Finding #3: *The removal of the audit fee has improved participation*. FirstEnergy dropped the customer payment for the audit and adjusted the ceiling for the amount that could be spent on direct-install measures in each home. After a somewhat slow launch in PY13, participation has significantly increased in PY14.

3.1.7.3 Behavioral Online Audits

Finding #1: *Awareness and understanding of the program are low.* Many program participants did not remember completing the online energy audit when contacted for the survey. Survey responses and qualitative information suggest that most come upon the audit accidentally while visiting the website. Recall of energy-saving tips is low—among customers who remembered completing the online audit, about 60 percent clicked on the categories to see relevant energy-saving tips. About one-half of those customers did not recall any energy-saving tips or provided generic statements instead of specific tips.

Finding #2: *Customers report that it was easy to both log in to the online audit webpage and answer the questions in the online audit*. Almost all customers reported that it was *very easy* or *somewhat easy* to log in to the webpage and answer the questions.

Finding #3: *Customers were likely to implement energy-saving actions if they saw tips through the online audit.* Customers were most likely to report that they *changed the temperature on their thermostat*, *turned off lights when not in the room*, or *installed energy-efficient lighting* as a result of completing the online audit. At least one-third of the customers indicated doing or planning to do things months after completing the online audit.

Finding #4: *Cost continues to be a barrier to saving energy for most customers.* Almost one-third of the customers selected the *cost of doing things to save energy* as a reason for not taking action to save energy.

Finding #5: *Customers express high satisfaction with aspects of the program*. Between 61 and 78 percent are at least *very satisfied* with each of three aspects of the program—the program overall, the length of time it took to answer the questions in the online audit[7], and the information and tips received on how to save energy.

[7] Throughout this memo, we refer to the program as the "Online Audit program" and the tool itself as the "online audit".

Finding #6: *Customers express high satisfaction with FirstEnergy*. About 70 percent are at least *very satisfied* with the overall quality of service provided by their EDC. Roughly one in five reported that their opinion of the company improved as a result of their participation in the program.

Recommendation #1: *Seek ways to raise awareness of or engagement with the online audit.* FirstEnergy can work with its conservation service provider (CSP) to explore ways to make the online audit stand out more. The following can be considered:

- sending an email or posting a notification on the customer's account after they complete the online audit to remind them of the online audit results and relevant tips; or
- expanding marketing through email blasts, bill inserts, or brochures.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *Continue to develop ways to keep the online audit results page useful and to prompt more customers to click on energy-saving tips.* FirstEnergy can work with its CSP to identify ways to make the tips more accessible and eye-catching. A small number of customers suggested providing more energy usage information and tips; although mentioned by a few, these ideas may be valued by many more customers when the data are presented to them.

EDC Status Report #2: Recommendation accepted.

3.1.7.4 New Homes

Finding #1: *Participating program builders' overall satisfaction was the program is high.* Similar to Phase III, the mean satisfaction score *was* 4.3 on a scale of 1 (*not at all satisfied*) to 5 (*very satisfied*).

Finding #2: *Performance Systems Development's (PSD) (the conservation service provider (CSP)) communication with builders remains a program strength*. Builders continue to value the support and information that PSD provides to them.

Finding #3: *Builders are aware of updated Section 45L Tax Credits for ENERGY STAR® new homes,* yet, they are not enticed to begin building ENERGY STAR-certified homes. The main reasons included *a lack of interest among their clients* and *high compliance costs*. Several raters are working with builders to show them how to balance the ENERGY STAR cost equation.

Finding #4: *The program influenced builders to increase the efficiency of new homes under the IECC 2015 code.* NTG was estimated at 72 percent for PY14. Builders credited the program for increasing their efficiency above code.

Finding #5: *Builders repeatedly mentioned that the program provided valuable information and that the program staff was helpful and responsive*. Builders also said that PSD and raters enhance builders' building practices through on-site training on building methods and new technologies.

Finding #6: *Raters report very high satisfaction with the program overall, with a mean score of 4.75* on a scale of 1 (*not at all satisfied*) and 5 (*very satisfied*).

Finding #7: *Raters' satisfaction with PSD remains very high (4.5), as it has been in previous years' evaluations.*

Finding #8 *Raters spend a significant amount of time uploading multifamily information to Compass.* Raters are required to upload information separately for each unit which is very time-consuming and results in higher costs to multifamily developers and builders.

Finding #9: *Raters are eagerly awaiting the roll-out of Ekotrope as an approved software* for providing home ratings to Compass. Ekotrope is used by builders and raters participating in other new homes programs across the country.

Finding #10: *Raters expressed mixed views on the ease with which builders would be able to exceed the 2018 International Energy Conservation Code (IECC) in PY15.* Most of the raters we interviewed (5 of 6) were optimistic that adjusting to the 2018 code would entail less significant changes in building practices for many builders. However, exceeding 2018 IECC code would be challenging for some, and especially smaller builders who may leave the program as a result.

Recommendation #1: *Continue to utilize PSD's New Construction trainer and experienced raters to educate builders on how they can improve new homes' efficiency above IECC 2018*. Together, PSD's trainer and their experienced raters should continue to educate and demonstrate the type of changes needed in building practices and equipment installed to exceed the IECC 2018 code, along with further educating builders on the updated ENERGY STAR-certified home requirements.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *Work with raters to identify the changes to Compass software that would ease the burden* raters face when registering and uploading program documentation, especially for multifamily units and buildings. Approving Ekotrope as a rating software and working with raters to identify the most impactful changes needed to Compass, such as bulk uploading, exporting data, and registration requirements, may result in higher participation in the program.

EDC Status Report #2: Recommendation accepted.

3.1.7.5 Multifamily

Finding #1*: Peer utilities' programs are similar to FirstEnergy's multifamily programs.* All peer utilities include multifamily income-qualified and market rate programs in their mix of energy efficiency programs similar to FirstEnergy. These multifamily programs target and provide in-unit and common areas with energy efficiency measures. Peer utilities serve master-metered buildings through their commercial program umbrella and individual units—particularly non-master-metered buildings through their residential program umbrella when independent multifamily programs are not included in their portfolios.

Finding #2*: Electrification and low-carbon measures are replacing lighting*. *Electrification* and *low-carbon* measures such as (1) *heat pumps*, (2) *heat pump water heaters*, (3) *electrical appliances*, (4) *expanded lighting controls and systems*, and (5) *enhanced building envelope* measures are being incorporated into utility programs to address their states' carbon reduction goals and to replace deteriorating savings from *existing lighting* measures. Utilities are also exploring greater incorporation of multifamily buildings into demand response programs.

Finding #3: *Peer utilities coordinate outreach with others and adopt a range of strategies to engage potential participants.* Peer utilities regularly collaborate and coordinate their outreach efforts with other associations and organizations working with multifamily building owners and property managers. The strategies to engage multifamily owners include (1) dedicated outreach teams, (2) in-person visits, (3) hosting events, (4) digital communications, (5) webinars, and (6) training related to the programs and services offered.

3.2 Energy Efficient Products Program

Through the Residential Energy Efficient Products Program, customers receive incentives for installing ENERGY STAR® qualified appliances, energy efficient HVAC equipment, and energy efficient water heaters. Qualifying appliances include items such as clothes washers, dehumidifiers, and refrigerators. HVAC equipment qualifying as part of the program includes central air conditioners, air source heat pumps, ground source heat pumps, and mini-split heat pumps. The program also provides incentives to customers for the maintenance (tune-ups) of existing HVAC equipment. Water heaters rebated under the program include heat pump water heaters, efficient electric water heaters, and solar water heaters. The program also provides incentives to customers who recycle old, inefficient appliances. The Companies have retained Franklin Energy Services to administer the rebate components of the program and ARCA for the recycling component.

For the appliances component of the program, the participant count is equal to the sum of appliances rebated by the program. For the HVAC component, the participant count is equal to the sum of the distinct HVAC measures rebated by the program. For the upstream electronics component of the program, the participant count is equal to the number of electronics equipment sold.

3.2.1 Participation and Reported Savings by Customer Segment

This program serves primarily the residential customer segment. Table 48, Table 49, Table 50, and Table 51 present the participation counts, reported energy and demand savings, and incentive payments for the EEP Program in PY14 by customer segment and EDC.

Table 48: EEP Program Participation and Reported Impacts for Met-Ed

Parameter	Residential (Non-LI)	Small C&I (Non-GNI)	GNI	Total
PYTD # Participants	31,233	0	0	31,233
PYRTD MWh/yr	11,331	0	0	11,331
PYRTD MW/yr	2.72	0.00	0.00	3
PYTD Incentives ($1000)	1,983	0.00	0.00	1,983

Table 49: EEP Program Participation and Reported Impacts for Penelec

Parameter	Residential (Non-LI)	Small C&I (Non-GNI)	GNI	Total
PYTD # Participants	28,158	0	0	28,158
PYRTD MWh/yr	7,887	0	0	7,887
PYRTD MW/yr	2.11	0.00	0.00	2
PYTD Incentives ($1000)	1,220	0.00	0.00	1,220

Table 50: EEP Program Participation and Reported Impacts for Penn Power

Parameter	Residential (Non-LI)	Small C&I (Non-GNI)	GNI	Total
PYTD # Participants	10,829	0	0	10,829
PYRTD MWh/yr	3,128	0	0	3,128
PYRTD MW/yr	0.75	0.00	0.00	1
PYTD Incentives ($1000)	458	0.00	0.00	458

Table 51: EEP Program Participation and Reported Impacts for WPP

Parameter	Residential (Non-LI)	Small C&I (Non-GNI)	GNI	Total
PYTD # Participants	29,951	0	0	29,951
PYRTD MWh/yr	9,994	0	0	9,994
PYRTD MW/yr	2.53	0.00	0.00	3
PYTD Incentives ($1000)	1,443	0.00	0.00	1,443

3.2.2 Gross Impact Evaluation

This program is disaggregated into five initiatives for evaluation. The impact evaluation of the Appliance Recycling initiative is described in Appendix J. The impact evaluation of the Upstream Electronics initiative is described in detail in Appendix K. The impact evaluation of the Res HVAC initiative is described in detail in Appendix L. The impact evaluation of the Res Appliances initiative is described in detail in Appendix M. The impact evaluation of the Res Midstream Appliances initiative is described in detail in Appendix N. Table 52 summarizes program verified impacts and realization rates for each EDC.

Table 52: EEP Program Gross Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	Gross Verified MW	MWh Realization Rate	MW Realization Rate
Met-Ed	Appliance Recycling	4,537	1.34	116.4%	112.7%
Met-Ed	Upstream Electronics	0	0.00	0.0%	0.0%
Met-Ed	HVAC	1,632	0.22	135.2%	113.1%
Met-Ed	Appliances	1,031	0.19	116.5%	118.5%
Met-Ed	Midstream Appliances	5,588	1.11	104.6%	93.6%
Met-Ed Total		**12,788**	**2.85**	**113%**	**105%**
Penelec	Appliance Recycling	3,287	0.95	105.8%	101.5%
Penelec	Upstream Electronics	0	0.00	0.0%	0.0%
Penelec	HVAC	677	0.10	96.7%	145.3%
Penelec	Appliances	402	0.07	101.2%	103.0%
Penelec	Midstream Appliances	3,762	0.99	102.2%	95.8%
PenelecTotal		**8,128**	**2.11**	**103%**	**100%**
Penn Power	Appliance Recycling	1,116	0.28	103.6%	102.3%
Penn Power	Upstream Electronics	0	0.00	0.0%	0.0%
Penn Power	HVAC	283	0.05	142.6%	130.7%
Penn Power	Appliances	251	0.05	109.6%	113.8%
Penn Power	Midstream Appliances	1,668	0.39	102.8%	97.6%
Penn PowerTotal		**3,319**	**0.77**	**106%**	**102%**
WPP	Appliance Recycling	5,035	1.40	106.2%	105.8%
WPP	Upstream Electronics	0	0.00	0.0%	0.0%
WPP	HVAC	1,360	0.17	134.4%	102.1%
WPP	Appliances	864	0.15	108.3%	109.0%
WPP	Midstream Appliances	3,532	0.88	102.6%	97.1%
WPP Total		**10,791**	**2.60**	**108%**	**103%**

The gross realization rates for energy savings were driven primarily by the realization rates of the appliance recycling and midstream appliances components.

3.2.2.1 Evaluation Adjustments in Response to the COVID-19 Pandemic

Data to support evaluation, measurement, and verification of this program are collected with remote online and telephone surveys. As a result, the PY14 evaluation was not altered due to COVID-19 induced social distancing measures.

3.2.3 Net Impact Evaluation

The impact evaluation of the Appliance Recycling initiative is described in Appendix J. The impact evaluation of the Upstream Electronics initiative is described in detail in Appendix K. The impact evaluation of the Res HVAC initiative is described in detail in Appendix L. The impact evaluation of the Res Appliances initiative is described in detail in Appendix M. . The impact evaluation of the Res Midstream Appliances initiative is described in detail in Appendix N. Note that only the Appliance Recycling initiative was evaluated for NTG in PY13 and the Appliance Rebate initiative was evaluated for NTG in PY14. Historical NTG values from research in Phase

III were applied to other initiatives as shown in Table 53, which summarizes program verified gross and net energy impacts and net-to-gross ratios for each EDC.

Table 53: EEP Program Net Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	NTG	Net Verified MWh	Net Verified MW
Met-Ed	Appliance Recycling	4,537	39.0%	1,769	0.52
Met-Ed	Upstream Electronics	0	58.3%	0	0.00
Met-Ed	HVAC	1,632	50.7%	828	0.11
Met-Ed	Appliances	1,031	67.0%	690	0.13
Met-Ed	Midstream Appliances	5,588	47.2%	2,638	0.52
Met-Ed Total		**12,788**	**46.3%**	**5,925**	**1.28**
Penelec	Appliance Recycling	3,287	65.0%	2,137	0.62
Penelec	Upstream Electronics	0	58.3%	0	0.00
Penelec	HVAC	677	52.3%	354	0.05
Penelec	Appliances	402	48.0%	193	0.03
Penelec	Midstream Appliances	3,762	53.1%	1,997	0.53
Penelec Total		**8,128**	**57.6%**	**4,681**	**1.23**
Penn Power	Appliance Recycling	1,116	38.0%	424	0.11
Penn Power	Upstream Electronics	0	58.3%	0	0.00
Penn Power	HVAC	283	54.8%	155	0.03
Penn Power	Appliances	251	50.8%	127	0.02
Penn Power	Midstream Appliances	1,668	44.0%	734	0.17
Penn Power Total		**3,319**	**43.4%**	**1,441**	**0.33**
WPP	Appliance Recycling	5,035	70.0%	3,524	0.98
WPP	Upstream Electronics	0	58.3%	0	0.00
WPP	HVAC	1,360	52.0%	707	0.09
WPP	Appliances	864	50.6%	437	0.07
WPP	Midstream Appliances	3,532	50.8%	1,794	0.45
WPP Total		**10,791**	**59.9%**	**6,463**	**1.59**

3.2.3.1 High-Impact Measure Research

The Appliance Recycling Initiative was identified as a high-impact measure and researched for net-to-gross in PY13. The net impact evaluation of the Appliance Recycling Initiative is described in Appendix J. Tetra Tech conducted a net-to-gross study for downstream appliances in PY14, but the initiative is not identified as a high-impact measure.

3.2.4 Verified Savings Estimates

In Table 54 the realization rates and net-to-gross ratios determined by the ADM and Tetra Tech team are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for the Energy Efficient Products Program in PY14. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 54: PYTD and P4TD Savings Summary

	Met-Ed		Penelec		Penn Power		WPP	
Savings Type	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	11,331	2.72	7,887	2.11	3,128	0.75	9,994	2.53
PYVTD Gross	12,788	2.85	8,128	2.11	3,319	0.77	10,791	2.60
PYVTD Net	5,925	1.28	4,681	1.23	1,441	0.33	6,463	1.59
RTD	20,629	4.66	14,370	3.48	5,677	1.27	17,788	4.13
VTD Gross	22,491	4.84	15,192	3.56	5,899	1.30	19,061	4.21
VTD Net	10,177	2.14	8,851	2.09	2,552	0.56	11,538	2.58

3.2.5 Process Evaluation

In PY14, Tetra Tech completed a process evaluation for the downstream and midstream Appliance Rebates program components. The sample design for Phase IV process evaluation research conducted to date is shown in Table 55 below.

Table 55: EEP Program Process Evaluation Sample Design

EDC	Measure	Activity	Target Sample Size	Achieved Sample Size	Response Rate
Met-Ed	Appliance Recyding	In-Depth Interviews (PY13) Customer Surveys (PY13)	139	151	21.7%
Penelec	Appliance Recyding		123	177	28.9%
Penn Power	Appliance Recyding		68	95	28.0%
WPP	Appliance Recyding		130	163	25.2%
Met-Ed	Downstream Appliances	Customer Surveys (PY14)	70	69	25.0%
Penelec	Downstream Appliances		70	71	25.5%
Penn Power	Downstream Appliances		70	74	26.4%
WPP	Downstream Appliances		70	72	28.6%
Met-Ed	Downstream Appliances	General Population Survey (PY14)	70	74	10.6%
Penelec	Downstream Appliances		70	72	9.0%
Penn Power	Downstream Appliances		70	76	10.9%
WPP	Downstream Appliances		70	71	10.1%
All	Midstream Appliances	Retailed Interviews (PY14)	6	6	21.4%
Program Total			**1,025**	**1,171**	**18.6%**

Process evaluation efforts for each program component are summarized below.

3.2.5.1 Appliance Recycling

The Appliance Recycling program process evaluation in PY13 relied on program staff and ICSP interviews as well as participant customer surveys. The researchable issues for process evaluation related to customer satisfaction and program awareness. The results of both of these metrics remain similar to Phase III. The results are also similar across the FirstEnergy EDCs. The sample for the survey was randomly selected for each EDC. Key findings and

recommendations for the Appliance Recycling component are listed in the Companies' PY13 annual report.

3.2.5.2 Downstream and Midstream Appliances

Tetra Tech conducted process evaluation for both the downstream and midstream appliance rebate components of the EEP program in PY14. The process evaluation included downstream rebate participant surveys, in-depth interviews of retailers that participate in the midstream program, a general population survey of residential customers, and a benchmarking analysis. The participant surveys were administered by telephone in spring of 2023, and also included a net impact evaluation battery. The survey effort was preceded by a postcard invitation campaign to explain the purpose of the study and to ask for cooperation in completing the telephone survey. The general population survey targeted a sample of FirstEnergy residential customers, regardless of prior participation in an energy efficiency program or energy-saving actions, and yielded insights into customers' awareness, usage, and satisfaction with energy-efficient products. In addition, the survey sought to assess nonparticipant spillover, which was used in conjunction with the participant survey to estimate a net-to-gross ratio. The survey also included questions related to the upcoming PY15 HVAC process and NTG evaluation. Retailer interviews occurred in July 2023 and represented each of the main retail chains that participate in the midstream program component. Related results and recommendations are included in Section 3.2.7.1.

3.2.5.3 HVAC

Process evaluation for the HVAC program component is scheduled for PY15.

3.2.5.4 Midstream Electronics

The midstream electronics sub-program was not offered in PY14.

3.2.6 Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 56, Table 57, Table 58, and Table 59 for Met-Ed, Penelec, Penn Power, and WPP respectively. The last two columns of the tables show benefits as calculated with net verified impacts, along with net participant costs (if applicable). The third and fourth columns show results as calculated on a gross basis. PYTD costs and benefits are net present values (NPV) expressed in 2022 dollars. NPV costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 56: Summary of Program Finances – Met-Ed

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	6,707		10,052		3,465		5,077	
2	Rebates to Participants and Trade Allies	936		1,538		936		1,538	
3	Upstream / Midstream Incentives	1,146		1,693		1,146		1,693	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	4,625		6,821		1,382		1,845	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	2	1	6	0	2	1	6
8	Administration and Management	142	955	295	1,674	142	955	295	1,674
9	Marketing	29	190	55	404	29	190	55	404
10	Program Delivery	8	63	15	117	8	63	15	117
11	EDC Evaluation Costs	108		188		108		188	
12	SWE Audit Costs	40		78		40		78	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,537		2,832		1,537		2,832	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**8,244**		**12,884**		**5,002**		**7,908**	
15	Total NPV Lifetime Electric Energy Benefits	3,562		5,758		1,722		2,721	
16	Total NPV Lifetime Electric Capacity Benefits	2,935		4,847		1,387		2,252	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	366		593		196		304	
19	Total NPV Lifetime Water Impacts	195		295		131		180	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**7,058**		**11,494**		**3,436**		**5,457**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.86**		**0.89**		**0.69**		**0.69**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 57: Summary of Program Finances – Penelec

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	4,829		7,481		2,542		3,992	
2	Rebates to Participants and Trade Allies	580		936		580		936	
3	Upstream / Midstream Incentives	701		1,057		701		1,057	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	3,548		5,488		1,260		1,999	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	2	1	5	0	2	1	5
8	Administration and Management	139	667	289	1,156	139	667	289	1,156
9	Marketing	28	157	53	327	28	157	53	327
10	Program Delivery	8	51	15	91	8	51	15	91
11	EDC Evaluation Costs	100		174		100		174	
12	SWE Audit Costs	38		75		38		75	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,191		2,188		1,191		2,188	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**6,020**		**9,668**		**3,733**		**6,180**	
15	Total NPV Lifetime Electric Energy Benefits	2,164		3,757		1,196		2,099	
16	Total NPV Lifetime Electric Capacity Benefits	1,938		3,150		1,080		1,771	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	280		467		145		248	
19	Total NPV Lifetime Water Impacts	109		182		52		97	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**4,491**		**7,557**		**2,473**		**4,215**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.75**		**0.78**		**0.66**		**0.68**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 58: Summary of Program Finances – Penn Power

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	1,285		2,143		634		1,059	
2	Rebates to Participants and Trade Allies	209		357		209		357	
3	Upstream / Midstream Incentives	272		444		272		444	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	804		1,341		153		257	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	1	0	2	0	1	0	2
8	Administration and Management	54	232	106	418	54	232	106	418
9	Marketing	8	53	16	109	8	53	16	109
10	Program Delivery	3	16	6	29	3	16	6	29
11	EDC Evaluation Costs	30		52		30		52	
12	SWE Audit Costs	12		24		12		24	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	410		761		410		761	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**1,694**		**2,903**		**1,044**		**1,819**	
15	Total NPV Lifetime Electric Energy Benefits	976		1,643		440		738	
16	Total NPV Lifetime Electric Capacity Benefits	495		818		220		363	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	189		322		86		149	
19	Total NPV Lifetime Water Impacts	62		96		31		51	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**1,721**		**2,879**		**777**		**1,301**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.02**		**0.99**		**0.74**		**0.72**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 59: Summary of Program Finances – WPP

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	5,038		8,023		2,663		4,338	
2	Rebates to Participants and Trade Allies	890		1,445		890		1,445	
3	Upstream / Midstream Incentives	625		969		625		969	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	3,522		5,609		1,148		1,923	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	3	1	7	0	3	1	7
8	Administration and Management	164	899	342	1,549	164	899	342	1,549
9	Marketing	35	177	65	370	35	177	65	370
10	Program Delivery	9	70	18	122	9	70	18	122
11	EDC Evaluation Costs	123		213		123		213	
12	SWE Audit Costs	46		90		46		90	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,524		2,776		1,524		2,776	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**6,562**		**10,799**		**4,187**		**7,114**	
15	Total NPV Lifetime Electric Energy Benefits	2,936		4,915		1,645		2,788	
16	Total NPV Lifetime Electric Capacity Benefits	1,311		2,087		749		1,201	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	356		572		180		303	
19	Total NPV Lifetime Water Impacts	208		334		105		188	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**4,809**		**7,908**		**2,679**		**4,481**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.73**		**0.73**		**0.64**		**0.63**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

3.2.7 Status of Recommendations

The process evaluation activities in PY14 led to the following findings and recommendations from Tetra Tech to the Companies, along with a summary of how the Companies plan to address the recommendation in program delivery. Findings and recommendations from previous process evaluation efforts can be found in the Companies' PY13 annual report.

3.2.7.1 Appliances

Finding #1: *All four EDCs reached their annual savings targets for this program component*.

Finding #2: *While major marketing efforts for retailers are managed at the corporate level, each store we spoke to adopts its practices for promoting either the point-of-sale (POS) or mail-in rebate component*.

Finding #3: *Participant survey results show marketing efforts, primarily through store displays and signage and bill inserts, are effective in producing program awareness*.

Finding #4: *Participant satisfaction across multiple program aspects is high*.

Finding #5: *The general population survey shows over one-quarter of the refrigerator and standalone freezer owners have units that are at least ten years old*.

Finding #6: *Only 22 percent of the general population survey respondents believed their home is very energy efficient*.

Finding #7: *The cost of upgrading is the most frequently mentioned reason for not making energy-efficient changes in the home (61 percent), according to the general population survey respondents*.

Recommendation #1: *Provide more marketing materials for midstream retailers.* All interviewed said the signage, stickers, and brochures help promote sales of more energy-efficient appliances. Because of the large number of eligible midstream items that cannot be tagged with promotional stickers, two retailers requested *larger marketing materials, such as posters and endcap displays,* to help direct customers down the aisle to the right products.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *Continue using retail stores and bill inserts to increase customer awareness of both the downstream rebates and POS discounts and encourage participation.* Thirty-one percent of respondents reported hearing about the program through an *appliance store*. Second was *utility bill inserts* (16 percent), followed by the *utility website* (13 percent).

EDC Status Report #2: Recommendation accepted.

Recommendation #3: *Continue to use bill inserts and email to promote the program.* Almost one-half of survey participants cite bill inserts as a source of program awareness; nearly one in five mention email. These communication channels are effective and can be deployed cost-efficiently.

EDC Status Report #3: Recommendation accepted.

3.3 LOW-INCOME ENERGY EFFICIENCY PROGRAM

The Low-Income Energy Efficiency Program (LIEEP) has seven distinct initiatives, each described below.

The *Low-Income Direct Install* (LI DI) component is administered by the Companies, and has three distinct components:

- *WARM Plus* low-income weatherization
- *WARM Extra Measures* low-income weatherization
- *WARM Multifamily*

These programs provide for direct installation of energy efficiency measures within customers' homes and tenants' apartments. The WARM Plus and WARM Multifamily components provide for audits and direct installation of energy efficient equipment and envelope upgrades. WARM *Extra Measures* is similar to WARM Plus, except that it provides for additional measures that are Act 129 funded to be installed in homes that participate in the Companies' non-Act 129 Low-Income Usage Reduction Programs. The Companies' tracking and reporting system can cross reference account numbers with previous years to generate a list of unique, new participants for each program year. For sampling and reporting purposes, however, ADM selects to treat each unique account in the tracking data for the program year as one participant.

Each of these program components are similar to their corresponding non-Low-Income components in the Energy Efficient Homes Program, but they are targeted to low-income customers.

The *Low-Income Appliance Recycling* (LI ATI) component is administered by ARCA. The program is implemented in parallel with the main residential Appliance Recycling program, but provides targeted marketing and enhanced incentives to income qualified customers. Each rebate application (which corresponds to an appliance pick-up event, and may involve multiple appliances) is treated as one participant.

The *Low-Income Kits* (LI Kit) component includes two subcomponents, both administered by AMCG:

- Low-Income EE Kits
- Low-Income School Education Program

Low-Income kits contained Advanced Power Strips instead of Electrical Outlet Gaskets. Each kit is treated as a participant.

The *Low-Income Appliance Rebates* (LI Appliances) component is administered by Franklin Energy Services and provides for targeted marketing and enhanced downstream rebates on appliances.

The *Low-Income Home Energy Reports* (LI HER) component is similar to the HER component in the Energy Efficient Homes Program but is targeted to low-income qualified customers.

The *Low-Income Online Audits* (LI Online Audit) component is similar to the Online Audit component in the Energy Efficient Homes Program but is targeted to low-income qualified customers.

The *Low Income New Homes* component is similar to the New Homes component in the Energy Efficient Homes Program but is targeted to low-income customers.

3.3.1 Participation and Reported Savings by Customer Segment

Table 60 presents the participation counts, reported energy and demand savings, and incentive payments for the Low-Income Energy Efficiency Program in PY14 by customer segment and EDC. This program serves only the low-income residential customer segment.

Table 60: LIEEP Participation and Reported Impacts

Parameter	Met-Ed LI Residential	Penelec LI Residential	Penn Power LI Residential	WPP LI Residential
PYTD # Participants	32,437	20,534	7,084	22,741
PYRTD MWh/yr	4,009	3,876	1,387	5,802
PYRTD MW/yr	0.56	0.59	0.18	0.80
PYTD Incentives ($1000)	1,497	1,685	524	2,198

3.3.2 Gross Impact Evaluation

The impact evaluation of the Res Appliances initiative is described in detail in Appendix M. The impact evaluation of the LI Appliance Recycling sub-initiative is described in detail in Appendix O. The impact evaluation of the LI DI initiative is described in Appendix P. The impact evaluation of the HER initiative is described in Appendix B. The impact evaluation of the LI EE Kits sub-initiative is described in Appendix Q. The impact evaluation of the Res NC initiative is described in Appendix G. The impact evaluation of the Online Audit initiative is described in Appendix I. Table 61 summarizes program verified impacts and realization rates for each EDC.

Table 61: LIEEP Gross Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	Gross Verified MW	MWh Realization Rate	MW Realization Rate
Met-Ed	Appliances	34	0.01	116.5%	118.5%
Met-Ed	Appliance Turn-In	607	0.19	121.5%	122.2%
Met-Ed	Direct Install	1,039	0.13	101.4%	101.8%
Met-Ed	Home Energy Reports	269	0.17	136.6%	998.2%
Met-Ed	Kits	2,068	0.24	97.2%	103.1%
Met-Ed	New Homes	59	0.01	102.3%	69.3%
Met-Ed	Online Audits	272	0.05	372.1%	574.1%
Met-Ed Total		**4,348**	**0.79**	**108%**	**142%**
Penelec	Appliances	29	0.01	101.2%	103.0%
Penelec	Appliance Turn-In	645	0.19	112.9%	98.4%
Penelec	Direct Install	1,396	0.17	99.1%	98.9%
Penelec	Home Energy Reports	556	0.05	381.9%	105.4%
Penelec	Kits	1,730	0.18	106.1%	108.8%
Penelec	New Homes	0	0.00	100.2%	43.4%
Penelec	Online Audits	290	0.04	319.0%	427.3%
PenelecTotal		**4,646**	**0.64**	**120%**	**108%**
Penn Power	Appliances	13	0.00	109.6%	113.8%
Penn Power	Appliance Turn-In	149	0.04	110.6%	103.2%
Penn Power	Direct Install	526	0.07	102.1%	102.4%
Penn Power	Home Energy Reports	335	0.09	52.5%	139.0%
Penn Power	Kits	75	0.01	108.2%	102.6%
Penn Power	New Homes	0	0.00	102.0%	59.8%
Penn Power	Online Audits	62	0.01	344.5%	543.1%
Penn PowerTotal		**1,160**	**0.22**	**84%**	**120%**
WPP	Appliances	42	0.01	108.3%	109.0%
WPP	Appliance Turn-In	657	0.21	122.5%	114.5%
WPP	Direct Install	1,691	0.23	100.2%	100.5%
WPP	Home Energy Reports	769	0.08	96.3%	119.2%
WPP	Kits	2,949	0.35	110.1%	113.2%
WPP	New Homes	3	0.00	105.1%	60.0%
WPP	Online Audits	203	0.03	343.4%	496.8%
WPP Total		**6,314**	**0.91**	**109%**	**113%**

The gross realization rates for energy savings were driven primarily by the three largest components: Kits, Home Energy Reports and Direct Install.

3.3.2.1 Evaluation Adjustments in Response to the COVID-19 Pandemic

The evaluation effort for the Low-Income Energy Efficiency Program was not impacted by the COVID-19 pandemic in PY14.

3.3.3 Net Impact Evaluation

Net impact evaluation was not formally conducted for this program in PY14, in accordance with our evaluation plan. The NTG for the Low-Income Energy Efficiency Program is estimated as 1.0 for the purpose of net cost effectiveness calculations.

3.3.4 Verified Savings Estimates

In Table 62 the realization rates determined by ADM are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for The Low-Income Energy Efficiency Program in PY14. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 62: PYTD and P4TD Savings Summary

	Met-Ed		Penelec		Penn Power		WPP	
Savings Type	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	4,009	0.56	3,876	0.59	1,387	0.18	5,802	0.80
PYVTD Gross	4,348	0.79	4,646	0.64	1,160	0.22	6,314	0.91
PYVTD Net	4,348	0.79	4,646	0.64	1,160	0.22	6,314	0.91
RTD	8,069	1.09	9,796	1.33	3,125	0.42	11,199	1.61
VTD Gross	8,110	1.29	10,588	1.28	2,877	0.40	12,131	1.50
VTD Net	8,110	1.29	10,588	1.28	2,877	0.40	12,131	1.50

3.3.5 Process Evaluation

Several initiatives within the Low-Income Energy Efficiency Program underwent process evaluation in PY14. Evaluation activities from PY14 and past years in Phase IV are summarized in Table 63 and described below.

Table 63: LIEEP Program Process Evaluation Sample Design

EDC	Measure	Activity	Target Sample Size	Achieved Sample Size	Response Rate
Met-Ed	Direct Install (WARM)	Customer Surveys (PY14)	70	71	36.8%
Penelec			70	70	29.8%
Penn Power			59	76	39.2%
WPP			70	75	38.5%
Met-Ed	Direct Install (Multifamily)	Customer Surveys (PY14)	20	15	31.9%
Penelec			35	28	15.9%
Penn Power			5	2	20.0%
WPP			35	31	17.2%
Met-Ed	Hone Energy Reports	Participant Surveys (PY13/14)	140	148	7.8%
Penelec			140	138	7.3%
Penn Power			140	178	9.4%
WPP			140	148	7.8%
All EDCs	Direct Install (WARM)	Auditor Interviews	8	8	100.0%
All EDCs	Direct Install (Multifamily)	Auditor Interviews	5	5	100.0%
Program Total			**937**	**993**	**11.2%**

3.3.5.1 Downstream Appliances

Tetra Tech conducted a combined process evaluation of the residential and low-income residential appliance rebate programs in PY14. The evaluation is described in Section 3.2.5.2, with associated findings and recommendations presented in Section 3.2.7.1.

3.3.5.2 Appliance Recycling

The Appliance Recycling program process evaluation in PY13 relied on program staff and ICSP interviews as well as participant customer surveys. The researchable issues for process evaluation related to customer satisfaction and program awareness. The results of both of these metrics remain similar to Phase III. The results are also similar across the FirstEnergy EDCs. The sample for the survey was randomly selected for each EDC. Key findings and recommendations for the Appliance Recycling component are available in the Companies' PY13 annual report.

3.3.5.3 Direct Install

Tetra Tech conducted a process evaluation for the WARM Plus/Extra Measures program component and the Multifamily program component (which together comprise the Low-Income Direct Install initiative). While there were separate samples for each program component, data collection occurred concurrently with participant surveys in February and March of 2023, and contractor interviews between February and April of 2023. In addition to surveys and interviews, Tetra Tech combined a benchmarking study for the Companies' Multifamily programs, including the low-income component. Findings and recommendations from the PY14 process evaluation effort are presented in Section 3.3.7.2 and Section 3.3.7.3.

3.3.5.4 Home Energy Reports

Tetra Tech conducted a combined process evaluation of the residential and low-income Home Energy Report programs in PY14. The evaluation is described in Section 3.1.5.1, with associated findings and recommendations presented in Section 3.1.7.1.

3.3.5.5 School Education Program

This program was not the focus of process evaluation activities in PY14. A process evaluation will be conducted in PY15.

3.3.5.6 New Homes

Tetra Tech conducted a combined process evaluation of the residential and low-income New Homes programs in PY14. The evaluation is described in Section 3.1.5.4, with associated findings and recommendations in Section 3.1.7.4.

3.3.5.7 Behavioral Online Audits

Tetra Tech conducted a combined process evaluation of the residential and low-income Behavioral Online Audit programs in PY14. The evaluation is described in Section 3.1.5.6, with associated findings and recommendations presented in Section 3.1.7.2.

3.3.6 Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 64, Table 65, Table 66, and Table 67 for Met-Ed, Penelec, Penn Power, and WPP respectively. The last two columns of the tables show benefits as calculated with net verified impacts, along with net participant costs (if applicable). The third and fourth columns show results as calculated on a gross basis. PYTD costs and benefits are net present values (NPV) expressed in 2022 dollars. NPV costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 64: Summary of Program Finances – Met-Ed

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	1,721		2,684		1,721		2,684	
2	Rebates to Participants and Trade Allies	102		200		102		200	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	376		734		376		734	
5	Direct Installation Program Materials and Labor	1,093		1,551		1,093		1,551	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	149		198		149		198	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	1	0	3	0	1	0	3
8	Administration and Management	101	338	233	667	101	338	233	667
9	Marketing	0	37	0	114	0	37	0	114
10	Program Delivery	4	52	9	77	4	52	9	77
11	EDC Evaluation Costs	126		166		126		166	
12	SWE Audit Costs	24		48		24		48	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	685		1,317		685		1,317	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**2,405**		**4,001**		**2,405**		**4,001**	
15	Total NPV Lifetime Electric Energy Benefits	1,166		2,159		1,166		2,159	
16	Total NPV Lifetime Electric Capacity Benefits	695		1,254		695		1,254	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-51		-73		-51		-73	
19	Total NPV Lifetime Water Impacts	591		1,340		591		1,340	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**2,401**		**4,680**		**2,401**		**4,680**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.00**		**1.17**		**1.00**		**1.17**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 65: Summary of Program Finances – Penelec

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	1,890		3,331		1,890		3,331	
2	Rebates to Participants and Trade Allies	91		164		91		164	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	310		891		310		891	
5	Direct Installation Program Materials and Labor	1,369		2,134		1,369		2,134	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	121		142		121		142	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	2	0	4	0	2	0	4
8	Administration and Management	122	344	282	696	122	344	282	696
9	Marketing	0	60	0	182	0	60	0	182
10	Program Delivery	4	31	10	57	4	31	10	57
11	EDC Evaluation Costs	150		198		150		198	
12	SWE Audit Costs	26		52		26		52	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	739		1,480		739		1,480	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**2,628**		**4,811**		**2,628**		**4,811**	
15	Total NPV Lifetime Electric Energy Benefits	1,227		2,814		1,227		2,814	
16	Total NPV Lifetime Electric Capacity Benefits	557		1,230		557		1,230	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-42		-122		-42		-122	
19	Total NPV Lifetime Water Impacts	711		1,467		711		1,467	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**2,453**		**5,388**		**2,453**		**5,388**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.93**		**1.12**		**0.93**		**1.12**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 66: Summary of Program Finances – Penn Power

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	556		944		556		944	
2	Rebates to Participants and Trade Allies	22		37		22		37	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	18		160		18		160	
5	Direct Installation Program Materials and Labor	510		738		510		738	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	5		9		5		9	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	0	0	1	0	0	0	1
8	Administration and Management	39	153	88	293	39	153	88	293
9	Marketing	0	9	0	52	0	9	0	52
10	Program Delivery	2	23	4	41	2	23	4	41
11	EDC Evaluation Costs	47		62		47		62	
12	SWE Audit Costs	9		17		9		17	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	281		557		281		557	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**837**		**1,501**		**837**		**1,501**	
15	Total NPV Lifetime Electric Energy Benefits	287		797		287		797	
16	Total NPV Lifetime Electric Capacity Benefits	98		231		98		231	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-15		-51		-15		-51	
19	Total NPV Lifetime Water Impacts	15		186		15		186	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**385**		**1,163**		**385**		**1,163**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.46**		**0.77**		**0.46**		**0.77**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 67: Summary of Program Finances – WPP

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	2,333		3,286		2,333		3,286	
2	Rebates to Participants and Trade Allies	90		152		90		152	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	473		875		473		875	
5	Direct Installation Program Materials and Labor	1,745		2,215		1,745		2,215	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	26		44		26		44	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	2	0	4	0	2	0	4
8	Administration and Management	110	379	253	670	110	379	253	670
9	Marketing	0	80	0	182	0	80	0	182
10	Program Delivery	4	24	9	43	4	24	9	43
11	EDC Evaluation Costs	134		178		134		178	
12	SWE Audit Costs	26		50		26		50	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	759		1,389		759		1,389	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**3,092**		**4,675**		**3,092**		**4,675**	
15	Total NPV Lifetime Electric Energy Benefits	1,863		3,246		1,863		3,246	
16	Total NPV Lifetime Electric Capacity Benefits	518		884		518		884	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	0		0		0		0	
18	Total NPV Lifetime Fossil Fuel Impacts	-87		-134		-87		-134	
19	Total NPV Lifetime Water Impacts	1,016		1,829		1,016		1,829	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**3,310**		**5,825**		**3,310**		**5,825**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.07**		**1.25**		**1.07**		**1.25**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

3.3.7 Status of Recommendations

The process evaluation activities in PY14 led to the following findings and recommendations from Tetra Tech to the Companies, along with a summary of how the Companies plan to address the recommendation in program delivery. Findings and recommendations from previous process evaluation efforts can be found in the Companies' PY13 annual report.

3.3.7.1 Appliances

The process evaluation for the residential and low-income residential Appliances program components was combined. Key findings and recommendations from the evaluation are listed in Section 3.2.5.2.

3.3.7.2 Direct Install (WARM Programs)

Finding #1: *Participants learn about the program from a variety of sources.* The most common source of program awareness was bill inserts and direct mail (21 percent), followed by word-of-mouth (15 percent). Assistance programs were also cited frequently, especially the Low-Incme Home Energy Assistance Program (LIHEAP) (14 percent), followed by the Pennsylvania Customer Assistance Program (PCAP) (13 percent). Telephone calls, mentioned by 12 percent, are a new source of awareness in this evaluation phase. This increase in telephone calls is likely a result of the outreach by contractors once eligible customers are identified.

Finding #2: *There is a good recall of energy-saving tips provided by the energy auditors.* More than 70 percent of respondents remember the energy auditor discussed the benefits or recommended turning off lights when leaving rooms and unplugging electronics when not in use. Another 65 percent remembered discussing washing clothes in cold water to save energy.

Finding #3: *Most equipment received through the program is still installed.* For most measures, reported installation persistence is above 90 percent. Low-flow showerheads, furnace whistles, and window air conditioners are the most likely to be removed after installation. Window air conditioners are mostly removed seasonally. Air sealing, smart thermostats, and reflective tint all remain installed.

Finding #4: *Energy specialists provide respondents with clear explanations of their actions in the participant's home.* Almost 90 percent of participants said their energy specialist explained what they were doing in their homes. Of those, only one percent (three participants) said they could not understand their explanation.

Finding #5: *Participants are very satisfied with the program.* Thirty-nine percent of participants said they were *extremely satisfied*, and another 41 percent said they were *very satisfied*. The highest-rated aspects of the program were interactions with the energy auditor, the types of energy-efficient items received through the program, and the quality of the energy-efficient items received.

Finding #6: *Energy auditors have positive experiences with program processes.* Two of the eight contractors interviewed rated the overall program process as *very easy* (a 5, on a scale of 1 to 5), and one other rated all aspects of the process a 5 except for payment. Two more rated the overall process a 4.5.

Finding #7: *Energy audit contractors continue to experience difficulties completing projects with customers who express interest in the program*. Scheduling audit visits has become more challenging in Phase IV, and COVID-19 has added to the existing barriers for energy auditors to complete the necessary work in customers' homes

Finding #8: *The workload for completing audits and direct installs is split between CLEAResult and subcontractors*. CLEAResult, the conservation service provider (CSP), delivers most audit and direct installation projects for WARM Plus. They deliver all projects in Penn Power's service territory and cover other territories where its subcontractors do not have the capacity. CLEAResult continues to recruit subcontractors and added two in PY14.

Recommendation #1: *Continue using a variety of outreach methods to increase customer awareness and encourage participation.* There is no one primary way customers learned of the program. In addition, with audit contractors struggling to schedule participants, messages to encourage participation through multiple channels may help motivate customers.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *CLEAResult should continue carefully balancing the allocation of projects between subcontractors and CLEAResult staff.* CLEAResult should continue allocating project work to subcontractors committed to delivering projects through WARM Plus and ensuring they have adequate staff. Subcontractors will be hesitant to hire staff if project work slows down. Continued recruiting for more subcontract firms would strengthen program delivery in underserved territories.

EDC Status Report #2: Recommendation accepted.

3.3.7.3 Direct Install (Multifamily Program)

Finding #1: *Participants learn about the program through a variety of sources. The most common source of program awareness was their landlord (41 percent) or word-of-mouth (13 percent), followed by bill inserts and direct mail (12 percent).* Engagement with property managers and leasing agents (11 percent) while recruiting tenants to participate in the program was also cited as a source of program awareness

Finding #2: *There is a high level of recall of energy-saving tips provided by the energy auditors.* More than 85 percent of respondents remember the energy auditor discussed the benefits or recommended turning off lights when leaving rooms, and 69 percent remembered discussing unplugging electronics when not in use

Finding #3: *Most of the equipment received through the program is still installed*. Most equipment installed through the program remained installed at the time of the survey (at least 85 percent). Smart power strips had lower retention: Almost 24 percent (7 of 29) of participants had removed the power strip, primarily because it interfered with their use of televisions and gaming consoles (4 participants) or was never installed (2 participants).

Finding #4: *Most participants felt that their energy auditors were clear in explaining the actions they were taking in the participant's home*. Almost 88 percent (42 participants) said that their energy auditor explained what they were doing in their home, and of those, almost 100 percent (41 participants) said that they were able to understand the explanation they were given. Although survey participants were highly engaged, contractors reported low levels of engagement among multifamily tenants

Finding #5: *Participants are very satisfied with the program*. Forty-two percent of participants said they were *extremely satisfied*, and another 45 percent said they were *very satisfied*. The highest-rated aspects of the program were interactions with the energy auditor, the types of

energy-efficient items received through the program, and the quality of the energy-efficient items received

Finding #6: *All energy auditors (five) experienced difficulties scheduling audits with customers who expressed interest in the program*. Scheduling audit visits has become more challenging in Phase IV, and COVID-19 continues to be a barrier for energy auditors to complete the necessary work in customer homes

Finding #7: *Energy auditors find the program process easy.* One contractor rated the program process as *very easy* (1 on a scale of 1 to 5), and two others rated the process as a 2, noting that the rating was not a 1 due to scheduling difficulties and payment delays. Two energy auditors rated the program process a 4 due to recruitment and scheduling difficulties, delayed payments, and limited time to build relationships with building owners and customers

Finding #8: *Energy auditors feel that the LEEN tracking system is easy to use. However, they also reported uploading individual multifamily unit data is extremely time-consuming.* Three of the five contractors interviewed mentioned the LEEN system is built for single-family homes rather than multifamily buildings. The example most often given was that LEEN does not allow them to bulk-upload multifamily unit/building information and documentation

Finding #9: *The workload for completing audits and direct installs is split between CLEAResult and subcontractors.* CLEAResult, the conservation service provider (CSP), is conducting a large portion of the audits and direct-install projects (approximately 46 percent). This is primarily due to having a limited number or no subcontractors providing services in the Met-Ed and Penelec service territories. Three of the five subcontractor firms interviewed are working on adding and training new staff to take on more work in the FirstEnergy service territories they are currently working within.

Recommendation #1: *Continue using a variety of outreach methods to increase customer awareness and encourage participation.* There is no one primary way customers learned of the program. In addition, with audit contractors struggling to schedule participants, messages to encourage participation through multiple channels may help motivate customers.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *FirstEnergy should work with CLEAResult and its energy auditors to explore ways to modify the LEEN database.* The most commonly suggested improvement energy auditors provided was a modification that allows contractors to reduce the time spent uploading information on multifamily buildings into LEEN, such as bulk uploading rather than one unit at a time.

EDC Status Report #2: Recommendation accepted.

Recommendation #3: *CLEAResult should continue recruiting subcontractors and balancing project allocation across subcontractors.* CLEAResult should continue allocating project work to subcontractors committed to delivering projects through the LI Multifamily Residential program and ensuring they have adequate staff. Subcontractors will be hesitant to hire staff if project

work slows down. Continued recruiting for more subcontract firms would strengthen program delivery in underserved territories.

EDC Status Report #3: Recommendation accepted.

3.3.7.4 Home Energy Reports

The process evaluation for the residential and low-income residential Home Energy Reports program components was combined. Key findings and recommendations from the evaluation are listed in Section 3.1.7.1.

3.3.7.5 New Homes

The process evaluation for the residential and low-income residential New Homes program components was combined. Key findings and recommendations from the evaluation are listed in Section 3.1.7.4.

3.3.7.6 Online Audits

The process evaluation for the residential and low-income residential Online Audits program components was combined. Key findings and recommendations from the evaluation are listed in Section 3.1.7.2.

3.4 C&I Energy Solutions for Business Program - Small

The C&I Solutions for Business Program – Small (referred to as ESB-Small Program) is offered to small commercial and industrial customers and was implemented jointly by Franklin Energy Services, Willdan, CLEAResult, and ARCA for PY14. The Franklin Energy Services portion of the program includes downstream and midstream incentives for customers that install energy efficient equipment. The Willdan portion of the program includes incentives for efficient new construction and the Building Tune-Up direct install program in PY14. CLEAResult staff conduct most of the audits and direct installations for the CI Multifamily initiative. ARCA administers the Appliance Recycling program component.

3.4.1 Participation and Reported Savings by Customer Segment

Table 68 and Table 69 present the participation counts, reported energy and demand savings, and incentive payments for the ESB-Small Program in PY14 by customer segment and EDC. This program serves the Small C&I and GNI customer segments. Each separate rebate application is counted as one participant.

Table 68: ESB-Small Program Participation and Reported Impacts for Met-Ed and Penelec

Parameter	Met-Ed Small C&I (Non-GNI)	Met-Ed GNI	Met-Ed Total	Penelec Small C&I (Non-GNI)	Penelec GNI	Penelec Total
PYTD # Participants	641	15	656	1,033	20	1,053
PYRTD MWh/yr	17,181	362	17,544	20,833	367	21,200
PYRTD MW/yr	2.90	0.07	2.96	3.99	0.07	4.06
PYTD Incentives ($1000)	2,808	47	2,855	4,134	55	4,190

Table 69: ESB-Small Program Participation and Reported Impacts for Penn Power and WPP

Parameter	Penn Power Small C&I (Non-GNI)	Penn Power GNI	Penn Power Total	WPP Small C&I (Non-GNI)	WPP GNI	WPP Total
PYTD # Participants	205	9	214	1,047	12	1,059
PYRTD MWh/yr	5,577	512	6,089	25,302	732	26,034
PYRTD MW/yr	1.16	0.09	1.24	4.48	0.15	4.63
PYTD Incentives ($1000)	1,255	84	1,339	4,064	136	4,199

3.4.2 Gross Impact Evaluation

The ESB-Small Program was disaggregated into five sampling initiatives for gross impact evaluation. Downstream and midstream lighting improvements and downstream prescriptive rebates for efficient equipment such as HVAC systems, food service, refrigeration, appliances, and agricultural measures were grouped into the CI Prescriptive initiative and evaluated according to PA TRM protocols as described in detail in Appendix R. Within the Prescriptive

initiative, lighting and non-lighting, and downstream and midstream components each had distinct sampling strata. Custom projects include combinations of measures that serve multiple end-uses, as well as custom projects that involve combined heat and power, motors and drives, industrial process improvements, refrigeration, retro-commissioning, compressed air upgrades, data centers, and custom HVAC and chillers. The impact evaluation for the custom initiative is described in Appendix S. The Energy Management and New Construction (CI EMNC) initiative includes the Building Tune-Up direct install component, incentives for efficient new construction, and may eventually include additional components such as building operator certification, retro and virtual commissioning, and incentives for building improvements. The impact evaluation for the CI EMNC initiative is describe in Appendix T. The Master Metered Multifamily Direct Install (CI Multifamily) initiative targets low-income customers in master-metered communities. Evaluation activities for the CI Multifamily initiative are described in Appendix U. Appendix V describes the evaluation of the Appliance Recycling initiative. Table 70 summarizes program verified impacts and realization rates for each EDC.

Table 70: ESB-Small Program Gross Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	Gross Verified MW	MWh Realization Rate	MW Realization Rate
Met-Ed	CI Prescriptive	14,052	2.55	103%	100.0%
Met-Ed	CI Custom	111	0.02	103%	100.2%
Met-Ed	CI EMNC	3,460	0.56	98%	97.0%
Met-Ed	CI Multifamily	114	0.02	92%	92.3%
Met-Ed	Appliance Recycling	67	0.01	116%	112.7%
Met-Ed Total		**17,805**	**3.16**	**101%**	**99%**
Penelec	CI Prescriptive	15,929	3.31	106%	96%
Penelec	CI Custom	377	0.04	101%	102%
Penelec	CI EMNC	4,396	0.56	85%	72%
Penelec	CI Multifamily	496	0.07	90%	90%
Penelec	Appliance Recycling	45	0.01	106%	102%
PenelecTotal		**21,243**	**3.99**	**100%**	**92%**
Penn Power	CI Prescriptive	2,534	0.49	85%	72%
Penn Power	CI Custom	40	0.02	101%	98%
Penn Power	CI EMNC	2,757	0.53	91%	88%
Penn Power	CI Multifamily	0	0.00	100%	100%
Penn Power	Appliance Recycling	35	0.01	104%	102%
Penn PowerTotal		**5,366**	**1.05**	**88%**	**80%**
WPP	CI Prescriptive	20,506	3.45	112%	89%
WPP	CI Custom	153	0.04	92%	87%
WPP	CI EMNC	5,961	0.86	89%	89%
WPP	CI Multifamily	626	0.05	82%	60%
WPP	Appliance Recycling	66	0.02	106%	106%
WPP Total		**27,313**	**4.42**	**105%**	**89%**

The gross realization rates for energy savings were driven primarily by variances between assumed lighting hours of use in advance of rebate approval and hours of use that were determined through impact evaluation activities.

3.4.2.1 Evaluation Adjustments in Response to the COVID-19 Pandemic

This program's gross impact evaluation typically involves on-site visits, with occasional metering of equipment and monitoring lighting hours of use. ADM resumed on-site visits at the end of Phase III after businesses reopened. The COVID-19 pandemic did not hinder the evaluation effort for PY14, and no adjustments were made to typical evaluation processes.

3.4.3 Net Impact Evaluation

The net impact evaluation of the Prescriptive initiative is described in Appendix R. The net impact evaluation of the Custom initiative is described in Appendix S. The net impact evaluation of the CI EMNC initiative is described in Appendix T. Net impact evaluation was not conducted for the CI Multifamily initiative since that is a dedicated low-income program. The NTG for the Appliance Recycling Initiative is estimated to be the same as the NTG of the residential Appliance Recycling Initiative, as described in Appendix V.

All initiatives other than CI Multifamily were evaluated for NTG in PY14, with results shown in Table 71.

Table 71: ESB-Small Program Net Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	NTG	Net Verified MWh	Net Verified MW
Met-Ed	CI Prescriptive	14,052	69.4%	9,759	1.77
Met-Ed	CI Custom	111	57.1%	64	0.01
Met-Ed	CI EMNC	3,460	97.8%	3,384	0.55
Met-Ed	CI Multifamily	114	100.0%	114	0.02
Met-Ed	Appliance Recycling	67	39.0%	26	0.01
Met-Ed Total		**17,805**	**75.0%**	**13,348**	**2.35**
Penelec	CI Prescriptive	15,929	66.0%	10,506	2.19
Penelec	CI Custom	377	52.1%	196	0.02
Penelec	CI EMNC	4,396	83.8%	3,684	0.47
Penelec	CI Multifamily	496	100.0%	496	0.07
Penelec	Appliance Recycling	45	65.0%	29	0.01
Penelec Total		**21,243**	**70.2%**	**14,911**	**2.75**
Penn Power	CI Prescriptive	2,534	82.8%	2,098	0.41
Penn Power	CI Custom	40	100.0%	40	0.02
Penn Power	CI EMNC	2,757	97.3%	2,683	0.52
Penn Power	CI Multifamily	0	100.0%	0	0.00
Penn Power	Appliance Recycling	35	38.0%	13	0.00
Penn Power Total		**5,366**	**90.1%**	**4,834**	**0.95**
WPP	CI Prescriptive	20,506	65.9%	13,523	2.27
WPP	CI Custom	153	49.1%	75	0.02
WPP	CI EMNC	5,961	110.0%	6,558	0.94
WPP	CI Multifamily	626	100.0%	626	0.05
WPP	Appliance Recycling	66	70.0%	46	0.01
WPP Total		**27,313**	**76.3%**	**20,828**	**3.30**

3.4.3.1 High-Impact Measure Research

The CI Prescriptive, CI Custom, and CI EMNC initiatives were all designated as high-impact measures in PY14. The net impact evaluation of the Prescriptive initiative is described in Appendix R. The net impact evaluation of the Custom initiative is described in Appendix S. The net impact evaluation of the CI EMNC initiative is described in Appendix T.

3.4.4 Verified Savings Estimates

In Table 72 the realization rates and net-to-gross ratios determined by ADM and Tetra Tech are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for the ESB-Small Program in PY14. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 72: PYTD and P4TD Savings Summary

	Met-Ed		Penelec		Penn Power		WPP	
Savings Type	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	17,544	3.18	21,200	4.35	6,089	1.31	26,034	4.99
PYVTD Gross	17,805	3.16	21,243	3.99	5,366	1.05	27,313	4.42
PYVTD Net	13,348	2.35	14,911	2.75	4,834	0.95	20,828	3.30
RTD	22,787	4.13	35,029	8.21	7,239	1.48	33,302	6.22
VTD Gross	23,368	4.10	34,649	7.72	6,528	1.20	34,246	5.49
VTD Net	16,838	2.94	26,521	6.02	5,785	1.07	25,786	4.06

3.4.5 Process Evaluation

In PY14 Tetra Tech conducted participant surveys, trade ally surveys, and midstream distributor interviews. Process evaluation activities were combined for the ESB Small and ESB Large programs. Tetra Tech opted to survey and interview the census of program participants, trade allies, and distributors. To further increase the number of survey participants, Tetra Tech drew from both PY13 and PY14 participants. Response rates varied but were generally higher than expected, which resulted in robust overall samples. Table 73 shows the sample design for the PY14 process evaluation effort. After review of the tracking and reporting system and the gross impact evaluation sample design, Tetra Tech applied a similar stratification approach as the gross impact evaluation at the initiative level. However, downstream and midstream sub-initiatives were not further disaggregated into lighting and non-lighting components. In Table 73 below, the Prescriptive stratum includes both lighting and non-lighting downstream projects, while the Midstream stratum incudes both lighting and non-lighting midstream projects. Participant telephone surveys combined net impact and process evaluation and were fielded in May and June 2023. An email campaign preceded the surveys to notify customers of the upcoming survey effort and to increase response rates. Trade ally surveys and distributor interviews occurred in July 2023.

Table 73: Combined C&I Program Process Evaluation Sample Design

Stratum	Population Size	Sample Size (Census Att	Response Rate
Met-Ed Custom	10	7	70%
Met-Ed Prescriptive	161	41	25%
Met-Ed Midstream	64	16	25%
Met-Ed EMNC	79	34	43%
Penelec Custom	21	13	62%
Penelec Prescriptive	200	70	35%
Penelec Midstream	162	39	24%
Penelec EMNC	98	32	33%
Penn Power Custom	5	4	80%
Penn Power Prescriptive	91	35	38%
Penn Power Midstream	8	1	13%
Penn Power EMNC	42	11	26%
WPP Custom	18	12	67%
WPP Prescriptive	272	97	36%
WPP Midstream	93	20	22%
WPP EMNC	120	35	29%
Trade Ally Surveys	165	51	31%
Midstream Distributor Interviews	17	15	88%
Program Total	**1,626**	**533**	**33%**

Key findings and recommendations are listed in Section 3.4.7.

3.4.6 Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 74, Table 75, Table 76, and Table 77 for Met-Ed, Penelec, Penn Power, and WPP respectively. The last two columns of the tables show benefits as calculated with net verified impacts, along with net participant costs (if applicable). The third and fourth columns show results as calculated on a gross basis. PYTD costs and benefits are net present values (NPV) expressed in 2022 dollars. NPV costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 74: Summary of Program Finances – Met-Ed

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	6,192		8,067		4,629		5,788	
2	Rebates to Participants and Trade Allies	2,755		3,195		2,755		3,195	
3	Upstream / Midstream Incentives	0		4		0		4	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	242		239		242		239	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	3,194		4,629		1,632		2,350	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	4	1	9	0	4	1	9
8	Administration and Management	223	753	462	1,301	223	753	462	1,301
9	Marketing	0	101	0	178	0	101	0	178
10	Program Delivery	20	18	40	37	20	18	40	37
11	EDC Evaluation Costs	306		433		306		433	
12	SWE Audit Costs	64		126		64		126	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,488		2,586		1,488		2,586	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**7,680**		**10,653**		**6,117**		**8,375**	
15	Total NPV Lifetime Electric Energy Benefits	7,287		9,202		5,455		6,616	
16	Total NPV Lifetime Electric Capacity Benefits	5,630		7,009		4,178		5,014	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	744		1,025		552		724	
18	Total NPV Lifetime Fossil Fuel Impacts	-743		-914		-529		-635	
19	Total NPV Lifetime Water Impacts	0		20		0		20	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**12,918**		**16,342**		**9,655**		**11,740**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.68**		**1.53**		**1.58**		**1.40**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 75: Summary of Program Finances – Penelec

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	5,910		9,009		4,367		6,971	
2	Rebates to Participants and Trade Allies	3,879		4,574		3,879		4,574	
3	Upstream / Midstream Incentives	0		4		0		4	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	520		892		520		892	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	1,510		3,539		-32		1,502	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	4	1	10	0	4	1	10
8	Administration and Management	252	1,212	522	2,285	252	1,212	522	2,285
9	Marketing	0	133	0	244	0	133	0	244
10	Program Delivery	21	34	42	65	21	34	42	65
11	EDC Evaluation Costs	340		480		340		480	
12	SWE Audit Costs	71		139		71		139	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	2,066		3,788		2,066		3,788	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**7,976**		**12,797**		**6,434**		**10,759**	
15	Total NPV Lifetime Electric Energy Benefits	9,074		13,973		6,325		10,637	
16	Total NPV Lifetime Electric Capacity Benefits	6,322		11,751		4,333		9,149	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	1,292		1,607		915		1,166	
18	Total NPV Lifetime Fossil Fuel Impacts	-437		-3,931		-300		-3,410	
19	Total NPV Lifetime Water Impacts	0		3		0		3	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**16,251**		**23,403**		**11,273**		**17,544**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**2.04**		**1.83**		**1.75**		**1.63**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 76: Summary of Program Finances – Penn Power

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	2,262		2,534		2,024		2,247	
2	Rebates to Participants and Trade Allies	1,406		1,512		1,406		1,512	
3	Upstream / Midstream Incentives	0		0		0		0	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		67		0		67	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	856		954		617		667	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	1	0	3	0	1	0	3
8	Administration and Management	82	307	167	506	82	307	167	506
9	Marketing	0	34	0	56	0	34	0	56
10	Program Delivery	6	8	13	16	6	8	13	16
11	EDC Evaluation Costs	87		123		87		123	
12	SWE Audit Costs	19		38		19		38	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	544		922		544		922	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**2,806**		**3,456**		**2,568**		**3,169**	
15	Total NPV Lifetime Electric Energy Benefits	2,346		2,726		2,114		2,416	
16	Total NPV Lifetime Electric Capacity Benefits	1,050		1,147		947		1,021	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	250		288		221		252	
18	Total NPV Lifetime Fossil Fuel Impacts	-112		-141		-94		-118	
19	Total NPV Lifetime Water Impacts	0		0		0		0	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**3,534**		**4,020**		**3,187**		**3,572**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.26**		**1.16**		**1.24**		**1.13**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 77: Summary of Program Finances – WPP

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	IMCs	7,692		10,098		6,003		7,746	
2	Rebates to Participants and Trade Allies	4,094		4,516		4,094		4,516	
3	Upstream / Midstream Incentives	0		6		0		6	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	315		1,391		315		1,391	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	3,283		4,186		1,594		1,833	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	4	1	9	0	4	1	9
8	Administration and Management	226	1,203	471	2,016	226	1,203	471	2,016
9	Marketing	0	110	0	188	0	110	0	188
10	Program Delivery	17	36	35	70	17	36	35	70
11	EDC Evaluation Costs	303		428		303		428	
12	SWE Audit Costs	62		121		62		121	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,960		3,339		1,960		3,339	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**9,652**		**13,437**		**7,963**		**11,084**	
15	Total NPV Lifetime Electric Energy Benefits	12,274		14,607		9,304		10,936	
16	Total NPV Lifetime Electric Capacity Benefits	4,118		4,876		3,056		3,585	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	1,321		1,472		972		1,087	
18	Total NPV Lifetime Fossil Fuel Impacts	-870		-895		-620		-643	
19	Total NPV Lifetime Water Impacts	0		54		0		54	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**16,843**		**20,115**		**12,712**		**15,019**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.74**		**1.50**		**1.60**		**1.36**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

3.4.7 Status of Recommendations

The process evaluation activities in PY14 led to the following findings and recommendations from Tetra Tech to the Companies, along with a summary of how the Companies plan to address the recommendation in program delivery.

Finding #1: *Satisfaction among participating customers and vendors remains high*. The average participant rating across all program aspects was 3.8 or higher for customers and 3.0 or higher for vendors on a 1 to 5 scale, where 1 was *not at all satisfied,* and 5 was *very satisfied*. More than one-half of participating customers have recommended the program to others, and 85 percent said they were very likely to participate again.

Finding #2: *Trade allies (contractors and vendors) continue to be the most common source of respondent awareness*. Two-thirds of customer respondents learned about the program from their contractor or vendor. Alternatively, customers said they *prefer* to receive information about the energy efficiency programs from FirstEnergy, specifically electronically through an email or a direct mail piece. Vendors echoed this feedback saying they felt the most effective communication was from FirstEnergy (i.e., account manager, call center, bill inserts).

Finding #3: • *The application process received mixed feedback.* While most program participants (75 percent) had no problems completing the program application, the application was mentioned as one of the features of the program that customer and vendor respondents would change. Simplifying the process and adding an electronic signature option were mentioned by both respondent groups. The application was also one of the program aspects customer respondents rated the lowest for their satisfaction.

Finding #4: *Most customer respondents had no recommended improvements or changes to the program, while most vendor respondents felt improvements were needed (65 percent each).* Customers with recommendations mentioned increasing program awareness (17 percent), expanding service offerings (16 percent), and simplifying the application (16 percent). Vendor respondent recommendations included more/clearer communication (five respondents), simplifying the process (five respondents), no more wet signatures (four respondents), increased incentives (three respondents), and more qualifying measures (two respondents).

Finding #5: *The Midstream Instant Discount program has successfully launched with mixed feedback on awareness.* Distributors were fairly satisfied with the overall program and were very satisfied with Franklin Energy (Franklin). Most of the distributors felt the rebates helped to increase their sales, and they all stocked or could get quick delivery on all the eligible equipment for the program. Awareness is high among customers who received equipment through the Midstream Instant Discount program, but only one-third of customers participating in downstream components knew about the program discount.

Recommendation #1: *Work with distributors to increase awareness of the Midstream Instant Discount program.* Distributors were generally satisfied with the program but rated the marketing or promotional materials available through the program the lowest. The most common improvements distributors recommended were to increase the direct promotion of the program to FirstEnergy customers and to provide marketing materials distributors can use in their stores, online, and for other points of sale.

EDC Status Report #1: Recommendation accepted.

Recommendation #2: *Continue to utilize multiple strategies to promote the programs to customers, vendors, and distributors*. FirstEnergy and the conservation service providers (CSP) use many different outreach strategies to market the programs; this can be seen in the variety of sources customers reported hearing about the program, but a preference for direct communication from FirstEnergy is among the lowest sources of awareness.

EDC Status Report #2: Recommendation accepted.

Recommendation #3: *Continue to seek opportunities to simplify the application and approval processes*. Customers who had difficulty with the application said the application was difficult to complete in general or that additional information was needed to be submitted with the application. Customers and vendors thought the process could be simplified by adding an electronic signature option, making improvements to the online portal, and making the online application more "user-friendly." The time it took to complete the paperwork and the amount of paperwork required by the program were two aspects of the program with the lowest satisfaction scores.

EDC Status Report #3: Recommendation accepted.

Recommendation #4: *Streamline the Midstream Instant Discount program processes.* Distributors appreciated the support provided by Franklin but felt some of the processes could be improved, mainly related to the online portal. These processes include having an automated system and portal to verify eligible equipment, qualify customers, and track and process rebates. Confirming eligibility through a portal instead of using a utility bill, address, or account number was suggested by distributors.

EDC Status Report #4: Recommendation accepted.

3.5 C&I Energy Solutions for Business Program - Large

The C&I Solutions for Business Program – Large (referred to as ESB-Large Program) is offered to large commercial and industrial customers and was implemented jointly by Franklin Energy Services and Willdan for PY14. The Franklin Energy Services portion of the program includes downstream and midstream incentives for customers that install energy efficient equipment. The Willdan portion of the program includes incentives for efficient new construction and the Building Tune-Up direct install program in PY14.

3.5.1 Participation and Reported Savings by Customer Segment

Table 78 and Table 79 present the participation counts, reported energy and demand savings, and incentive payments for the ESB-Large Program in PY14 by customer segment and EDC. This program serves the Large C&I and GNI customer segments. Each separate rebate application is counted as one participant.

Table 78: ESB-Large Program Participation and Reported Impacts for Met-Ed and Penelec

Parameter	Met-Ed Large C&I (Non-GNI)	Met-Ed GNI	Met-Ed Total	Penelec Large C&I (Non-GNI)	Penelec GNI	Penelec Total
PYTD # Participants	189	10	199	138	1	139
PYRTD MWh/yr	34,636	103	34,740	17,985	13	17,999
PYRTD MW/yr	4.33	0.01	4.34	2.85	0.00	2.85
PYTD Incentives ($1000)	1,215	15	1,230	691	0	691

Table 79: ESB-Large Program Participation and Reported Impacts for Penn Power and WPP

Parameter	Penn Power Large C&I (Non-GNI)	Penn Power GNI	Penn Power Total	WPP Large C&I (Non-GNI)	WPP GNI	WPP Total
PYTD # Participants	34	5	39	174	2	176
PYRTD MWh/yr	1,954	675	2,629	18,313	81	18,394
PYRTD MW/yr	0.37	0.14	0.51	2.79	0.00	2.80
PYTD Incentives ($1000)	120	63	183	1,071	4	1,075

3.5.2 Gross Impact Evaluation

The ESB-Large Program is disaggregated into three sampling initiatives for gross impact evaluation. Each of these initiatives spans both the ESB-Large and ESB-Small programs. The gross impact evaluation of the Prescriptive initiative is described in Appendix R. The gross impact evaluation of the Custom initiative is described in Appendix S. The gross impact

evaluation of the CI EMNC initiative is described in Appendix T. Table 80 summarizes program verified impacts and realization rates for each EDC.

Table 80: ESB-Large Program Gross Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	Gross Verified MW	MWh Realization Rate	MW Realization Rate
Met-Ed	CI Prescriptive	11,747	2.01	103%	100%
Met-Ed	CI Custom	23,770	2.62	103%	100%
Met-Ed	CI EMNC	145	0.03	98%	97%
Met-Ed	Appliance Recycling	0	0.00	116%	113%
Met-Ed Total		**35,662**	**4.66**	**102.7%**	**100.1%**
Penelec	CI Prescriptive	18,211	2.81	106%	96%
Penelec	CI Custom	300	0.03	101%	102%
Penelec	CI EMNC	409	0.07	85%	72%
Penelec	Appliance Recycling	0	0.00	106%	102%
PenelecTotal		**18,920**	**2.92**	**105.1%**	**95.5%**
Penn Power	CI Prescriptive	1,765	0.29	85%	72%
Penn Power	CI Custom	0	0.00	101%	98%
Penn Power	CI EMNC	505	0.12	91%	88%
Penn Power	Appliance Recycling	0	0.00	104%	102%
Penn PowerTotal		**2,271**	**0.41**	**86.4%**	**76.2%**
WPP	CI Prescriptive	18,839	2.51	112%	89%
WPP	CI Custom	936	0.09	92%	87%
WPP	CI EMNC	466	0.09	89%	89%
WPP	Appliance Recycling	1	0.00	106%	106%
WPP Total		**20,243**	**2.69**	**110.1%**	**89.0%**

The gross realization rates for energy savings were driven primarily by variances between assumed operational characteristics in advance of rebate approval and operational characteristics that were determined through impact evaluation activities. Key operational characteristics include lighting hours of use and equivalent full load hours for chillers, air compressors, and motors.

3.5.2.1 Evaluation Adjustments in Response to the COVID-19 Pandemic

This program's gross impact evaluation typically involves on-site visits, with occasional metering of equipment and monitoring lighting hours of use. ADM resumed on-site visits at the end of Phase III after businesses reopened. The COVID-19 pandemic did not hinder the evaluation effort for PY14, and no adjustments were made to typical evaluation processes.

3.5.3 Net Impact Evaluation

The net impact evaluation of the Prescriptive initiative is described in Appendix R. The net impact evaluation of the Custom initiative is described in Appendix S. The net impact evaluation of the CI EMNC initiative is described in Appendix T. Note that none of these initiatives were evaluated for NTG in PY13. Historical NTG values from research in Phase III were applied to

other initiatives as shown in Table 81, which summarizes program verified gross and net energy impacts and net-to-gross ratios for each EDC.

Table 81: ESB-Large Program Net Impact Evaluation Summary for PY14

EDC	Sampling Initiative	Gross Verified MWh	NTG	Net Verified MWh	Net Verified MW
Met-Ed	CI Prescriptive	11,747	69.4%	8,158	1.40
Met-Ed	CI Custom	23,770	57.1%	13,583	1.50
Met-Ed	CI EMNC	145	97.8%	142	0.03
Met-Ed	Appliance Recycling	0	39.0%	0	0.00
Met-Ed Total		**35,662**	**61.4%**	**21,883**	**2.92**
Penelec	CI Prescriptive	18,211	66.0%	12,011	1.86
Penelec	CI Custom	300	52.1%	156	0.01
Penelec	CI EMNC	409	83.8%	343	0.06
Penelec	Appliance Recycling	0	65.0%	0	0.00
Penelec Total		**18,920**	**66.1%**	**12,510**	**1.93**
Penn Power	CI Prescriptive	1,765	82.8%	1,462	0.24
Penn Power	CI Custom	0	100.0%	0	0.00
Penn Power	CI EMNC	505	97.3%	492	0.11
Penn Power	Appliance Recycling	0	38.0%	0	0.00
Penn Power Total		**2,271**	**86.0%**	**1,953**	**0.35**
WPP	CI Prescriptive	18,839	65.9%	12,424	1.65
WPP	CI Custom	936	49.1%	460	0.04
WPP	CI EMNC	466	110.0%	513	0.10
WPP	Appliance Recycling	1	70.0%	1	0.00
WPP Total		**20,243**	**66.2%**	**13,397**	**1.80**

3.5.3.1 High-Impact Measure Research

The CI Prescriptive, CI Custom, and CI EMNC initiatives were all designated as high-impact measures in PY14. The net impact evaluation of the Prescriptive initiative is described in Appendix R. The net impact evaluation of the Custom initiative is described in Appendix S. The net impact evaluation of the CI EMNC initiative is described in Appendix T.

3.5.4 Verified Savings Estimates

In Table 82 the realization rates and net-to-gross ratios determined by ADM and Tetra Tech are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for ESB-Large Program in PY14. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 82: PYTD and P4TD Savings Summary

	Met-Ed		Penelec		Penn Power		WPP	
Savings Type	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	34,740	4.66	17,999	3.05	2,629	0.53	18,394	3.02
PYVTD Gross	35,662	4.66	18,920	2.92	2,271	0.41	20,243	2.69
PYVTD Net	21,883	2.92	12,510	1.93	1,953	0.35	13,397	1.80
RTD	51,319	6.98	20,148	3.42	9,922	1.37	29,588	4.33
VTD Gross	52,824	7.02	20,956	3.23	9,611	1.24	31,486	3.92
VTD Net	31,514	4.26	14,102	2.18	6,662	0.90	20,223	2.55

3.5.5 Process Evaluation

The process evaluation effort for both C&I Programs is described in Sections 3.4.5 and 3.4.7. Most practical aspects of the programs are managed as one general effort rather than distinct programs, but applications are placed in one of the two programs according to their associated rate classes.

3.5.6 Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 83, Table 84, Table 85, and Table 86 for Met-Ed, Penelec, Penn Power, and WPP respectively. The last two columns of the tables show benefits as calculated with net verified impacts, along with net participant costs (if applicable). The third and fourth columns show results as calculated on a gross basis. PYTD costs and benefits are net present values (NPV) expressed in 2022 dollars. NPV costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 83: Summary of Program Finances – Met-Ed

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	6,189		11,101		3,698		6,469	
2	Rebates to Participants and Trade Allies	1,095		1,661		1,095		1,661	
3	Upstream / Midstream Incentives	197		189		197		189	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	4,897		9,251		2,406		4,619	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	5	1	12	0	5	1	12
8	Administration and Management	288	613	578	1,062	288	613	578	1,062
9	Marketing	0	56	0	101	0	56	0	101
10	Program Delivery	20	2	38	5	20	2	38	5
11	EDC Evaluation Costs	308		507		308		507	
12	SWE Audit Costs	83		162		83		162	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,374		2,467		1,374		2,467	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**7,563**		**13,569**		**5,072**		**8,936**	
15	Total NPV Lifetime Electric Energy Benefits	15,223		21,377		9,341		12,758	
16	Total NPV Lifetime Electric Capacity Benefits	4,506		6,493		2,824		3,939	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	-2,482		-2,236		-1,362		-1,217	
18	Total NPV Lifetime Fossil Fuel Impacts	-4,631		-4,690		-2,660		-2,710	
19	Total NPV Lifetime Water Impacts	0		0		0		0	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**12,616**		**20,944**		**8,142**		**12,770**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**1.67**		**1.54**		**1.61**		**1.43**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 84: Summary of Program Finances – Penelec

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	4,150		4,423		2,909		3,139	
2	Rebates to Participants and Trade Allies	531		684		531		684	
3	Upstream / Midstream Incentives	194		187		194		187	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	3,425		3,552		2,183		2,268	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	3	1	9	0	3	1	9
8	Administration and Management	215	316	433	573	215	316	433	573
9	Marketing	0	43	0	78	0	43	0	78
10	Program Delivery	14	2	27	6	14	2	27	6
11	EDC Evaluation Costs	228		376		228		376	
12	SWE Audit Costs	60		118		60		118	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	882		1,620		882		1,620	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**5,032**		**6,044**		**3,791**		**4,760**	
15	Total NPV Lifetime Electric Energy Benefits	7,784		8,247		5,145		5,552	
16	Total NPV Lifetime Electric Capacity Benefits	2,955		3,132		1,957		2,113	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	758		763		517		525	
18	Total NPV Lifetime Fossil Fuel Impacts	-515		-537		-349		-369	
19	Total NPV Lifetime Water Impacts	0		0		0		0	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**10,981**		**11,605**		**7,270**		**7,822**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**2.18**		**1.92**		**1.92**		**1.64**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 85: Summary of Program Finances – Penn Power

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	1,257		8,456		1,166		5,618	
2	Rebates to Participants and Trade Allies	161		613		161		613	
3	Upstream / Midstream Incentives	31		30		31		30	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	1,065		7,813		974		4,975	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	1	0	2	0	1	0	2
8	Administration and Management	69	135	138	312	69	135	138	312
9	Marketing	0	21	0	36	0	21	0	36
10	Program Delivery	5	2	10	4	5	2	10	4
11	EDC Evaluation Costs	57		93		57		93	
12	SWE Audit Costs	16		32		16		32	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	306		627		306		627	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**1,563**		**9,083**		**1,472**		**6,245**	
15	Total NPV Lifetime Electric Energy Benefits	994		4,105		854		2,839	
16	Total NPV Lifetime Electric Capacity Benefits	317		960		275		689	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	188		4,459		172		2,802	
18	Total NPV Lifetime Fossil Fuel Impacts	-143		-163		-127		-143	
19	Total NPV Lifetime Water Impacts	0		0		0		0	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**1,356**		**9,360**		**1,174**		**6,188**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.87**		**1.03**		**0.80**		**0.99**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Table 86: Summary of Program Finances – WPP

Row #	Cost Category	Gross PYTD ($1,000)		Gross P4TD ($1,000)		Net PYTD ($1,000)		Net P4TD ($1,000)	
1	**IMCs**	3,188		5,955		2,102		3,766	
2	Rebates to Participants and Trade Allies	916		1,528		916		1,528	
3	Upstream / Midstream Incentives	213		204		213		204	
4	Material Cost for Self-Install Programs (EE&C Kits)	0		0		0		0	
5	Direct Installation Program Materials and Labor	0		0		0		0	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	2,060		4,222		974		2,034	
		EDC	CSP	EDC	CSP	EDC	CSP	EDC	CSP
7	Program Design	0	3	1	8	0	3	1	8
8	Administration and Management	208	465	421	812	208	465	421	812
9	Marketing	0	36	0	65	0	36	0	65
10	Program Delivery	12	2	23	5	12	2	23	5
11	EDC Evaluation Costs	221		365		221		365	
12	SWE Audit Costs	57		112		57		112	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	1,004		1,811		1,004		1,811	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	**4,192**		**7,766**		**3,106**		**5,578**	
15	Total NPV Lifetime Electric Energy Benefits	8,921		13,375		5,901		8,581	
16	Total NPV Lifetime Electric Capacity Benefits	1,737		2,442		1,161		1,587	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	383		490		253		323	
18	Total NPV Lifetime Fossil Fuel Impacts	-755		-905		-498		-597	
19	Total NPV Lifetime Water Impacts	0		0		0		0	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	**10,286**		**15,401**		**6,817**		**9,894**	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**2.45**		**1.98**		**2.19**		**1.77**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

3.5.7 Status of Recommendations

Recommendations for the nonresidential programs are listed in Section 3.4.7.

4 Portfolio Finances and Cost Recovery

This section provides an overview of the expenditures associated with the Companies' portfolios and the recovery of those costs from ratepayers

4.1 Program Finances

Program-specific and portfolio total finances for PY14 are shown in Table 87, Table 88, Table 89, and Table 90 for Met-Ed, Penelec, Penn Power, and WPP. The columns in these tables Table 87 through Table 94 are adapted from the 'Direct Program Cost' categories in the Commission's EE&V Plan template[8] for Phase IV. Non-incentives include EDC Materials, Labor, and Administration costs (including costs associated with an EDC's own employees) as well as ICSP Materials, Labor, and Administration costs (including both the program implementation contractor and the costs of any other outside vendors and EDCs employs to support program delivery). The dollar figures shown in Table 87 through Table 94 are based on EDC tracking of expenditures with no adjustments to account for inflation.[9]

Table 87: Met-Ed PY14 Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	2,968	1,262	4,229
Energy Efficient Products	2,083	1,497	3,580
Low Income Energy Efficiency	1,571	660	2,232
C&I Energy Solutions for Business - Small	2,997	1,424	4,421
C&I Energy Solutions for Business - Large	1,291	1,291	2,582
Common Portfolio Costs[1]		0	0
Portfolio Total	**10,910**	**6,134**	**17,044**
SWE Costs[2]	**N/A**	**N/A**	**253**
Total	**10,910**	**6,134**	**17,298**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

[8] https://www.puc.pa.gov/pcdocs/1676672.docx

[9] The cost-recovery of program expenses through riders generally happens promptly so that costs are being recovered from ratepayers in the same dollars that they are incurred.

Table 88: Penelec PY14 Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	2,444	842	3,286
Energy Efficient Products	1,281	1,152	2,434
Low Income Energy Efficiency	1,769	712	2,482
C&I Energy Solutions for Business - Small	4,399	1,995	6,394
C&I Energy Solutions for Business - Large	726	821	1,547
Common Portfolio Costs[1]		0	0
Portfolio Total	**10,619**	**5,523**	**16,142**
SWE Costs[2]	**N/A**	**N/A**	**230**
Total	**10,619**	**5,523**	**16,372**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

Table 89: Penn Power PY14 Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	1,048	458	1,506
Energy Efficient Products	481	397	878
Low Income Energy Efficiency	550	273	823
C&I Energy Solutions for Business - Small	1,406	525	1,931
C&I Energy Solutions for Business - Large	192	290	482
Common Portfolio Costs[1]		0	0
Portfolio Total	**3,678**	**1,943**	**5,621**
SWE Costs[2]	**N/A**	**N/A**	**71**
Total	**3,678**	**1,943**	**5,692**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

Table 90: WPP PY14 Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	2,875	1,414	4,290
Energy Efficient Products	1,515	1,478	2,993
Low Income Energy Efficiency	2,308	733	3,040
C&I Energy Solutions for Business - Small	4,409	1,898	6,307
C&I Energy Solutions for Business - Large	1,128	946	2,075
Common Portfolio Costs[1]		0	0
Portfolio Total	**12,236**	**6,470**	**18,706**
SWE Costs[2]	**N/A**	**N/A**	**238**
Total	**12,236**	**6,470**	**18,943**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

Program-specific and portfolio total finances since the inception of Phase IV are shown in Table 91, Table 92, Table 93, and Table 94 for Met-Ed, Penn Power, Penelec, and WPP.

Table 91: Met-Ed P4TD Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	5,191	2,257	7,448
Energy Efficient Products	3,330	2,825	6,156
Low Income Energy Efficiency	2,560	1,301	3,861
C&I Energy Solutions for Business - Small	3,581	2,528	6,109
C&I Energy Solutions for Business - Large	1,912	2,366	4,278
Common Portfolio Costs[1]		0	0
Portfolio Total	**16,574**	**11,278**	**27,852**
SWE Costs[2]	**N/A**	**N/A**	**507**
Total	**16,574**	**11,278**	**28,359**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

Table 92: Penelec P4TD Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	3,811	1,462	5,274
Energy Efficient Products	2,054	2,168	4,221
Low Income Energy Efficiency	3,273	1,462	4,736
C&I Energy Solutions for Business - Small	5,679	3,744	9,423
C&I Energy Solutions for Business - Large	906	1,542	2,447
Common Portfolio Costs[1]		0	0
Portfolio Total	**15,723**	**10,378**	**26,101**
SWE Costs[2]	**N/A**	**N/A**	**459**
Total	**15,723**	**10,378**	**26,560**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

Table 93: Penn Power P4TD Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	1,660	844	2,504
Energy Efficient Products	824	756	1,580
Low Income Energy Efficiency	961	553	1,514
C&I Energy Solutions for Business - Small	1,646	909	2,556
C&I Energy Solutions for Business - Large	652	609	1,262
Common Portfolio Costs[1]		0	0
Portfolio Total	**5,744**	**3,672**	**9,416**
SWE Costs[2]	**N/A**	**N/A**	**143**
Total	**5,744**	**3,672**	**9,558**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

Table 94: WPP P4TD Program and Portfolio total Finances ($1,000)

Program	Incentives	Non-Incentives	Total Cost
Energy Efficient Homes	5,025	2,492	7,517
Energy Efficient Products	2,486	2,757	5,243
Low Income Energy Efficiency	3,352	1,373	4,725
C&I Energy Solutions for Business - Small	6,122	3,308	9,431
C&I Energy Solutions for Business - Large	1,786	1,745	3,531
Common Portfolio Costs[1]		0	0
Portfolio Total	**18,771**	**11,676**	**30,447**
SWE Costs[2]	**N/A**	**N/A**	**475**
Total	**18,771**	**11,676**	**30,922**

1. Common portolio costs are zero because all costs are distributed among programs as in the Company's EE&C plan.
2. Statewide Evaluation costs are outside of the 2% spending cap.

4.2 Cost Recovery

Act 129 allows Pennsylvania EDCs to recover EE&C plan costs through a cost-recovery mechanism. Each EDC's cost-recovery charges are organized separately by five customer sectors to ensure that the electric rate classes that finance the programs are the rate classes that receive the direct energy and conservation benefits. Cost-recovery is governed by tariffed rate class, so it is necessarily tied to the way customers are metered and charged for electric service. Readers should be mindful of the differences between the tables below and Section 2.3. For example, the low-income customer segments are subsets of the residential tariff(s) and therefore not listed separately in Table 95, Table 96, Table 97, and Table 98.

Table 95: Met-Ed EE&C Expenditures by Cost-Recovery Category[10] ($1,000)

Cost Recovery Sector	Rate Classes Included	PYTD $ Spending ($1,000)	P4TD $ Spending ($1,000)
Residential (incl Low Income)	Rate RS	$10,147	$17,676
Small C&I	Rate GS-Small, Rate GS-Medium, and Outdoor Lighting Service	$4,473	$6,223
Large C&I	Rate GS-Large, Rate GP and Rate TP	$2,666	$4,445
Street Lighting	Street Lighting Service, LED Street Lighting Service and Ornamental Street Lighting Service	$13	$15
Portfolio Total		**$17,298**	**$28,359**

Table 96: Penelec EE&C Expenditures by Cost-Recovery Category[11] ($1,000)

Cost Recovery Sector	Rate Classes Included	PYTD $ Spending ($1,000)	P4TD $ Spending ($1,000)
Residential (incl Low Income)	Rate RS	$8,299	$14,427
Small C&I	Rate GS-Small, Rate GS-Medium, and Outdoor Lighting Service	$6,454	$9,552
Large C&I	Rate GS-Large, Rate GP, and Rate LP	$1,608	$2,568
Street Lighting	Street Lighting Service, LED Street Lighting Service, and Ornamental Street Lighting Service	$12	$14
Portfolio Total		**$16,372**	**$26,560**

Table 97: Penn Power EE&C Expenditures by Cost-Recovery Category[12] ($1,000)

Cost Recovery Sector	Rate Classes Included	PYTD $ Spending ($1,000)	P4TD $ Spending ($1,000)
Residential (incl Low Income)	Rate RS	$3,243	$5,670
Small C&I	Rate GS, GS Special Rider GSDS, Rate GM, Rate GS-Large and POL	$1,945	$2,588
Large C&I	Rate GP, and Rate GT	$498	$1,294
Street Lighting	Rate Schedules SV, SVD, SM and LED	$5	$6
Portfolio Total		**$5,692**	**$9,558**

[10] Includes SWE costs
[11] Includes SWE costs
[12] Includes SWE costs

Table 98: WPP EE&C Expenditures by Cost-Recovery Category[13] ($1,000)

Cost Recovery Sector	Rate Classes Included	PYTD $ Spending ($1,000)	P4TD $ Spending ($1,000)
Residential (incl Low Income)	Rate 10	$10,442	$17,722
Small C&I	Rate GS 20, Rate GS 30	$6,366	$9,549
Large C&I	Rate GS 35, 40, 44, 46, and Tariff No. 38	$2,132	$3,645
Street Lighting	Rate Schedules 51 through 58, 71, 72	$3	$5
Portfolio Total		**$18,943**	**$30,922**

[13] Includes SWE costs

Appendix A Site Inspection Summary

Table 99: PY14 Site Visit Summary

EDC	Program	Inspection Firm	Number of Inspections Conducted	Number of Virtual Inspections Conducted	Number of Sites with Discrepancies from Reported Values	Summary of Common Discrepancies
Met-Ed	Energy Efficient Products Program - HVAC Rebates (CAC, ASHP, Mini-Splits)	Franklin	87	0	6	Physical address or phone number differed from contact information on rebate application. A serial number on a CAC system was incorrectly entered as a "B", instead of an "8" Customer had moved in between installation and inspection, resulting in a different customer living at home at time of inspection.
Penelec		Franklin	57	0	2	
Penn Power		Franklin	8	0	1	
WPP		Franklin	53	0	8	
Met-Ed	Energy Efficient Homes Program - New Construction	PSD	34	0	Please refer to the gross realization rates in past reports as a measure of consistency between reported and verified values.	The most common discrepancies are incorrect equipment capacities, using REM/Rate defaults for furnace fan energy usage rating rather than looking them up by model #, estimating the % of lamps that are efficient, window sizes, and building orientation.
Met-Ed		ADM	0	0		
Penelec		PSD	4	0		
Penelec		ADM	8	0		
Penn Power		PSD	37	0		
Penn Power		ADM	0	0		
WPP		PSD	41	0		
WPP		ADM	0	0		
Met-Ed	Low Income Direct Install Programs	PSD, Honeywell	44	0	1	No discrepancies found for PY14
Penelec			57	0	0	
Penn Power			48	0	0	
WPP			57	0	0	
Met-Ed	C/I Programs	ADM	22	0	Please refer to gross realizaion rates as a measure of consistency.	The main discrepancy is lamp fixture counts/types. Other measures are verified essentially 100% of the time.
Penelec	C/I Programs	ADM	38	0		
Penn Power	C/I Programs	ADM	31	0		
WPP	C/I Programs	ADM	57	1		
TOTAL	**TOTAL**		**683**	**1**	**n/a**	

Appendix B HER Impact Evaluation Detail

B.1 Gross Impact Evaluation

The Behavioral Modification subprogram provides home energy reports to residential customers in the FirstEnergy PA service territory. These reports detail customers' historical energy usage, providing tips on ways customers can save energy, and promoting other programs in FirstEnergy's residential energy efficiency portfolio. The subprogram is divided between standard residential customers and Low-Income customers, with Low-Income customers receiving reports more frequently than participants in the standard residential subprogram and exclusively receiving low-cost or no-cost tips in their reports. The subprogram is administered as a randomized control trial (RCT) and participants are enrolled in experimental cohorts, with the frequency and start date of each cohort differing for the four EDCs. A monthly billing analysis regression is the primary activity used to calculate savings. Each participant cohort is modeled separately to generate verified gross usage savings. The following section describes ADM's gross impact evaluation methodology.

B.1.1 Data Preparation and Analysis Procedure

B.1.1.1 Data Gathering

Monthly billing data dating back to 12 months prior to each experimental cohort's treatment start date through May 2023 was requested from FirstEnergy for all participants. Monthly billing data was provided with indicators identifying whether the monthly bill was estimated or based on an actual meter read. Control vs. treatment indicators were also provided in the billing data set. Demographic information such as participant account number, etc. were masked in the billing data set. ADM utilized a map of customer IDs to utility account numbers for use in dual participation analysis.

B.1.1.2 Data Preparation

During Phase III, FirstEnergy converted most residential accounts to AMI. Thus, ADM leveraged the daily AMI extract provided by FirstEnergy to conduct the billing data analysis for Home Energy Reports in Phase IV.

ADM's preparation of AMI data is as follows:

- Residential AMI data is filtered by cohort by the treatment and comparison group account numbers.
- Estimated AMI data may be present in the AMI data as a means of backfilling missing reads. Rather than interpolating estimated AMI data, estimated AMI data and any calendar day containing estimated AMI data is removed from the data set on a per-customer basis.
- Calendar days with missing/incomplete data are excluded from analysis on a per customer basis.
- The total daily kWh per customer is taken for each customer for each day by summing across the kWh for each calendar day.

- An outlier filter of +/- 300 kWh per day was applied to the data set.

An average daily kWh per month for each customer is taken by averaging the total daily kWh for each customer for each calendar month. This is done to interpolate across any missing days in the calendar month.

B.1.1.3 Billing Analysis

ADM utilized a lagged seasonal (LS) multivariate regression model to estimate program savings for all experimental cohorts. The LS model is specified in the equation below:

$$kWh_{imy} = \beta_0 + \sum_{m=1}^{12}\sum_{y=2011}^{2021} \mathrm{I}_{my} * \beta_{mys} * (AvgPre_i + AvePreSummer_i + AvePreWinter_i) + \sum_{m=1}^{12}\sum_{y=2011}^{2021} \mathrm{I}_{my} * \tau_{my} * \mathrm{treatment}_{imy} + \varepsilon_{imy}$$

Equation 1: Formula specifying the lagged seasonal regression model

The variables above are defined in Table 100 below. The regression coefficient of the interaction between the month post-treatment and the treatment dummy variable represents the average treatment effect per home for that given month. A negative regression coefficient represents a savings in the overall billed usage for the treatment group. Taking the negative of that coefficient will represent the daily kWh savings attributable to the treatment effect for that month per home.

Table 100: Definition of variables in the lagged seasonal regression model

Variable	Definition
kWh_{imy}	Customer i's average daily energy usage in bill month m in year y.
β_0	Intercept of the regression equation.
I_{my}	Equal to one for each monthly bill month m, year y, and zero otherwise.
β_{mys}	The coefficient on the bill month m, year y indicator variable interacted with season s.
$AvgPre_i$	Average daily usage for customer i in the pre-treatment period.
$AvePreSummer_i$	Average daily usage for customer i in the pre-treatment period during June through September.
$AvePreWinter_i$	Average daily usage for customer i in the pre-treatment period during December through March.
$treatment_{imy}$	The treatment indicator variable. Equal to one when the treatment is in effect for the treatment group. Zero otherwise. Always zero for the control group.
τ_{my}	The estimated treatment effect in kWh per day per customer; the main parameter of interest.
ε_{imy}	The error terms.

B.1.1.4 Dual Participation Analysis

Participants in both the treatment and control groups participate in other FirstEnergy energy efficiency programs. Furthermore, the "Home Energy Report" measure received by participants in the treatment group may cause treatment group participants to seek out other programs and measures offered in the FirstEnergy efficiency portfolio to a greater extent than the control group. To the extent that the treatment group participates in other FirstEnergy programs at a rate above and beyond that of the control group, those incremental savings will be reflected in the gross energy savings calculated using the method above. However, savings for these items will also have been attributed to their respective programs and subprograms. ADM corrected for dual participation that occurred after treatment began to the extent that the treatment group participated at a higher rate than the control group.

Adjustment for Downstream Measures

For downstream measures, ADM conducted a review of the tracking and reporting system for each experimental cohort to identify EE program participation that occurred from the treatment start date onwards. The following steps detail the process of correcting for these measures:

1. The measures for the treatment group and control group were assigned to an appropriate month based on the reported date of installation for measures installed after the treatment start date.
2. For each month of the program year, the annual savings for all measures installed prior to the month of interest dating back to the treatment start date that had not yet reached the end of their effective useful life were summed for all active participants for each group. For measures installed prior to the current Program Year, ADM used verified savings for dual participation analysis. For measures installed during the Program Year, ADM utilized reported savings as verification activities occurred concurrently to the evaluation of the Behavioral Modification subprogram.
3. The totaled savings for each group was then divided by 365.25 and then divided by the number of active customers in each group to create a daily average dual participation savings value per home.
4. For each month, the daily average dual participation savings value per home for the control group was then subtracted from the daily average dual participation savings value per home from the treatment group. This resulted in an adjustment factor which was then subtracted from the daily savings value extrapolated from the billing analysis prior to using these values to calculate gross verified energy savings.

Adjustment for Upstream Measures

Adjustments for upstream measures was conducted in accordance to the Phase IV Evaluation Framework. The adjustment was cast as a multiplier and applied after the correction for the downstream energy efficiency programs and the initial calculation of annual savings for the program year for a given participant wave. The multiplier values depended on the number of years since program enrollment for a given participation wave and are summarized in Table 101 below.

Table 101: Adjustment factors for dual participation in upstream programs.

Years Since Enrollment	Adjustment multiplier for upstream program
1	99.25%
2	98.5%
3	97.75%
4 or more	97%

B.1.1.5 Gross Energy Savings Calculation

Gross energy savings can be calculated by taking the treatment effect in a given month (the negative of the regression coefficient of the treatment effect for a given month minus the downstream dual participation adjustment factor for that month), multiplying it by the number of days in the month, the number of active treatment group participants in that month, and the upstream adjustment multiplier. Equation 2 demonstrates the algorithm for calculating verified savings for the model for each month in the program year.

$$kWh\ savings_{my} = \tau_{my} \times days_{my} \times number\ of\ participants_{my} \times upstream\ adjustment\ multiplier$$

Equation 2: kWh savings calculation

The variables in the above equation are defined in Table 102 below.

Table 102: Definition of variables for kWh savings calculation

Variable	Definition
τ_{my}	The average daily treatment effect for month *my*—the inverse of the regression coefficient from the regression model minus the downstream dual participation correction factor.
my	The month of interest.
$upstream\ adjustment\ multiplier$	The upstream adjustment multiplier for the experimental cohort.

Savings were calculated for each wave separately and then summed together to determine the total savings for each initiative (standard residential v. Low-Income) per EDC. Monthly savings were added together to generate annual savings.

Table 103: Dual participation correction results by EDC and participation wave

Wave	Treat	Control	Delta	Wave	Treat	Control	Delta
ME-1-LI	340	267	74	PN-1	124	121	3
ME-1	827	796	31	PN-1-LI	387	435	-47
ME-2-LI	129	116	13	PN-2	68,070	65,081	2,989
ME-2	254	261	-7	WP-1	927	803	124
PP-1	411	326	86	WP-1-LI	382	330	52
PP-1-LI	296	288	8	WP-2	351	272	79

B.1.1.6 Gross Demand Savings Calculation

For cohorts established in Phase IV of Act 129, ADM leveraged advanced metering infrastructure (AMI) data to measure gross demand savings by modifying the LS model for use in the measurement of demand savings, as shown in the following equation:

$$kWh_{i\_peak} = \beta_0 + \beta_1 * AvgPre_i + \tau * treatment_i + \varepsilon_{\text{imy}}$$

Equation 3: Formula specifying the lagged peak demand regression model

Table 104: Definition of variables in the lagged peak demand regression model

Variable	Definition
kWh_{i_peak}	Customer i's hourly energy usage during the peak demand window (non-holiday weekdays between 2 p.m. to 6 p.m. from June through August) during the post-period only.
β_0	Intercept of the regression equation.
β_1	The coefficient of the lagged pre-usage term.
$AvgPre_i$	The lagged pre-usage term, representing the average hourly consumption during the peak demand window of the pre-treatment period. I.e., the average hourly consumption from June through August on non-holiday weekdays from 2 p.m. to 6 p.m.
$treatment_i$	The treatment indicator variable. Equal to one when the treatment is in effect for the treatment group. Zero otherwise. Always zero for the control group.
τ	The estimated treatment effect in kWh per hour per customer during the peak demand window; the main parameter of interest.
ε_{imy}	The error terms.

As shown in the table above, the parameter τ represents the peak demand savings out of the regression equation and simply needs to be multiplied by the number of participants and the sign inverted to obtain the cohort-level peak demand savings.

In PY14, the 2012 standard residential cohort for Penelec began receiving treatment after previously being inactive for PY13. AMI had yet to be established at the time this cohort was enrolled in the HER subprogram. Therefore, ADM followed the Phase IV Evaluation Framework

guidance for measuring demand savings for customers without AMI data in the pre-treatment period by checking the equivalence in the average daily kWh during the summer pre-treatment period. Once this pre-summer equivalence was confirmed, ADM used a simple subtraction method for determining the gross demand savings for the 2012 Penelec standard residential cohort.

B.1.1.1 Adjustment for Persistence in Energy and Demand Savings

Consistent with Section 6.1.9 of the Phase IV TRM, ADM adjusted savings for any cohorts with greater than two years of exposure to adjust for savings persistence had treatment no longer been administered to said cohort. For PY14, the 2012 Penelec standard residential featured such an adjustment. The equations below have been recreated from the TRM for reference:

- For y=1 or 2, i.e., the first or second year of exposure:

$$\Delta kWh_y = ATE_y * Treatment\ Accounts_y * Days_y$$

$$FYSATE_y = ATE_y$$

- For y=3, i.e., the third year of exposure:

$$FYSATE_y = ATE_y - \sum_{x=1}^{x=1} FYSATE_{y-x} - FYSATE_{y-x} * Decay * (X - 0.5)$$

$$\Delta kWh_y = FYSATE_y * Treatment\ Accounts_y * Days_y$$

- For y=4, i.e., the fourth year of exposure:

$$FYSATE_y = ATE_y - \sum_{x=1}^{x=2} FYSATE_{y-x} - FYSATE_{y-x} * Decay * (X - 0.5)$$

$$\Delta kWh_y = FYSATE_y * Treatment\ Accounts_y * Days_y$$

- And for y>=5, i.e., the fifth year of exposure and beyond:

$$FYSATE_y = ATE_y - \sum_{x=1}^{x=3} FYSATE_{y-x} - FYSATE_{y-x} * Decay * (X - 0.5)$$

$$\Delta kWh_y = FYSATE_y * Treatment\ Accounts_y * Days_y$$

In the above equations ATE_y is the average daily savings as estimated through the regression analysis and adjusted for dual participation. Y is the year of the program being evaluated; equivalently, the number of years the program has been in effect for that cohort. ADM applied the TRM's default decay rate of 31.3%.

In addition to adjusting annual savings, lifetime savings were also adjusted using the formulas below:

- For y=1:

$$\Delta kWh_{Y,lifetime} = ATE_y * Treatment\ Accounts_y * Days_y$$

- For y=2 and beyond:

$$\Delta kWh_{Y,lifetime} = \Delta kWh_Y + \sum_{X=1}^{X=3}\Big(\big(FYSATE_Y - FYSATE_Y * Decay * (X-0.5)\big) * (1-Churn)^X\Big) * Days_{Y+X} * Treatment\ Accounts_Y$$

  - Where Churn rate is taken to be 6%.

Adjustments to peak demand savings were applied in the same manner as the energy savings adjustments detailed above.

B.1.2 Program Participation Levels

Table 105 provides a table of the participation levels. The nomenclature in the table includes a prefix to denote the EDC, a suffix of "-LI" for low-income groups, and a number that identifies waves of participants sequentially. The first new waves for Phase IV started in October 2021. In PY14, Penelec

Table 105: PY14 Participation Bill Counts by Month and Cohort

Wave	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23
ME-1-LI	10,801	10,596	10,411	10,179	9,995	9,811	9,670	9,567	9,455	9,358	9,231	9,081
ME-1	31,392	31,070	30,754	30,423	30,160	29,864	29,641	29,465	29,276	29,101	28,906	28,717
ME-2-LI	10,302	10,152	9,933	9,692	9,465	9,267	9,103	8,965	8,834	8,715	8,559	8,398
ME-2	26,885	26,746	26,453	26,120	25,835	25,588	25,370	25,200	24,980	24,807	24,611	24,444
PP-1	17,108	16,938	16,784	16,624	16,512	16,347	16,234	16,147	16,048	15,978	15,895	15,811
PP-1-LI	5,718	5,611	5,500	5,425	5,334	5,250	5,182	5,127	5,059	5,004	4,932	4,868
PN-1	14,640	14,676	14,510	14,267	14,075	13,848	13,719	13,653	13,513	13,425	13,294	13,148
PN-1-LI	10,160	9,927	9,705	9,480	9,289	9,118	8,990	8,895	8,780	8,678	8,561	8,420
PN-2	41,192	41,044	40,928	40,779	40,666	40,541	40,429	40,350	40,254	40,189	40,101	40,017
WP-1	41,461	41,062	40,607	40,183	39,890	39,607	39,363	39,175	38,980	38,806	38,568	38,335
WP-1-LI	8,527	8,363	8,193	8,008	7,861	7,735	7,648	7,568	7,492	7,404	7,326	7,214
WP-2	35,539	35,485	34,866	34,359	34,042	33,691	33,434	33,258	33,014	32,869	32,640	32,415

B.1.3 Results

The reported and verified energy savings are shown in Table 106 below. The values below include dual participation adjustments. The last column of the table shows model absolute precisions for each cohort, and also combined for each distinct initiative. Table 107 shows the reported and verified demand reduction for each EDC and initiative.

Table 106: Verified Energy Savings and Absolute Precisions by EDC and Wave

Operating Company	Experimental Cohort	PYRTD (MWh)	PYVTD (MWh)	Relative Savings (%)	Absolute Precision at 95% CL
Met-Ed	ME-1	2,298	2,358	0.81%	0.24%
Met-Ed	ME-2	529	543	0.22%	0.21%
Met-Ed	**Total for EEH Program**	**2,827**	**2,900**	**0.70%**	**0.17%**
Met-Ed	ME-1-LI	86	118	0.10%	0.33%
Met-Ed	ME-2-LI	111	151	0.14%	0.31%
Met-Ed	**Total for LI Program**	**197**	**269**	**0.10%**	**0.15%**
Penelec	PN-1	1,098	1,053	0.89%	0.29%
Penelec	PN-2	3,777	3,624	0.77%	0.25%
Penelec	**Total for EEH Program**	**4,875**	**4,677**	**0.89%**	**0.29%**
Penelec	PN-1-LI	146	556	0.62%	0.40%
Penelec	**Total for LI Program**	**146**	**556**	**0.62%**	**0.40%**
Penn Power	PP-1	1,158	1,275	0.78%	0.25%
Penn Power	**Total for EEH Program**	**1,158**	**1,275**	**0.78%**	**0.25%**
Penn Power	PP-1-LI	638	335	0.58%	0.46%
Penn Power	**Total for LI Program**	**638**	**335**	**0.58%**	**0.46%**
WPP	WP-1	1,516	1,378	0.36%	0.22%
WPP	WP-2	646	588	0.18%	0.20%
WPP	**Total for EEH Program**	**2,163**	**1,966**	**0.36%**	**0.15%**
WPP	WP-1-LI	799	769	0.81%	0.36%
WPP	**Total for LI Program**	**799**	**769**	**0.81%**	**0.36%**

Table 107: Reported and verified demand reductions for the HER Initiative

Operating Company	Experimental Cohort	PYRTD MW/yr	PYVTD MW/yr	Demand Realization Rate
Met-Ed	ME-1	0.27	0.37	138.73%
Met-Ed	ME-2	0.13	0.19	138.73%
Met-Ed	**Total for EEH Program**	**0.40**	**0.55**	**138.73%**
Met-Ed	ME-1-LI	0.01	0.11	998.20%
Met-Ed	ME-2-LI	0.01	0.06	998.20%
Met-Ed	**Total for LI Program**	**0.02**	**0.17**	**998.20%**
Penelec	PN-1	0.00	0.00	82.28%
Penelec	PN-2	1.36	1.12	82.28%
Penelec	**Total for EEH Program**	**1.36**	**1.12**	**82.28%**
Penelec	PN-1-LI	0.05	0.05	96.33%
Penelec	**Total for LI Program**	**0.04**	**0.05**	**105.43%**
Penn Power	PP-1	0.36	0.43	117.17%
Penn Power	**Total for EEH Program**	**0.33**	**0.43**	**128.29%**
Penn Power	PP-1-LI	0.07	0.09	126.96%
Penn Power	**Total for LI Program**	**0.07**	**0.09**	**139.01%**
WPP	WP-1	0.40	0.29	71.76%
WPP	WP-2	-0.04	-0.03	71.76%
WPP	**Total for EEH Program**	**0.36**	**0.26**	**71.76%**
WPP	WP-1-LI	0.08	0.08	108.91%
WPP	**Total for LI Program**	**0.07**	**0.08**	**119.18%**

Appendix C PYTD and P4TD Summary by Customer Segment and LI Carveout

Table 108 presents a summary of the programs, components / initiatives and customer segments that contribute to the low-income carveout in PY14 and P4TD.

Table 108: Summary of Low-Income Carveout Energy Savings (MWh/Year)

EDC	Program	Component / Initiative	Customer Segment	PYVTD Gross (MWh/yr)	VTD Gross (MWh/yr)
Met-Ed	Low Income Energy Efficiency	Appliances	Residential	34	46
Met-Ed	Low Income Energy Efficiency	Appliance Turn-In	Residential	607	1232
Met-Ed	Low Income Energy Efficiency	Direct Install	Residential	1,039	1822
Met-Ed	Low Income Energy Efficiency	Home Energy Reports	Residential	269	467
Met-Ed	Low Income Energy Efficiency	Kits	Residential	2,068	4111
Met-Ed	Low Income Energy Efficiency	New Homes	Residential	59	161
Met-Ed	Low Income Energy Efficiency	Online Audits	Residential	272	272
Met-Ed	C&I Energy Solutions for Business - Small	CI Multifamily	Master Metered MF	114	174
Met-Ed Total				**4,462**	**8284**
Penelec	Low Income Energy Efficiency	Appliances	Residential	29	43
Penelec	Low Income Energy Efficiency	Appliance Turn-In	Residential	645	1240
Penelec	Low Income Energy Efficiency	Direct Install	Residential	1,396	2663
Penelec	Low Income Energy Efficiency	Home Energy Reports	Residential	556	1201
Penelec	Low Income Energy Efficiency	Kits	Residential	1,730	5142
Penelec	Low Income Energy Efficiency	New Homes	Residential	0	8
Penelec	Low Income Energy Efficiency	Online Audits	Residential	290	290
Penelec	C&I Energy Solutions for Business - Small	CI Multifamily	Master Metered MF	496	941
PenelecTotal				**5,141**	**11529**
Penn Power	Low Income Energy Efficiency	Appliances	Residential	13	17
Penn Power	Low Income Energy Efficiency	Appliance Turn-In	Residential	149	283
Penn Power	Low Income Energy Efficiency	Direct Install	Residential	526	1013
Penn Power	Low Income Energy Efficiency	Home Energy Reports	Residential	335	610
Penn Power	Low Income Energy Efficiency	Kits	Residential	75	891
Penn Power	Low Income Energy Efficiency	New Homes	Residential	0	0
Penn Power	Low Income Energy Efficiency	Online Audits	Residential	62	62
Penn Power	C&I Energy Solutions for Business - Small	CI Multifamily	Master Metered MF	0	120
Penn PowerTotal				**1,160**	**2996**
WPP	Low Income Energy Efficiency	Appliances	Residential	42	63
WPP	Low Income Energy Efficiency	Appliance Turn-In	Residential	657	1170
WPP	Low Income Energy Efficiency	Direct Install	Residential	1,691	2925
WPP	Low Income Energy Efficiency	Home Energy Reports	Residential	769	2268
WPP	Low Income Energy Efficiency	Kits	Residential	2,949	5500
WPP	Low Income Energy Efficiency	New Homes	Residential	3	3
WPP	Low Income Energy Efficiency	Online Audits	Residential	203	203
WPP	C&I Energy Solutions for Business - Small	CI Multifamily	Master Metered MF	626	1783
WPP Total				**6,940**	**13914**

Appendix D Summary of Program-Level Impacts, Cost-Effectiveness, and HIM NTG

D.1 Program and Initiative-Level Impacts Summary

A summary of energy impacts by program and component / initiative through PY14 is presented in Table 27.

Table 109: Met-Ed Annual Energy Savings by Program & Initiative (MWh/Year)

Program	Initiative	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	EE Kits	13,020	9,288	7,616	22,740	15,918	13,052
Energy Efficient Homes	Home Energy Reports	2,827	2,900	2,900	4,135	4,336	4,336
Energy Efficient Homes	Direct Install	329	360	342	357	390	371
Energy Efficient Homes	New Homes	2,008	2,054	1,479	4,221	4,224	3,063
Energy Efficient Homes	Multifamily	29	32	26	29	32	26
Energy Efficient Homes	Online Audits	834	519	519	1,571	519	519
Energy Efficient Products	Appliance Recycling	3,897	4,537	1,769	8,276	9,039	3,525
Energy Efficient Products	Upstream Electronics	0	0	0	0	0	0
Energy Efficient Products	HVAC	1,208	1,632	828	1,929	2,458	1,246
Energy Efficient Products	Appliances	885	1,031	690	1,295	1,436	894
Energy Efficient Products	Midstream Appliances	5,341	5,588	2,638	9,130	9,558	4,512
Low Income Program	Appliances	29	34	34	42	46	46
Low Income Program	Appliance Turn-In	500	607	607	1,046	1,232	1,232
Low Income Program	Direct Install	1,024	1,039	1,039	1,805	1,822	1,822
Low Income Program	Home Energy Reports	197	269	269	519	467	467
Low Income Program	Kits	2,128	2,068	2,068	4,363	4,111	4,111
Low Income Program	New Homes	58	59	59	161	161	161
Low Income Program	Online Audits	73	272	272	133	272	272
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	25,169	25,799	17,918	31,780	33,595	22,850
C&I Solutions for Business Programs - Small and Large	CI Custom	23,239	23,881	13,646	36,878	37,520	21,019
C&I Solutions for Business Programs - Small and Large	CI EMNC	3,693	3,606	3,526	5,091	4,782	4,261
C&I Solutions for Business Program - Small	CI Multifamily	125	114	114	247	174	174
C&I Solutions for Business Programs - Small and Large	Appliance Recycling	58	67	26	110	121	47
Portfolio Total		**86,671**	**85,756**	**58,386**	**135,858**	**132,211**	**88,006**

Table 110: Penelec Annual Energy Savings by Program & Initiative (MWh/Year)

Program	Initiative	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	EE Kits	12,823	14,088	11,764	20,635	21,244	17,742
Energy Efficient Homes	Home Energy Reports	4,875	4,677	4,677	4,771	4,866	4,866
Energy Efficient Homes	Direct Install	172	197	203	177	203	209
Energy Efficient Homes	New Homes	281	281	203	496	502	364
Energy Efficient Homes	Multifamily	37	45	38	39	47	40
Energy Efficient Homes	Online Audits	512	120	120	989	120	120
Energy Efficient Products	Appliance Recycling	3,107	3,287	2,137	6,286	6,737	4,379
Energy Efficient Products	Upstream Electronics	0	0	0	0	0	0
Energy Efficient Products	HVAC	700	677	354	1,064	1,242	649
Energy Efficient Products	Appliances	398	402	193	588	583	302
Energy Efficient Products	Midstream Appliances	3,682	3,762	1,997	6,432	6,630	3,521
Low Income Program	Appliances	29	29	29	43	43	43
Low Income Program	Appliance Turn-In	571	645	645	1,162	1,240	1,240
Low Income Program	Direct Install	1,409	1,396	1,396	2,671	2,663	2,663
Low Income Program	Home Energy Reports	146	556	556	603	1,201	1,201
Low Income Program	Kits	1,630	1,730	1,730	5,132	5,142	5,142
Low Income Program	New Homes	0	0	0	8	8	8
Low Income Program	Online Audits	91	290	290	176	290	290
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	32,285	34,140	22,517	36,678	38,328	25,801
C&I Solutions for Business Programs - Small and Large	CI Custom	668	677	353	10,216	10,258	8,905
C&I Solutions for Business Programs - Small and Large	CI EMNC	5,653	4,805	4,026	7,024	5,983	4,916
C&I Solutions for Business Program - Small	CI Multifamily	550	496	496	1,169	941	941
C&I Solutions for Business Programs - Small and Large	Appliance Recycling	43	45	29	89	96	62
Portfolio Total		**69,661**	**72,345**	**53,752**	**106,449**	**108,366**	**83,402**

Table 111: Penn Power Annual Energy Savings by Program & Initiative (MWh/Year)

Program	Initiative	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	EE Kits	3,718	3,564	2,994	6,084	5,382	4,521
Energy Efficient Homes	Home Energy Reports	1,158	1,275	1,275	1,801	1,877	1,877
Energy Efficient Homes	Direct Install	124	136	136	142	158	158
Energy Efficient Homes	New Homes	1,109	1,132	815	1,842	1,824	1,320
Energy Efficient Homes	Multifamily	0	0	0	0	0	0
Energy Efficient Homes	Online Audits	170	63	63	323	63	63
Energy Efficient Products	Appliance Recycling	1,077	1,116	424	2,088	2,074	788
Energy Efficient Products	Upstream Electronics	0	0	0	0	0	0
Energy Efficient Products	HVAC	199	283	155	358	453	248
Energy Efficient Products	Appliances	229	251	127	340	368	193
Energy Efficient Products	Midstream Appliances	1,624	1,668	734	2,890	3,004	1,322
Low Income Program	Appliances	12	13	13	16	17	17
Low Income Program	Appliance Turn-In	135	149	149	267	283	283
Low Income Program	Direct Install	515	526	526	1,004	1,013	1,013
Low Income Program	Home Energy Reports	638	335	335	889	610	610
Low Income Program	Kits	69	75	75	914	891	891
Low Income Program	New Homes	0	0	0	0	0	0
Low Income Program	Online Audits	18	62	62	35	62	62
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	5,046	4,299	3,560	6,663	5,991	4,920
C&I Solutions for Business Programs - Small and Large	CI Custom	39	40	40	6,364	6,367	3,934
C&I Solutions for Business Programs - Small and Large	CI EMNC	3,599	3,262	3,174	3,960	3,618	3,458
C&I Solutions for Business Program - Small	CI Multifamily	0	0	0	132	120	120
C&I Solutions for Business Programs - Small and Large	Appliance Recycling	34	35	13	42	43	16
Portfolio Total		**19,512**	**18,284**	**14,670**	**36,155**	**34,218**	**25,814**

Table 112: WPP Annual Energy Savings by Program & Initiative (MWh/Year)

Program	Initiative	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Energy Efficient Homes	EE Kits	11,957	10,654	11,779	22,857	18,555	20,492
Energy Efficient Homes	Home Energy Reports	2,163	1,966	1,966	3,913	3,941	3,941
Energy Efficient Homes	Direct Install	268	299	311	291	327	340
Energy Efficient Homes	New Homes	2,019	2,121	1,527	3,449	3,591	2,600
Energy Efficient Homes	Multifamily	148	166	132	150	167	134
Energy Efficient Homes	Online Audits	690	303	303	1,269	303	303
Energy Efficient Products	Appliance Recycling	4,741	5,035	3,524	8,940	9,226	6,459
Energy Efficient Products	Upstream Electronics	0	0	0	0	0	0
Energy Efficient Products	HVAC	1,012	1,360	707	1,685	2,380	1,238
Energy Efficient Products	Appliances	798	864	437	1,187	1,271	701
Energy Efficient Products	Midstream Appliances	3,443	3,532	1,794	5,976	6,183	3,141
Low Income Program	Appliances	39	42	42	59	63	63
Low Income Program	Appliance Turn-In	536	657	657	1,040	1,170	1,170
Low Income Program	Direct Install	1,688	1,691	1,691	2,921	2,925	2,925
Low Income Program	Home Energy Reports	799	769	769	1,835	2,268	2,268
Low Income Program	Kits	2,679	2,949	2,949	5,234	5,500	5,500
Low Income Program	New Homes	3	3	3	3	3	3
Low Income Program	Online Audits	59	203	203	107	203	203
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	35,202	39,345	25,946	43,710	47,947	31,616
C&I Solutions for Business Programs - Small and Large	CI Custom	1,180	1,090	535	8,392	8,307	4,703
C&I Solutions for Business Programs - Small and Large	CI EMNC	7,214	6,428	7,071	8,437	7,590	7,834
C&I Solutions for Business Program - Small	CI Multifamily	769	626	626	2,251	1,783	1,783
C&I Solutions for Business Programs - Small and Large	Appliance Recycling	63	67	47	101	105	73
Portfolio Total		**77,468**	**80,171**	**63,022**	**123,806**	**123,808**	**97,488**

Table 113, Table 114, Table 115, and Table 116 present summaries of the peak demand impacts by energy efficiency program and initiative through the current reporting period.

Table 113: Met-Ed Peak Demand Savings by Program & Initiative (MW/Year)

Program	Initiative	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	EE Kits	1.40	1.09	0.89	2.44	1.79	1.47
Energy Efficient Homes	Home Energy Reports	0.40	0.55	0.55	0.64	0.55	0.55
Energy Efficient Homes	Direct Install	0.06	0.05	0.04	0.07	0.05	0.05
Energy Efficient Homes	New Homes	0.78	0.54	0.39	1.68	1.16	0.84
Energy Efficient Homes	Multifamily	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Homes	Online Audits	0.09	0.10	0.10	0.09	0.10	0.10
Energy Efficient Products	Appliance Recycling	1.19	1.34	0.52	2.20	2.34	0.91
Energy Efficient Products	Upstream Electronics	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Products	HVAC	0.19	0.22	0.11	0.33	0.38	0.19
Energy Efficient Products	Appliances	0.16	0.19	0.13	0.22	0.26	0.16
Energy Efficient Products	Midstream Appliances	1.18	1.11	0.52	1.91	1.86	0.88
Low Income Program	Appliances	0.01	0.01	0.01	0.01	0.01	0.01
Low Income Program	Appliance Turn-In	0.15	0.19	0.19	0.28	0.33	0.33
Low Income Program	Direct Install	0.13	0.13	0.13	0.22	0.23	0.23
Low Income Program	Home Energy Reports	0.02	0.17	0.17	0.07	0.17	0.17
Low Income Program	Kits	0.23	0.24	0.24	0.48	0.48	0.48
Low Income Program	New Homes	0.01	0.01	0.01	0.03	0.02	0.02
Low Income Program	Online Audits	0.01	0.05	0.05	0.01	0.05	0.05
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	4.56	4.56	3.16	5.85	5.92	4.02
C&I Solutions for Business Programs - Small and Large	CI Custom	2.63	2.64	1.51	4.35	4.36	2.44
C&I Solutions for Business Programs - Small and Large	CI EMNC	0.61	0.59	0.58	0.85	0.79	0.70
C&I Solutions for Business Program - Small	CI Multifamily	0.02	0.02	0.02	0.04	0.03	0.03
C&I Solutions for Business Program - Small	Appliance Recycling	0.01	0.01	0.01	0.02	0.03	0.01
Portfolio Total		**13.85**	**13.79**	**9.32**	**21.79**	**20.89**	**13.64**

Table 114: Penelec Peak Demand Savings by Program & Initiative (MW/Year)

Program	Initiative	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	EE Kits	1.28	1.46	1.22	2.05	2.18	1.82
Energy Efficient Homes	Home Energy Reports	1.36	1.12	1.12	1.34	1.12	1.12
Energy Efficient Homes	Direct Install	0.03	0.02	0.02	0.03	0.02	0.02
Energy Efficient Homes	New Homes	0.12	0.05	0.04	0.22	0.14	0.10
Energy Efficient Homes	Multifamily	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Homes	Online Audits	0.06	0.02	0.02	0.06	0.02	0.02
Energy Efficient Products	Appliance Recycling	0.94	0.95	0.62	1.65	1.69	1.10
Energy Efficient Products	Upstream Electronics	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Products	HVAC	0.07	0.10	0.05	0.10	0.16	0.08
Energy Efficient Products	Appliances	0.07	0.07	0.03	0.10	0.10	0.05
Energy Efficient Products	Midstream Appliances	1.03	0.99	0.53	1.63	1.61	0.86
Low Income Program	Appliances	0.01	0.01	0.01	0.01	0.01	0.01
Low Income Program	Appliance Turn-In	0.20	0.19	0.19	0.33	0.32	0.32
Low Income Program	Direct Install	0.17	0.17	0.17	0.32	0.32	0.32
Low Income Program	Home Energy Reports	0.04	0.05	0.05	0.13	0.05	0.05
Low Income Program	Kits	0.17	0.18	0.18	0.53	0.54	0.54
Low Income Program	New Homes	0.00	0.00	0.00	0.00	0.00	0.00
Low Income Program	Online Audits	0.01	0.04	0.04	0.01	0.04	0.04
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	6.36	6.13	4.04	7.27	6.91	4.65
C&I Solutions for Business Programs - Small and Large	CI Custom	0.06	0.06	0.03	3.16	3.16	2.80
C&I Solutions for Business Programs - Small and Large	CI EMNC	0.89	0.64	0.53	1.02	0.74	0.61
C&I Solutions for Business Program - Small	CI Multifamily	0.08	0.07	0.07	0.16	0.13	0.13
C&I Solutions for Business Program - Small	Appliance Recycling	0.01	0.01	0.01	0.02	0.02	0.02
Portfolio Total		**12.95**	**12.33**	**8.97**	**20.15**	**19.27**	**14.65**

Table 115: Penn Power Peak Demand Savings by Program & Initiative (MW/Year)

Program	Initiative	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	EE Kits	0.40	0.37	0.31	0.66	0.56	0.47
Energy Efficient Homes	Home Energy Reports	0.33	0.43	0.43	0.46	0.43	0.43
Energy Efficient Homes	Direct Install	0.02	0.02	0.02	0.02	0.02	0.02
Energy Efficient Homes	New Homes	0.47	0.28	0.20	0.84	0.50	0.36
Energy Efficient Homes	Multifamily	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Homes	Online Audits	0.02	0.01	0.01	0.02	0.01	0.01
Energy Efficient Products	Appliance Recycling	0.27	0.28	0.11	0.48	0.47	0.18
Energy Efficient Products	Upstream Electronics	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Products	HVAC	0.04	0.05	0.03	0.07	0.09	0.05
Energy Efficient Products	Appliances	0.04	0.05	0.02	0.06	0.07	0.03
Energy Efficient Products	Midstream Appliances	0.40	0.39	0.17	0.66	0.67	0.29
Low Income Program	Appliances	0.00	0.00	0.00	0.00	0.00	0.00
Low Income Program	Appliance Turn-In	0.04	0.04	0.04	0.07	0.07	0.07
Low Income Program	Direct Install	0.07	0.07	0.07	0.13	0.13	0.13
Low Income Program	Home Energy Reports	0.07	0.09	0.09	0.12	0.09	0.09
Low Income Program	Kits	0.01	0.01	0.01	0.10	0.10	0.10
Low Income Program	New Homes	0.00	0.00	0.00	0.00	0.00	0.00
Low Income Program	Online Audits	0.00	0.01	0.01	0.00	0.01	0.01
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	1.08	0.78	0.65	1.34	1.03	0.85
C&I Solutions for Business Programs - Small and Large	CI Custom	0.02	0.02	0.02	0.70	0.70	0.44
C&I Solutions for Business Programs - Small and Large	CI EMNC	0.74	0.65	0.63	0.79	0.68	0.66
C&I Solutions for Business Program - Small	CI Multifamily	0.00	0.00	0.00	0.02	0.01	0.01
C&I Solutions for Business Program - Small	Appliance Recycling	0.01	0.01	0.00	0.01	0.01	0.00
Portfolio Total		**4.02**	**3.55**	**2.82**	**6.55**	**5.65**	**4.21**

Table 116: WPP Peak Demand Savings by Program & Initiative (MW/Year)

Program	Initiative	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Energy Efficient Homes	EE Kits	1.36	1.25	1.38	2.59	2.22	2.45
Energy Efficient Homes	Home Energy Reports	0.36	0.26	0.26	0.70	0.26	0.26
Energy Efficient Homes	Direct Install	0.05	0.04	0.04	0.05	0.04	0.05
Energy Efficient Homes	New Homes	0.79	0.47	0.34	1.46	0.86	0.62
Energy Efficient Homes	Multifamily	0.03	0.02	0.02	0.03	0.02	0.02
Energy Efficient Homes	Online Audits	0.08	0.05	0.05	0.08	0.05	0.05
Energy Efficient Products	Appliance Recycling	1.33	1.40	0.98	2.23	2.27	1.59
Energy Efficient Products	Upstream Electronics	0.00	0.00	0.00	0.00	0.00	0.00
Energy Efficient Products	HVAC	0.17	0.17	0.09	0.27	0.29	0.15
Energy Efficient Products	Appliances	0.13	0.15	0.07	0.19	0.21	0.12
Energy Efficient Products	Midstream Appliances	0.91	0.88	0.45	1.44	1.44	0.73
Low Income Program	Appliances	0.01	0.01	0.01	0.01	0.01	0.01
Low Income Program	Appliance Turn-In	0.18	0.21	0.21	0.30	0.32	0.32
Low Income Program	Direct Install	0.23	0.23	0.23	0.39	0.39	0.39
Low Income Program	Home Energy Reports	0.07	0.08	0.08	0.30	0.08	0.08
Low Income Program	Kits	0.31	0.35	0.35	0.60	0.65	0.65
Low Income Program	New Homes	0.00	0.00	0.00	0.00	0.00	0.00
Low Income Program	Online Audits	0.01	0.03	0.03	0.01	0.03	0.03
C&I Solutions for Business Programs - Small and Large	CI Prescriptive	6.69	5.96	3.93	8.05	7.15	4.71
C&I Solutions for Business Programs - Small and Large	CI Custom	0.15	0.13	0.06	0.87	0.85	0.48
C&I Solutions for Business Programs - Small and Large	CI EMNC	1.07	0.95	1.05	1.30	1.17	1.19
C&I Solutions for Business Program - Small	CI Multifamily	0.09	0.05	0.05	0.29	0.21	0.21
C&I Solutions for Business Program - Small	Appliance Recycling	0.01	0.02	0.01	0.02	0.02	0.02
Portfolio Total		**14.00**	**12.71**	**9.70**	**21.20**	**18.57**	**14.15**

D.2 Program-Level Cost-Effectiveness Summary

Table 117, Table 118, Table 119, and Table 120 show the TRC ratios by program and for the portfolio for Met-Ed, Penelec, Penn Power, and WPP respectively. The benefits in the tables were calculated using gross verified impacts. PYTD costs and benefits are expressed in the base dollars for the calendar year in which the program starts. For PY14, cost and benefits are expressed in 2022 dollars.

Table 117: PY14 Gross TRC Ratios by Program ($1,000) for Met-Ed

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$11,377	$4,938	2.30	$6,439
Energy Efficient Products	$7,058	$8,244	0.86	-$1,186
Low Income Energy Efficiency	$2,401	$2,405	1.00	-$5
Residential Subtotal	**$20,836**	**$15,588**	**1.34**	**$5,248**
C&I Energy Solutions for Business - Small	$12,918	$7,680	1.68	$5,238
C&I Energy Solutions for Business - Large	$12,616	$7,563	1.67	$5,053
Non-Residential Subtotal	**$25,533**	**$15,243**	**1.68**	**$10,290**
Portfolio Total	**$46,369**	**$30,831**	**1.50**	**$15,538**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 118: PY14 Gross TRC Ratios by Program ($1,000) for Penelec

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$13,298	$3,330	3.99	$9,968
Energy Efficient Products	$4,491	$6,020	0.75	-$1,529
Low Income Energy Efficiency	$2,453	$2,628	0.93	-$176
Residential Subtotal	**$20,242**	**$11,978**	**1.69**	**$8,264**
C&I Energy Solutions for Business - Small	$16,251	$7,976	2.04	$8,275
C&I Energy Solutions for Business - Large	$10,981	$5,032	2.18	$5,948
Non-Residential Subtotal	**$27,232**	**$13,008**	**2.09**	**$14,223**
Portfolio Total	**$47,473**	**$24,986**	**1.90**	**$22,487**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 119: PY14 Gross TRC Ratios by Program ($1,000) for Penn Power

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$3,804	$2,191	1.74	$1,613
Energy Efficient Products	$1,721	$1,694	1.02	$26
Low Income Energy Efficiency	$385	$837	0.46	-$452
Residential Subtotal	**$5,909**	**$4,722**	**1.25**	**$1,187**
C&I Energy Solutions for Business - Small	$3,534	$2,806	1.26	$728
C&I Energy Solutions for Business - Large	$1,356	$1,563	0.87	-$207
Non-Residential Subtotal	**$4,890**	**$4,369**	**1.12**	**$521**
Portfolio Total	**$10,799**	**$9,091**	**1.19**	**$1,708**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 120: PY14 Gross TRC Ratios by Program ($1,000) for WPP

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$11,609	$5,473	2.12	$6,137
Energy Efficient Products	$4,809	$6,562	0.73	-$1,752
Low Income Energy Efficiency	$3,310	$3,092	1.07	$218
Residential Subtotal	**$19,728**	**$15,126**	**1.30**	**$4,602**
C&I Energy Solutions for Business - Small	$16,843	$9,652	1.74	$7,190
C&I Energy Solutions for Business - Large	$10,286	$4,192	2.45	$6,095
Non-Residential Subtotal	**$27,129**	**$13,844**	**1.96**	**$13,285**
Portfolio Total	**$46,857**	**$28,970**	**1.62**	**$17,887**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 121, Table 122, Table 123, and Table 124 present PY14 cost-effectiveness for Met-Ed, Penelec, Penn Power, and WPP respectively, using net verified savings to calculate benefits.

Table 121: PY14 Net TRC Ratios by Program ($1,000) for Met-Ed

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$9,239	$4,542	2.03	$4,697
Energy Efficient Products	$3,436	$5,002	0.69	-$1,566
Low Income Energy Efficiency	$2,401	$2,405	1.00	-$5
Residential Subtotal	**$15,075**	**$11,949**	**1.26**	**$3,126**
C&I Energy Solutions for Business - Small	$9,655	$6,117	1.58	$3,538
C&I Energy Solutions for Business - Large	$8,142	$5,072	1.61	$3,070
Non-Residential Subtotal	**$17,798**	**$11,189**	**1.59**	**$6,609**
Portfolio Total	**$32,873**	**$23,138**	**1.42**	**$9,735**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 122: PY14 Net TRC Ratios by Program ($1,000) for Penelec

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$11,201	$3,319	3.38	$7,883
Energy Efficient Products	$2,473	$3,733	0.66	-$1,259
Low Income Energy Efficiency	$2,453	$2,628	0.93	-$176
Residential Subtotal	**$16,128**	**$9,680**	**1.67**	**$6,448**
C&I Energy Solutions for Business - Small	$11,273	$6,434	1.75	$4,839
C&I Energy Solutions for Business - Large	$7,270	$3,791	1.92	$3,479
Non-Residential Subtotal	**$18,543**	**$10,224**	**1.81**	**$8,318**
Portfolio Total	**$34,671**	**$19,904**	**1.74**	**$14,766**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 123: PY14 Net TRC Ratios by Program ($1,000) for Penn Power

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$3,142	$1,896	1.66	$1,246
Energy Efficient Products	$777	$1,044	0.74	-$266
Low Income Energy Efficiency	$385	$837	0.46	-$452
Residential Subtotal	**$4,304**	**$3,776**	**1.14**	**$527**
C&I Energy Solutions for Business - Small	$3,187	$2,568	1.24	$619
C&I Energy Solutions for Business - Large	$1,174	$1,472	0.80	-$299
Non-Residential Subtotal	**$4,360**	**$4,040**	**1.08**	**$320**
Portfolio Total	**$8,664**	**$7,817**	**1.11**	**$847**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 124: PY14 Net TRC Ratios by Program ($1,000) for WPP

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$12,232	$4,982	2.46	$7,250
Energy Efficient Products	$2,679	$4,187	0.64	-$1,508
Low Income Energy Efficiency	$3,310	$3,092	1.07	$218
Residential Subtotal	**$18,221**	**$12,261**	**1.49**	**$5,960**
C&I Energy Solutions for Business - Small	$12,712	$7,963	1.60	$4,748
C&I Energy Solutions for Business - Large	$6,817	$3,106	2.19	$3,711
Non-Residential Subtotal	**$19,529**	**$11,069**	**1.76**	**$8,460**
Portfolio Total	**$37,750**	**$23,330**	**1.62**	**$14,420**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 125, Table 126, Table 127, and Table 128 summarize cost-effectiveness by program respectively for Met-Ed, Penelec, Penn Power, and WPP for Phase IV of Act 129. P4TD costs and benefits are expressed in 2021 dollars regardless of program or reporting year.

Table 125: P4TD Gross TRC Ratios by Program ($1,000) for Met-Ed

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$18,929	$9,170	2.06	$9,759
Energy Efficient Products	$11,494	$12,884	0.89	-$1,390
Low Income Energy Efficiency	$4,680	$4,001	1.17	$678
Residential Subtotal	**$35,102**	**$26,055**	**1.35**	**$9,047**
C&I Energy Solutions for Business - Small	$16,342	$10,653	1.53	$5,688
C&I Energy Solutions for Business - Large	$20,944	$13,569	1.54	$7,375
Non-Residential Subtotal	**$37,285**	**$24,222**	**1.54**	**$13,063**
Portfolio Total	**$72,388**	**$50,277**	**1.44**	**$22,111**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 126: P4TD Gross TRC Ratios by Program ($1,000) for Penelec

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$19,018	$5,369	3.54	$13,649
Energy Efficient Products	$7,557	$9,668	0.78	-$2,112
Low Income Energy Efficiency	$5,388	$4,811	1.12	$577
Residential Subtotal	**$31,963**	**$19,849**	**1.61**	**$12,114**
C&I Energy Solutions for Business - Small	$23,403	$12,797	1.83	$10,607
C&I Energy Solutions for Business - Large	$11,605	$6,044	1.92	$5,561
Non-Residential Subtotal	**$35,008**	**$18,840**	**1.86**	**$16,168**
Portfolio Total	**$66,971**	**$38,689**	**1.73**	**$28,283**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 127: P4TD Gross TRC Ratios by Program ($1,000) for Penn Power

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$5,769	$3,696	1.56	$2,073
Energy Efficient Products	$2,879	$2,903	0.99	-$25
Low Income Energy Efficiency	$1,163	$1,501	0.77	-$338
Residential Subtotal	**$9,811**	**$8,101**	**1.21**	**$1,710**
C&I Energy Solutions for Business - Small	$4,020	$3,456	1.16	$564
C&I Energy Solutions for Business - Large	$9,360	$9,083	1.03	$277
Non-Residential Subtotal	**$13,380**	**$12,539**	**1.07**	**$841**
Portfolio Total	**$23,191**	**$20,639**	**1.12**	**$2,551**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 128: P4TD Gross TRC Ratios by Program ($1,000) for WPP

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$18,603	$9,652	1.93	$8,951
Energy Efficient Products	$7,908	$10,799	0.73	-$2,891
Low Income Energy Efficiency	$5,825	$4,675	1.25	$1,150
Residential Subtotal	**$32,336**	**$25,126**	**1.29**	**$7,210**
C&I Energy Solutions for Business - Small	$20,115	$13,437	1.50	$6,678
C&I Energy Solutions for Business - Large	$15,401	$7,766	1.98	$7,635
Non-Residential Subtotal	**$35,517**	**$21,203**	**1.68**	**$14,313**
Portfolio Total	**$67,853**	**$46,330**	**1.46**	**$21,523**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 129, Table 130, Table 131, and Table 132 present P4TD cost-effectiveness results for Met-Ed, Penelec, Penn Power, and WPP respectively using net verified savings to calculate benefits. Cost and benefits are expressed in 2021 Dollars.

Table 129: P4TD Net TRC Ratios by Program ($1,000) for Met-Ed

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$15,253	$8,009	1.90	$7,244
Energy Efficient Products	$5,457	$7,908	0.69	-$2,451
Low Income Energy Efficiency	$4,680	$4,001	1.17	$678
Residential Subtotal	**$25,390**	**$19,919**	**1.27**	**$5,471**
C&I Energy Solutions for Business - Small	$11,740	$8,375	1.40	$3,366
C&I Energy Solutions for Business - Large	$12,770	$8,936	1.43	$3,834
Non-Residential Subtotal	**$24,510**	**$17,311**	**1.42**	**$7,199**
Portfolio Total	**$49,900**	**$37,230**	**1.34**	**$12,671**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 130: P4TD Net TRC Ratios by Program ($1,000) for Penelec

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$15,952	$5,182	3.08	$10,770
Energy Efficient Products	$4,215	$6,180	0.68	-$1,965
Low Income Energy Efficiency	$5,388	$4,811	1.12	$577
Residential Subtotal	**$25,555**	**$16,173**	**1.58**	**$9,382**
C&I Energy Solutions for Business - Small	$17,544	$10,759	1.63	$6,784
C&I Energy Solutions for Business - Large	$7,822	$4,760	1.64	$3,062
Non-Residential Subtotal	**$25,365**	**$15,519**	**1.63**	**$9,846**
Portfolio Total	**$50,920**	**$31,692**	**1.61**	**$19,228**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 131: P4TD Net TRC Ratios by Program ($1,000) for Penn Power

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$4,738	$3,133	1.51	$1,605
Energy Efficient Products	$1,301	$1,819	0.72	-$518
Low Income Energy Efficiency	$1,163	$1,501	0.77	-$338
Residential Subtotal	**$7,203**	**$6,454**	**1.12**	**$749**
C&I Energy Solutions for Business - Small	$3,572	$3,169	1.13	$403
C&I Energy Solutions for Business - Large	$6,188	$6,245	0.99	-$57
Non-Residential Subtotal	**$9,760**	**$9,414**	**1.04**	**$346**
Portfolio Total	**$16,963**	**$15,867**	**1.07**	**$1,095**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

Table 132: P4TD Net TRC Ratios by Program ($1,000) for WPP

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Energy Efficient Homes	$19,557	$8,933	2.19	$10,624
Energy Efficient Products	$4,481	$7,114	0.63	-$2,633
Low Income Energy Efficiency	$5,825	$4,675	1.25	$1,150
Residential Subtotal	**$29,862**	**$20,721**	**1.44**	**$9,141**
C&I Energy Solutions for Business - Small	$15,019	$11,084	1.36	$3,935
C&I Energy Solutions for Business - Large	$9,894	$5,578	1.77	$4,316
Non-Residential Subtotal	**$24,913**	**$16,662**	**1.50**	**$8,251**
Portfolio Total	**$54,776**	**$37,384**	**1.47**	**$17,392**
1 Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025				

D.3 High-Impact Measure Net-to-Gross

Findings from net-to-gross research are not used to adjust compliance savings in Pennsylvania. Instead, net-to-gross research provides directional information for program planning purposes. Table 133 and Table 134 present net-to-gross findings for the one HIM studied in PY14[14].

Table 133: High-Impact Measure Net-to-Gross for Met-Ed and Penelec

HIM	Met-Ed			Penelec		
	Free ridership	Spillover	Net to Gross Ratio	Free ridership	Spillover	Net to Gross Ratio
CI Custom	42.9%	0.0%	57.1%	47.9%	0.0%	52.1%
CI Prescriptive	32.2%	1.7%	69.4%	36.2%	2.1%	66.0%
CI EMNC	2.2%	0.0%	97.8%	16.2%	0.0%	83.8%
Res Appliance Turn-In	61.0%	0.0%	39.0%	35.0%	0.0%	65.0%

Table 134: High-Impact Measure Net-to-Gross for Penn Power and WPP

HIM	Penn Power			West Penn Power		
	Free ridership	Spillover	Net to Gross Ratio	Free ridership	Spillover	Net to Gross Ratio
CI Custom	0.0%	0.0%	100.0%	50.9%	0.0%	49.1%
CI Prescriptive	18.9%	1.7%	82.8%	35.7%	1.7%	65.9%
CI EMNC	2.7%	0.0%	97.3%	8.2%	18.2%	110.0%
Res Appliance Turn-In	62.0%	0.0%	38.0%	30.0%	0.0%	70.0%

D.4 Program-Level Comparison of Performance to Approved EE&C Plan

Table 135, Table 136, Table 137, and Table 138 present PY14 expenditures, by program, compared to the budget estimates set forth in the EE&C plan for PY14 for Met-Ed, Penelec, Penn Power, and WPP. All the dollars in these tables are presented in 2022 Dollars.

[14] The Phase IV Evaluation Framework provides guidance to the EDCs to oversample measure categories (technologies) of high importance, called HIMs, to help program planners make decisions concerning those measures. The SWE suggests that for each program year, each EDC identify three to five HIMs for study based on energy impact, level of uncertainty, prospective value, funding, or other parameters. The intent is to prioritize measure-level NTGRs for HIMs, but the EDCs are encouraged to also provide some program-level NTG information – that is, to over-sample HIMs, but they may also include non-HIMs in the research, as appropriate.

Table 135: Comparison of PYTD Expenditures to EE&C Plan ($1,000) Met-Ed

Program	PY14 Budget from EE&C Plan	PY14 Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 4,650.00	$ 4,270.77	0.92
Energy Efficient Products Program	$ 2,679.00	$ 3,619.41	1.35
Low Income Energy Efficiency Program	$ 3,070.00	$ 2,256.34	0.73
C&I Energy Solutions for Business Program - Small	$ 7,491.00	$ 4,485.55	0.60
C&I Energy Solutions for Business Program - Large	$ 7,216.00	$ 2,665.61	0.37
Total	**$ 25,106.00**	**$ 17,297.70**	**0.69**

Table 136: Comparison of PYTD Expenditures to EE&C Plan ($1,000) Penelec

Program	PY14 Budget from EE&C Plan	PY14 Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 3,744.00	$ 3,318.80	0.89
Energy Efficient Products Program	$ 2,396.00	$ 2,472.22	1.03
Low Income Energy Efficiency Program	$ 3,241.00	$ 2,507.92	0.77
C&I Energy Solutions for Business Program - Small	$ 8,137.00	$ 6,465.49	0.79
C&I Energy Solutions for Business Program - Large	$ 5,691.00	$ 1,607.51	0.28
Total	**$ 23,209.00**	**$ 16,371.94**	**0.71**

Table 137: Comparison of PYTD Expenditures to EE&C Plan ($1,000) Penn Power

Program	PY14 Budget from EE&C Plan	PY14 Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 1,574.00	$ 1,521.33	0.97
Energy Efficient Products Program	$ 712.00	$ 890.44	1.25
Low Income Energy Efficiency Program	$ 808.00	$ 831.54	1.03
C&I Energy Solutions for Business Program - Small	$ 2,076.00	$ 1,950.57	0.94
C&I Energy Solutions for Business Program - Large	$ 1,546.00	$ 498.44	0.32
Total	**$ 6,716.00**	**$ 5,692.31**	**0.85**

Table 138: Comparison of PYTD Expenditures to EE&C Plan ($1,000) WPP

Program	PY14 Budget from EE&C Plan	PY14 Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 4,959.00	$ 4,336.62	0.87
Energy Efficient Products Program	$ 2,935.00	$ 3,039.37	1.04
Low Income Energy Efficiency Program	$ 3,170.00	$ 3,066.19	0.97
C&I Energy Solutions for Business Program - Small	$ 7,099.00	$ 6,369.24	0.90
C&I Energy Solutions for Business Program - Large	$ 5,422.00	$ 2,131.78	0.39
Total	**$ 23,585.00**	**$ 18,943.19**	**0.80**

Table 139, Table 140, Table 141, and Table 142 present P4TD expenditures, by program, compared to the budget estimates set forth in the EE&C plan through PY14 for Met-Ed, Penelec, Penn Power, and WPP respectively. All the dollars in these tables are presented in nominal Dollars.

Table 139: Comparison of P4TD Expenditures to EE&C Plan ($1,000) Met-Ed

Program	Phase IV Budget from EE&C Plan through PY14	P4TD Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 9,158.00	$ 7,530.71	0.82
Energy Efficient Products Program	$ 5,432.00	$ 6,235.43	1.15
Low Income Energy Efficiency Program	$ 6,174.00	$ 3,910.09	0.63
C&I Energy Solutions for Business Program - Small	$ 13,507.00	$ 6,238.26	0.46
C&I Energy Solutions for Business Program - Large	$ 14,685.00	$ 4,444.68	0.30
Total	**$ 48,956.00**	**$ 28,359.17**	**0.58**

Table 140: Comparison of P4TD Expenditures to EE&C Plan ($1,000) Penelec

Program	Phase IV Budget from EE&C Plan through PY14	P4TD Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 7,377.00	$ 5,340.17	0.72
Energy Efficient Products Program	$ 4,862.00	$ 4,298.06	0.88
Low Income Energy Efficiency Program	$ 6,619.00	$ 4,788.41	0.72
C&I Energy Solutions for Business Program - Small	$ 14,861.00	$ 9,565.57	0.64
C&I Energy Solutions for Business Program - Large	$ 11,508.00	$ 2,568.08	0.22
Total	**$ 45,227.00**	**$ 26,560.29**	**0.59**

Table 141: Comparison of P4TD Expenditures to EE&C Plan ($1,000) Penn Power

Program	Phase IV Budget from EE&C Plan through PY14	P4TD Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 3,193.00	$ 2,533.61	0.79
Energy Efficient Products Program	$ 1,439.00	$ 1,604.48	1.11
Low Income Energy Efficiency Program	$ 1,658.00	$ 1,531.57	0.92
C&I Energy Solutions for Business Program - Small	$ 3,840.00	$ 2,594.36	0.68
C&I Energy Solutions for Business Program - Large	$ 3,045.00	$ 1,294.12	0.42
Total	**$ 13,175.00**	**$ 9,558.14**	**0.73**

Table 142: Comparison of P4TD Expenditures to EE&C Plan ($1,000) WPP

Program	Phase IV Budget from EE&C Plan through PY14	P4TD Actual Expenditures	Ratio (Actual/Plan)
Energy Efficient Homes Program	$ 9,679.00	$ 7,610.58	0.79
Energy Efficient Products Program	$ 5,953.00	$ 5,335.29	0.90
Low Income Energy Efficiency Program	$ 6,478.00	$ 4,776.58	0.74
C&I Energy Solutions for Business Program - Small	$ 13,306.00	$ 9,554.44	0.72
C&I Energy Solutions for Business Program - Large	$ 11,335.00	$ 3,645.43	0.32
Total	**$ 46,751.00**	**$ 30,922.31**	**0.66**

Table 143, Table 144, Table 145, and Table 146 compare PYTD verified gross program savings compare to the energy savings projections filed in the EE&C plan for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 143: Comparison of PYTD Actual Program Savings to EE&C Plan Projections for Met-Ed

Program	EE&C Plan Projections for PY14	PY14 VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	18,017	15,153	0.84
Energy Efficient Products Program	8,978	12,788	1.42
Low Income Energy Efficiency Program	5,544	4,348	0.78
C&I Energy Solutions for Business Program - Small	24,288	17,805	0.73
C&I Energy Solutions for Business Program - Large	38,456	35,662	0.93
Total	**95,283**	**85,756**	**0.90**

Table 144: Comparison of PYTD Actual Program Savings to EE&C Plan Projections for Penelec

Program	EE&C Plan Projections for PY14	PY14 VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	14,091	19,408	1.38
Energy Efficient Products Program	7,936	8,128	1.02
Low Income Energy Efficiency Program	5,416	4,646	0.86
C&I Energy Solutions for Business Program - Small	30,252	21,243	0.70
C&I Energy Solutions for Business Program - Large	33,650	18,920	0.56
Total	**91,345**	**72,345**	**0.79**

Table 145: Comparison of PYTD Actual Program Savings to EE&C Plan Projections for Penn Power

Program	EE&C Plan Projections for PY14	PY14 VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	5,645	6,169	1.09
Energy Efficient Products Program	2,481	3,319	1.34
Low Income Energy Efficiency Program	1,644	1,160	0.71
C&I Energy Solutions for Business Program - Small	8,581	5,366	0.63
C&I Energy Solutions for Business Program - Large	8,206	2,271	0.28
Total	**26,558**	**18,284**	**0.69**

Table 146: Comparison of PYTD Actual Program Savings to EE&C Plan Projections for WPP

Program	EE&C Plan Projections for PY14	PY14 VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	18,808	15,509	0.82
Energy Efficient Products Program	10,368	10,791	1.04
Low Income Energy Efficiency Program	5,929	6,314	1.06
C&I Energy Solutions for Business Program - Small	25,940	27,313	1.05
C&I Energy Solutions for Business Program - Large	34,524	20,243	0.59
Total	**95,569**	**80,171**	**0.84**

Table 147, Table 148, Table 149, and Table 150 compare Phase IV verified gross program savings compare to the energy savings projections filed in the EE&C plan for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 147: Comparison of Phase IV Actual Program Savings to EE&C Plan Projections for Phase IV for Met-Ed

Program	EE&C Plan through PY14	VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	33,601	25,419	0.76
Energy Efficient Products Program	17,956	22,491	1.25
Low Income Energy Efficiency Program	10,401	8,110	0.78
C&I Energy Solutions for Business Program - Small	43,706	23,368	0.53
C&I Energy Solutions for Business Program - Large	75,854	52,824	0.70
Total	**181,518**	**132,211**	**0.73**

Table 148: Comparison of Phase IV Actual Program Savings to EE&C Plan Projections for Phase IV for Penelec

Program	EE&C Plan through PY14	VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	26,909	26,982	1.00
Energy Efficient Products Program	15,871	15,192	0.96
Low Income Energy Efficiency Program	10,572	10,588	1.00
C&I Energy Solutions for Business Program - Small	55,644	34,649	0.62
C&I Energy Solutions for Business Program - Large	66,242	20,956	0.32
Total	**175,238**	**108,366**	**0.62**

Table 149: Comparison of Phase IV Actual Program Savings to EE&C Plan Projections for Phase IV for Penn Power

Program	EE&C Plan through PY14	VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	10,863	9,304	0.86
Energy Efficient Products Program	4,962	5,899	1.19
Low Income Energy Efficiency Program	3,063	2,877	0.94
C&I Energy Solutions for Business Program - Small	16,035	6,528	0.41
C&I Energy Solutions for Business Program - Large	15,926	9,611	0.60
Total	**50,849**	**34,218**	**0.67**

Table 150: Comparison of Phase IV Actual Program Savings to EE&C Plan Projections for Phase IV for WPP

Program	EE&C Plan through PY14	VTD Gross MWh Savings	Ratio (Actual/Plan)
Energy Efficient Homes Program	34,723	26,885	0.77
Energy Efficient Products Program	20,735	19,061	0.92
Low Income Energy Efficiency Program	11,607	12,131	1.05
C&I Energy Solutions for Business Program - Small	48,387	34,246	0.71
C&I Energy Solutions for Business Program - Large	68,786	31,486	0.46
Total	**184,239**	**123,808**	**0.67**

Appendix E Evaluation Detail – EE Kits Sub-Initiative

E.1 Gross Impact Evaluation

The Energy Efficiency Kits (EE Kits) initiative has two sub-initiatives – EE Kits and Low-Income EE Kits. Each sub-initiative has two sub-components: EE Kits and School Education. Both components are administered by AMGC. The EE Kits component distributes kits to customers that submit an online or telephonic request for conservation kits and also provides "new mover" kits to customers who open new accounts. The School Education program component also distributes kits by mail but collaborates with local schools to develop an energy efficiency oriented educational component for children.

E.1.1 Gross Impact Evaluation Methodology

ADM's gross impact evaluation methodology was identical for all four EDCs and for all kit types, although separate samples and realization rates are developed for each kit type (School Kits, and EE Kits). In the EE Kit subprogram, distinct types of energy conservation kits were sent to customers depending on their hot water fuel source. The kits provided to customers with electric water heating included LED lamps, LED night lights, energy saving aerators, a furnace whistle, an energy saving showerhead, and electrical outlet gaskets. The kits provided to customers with non-electric water heating excludes the showerhead and aerators. School kits included LED lamps, LED night lights, a furnace whistle, and electrical outlet gaskets. Low-Income kits included advanced power strips instead of electrical outlet gaskets.

In evaluating the gross impact analysis for the energy conservation kits, four items must be determined:

1. The average energy savings and demand reduction for the kit elements that are installed;
2. The number and type of kits mailed to customers during the program year;
3. The installation rate or in-service rate (ISR) for the various kit elements;
4. The delivery rate, or percentage of reported kits sent to customers that were not received by customers, either because of shipping problems, customers moving, or other such scenarios.

The first item has been determined through application of the partially deemed savings protocols in the 2021 TRM. The second item, the total number and type of kits mailed to customers, is determined by reviewing the program tracking and reporting system.

The third item, installation rates, are determined through online and telephone customer verification surveys, except for LED lamps which are given "deemed" installation rates of 0.92 (later multiplied by the kit receipt rate as determined through surveys), consistent with the TRM.

For a particular site in a sample, the installation rate for each kit element takes on a binary value of 1, if the element is installed in accordance with the principles that define that element as an energy efficiency measure, and 0 otherwise. In particular, faucet aerators and energy saving

showerheads are only counted as “installed” if they are installed in a home that has electric water heating.

The final item, the delivery rate is determined through the online and phone survey instrument. Online and phone survey respondents are asked to indicate whether they received the conservation kit that was mailed to them. The reported in-service rates reflect the kit non-receipt rate as they are calculated as the ratio of the number of items installed to the number of items claimed to be delivered.

The survey instrument that was used to verify that the shipped energy conservation kits were installed asks a series of questions that determine how many of each item was installed and where each item was installed.

Both telephone and online surveys were conducted in PY14. The two modes yielded compatible results, so each survey response for a given stratum was given equal weight.

The gross realization rates for energy savings and demand reductions were driven primarily by in-service rates for the kit components. The realization rates for EE Kits were similar to those found in PY13. Reported impacts did not change from PY13 to PY14, neither did evaluation methods. The ADM team examined results from over 1,000 completed surveys statewide to better understand the nature of the realization rates in PY13 and PY14. The following factors contributed to realization rates:

- Opt-in kits did better than New Mover kits
  - ISRs were higher for Opt-in kits for all non-lighting measures
  - Percent electric water heating for aerators and showerhead in Opt-in kits also trended higher than those in New Mover kits
  - EDCs with higher fractions of Opt-in kits had higher realization rates overall
- Low-income kits did better than non-low-income kits mainly due to higher fractions of Opt-in kits.
  - Low-income kits average 9% Opt-in, statewide, compared to only 3% for non-Low-income.
- Electric kits were the main source of low RRs for New Movers due mainly to lower ISRs for showerheads and higher percentages on non-electric water heating obtained from survey responses.
  - ISRs for showerheads in Opt-in kits averaged 30%, statewide, compared to 35% assumed for ex antes while the same ISRs for New Movers averaged 24%.
    - For those respondents who did not install the showerhead, 58% reported already having a low flow showerhead installed.
    - Another 20% stated a technical reason such as “It didn’t fit” or “Water pressure too low”
  - Percent electric water heating for installed showerheads averaged 76% for New Movers, statewide, compared to 85% assumed for ex antes.

While ISRs can fluctuate from survey to survey, the general trend indicated a systematic shift toward lower ISRs. The evaluators considered whether customer recall could be a potential cause, but survey lag times were similar to past efforts. Most of the PY14 verification surveys

had two months of survey lag. Survey question formulation and wording were similar to past efforts, so the instrument itself is unlikely to cause such a shift in apparent ISRs. Other variables include a change in the program ICSP (however, the ICSP is an experienced implementer of kit programs and the School Education component, also administered by the ICSP, exhibited much higher ISRs for non-lighting components), and a change in outreach/recruitment approach – particularly with the "new mover kits". This is the second year in a row we have seen lower performance in kits distributed to customer that recently moved. The kits are still quite cost-effective despite the lower in-service rates associated with new mover kits, but given the higher ISRs for low-income and opt-in kits, ADM has offered some recommendations that may help to increase ISRs for new mover kits.

E.1.2 Sampling

The low-income kits are treated as a separate sub-initiative and are discussed in Appendix Q. Each kit type was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 151, Table 152, Table 153, and Table 154.

Table 151: EE Kits Sub-Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
EE Kits - Electric	39,691	147	Survey (phone + online)
EE Kits - Standard	23,377	91	
School Education kits	5,901	569	
Program Total	**68,969**	**807**	

Table 152: EE Kits Sub-Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
EE Kits - Electric	35,429	100	Survey (phone + online)
EE Kits - Standard	28,852	102	
School Education kits	6,275	922	
Program Total	**70,556**	**1,124**	

Table 153: EE Kits Sub-Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
EE Kits - Electric	9,671	36	Survey (phone + online)
EE Kits - Standard	8,538	40	
School Education kits	2,178	212	
Program Total	**20,387**	**288**	

Table 154: EE Kits Sub-Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
EE Kits - Electric	35,628	129	Survey (phone + online)
EE Kits - Standard	22,475	113	
School Education kits	5,161	767	
Program Total	**63,264**	**1,009**	

E.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 155, Table 156, Table 157, and Table 158 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 155: EE Kits Sub-Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	8,534	62%	0.8	9.5%
EE Kits - Standard	3,543	81%	0.8	12.1%
School Education kits	943	119%	0.8	4.6%
Program Total	**13,020**	**71.3%**	**0.8**	**6.6%**

Table 156: EE Kits Sub-Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	7,502	114%	0.8	11.5%
EE Kits - Standard	4,323	98%	0.8	11.4%
School Education kits	998	129%	0.8	3.5%
Program Total	**12,823**	**109.9%**	**0.8**	**7.8%**

Table 157: EE Kits Sub-Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	2,068	89%	0.8	19.2%
EE Kits - Standard	1,291	97%	0.8	18.2%
School Education kits	358	129%	0.8	7.5%
Program Total	**3,718**	**95.9%**	**0.8**	**11.8%**

Table 158: EE Kits Sub-Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	7,672	82%	0.8	10.1%
EE Kits - Standard	3,433	96%	0.8	10.8%
School Education kits	851	120%	0.8	3.8%
Program Total	**11,957**	**89.1%**	**0.8**	**6.9%**

E.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 159, Table 160, Table 161, Table 162 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 159: EE Kits Sub-Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	0.90	71.0%	0.8	9.5%
EE Kits - Standard	0.39	85.0%	0.8	12.1%
School Education kits	0.105	106.6%	0.8	4.6%
Program Total	**1.40**	**77.6%**	**0.8**	**6.7%**

Table 160: EE Kits Sub-Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	0.75	119.5%	0.8	11.5%
EE Kits - Standard	0.43	106.1%	0.8	11.4%
School Education kits	0.10	110.7%	0.8	3.5%
Program Total	**1.28**	**114.3%**	**0.8**	**7.9%**

Table 161: EE Kits Sub-Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	0.22	80.0%	0.8	19.2%
EE Kits - Standard	0.14	103.8%	0.8	18.2%
School Education kits	0.04	109.0%	0.8	7.5%
Program Total	**0.40**	**91.4%**	**0.8**	**11.8%**

Table 162: EE Kits Sub-Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EE Kits - Electric	0.84	85.6%	0.8	10.1%
EE Kits - Standard	0.41	99.6%	0.8	10.8%
School Education kits	0.10	114.5%	0.8	3.8%
Program Total	**1.36**	**92.1%**	**0.8**	**6.8%**

Note that the overall precision for the EE Kits initiative is the combined precision of the low income and non-low-income components. The combined precisions for each EDC are shown in Table 163 below.

Table 163: EE Kits Initiative Sampling Precisions

EDC	Relative Precision at 85% C.L., Energy	Relative Precision at 85% C.L., Demand
Met-Ed	6.1%	6.2%
Penelec	7.1%	7.2%
Penn Power	11.6%	11.6%
West Penn Power	5.9%	5.8%

E.2 NET IMPACT EVALUATION

E.2.1 Net Impact Evaluation Methodology

A net impact evaluation was not conducted in PY13. Net impact evaluation results from the Phase III evaluation effort will be applied to the initiative for PY13 and PY14. The net-to-gross evaluation for the Energy Efficiency Kits measures in Phase III was based on self-report data from program participants. The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY13 and PY14.

E.2.2 Sampling

The sample designs for the four EDCs are shown Table 164. Note that the survey effort crossed program years, with one effort targeting PY8 and PY9 participants, and the more recent Online Audit Kit survey targeting PY10 customers. PY10 population counts are listed in the table below, though the counts are similar to those of PY8 and PY9.

Table 164: EE Kits Initiative Net-to-Gross Sampling

EDC	Population Size	Achieved Sample Size (PY8/9)	Achieved Sample Size (PY10 Online Audits Only)	Achieved Sample Size (Normalized)	Response Rate
Met-Ed	68,969	172	97	172	14.0%
Penelec	70,556	171	71	163	13.4%
Penn Power	20,387	181	72	72	9.3%
WPP	63,264	193	90	101	8.9%

E.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 165. Results below are weighted for the PY8 and PY10 survey efforts as described above for survey counts.

Table 165: EE Kits Initiative Net-to-Gross Results

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Met-Ed	9,288	21.0%	3.0%	82.0%	5.5%
Penelec	14,088	20.8%	4.3%	83.5%	5.6%
Penn Power	3,564	27.0%	11.0%	84.0%	8.5%
WPP	10,654	22.7%	33.2%	110.6%	7.2%

Appendix F Evaluation Detail – Residential Direct Install Initiative

The Residential Direct Install (Res DI) Initiative is implemented by CLEAResult. A participant in this program is defined as a unique address in the program, multiple projects can be installed at one address.

This program consists of comprehensive residential energy audits performed by CLEAResult along with energy efficiency measures directly installed in customers' residences. The audit evaluates the performance of the participant's home heating and cooling system, insulation, windows, appliances, building shell and lighting equipment. The audit is used to identify energy savings opportunities. Some low-cost energy savings measures are directly installed in the consumer home during the audit. Low-cost measures can include light bulbs, nightlights, smart power strips, furnace whistles, aerators, showerheads, and pipe insulation. Major measures, (attic insulation, wall insulation, air sealing, and windows) can also be installed. These measures are usually installed after the initial audit.

For the initial in-home audit, up to $450 is allocated to cover the costs of the customer audit fee ($150) and the rebates for the direct-install measures (capped at $300). The customer audit fee is paid as a rebate directly to the trade ally by the CSP. The audit fee covers the auditor time, blower door test, home energy education, whole-home analysis, and the home energy report. Additional energy use education and recommendations for further measure installation are also part of the service. After the audit and direct-install measures are completed, the auditor will summarize their recommended measures, inform the customer of available rebates, and provide the customer with a complete list of the audit fee and direct-install measure costs covered by the Comprehensive Audit program. They also provide a FirstEnergy leave-behind flyer that includes information to help the customer with the next steps. If customers are interested in direct-install measures above the $300 cap or additional testing not covered in the program, auditors can work with the customer to complete the requests.

F.1 Gross Impact Evaluation

F.1.1 Gross Impact Evaluation Methodology

Gross impact evaluation for the Res DI Initiative utilized a stratified sampling plan. The projects are placed into one of the following strata: projects with weatherization measures, and non-weatherization projects.

The program tracking and reporting system is at the measure level, but also identifies the rebate application and participant address associated with each measure. In general, there can be multiple measures per application and even multiple applications per household. An example of the latter scenario is when a household first undergoes an initial audit with direct installation of

low-cost measures, but later has major measures installed as identified in the audit report. The subsequent retrofits would be captured in a separate rebate application.

ADM aggregated all measures by unique address and then placed each household in one of the following three strata:

- Weatherization Projects
- Non-Weatherization Projects with impacts below 2 MWh
- Non-Weatherization Projects with impacts above 2 MWh

Evaluation activities for each measure type is described below.

F.1.1.1 Weatherization Measures

Engineering calculation reviews were performed on all participants with major measures. Engineering calculations were checked for TRM compliance. The customer's zip code was used to determine EFLHs, HDDs, and CDDs. Reviews also consisted of a document review to verify HVAC equipment and water heating equipment.

Insulation areas, baseline and post-installation insulation R-values were provided in the rebate forms or from accompanying project documentation.

Residential air sealing measures used $CFM50_{post}$ and $CFM50_{pre}$ values found in the project rebate forms.

F.1.1.2 Non-Weatherization Measures

A sample of projects were used to determine measure level in-service rates. Furthermore, a document review when applicable was used to verify water heating. Non-weatherization measures include light bulbs, showerheads, night lights, smart power strips, aerators, pipe wrap insulation, and smart thermostats. All measures were evaluated according to their respective protocols in the 2021 PA TRM.

F.1.2 Sampling

Table 166, Table 167, Table 168, and Table 169 show sample sizes for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 166: Res DI Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
1	na	450	31	Inspection of QA/QC forms, desk reviews
2	2	1	1	
Weatherization	na	3	3	
Program Total		**454**	**35**	

Table 167: Res DI Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
1	na	303	37	Inspection of QA/QC forms, desk reviews
2	2	0	0	
Weatherization	na	0	0	
Program Total		**303**	**37**	

Table 168: Res DI Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
1	na	207	37	Inspection of QA/QC forms, desk reviews
2	2	0	0	
Weatherization	na	1	1	
Program Total		**208**	**38**	

Table 169: Res DI Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
1	na	438	36	Inspection of QA/QC forms, desk reviews
2	2	1	1	
Weatherization	na	1	1	
Program Total		**440**	**38**	

F.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 170, Table 171, Table 172, and Table 173 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 170: Res DI Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
1	na	319	109.3%	0.4	10%
2	2	4	109.9%	0.4	10%
Weatherization	na	7	103.0%	0.4	0%
Program Total		**329**	**109.2%**	**n/a**	**9.7%**

Table 171: Res DI Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
1	na	172	114.5%	0.4	9%
2	2	0	0.0%	0.4	9%
Weatherization	na	0	0.0%	0.4	0%
Program Total		**172**	**114.5%**	**n/a**	**8.9%**

Table 172: Res DI Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
1	na	117	113.5%	0.4	9%
2	2	0	0.0%	0.4	9%
Weatherization	na	6	40.6%	0.4	0%
Program Total		**124**	**109.7%**	**n/a**	**8.4%**

Table 173: Res DI Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
1	na	265	111.9%	0.4	9%
2	2	2	97.3%	0.4	9%
Weatherization	na	1	116.8%	0.4	0%
Program Total		**268**	**111.8%**	**n/a**	**9.1%**

F.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown Table 174, Table 175, Table 176, and Table 177 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 174: Res DI Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
1	na	0.06	73.6%	0.4	10%
2	2	0.00	69.3%	0.4	10%
Weatherization	na	0.00	105.3%	0.4	0%
Program Total		**0.06**	**73.6%**	**n/a**	**9.9%**

Table 175: Res DI Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
1	na	0.03	71.3%	0.4	9%
2	2	0.00	0.0%	0.4	9%
Weatherization	na	0.00	0.0%	0.4	0%
Program Total		**0.03**	**71.3%**	**n/a**	**8.9%**

Table 176: Res DI Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
1	na	0.02	78.4%	0.4	9%
2	2	0.00	0.0%	0.4	9%
Weatherization	na	0.00	44.1%	0.4	0%
Program Total		**0.02**	**77.9%**	**n/a**	**8.5%**

Table 177: Res DI Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
1	na	0.05	84.0%	0.4	9%
2	2	0.00	59.0%	0.4	9%
Weatherization	na	0.00	116.8%	0.4	0%
Program Total		**0.05**	**83.8%**	**n/a**	**9.1%**

F.2 Net Impact Evaluation

F.2.1 Net Impact Evaluation Methodology

A net impact evaluation was not conducted in PY14. Net impact evaluation results from the Phase III evaluation effort are applied to the initiative for PY14. The net-to-gross evaluation for the Res DI initiative in Phase III was based on self-report data from program participants. The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY13 and PY14.

F.2.2 Sampling

The sample of participants was selected from both PY9 and PY10, since the small participation counts made it difficult to reach sample quotas by drawing from participants from just one program year. The population sizes (combined for PY9 and PY10), achieved sample sizes, and response rates are shown in Table 178 below.

Table 178: Res DI Initiative Net-to-Gross Sampling

EDC	Population Size	Achieved Sample Size	Response Rate
Met-Ed	277	75	27.0%
Penelec	383	113	30.0%
Penn Power	170	70	41.0%
WPP	298	73	25.0%

F.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 179. Overall, the program had 18% free ridership and 19% spillover, resulting in an NTG of 101% (ranging from 95% to 104% among the four PA Companies). The top five measures contributing to spillover savings were air sealing, attic insulation, wall insulation, LEDs, and pipe wrap.

Table 179: Res DI Initiative Net-to-Gross Results by EDC

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Met-Ed	360	19.0%	14.0%	95.0%	7.1%
Penelec	197	16.0%	19.0%	103.0%	5.7%
Penn Power	136	19.0%	20.0%	100.0%	6.6%
WPP	299	20.0%	24.0%	104.0%	7.3%

Appendix G Evaluation Detail – Residential New Construction Initiative

The Residential New Construction program incentivizes builders to adopt energy efficient building practices. This includes building envelope improvements, high-efficiency HVAC equipment, duct sealing, and installation of ENERGY STAR® appliances, smart thermostats, and lighting. Participants are defined as each unique dwelling unit (e.g., unique mailing address).

All submitted projects used REM/Rate to generate reported energy and demand impacts.

G.1 Gross Impact Evaluation

G.1.1 Gross Impact Evaluation Methodology

Gross impact evaluation for the Residential New Construction (Res NC) Initiative involved reviewing the software models submitted with each sampled project, performing verification of model inputs, and re-running modified models through the same software used by program HERS raters. Models were modified based on site inspection information obtained by the implementer (PSD) during their quality control inspections, or ADM's verification site visits. Additional resources such as aerial maps were also used to verify model inputs such as orientation and number of stories. Modified models were then run against the reference home to obtain ex post energy savings and cooling demand reduction TRM inputs. Ex post cooling demand reductions followed the corresponding TRM algorithm which includes a coincidence factor. Ex post demand reductions for lighting, appliances, and water heaters were obtained from corresponding TRM algorithms. Total ex post demand reductions are the sum of the cooling demand reduction and the lighting, appliances, and water heater demand reductions. Additional algorithm parameters required by the TRM but not required by software inputs were obtained through the on-site verification efforts.

G.1.1.1 On-Site Inspections

Two types of on-site inspections were performed for the impact evaluation effort:

- Diagnostic inspection w/blower door and duct blaster
- Visual inspection without blower door and duct blaster

Diagnostic inspections include the same activity as visual inspections with the addition of blower door and duct blaster testing to verify duct leakage and whole house infiltration rates.

Visual inspection includes the following:

- Building Characteristics
  - Orientation (N, NE, E, SE, etc.)
  - Housing type (SF detached, Townhouse inside unit, Townhouse end unit, etc.)
  - Number of floors on or above grade
  - Conditioned sq. ft.
  - Number of bedrooms

    - Window type, size and orientation
    - Ceiling heights
- Envelope
    - Foundation type (slab, conditioned basement, unconditioned basement, etc.)
    - Wall and ceiling insulation R-values
    - Slab and framed floor insulation
    - Rim/band joist insulation
    - Number of exterior doors
- HVAC
    - Make and model
    - SEER, capacity, and HSPF
    - For gas furnaces, electric auxiliary energy usage (EAE) as obtained from the AHRI database
    - Smart thermostat is installed
    - Duct location (conditioned space, attic)
    - Type of mechanical ventilation if necessary
- Water heating
    - Type (storage, instantaneous)
    - Fuel (gas, electric resistance, heat pump)
    - Size in gallons
    - Energy factor as obtained from the AHRI database
- Lighting
    - Percent efficient installed interior, exterior, and in the garage. In cases of discrepancies, lighting counts were reported in the notes section of the checklist. ADM visual inspections reported lighting counts in each of these three areas.
    - Identification of source (incandescent, LED, or CFL)
- Appliances
    - An ENERGY STAR® appliance was installed at the time of inspection
    - kWh/yr for refrigerators and dishwashers
    - Fuel for ranges and cooktops
    - ADM visual inspections included make and model of each installed appliance

G.1.1.2 Engineering Model Reviews

Submitted building models were reviewed as part of the evaluation activities. These reviews included the following activities:

- Baseline specifications are accurate per the TRM
- Model inputs are reasonable and self-consistent
- Models are consistent with actual as-built homes

  Each sampled home was reviewed for consistency with actual as-built homes. In cases where submitted models differed from as-built homes, models were modified prior to generating ex post values.

G.1.1.3 TRM Impact Evaluation

Demand impact parameters for cooling equipment, including peak load and EER values, were obtained from software outputs and multiplied by coincidence factors based on zip code according to the TRM algorithm. The TRM requires that demand impacts from lighting and appliances are evaluated with relevant TRM protocols rather than within engineering simulation models. Since approved software does not produce peak load outputs for end uses other than cooling equipment, demand.

G.1.2 Sampling

Table 180, Table 181, Table 182, and Table 183 show sample sizes for Met-Ed, Penelec, Penn Power, and WPP respectively. New Homes and smart thermostats within those homes make up the two qualitative sampling strata.

Table 180: RES NC Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
New Homes	724	23	Model Review / On-Site
Smart Thermostats	128	11	
Program Total	**852**	**34**	

Table 181: RES NC Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
New Homes	97	20	Model Review / On-Site
Smart Thermostats	1	1	
Program Total	**98**	**21**	

Table 182: RES NC Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
New Homes	521	22	Model Review / On-Site
Smart Thermostats	345	10	
Program Total	**866**	**32**	

Table 183: RES NC Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
New Homes	895	23	Model Review / On-Site
Smart Thermostats	365	11	
Program Total	**1,260**	**34**	

G.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 184, Table 185, Table 186, and Table 187 for Met-Ed, Penelec, Penn Power, and WPP respectively. Gross realization rates for Smart Thermostats improved from PY13 values due to revising assumed square footage per ton values in PY14. Smart thermostat realization rates varied

across EDCs mainly due to small sample sizes resulting in higher and lower square footage per ton than ex ante assumptions.

Table 184: RES NC Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	2,028	102.5%	0.5	14.8%
Smart Thermostats	38	89.2%	0.5	20.8%
Program Total	**2,066**	**102.3%**	**0.5**	**14.5%**

Table 185: RES NC Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	281	100.2%	0.5	14.3%
Smart Thermostats	0	69.7%	0.5	0.0%
Program Total	**281**	**100.2%**	**0.5**	**14.3%**

Table 186: RES NC Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	1,046	101.4%	0.5	15.0%
Smart Thermostats	63	113.2%	0.5	22.4%
Program Total	**1,109**	**102.0%**	**0.5**	**14.1%**

Table 187: Res DI Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	1,948	105.2%	0.5	14.8%
Smart Thermostats	73	102.7%	0.5	21.4%
Program Total	**2,022**	**105.1%**	**0.5**	**14.3%**

G.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown Table 188, Table 189, Table 190, and Table 191 for Met-Ed, Penelec, Penn Power, and WPP respectively. Gross realization rates for demand savings were driven by missing coincidence factor in reported savings values. SWE issued a memo reflecting errata guidance on CFs in Q3 of PY14. Evaluation results from PY14 will be used to adjust ex-ante demand impacts for PY15.

Table 188: RES NC Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	0.78	68.8%	0.5	14.8%
Smart Thermostats	0.01	101.0%	0.5	20.8%
Program Total	**0.79**	**69.3%**	**0.5**	**14.5%**

Table 189: RES NC Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	0.12	43.4%	0.5	14.3%
Smart Thermostats	0.00	62.1%	0.5	0.0%
Program Total	**0.12**	**43.4%**	**0.5**	**14.3%**

Table 190: RES NC Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	0.45	57.3%	0.5	15.0%
Smart Thermostats	0.02	120.3%	0.5	22.4%
Program Total	**0.47**	**59.8%**	**0.5**	**14.0%**

Table 191: RES NC Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
New Homes	0.77	58.6%	0.5	14.8%
Smart Thermostats	0.02	108.3%	0.5	21.4%
Program Total	**0.79**	**60.0%**	**0.5**	**14.1%**

G.2 Net Impact Evaluation

G.2.1 Net Impact Evaluation Methodology

Tetra Tech conducted a net impact evaluation in PY14 by tailoring the common approach defined in the Pennsylvania Act 129 Phase IV Statewide Evaluation Framework to the New Homes program design. A series of free-ridership and spillover questions included in the builder interviews ask participating builders about the actions they would have taken if the program had not been offered and whether various program aspects influenced their actions. A total of 14

builders were interviewed from the 34 total builders that participated in the program across the four PA Companies. Builder responses resulted in a free ridership rate of 28 percent for PY14 (similar to the 27% measured in PY10). The net-to-gross research did not identify any participant spillover. Due to the homogeneity of the program approach across the four PA Companies, and the relatively small number of builders, the same NTG ratio is applied to all four Companies' programs.

G.2.2 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 192.

Table 192: Res NC Initiative Net-to-Gross Results by EDC

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Met-Ed	2,112	28.0%	0.0%	72.0%	14.5%
Penelec	281	28.0%	0.0%	72.0%	14.5%
Penn Power	1,132	28.0%	0.0%	72.0%	14.5%
WPP	2,124	28.0%	0.0%	72.0%	14.5%

Appendix H Evaluation Detail – Residential Multifamily Direct Install Initiative

The Residential Multifamily Direct Install (Res MF) Initiative is implemented by CLEAResult. A participant in this program is defined as a unique address in the program, multiple projects can be installed at one address.

This program consists of brief energy audits performed by CLEAResult along with energy efficiency measures directly installed in customers' dwelling units. The audit is used to identify low-cost energy savings opportunities, with associated energy savings measures directly installed in the unit during the audit. Low-cost measures installed in PY14 included light bulbs, nightlights, smart power strips, efficient showerheads, and low-flow aerators.

H.1 Gross Impact Evaluation

H.1.1 Gross Impact Evaluation Methodology

Gross impact evaluation for the Res DI Initiative utilized a stratified sampling plan. Most projects are placed into one sampling stratum, with an additional stratum reserved for high-impact projects.

The program tracking and reporting system is at the measure level, but also identifies the rebate application and participant address associated with each measure. ADM aggregated all measures by unique address and then placed each household in one of the two strata: high-impact projects with reported energy savings above 2,000 kWh, and all other projects.

Due to the low participation and impacts in this initiative in PY14, desk reviews were the most appropriate evaluation activity. ADM evaluators compared audit reports and invoices to program tracking and reporting data to reconcile quantities of installed measures. The evaluators also independently calculated impacts for all measures according to their respective protocols in the 2021 PA TRM.

H.1.2 Sampling

Table 193, Table 194, Table 195, and Table 196 show sample sizes for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 193: Res MF Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High-Impact	2,000	1	1	Inspection of QA/QC verification forms, desk reviews
All Other	na	46	32	
Program Total		**47**	**33**	

Table 194: Res MF Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High-Impact	2,000	0	0	Inspection of QA/QC verification forms, desk reviews
All Other	na	70	32	
Program Total		**70**	**32**	

Table 195: Res MF Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High-Impact	2,000	0	0	Inspection of QA/QC verification forms, desk reviews
All Other	na	0	0	
Program Total		**0**	**0**	

Table 196: Res MF Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High-Impact	2,000	1	1	Inspection of QA/QC verification forms, desk reviews
All Other	na	201	30	
Program Total		**202**	**31**	

H.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 197, Table 198, Table 199, and Table 200 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 197: Res MF Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	2	111.6%	0.4	0%
All Other	na	27	109.3%	0.4	6%
Program Total		**29**	**109.4%**	**n/a**	**5.2%**

Table 198: Res MF Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	0	0.0%	0.4	100%
All Other	na	37	120.7%	0.4	8%
Program Total		**37**	**120.7%**	**n/a**	**7.5%**

Table 199: Res MF Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	0	0.0%	0.4	100%
All Other	na	0	0.0%	0.4	100%
Program Total		**0**	**0.0%**	**n/a**	**100.0%**

Table 200: Res MF Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	2	38.1%	0.4	0%
All Other	na	146	112.8%	0.4	10%
Program Total		**148**	**111.6%**	**n/a**	**9.6%**

H.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 201, Table 202, Table 203, and Table 204 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 201: Res MF Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	0.00	84.1%	0.4	0%
All Other	na	0.00	84.4%	0.4	6%
Program Total		**0.00**	**84.3%**	**n/a**	**5.2%**

Table 202: Res MF Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	0.00	0.0%	0.4	100%
All Other	na	0.00	97.1%	0.4	8%
Program Total		**0.00**	**97.1%**	**n/a**	**7.5%**

Table 203: Res MF Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	0.00	0.0%	0.4	100%
All Other	na	0.00	0.0%	0.4	100%
Program Total		**0.00**	**0.0%**	**n/a**	**100.0%**

Table 204: Res MF Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High-Impact	2,000	0.00	31.4%	0.4	0%
All Other	na	0.03	84.6%	0.4	10%
Program Total		**0.03**	**83.9%**	**n/a**	**9.6%**

H.2 Net Impact Evaluation

H.2.1 Net Impact Evaluation Methodology

A net impact evaluation was not conducted in PY14. Net impact evaluation results from the Phase III evaluation effort for the similar singlefamily audit and direct install program are applied to the initiative for PY14, with the exception that spillover is set to zero for this program on grounds that additional energy efficiency opportunities are limited due to the tenant needing permission to make significant efficiency changes to the dwelling unit (the Phase III net impact evaluation attributed spillover to measures such as air sealing, insulation, pipe wrap, and additional LEDs). The population sizes, achieved sample sizes, and response rates for the proxy evaluation effort from Phase III are shown in Table 205 below.

Table 205: Res MF Initiative Net-to-Gross Sampling

EDC	Population Size	Achieved Sample Size	Response Rate
Met-Ed	277	75	27.0%
Penelec	383	113	30.0%
Penn Power	170	70	41.0%
WPP	298	73	25.0%

H.2.2 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 206.

Table 206: Res MF Initiative Net-to-Gross Results by EDC

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Met-Ed	32	19.0%	0.0%	81.0%	7.1%
Penelec	45	16.0%	0.0%	84.0%	5.7%
Penn Power	0	19.0%	0.0%	81.0%	6.6%
WPP	166	20.0%	0.0%	80.0%	7.3%

Appendix I Evaluation Detail – Residential Online Audit Initiative

Online Audit is a component of the Behavioral subprogram—a subprogram administered as part of both the Energy Efficient Homes and Low-Income Energy Efficiency programs. The Online Audit component provides residential customers with a web-based platform that provides: (1) visualizations of a customer's energy use, (2) tips on ways customers can save energy, and (3) promoting other programs in FirstEnergy's residential energy efficiency portfolio. The administration of this component is divided between standard residential customers, as part of the Energy Efficient Homes Program, or Low-Income customers, as part of the Low-Income Energy Efficiency Program. Online Audits are administered as a customer opt-in program, meaning that customers can freely enroll in the program at any time.

I.1 Gross Impact Evaluation

I.1.1.1 Data Gathering

ADM receives regularly-scheduled extracts of monthly billing data and hourly AMI data from FirstEnergy. ADM receives a monthly extract of FirstEnergy's T&R system. Additionally, ADM's team has access to run custom extracts directly from the T&R system as well.

I.1.1.2 Data Preparation

During Phase III, FirstEnergy converted most residential accounts to AMI. Thus, ADM leveraged the daily AMI extract provided by FirstEnergy to conduct the billing data analysis for Online Audits in Phase IV.

ADM's preparation of AMI data is as follows:

- Residential AMI data is filtered by cohort by the treatment and comparison group account numbers.
- Estimated AMI data may be present in the AMI data as a means of backfilling missing reads. Rather than interpolating estimated AMI data, estimated AMI data and any calendar day containing estimated AMI data is removed from the data set on a per-customer basis.
- Calendar days with missing/incomplete data are excluded from analysis on a per customer basis.
- The total daily kWh per customer is taken for each customer for each day by summing across the kWh for each calendar day.
- An outlier filter of +/- 300 kWh per day was applied to the data set.

I.1.1.3 Billing Analysis

Analysis Population

As part of the development of FirstEnergy's PY13 EM&V Plan, a resampling exercise was undertaken to determine the optimal number of customers needed to measure a statistically

significant result at the 85% confidence level at the projected per-customer savings level proposed by the EE&C Plan (approximately 4,000 customers per EDC). During the PY14 analysis, the SWE recommended aggregating across the marketplace and low income programs rather than aggregating across all participants. Additionally, concerns were raised at the potential impact of behavioral savings ramp-up impacting the measurement of incremental first-year savings, since overlap with the HER Behavioral component may introduce undue bias in the regression results. Therefore, the regression analysis was limited to the subset of non-HER customers with opt-in dates prior to January 1, 2023, to ensure sufficient post-exposure data (3,795 total customers in the EE Homes analysis; 342 total customers in the Low Income analysis).

Propensity Score Matching

The Phase IV Online Audit subprogram functions as an opt-in program, meaning that customers enroll in the program at their own discretion rather than being enrolled in the program automatically. Thus, a control group is not defined prior to program start. To develop a comparison group, ADM leveraged the population of residential AMI data and performed a nearest neighbor matching to develop a comparison group. To ensure customers were matched to appropriate comparison groups, matching occurred on a per-customer sector by EDC basis. I.e., treatment customers for the standard residential group for Met-Ed were matched to comparison customers from the standard residential population, etc. Standard and Low-Income populations for the comparison group were defined using enrollment in Health & Human Services Programs as defined by FirstEnergy's Customer Information System.

For PY14, ADM used the 12-month period of June 1, 2021, through May 31, 2022, as the baseline period for matching. ADM generated five pre-treatment variables for use in the matching algorithm: a pre-treatment annual variable (average daily kWh across the 12-month period), a pre-winter variable (average daily kWh for December, January, and February), a pre-spring variable (average daily kWh for March, April, and May), a pre-summer variable (average daily kWh for June, July, and August), and a pre-fall variable (average daily kWh for September, October, and November). Additionally, customer zip codes were used to look up approximate latitude and longitude for each customer address.

These seven variables were included in the nearest neighbor matching. The nearest neighbor match used "greedy" matching without replacement, meaning that the algorithm matched treatment group customers serially and sequentially. A match was considered "good" if a MANOVA of the five pre-treatment variables are not found to be statistically different. After testing various comparison group to treatment group ratios (from 5:1 to as low as 1:1), a 1:1 was used to meet the testing criteria.

Regression Model

Because the Online Audit component relies on a non-RCT design, ADM's method for evaluation draws from "Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol" of Uniform Methods Project (UMP) (Agnew & Goldberg, 2017). The UMP protocol for

whole building retrofit provides guidance for performing pooled billing analysis using a matched comparison group. The regression model recommended by the UMP is a form of the LFER model found in the Behavioral section of the Phase IV Evaluation Framework. ADM used a form of this regression model to evaluate savings for the Online Audits component.

Degree day bases were optimized for each customer by testing a range of potential CDD bases (65-80 degrees Fahrenheit) and HDD bases (50-65 degrees Fahrenheit) at all potential whole-number combinations rounded to the nearest multiple of 5 and selecting the pair that provides the highest R-squared value when regressing against each customer's monthly billing data.

Although ADM used a comparison group that should theoretically match the treatment group on pre-treatment characteristics, ADM opted to include weather terms in the Online Audit analysis to better control for potential variability between the treatment and control group. The model is specified in the equation below:

$$\mathrm{kWh}_{\mathrm{i,d}} = \beta_{\mathrm{i}} + \beta_{post} * post_{i,d} + \beta_{cdd} * \mathrm{CDD}_{i,d} + \beta_{hdd} * \mathrm{HDD}_{i,d} + \beta_{post,cdd} * post_{i,d} * \mathrm{CDD}_{i,d} +$$

$$\beta_{post,hdd} * post_{i,d} * \mathrm{HDD}_{i,d} + \beta_{treat,cdd} * treat_{i} * \mathrm{CDD}_{i,d} + \beta_{treat,hdd} * treat_{i} * \mathrm{HDD}_{i,d} + \tau_{post,treat} * post_{i,d} * \mathrm{treat}_{i} +$$

$$\tau_{post,treat,cdd} * post_{i,d} * \mathrm{treat} * \mathrm{CDD}_{i,d} + \tau_{post,treat,hdd} * post_{i,d} * \mathrm{treat} * \mathrm{HDD}_{i,d} + \varepsilon_{\mathrm{imy}}$$

Equation 4: Formula specifying the Online Audits regression model

The variables above are defined in Table 207 below.

Table 207: Definition of variables in the Online Audit regression model

Variable	Definition
$\mathbf{kWh_{i,d}}$	Customer i's daily electric usage on day d.
$\boldsymbol{\beta_i}$	The intercept term for customer i, or the "fixed effect" term.
$\boldsymbol{\beta_{post}}$	The coefficient for the main effect of "post."
$\boldsymbol{\beta_{cdd}}$	The coefficient of the main effect of CDD.
$\boldsymbol{\beta_{hdd}}$	The coefficient of the main effect of HDD.
$\boldsymbol{\beta_{post,cdd}}$	The coefficient of the interactive effect of CDD and post.
$\boldsymbol{\beta_{post,hdd}}$	The coefficient of the interactive effect of HDD and post.
$\boldsymbol{\beta_{treat,cdd}}$	The coefficient of the interactive effect of CDD and treat.
$\boldsymbol{\beta_{treat,hdd}}$	The coefficient of the interactive effect of HDD and treat.
$\boldsymbol{post_{i,d}}$	An indicator variable that equals one during the post-period for customer i.
$\boldsymbol{CDD_{i,d}}$	Customer i's CDD on day d.
$\boldsymbol{HDD_{i,d}}$	Customer i's HDD on day d.
$\boldsymbol{treat_i}$	An indicator variable that equals 1 for customers in the treatment group and 0 for customers in the comparison group.
$\boldsymbol{\tau_{post,treat}}$	The estimated treatment effect in kWh per day; the main parameter of interest. Estimated separately for each month and year
$\boldsymbol{\tau_{post,treat,cdd}}$	The estimated treatment effect in kWh per CDD.
$\boldsymbol{\tau_{post,treat,hdd}}$	The estimated treatment effect in kWh per HDD.
$\boldsymbol{\varepsilon_{\mathrm{imy}}}$	The error term.

I.1.1.4 Dual Participation Analysis

The following sub-section provides a formal description of ADM's Dual Participation Analysis for Online Audits. It is important to note that savings for Online Audits were not found to be statistically significant and the correction for Dual Participation did not exceed the observed error of the regression model. Therefore, the savings reported for the program were reported as 0 kWh and 0 kW regardless of the impact of Dual Participation. On average, ADM found an annual impact of Dual Participation of 6.7 kWh per customer.

Participants in both the treatment and comparison groups participate in other FirstEnergy energy efficiency programs. Furthermore, the Online Audits measure may cause treatment group participants to seek out other programs and measures offered in the FirstEnergy efficiency portfolio to a greater extent than the control group. To the extent that the treatment group participates in other FirstEnergy programs at a rate above and beyond that of the comparison group, those incremental savings were reflected in the gross energy savings calculated using the method above. However, savings for these items will also have been attributed to their respective programs and subprograms. ADM corrected for dual participation that occurred after treatment began to the extent that the treatment group participated at a higher rate than the comparison group.

It is important to note that dual participation with the HER component was controlled prior to the regression analysis by removing these participants from the treatment and comparison group. This is because, unlike other EE measures, participation in HER is compulsory. Thus, any savings estimated via regression analysis for Online Audits does not contain any cross-savings with HER.

Adjustment for Downstream Measures

For downstream measures, ADM conducted a review of the tracking and reporting system for each experimental cohort to identify EE program participation that occurred from the treatment start date onwards. The following steps detail the process of correcting for these measures:

1. The measures for the treatment group and control group were assigned to an appropriate month based on the reported date of installation for measures installed after the treatment start date.
2. For each month of the program year, the annual savings for all measures installed prior to the month of interest dating back to the treatment start date that had not yet reached the end of their effective useful life were summed for all active participants for each group. For measures installed prior to the current Program Year, ADM used verified savings for dual participation analysis. For measures installed during the Program Year, ADM utilized reported savings as verification activities occurred concurrently to the evaluation of the Behavioral Modification subprogram.
3. The totaled savings for each group was then divided by 365.25 and then divided by the number of active customers in each group to create a daily average dual participation savings value per home.
4. For each month, the daily average dual participation savings value per home for the control group was then subtracted from the daily average dual participation

savings value per home from the treatment group. This resulted in an adjustment factor which was then subtracted from the daily savings value extrapolated from the billing analysis prior to using these values to calculate gross verified energy savings.

Adjustment for Upstream Measures

The Phase IV Evaluation Framework recommends adjustment for upstream measures based on years of exposure to upstream lighting programs. Because the Companies did not administer an upstream lighting program in Phase IV, an upstream adjustment did not occur.

I.1.1.5 Gross Energy Savings Calculation

The regression model provides a series of regression coefficients for the measure month interacted with the treatment term. A negative coefficient represents a daily savings that can be attributed to the treatment effect for that measure month. Multiplying the inverse of the coefficient by the number of days in the month and the number of participants in that month provides the total kWh saved for that month. Summing the savings for the months corresponding to the program year provides the savings attributable to the component for the program year prior to adjusting for dual participation in other programs. Additionally, interactive effects of the main effect of treatment by HDD and CDD can be multiplied by the total HDDs and CDDs for all participants for the program year of interest to obtain the weather-dependent savings of interest. Equation 2 demonstrates the algorithm for calculating verified savings for the model prior to correcting for dual participation in other energy efficiency programs.

$$kWh\ savings = \ n \times \{(\tau_{base} \times days_y) + (\tau_{cdd} \times CDD_y) + (\tau_{hdd} \times HDD_y) - Dual\ Participation/yr\}$$

Equation 5: kWh savings calculation

The variables in the above equation are defined in Table 102 below.

Table 208: Definition of variables for kWh savings calculation

Variable	Definition
τ_{base}	The regression coefficient of the treatment effect that represents savings that are not weather-related.
τ_{cdd}	The estimated treatment effect in kWh per CDD.
τ_{hdd}	The estimated treatment effect in kWh per HDD.
CDD_y	The total annual CDD in year y.
HDD_y	The total annual HDD for customer X.
n	The total number of participants in the program year of interest.
y	The program year of interest

I.1.1.6 Gross Demand Savings Calculation

Because the Online Audits program allows customers to have a floating start date at any point between the beginning and end of the program year, directly measuring gross demand savings is not a feasible task for this program. Therefore, ADM generated an ETDF using residential load profiles corresponding to the treatment group for the period beginning June 1, 2022, and ending May 31, 2023. This ETDF was then applied to energy savings to estimate demand savings.

I.1.2 Results for Energy and Demand

Table 209 below shows the number of participants, reported energy savings, and verified energy savings for each EDC and cohort. The last two columns of the table show the gross realization rates and relative precisions. The nomenclature in the table includes a prefix to denote the EDC, a suffix of "-LI" for low-income groups, and a number that identifies waves of participants sequentially. The verified values below include dual participation adjustments. Table 210 shows the reported and verified demand reductions for the program.

Based on the Phase IV Evaluation Framework, non-RCT analyses should be statistically significant at the 85% confidence level. Because the Online Audits component failed to achieve this level of significance, savings has been reported as 0 kWh and 0 kW for PY13. The PY14 analysis did achieve the requisite level of significance, with results shown below.

Table 209: Res Online Audit Initiative Energy Gross Realization Rates

Operating Company	Experimental Cohort	Participants	PYRTD (MWh)	PYVTD (MWh)	Energy Realization Rate	Relative Precision at 85% CL
Met-Ed	ME-1	6,415	834	519	62.20%	42.50%
Met-Ed	**Total for EEH Program**	**6,415**	**834**	**519**	**62.20%**	**42.50%**
Met-Ed	ME-1-LI	562	73	272	372.08%	26.96%
Met-Ed	**Total for LI Program**	**562**	**73**	**272**	**372.08%**	**26.96%**
Penelec	PN-1	3,938	512	120	23.39%	111.24%
Penelec	**Total for EEH Program**	**3,938**	**512**	**120**	**23.39%**	**111.24%**
Penelec	PN-1-LI	700	91	290	319.03%	30.88%
Penelec	**Total for LI Program**	**700**	**91**	**290**	**319.03%**	**30.88%**
Penn Power	PP-1	1,308	170	63	36.85%	69.86%
Penn Power	**Total for EEH Program**	**1,308**	**170**	**63**	**36.85%**	**69.86%**
Penn Power	PP-1-LI	138	18	62	344.51%	27.67%
Penn Power	**Total for LI Program**	**138**	**18**	**62**	**344.51%**	**27.67%**
WPP	WP-1	5,306	690	303	43.94%	58.72%
WPP	**Total for EEH Program**	**5,306**	**690**	**303**	**43.94%**	**58.72%**
WPP	WP-1-LI	454	59	203	343.39%	28.50%
WPP	**Total for LI Program**	**454**	**59**	**203**	**343.39%**	**28.50%**

Table 210: Res Online Audit Initiative Demand Gross Realization Rates[15]

Operating Company	Experimental Cohort	PYRTD MW/yr	PYVTD MW/yr	Demand Realization Rate
Met-Ed	ME-1	0.09	0.10	106.24%
Met-Ed	**Total for EEH Program**	**0.09**	**0.10**	**106.24%**
Met-Ed	ME-1-LI	0.01	0.05	574.14%
Met-Ed	**Total for LI Program**	**0.01**	**0.05**	**574.14%**
Penelec	PN-1	0.06	0.02	34.08%
Penelec	**Total for EEH Program**	**0.06**	**0.02**	**34.08%**
Penelec	PN-1-LI	0.01	0.04	427.32%
Penelec	**Total for LI Program**	**0.01**	**0.04**	**427.32%**
Penn Power	PP-1	0.02	0.01	58.37%
Penn Power	**Total for EEH Program**	**0.02**	**0.01**	**58.37%**
Penn Power	PP-1-LI	0.00	0.01	543.12%
Penn Power	**Total for LI Program**	**0.00**	**0.01**	**543.12%**
WPP	WP-1	0.08	0.05	71.92%
WPP	**Total for EEH Program**	**0.08**	**0.05**	**71.92%**
WPP	WP-1-LI	0.01	0.03	496.79%
WPP	**Total for LI Program**	**0.01**	**0.03**	**496.79%**

I.2 Net Impact Evaluation

I.2.1 Net Impact Evaluation Methodology

The net-to-gross ratios are 100% because the gross impact evaluation methodology measures net impacts.

[15] The program implementer did not measure or report demand reductions for Online Audits. ADM has set the reported demand reduction to 0.013 kW per home (a rate of one kW per 10 MWh) to avoid divide-by-zero errors in reporting calculations.

Appendix J Evaluation Detail – Residential Appliance Recycling Sub-Initiative

J.1 Gross Impact Evaluation

The Appliance Recycling (ATI) Initiative has four sub-initiatives: Appliance Recycling, Low-Income Appliance Recycling, Nonresidential Appliance Recycling, and Midstream Appliance Recycling. The midstream sub-initiative differs from the other three in that it intercepts old, working, inefficient appliances at reseller locations before the old appliances are sold back to the public instead of at end-user homes and businesses.

There are five distinct measures offered by the program: refrigerator recycling, freezer recycling, room air conditioner (RAC) recycling, dehumidifier recycling, and mini refrigerator recycling. The midstream sub-initiative only offered refrigerator recycling and freezer recycling in PY14.

J.1.1 Gross Impact Evaluation Methodology

ADM's gross impact evaluation methodology was identical for all four EDCs. A TRM-based calculation was performed using population averages for parameter values required by the TRM algorithms. The TRM parameter values were taken from project-specific data in the tracking and reporting system when applicable, from TRM defaults, from customer verification surveys, and, for the midstream sub-initiative, from on-site verification activities.

For refrigerators and freezers, measure attributes that participants would readily recall were determined from participant surveys, and the average parameter values were applied to all measures. Apart from measure verification, these attributes include the part-use factor, the location in the home where the appliance was used, and for refrigerators, whether the appliance was a primary or secondary unit. For the midstream sub-initiative, these parameter values were taken from TRM defaults due to very limited survey responses.

Technical attributes of the appliances, such as the age, capacity, and configuration, as collected by the implementer, were taken from program tracking and reporting data. The TRM default value was used for RAC efficiency. Table 211 lists the data sources for gross impact calculation algorithms.

Table 211: Data Sources for the ATI Initiative Gross Impact Evaluation

Measure	TRM Parameter	Data Source
Refrigerator, Freezer	Appliance Age	Tracking and Reporting System
Refrigerator, Freezer	Pre-1990	Tracking and Reporting System
Refrigerator, Freezer	Appliance Size / Capacity	Tracking and Reporting System
Refrigerator, Freezer	Configuration/Type	Tracking and Reporting System
Refrigerator	Primary Usage	Participant Surveys
Refrigerator, Freezer	Part Use Factor	Participant Surveys
Refrigerator, Freezer	In Unconditioned Space?	Participant Surveys
Refrigerator, Freezer	CDD and HDD	TRM - Zip Code Lookup
RAC	Capacity	Tracking and Reporting System
RAC	EER	TRM Default
RAC	RAC EFLH	TRM - Zip Code Lookup
RAC	CF	TRM - Zip Code Lookup
Dehumidifier	Capacity	Tracking and Reporting System
Dehumidifier	Region (to determine kWh)	TRM - Zip Code Lookup
All Measures	Verification Rate	Participant Surveys

The gross realization rates for energy savings were driven primarily by part-use factors for refrigerators and freezers as determined through verification surveys, and by the unit energy consumptions for refrigerators and freezers, as determined through measure attributes recorded in the tracking and reporting system.

J.1.2 Sampling

Each measure was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 212, Table 213, Table 214, and Table 215. The population sizes and sample sizes represent individual appliances rather than individual customers. Survey samples were drawn randomly for each stratum and administered by email and telephone over the course of the program. Sample sizes reflect valid survey responses.

For the midstream sub-initiative, sampled sites were decided based on availability of evaluation staff and implementation staff to coordinate site visits. Midstream sample sizes reflect batches of verified appliances collected from reseller locations.

Table 212: ATI Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	3,210	93	Survey (online)
Freezers	772	59	
RACs	2,075	72	
Dehumidifiers	368	34	
Mini Friges	114	20	
Refrigerators - Midstream	0	0	Desk Review
Freezers - Midstream	0	0	
Program Total	**6,539**	**278**	

Table 213: ATI Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	2,467	90	Survey (online)
Freezers	628	65	
RACs	1,616	53	
Dehumidifiers	282	41	
Mini Friges	77	7	
Refrigerators - Midstream	107	24	Desk Review
Freezers - Midstream	5	1	
Program Total	**5,182**	**281**	

Table 214: ATI Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	854	51	Survey (online)
Freezers	226	24	
RACs	317	23	
Dehumidifiers	185	20	
Mini Friges	57	5	
Refrigerators - Midstream	0	0	Desk Review
Freezers - Midstream	0	0	
Program Total	**1,639**	**123**	

Table 215: ATI Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	3,334	97	Survey (online)
Freezers	861	49	
RACs	1,862	74	
Dehumidifiers	504	33	
Mini Friges	153	18	
Refrigerators - Midstream	639	26	Desk Review
Freezers - Midstream	0	0	
Program Total	**7,353**	**297**	

J.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 216, Table 217, Table 218, and Table 219 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 216: ATI Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	2,939	112.8%	0.5	7.5%
Freezers	457	142.7%	0.5	9.4%
RACs	264	104.6%	0.5	8.5%
Dehumidifiers	210	120.8%	0.5	12.3%
Mini Friges	28	148.9%	0.5	16.1%
Refrigerators - Midstream	0	100.0%	0.5	0.0%
Freezers - Midstream	0	100.0%	0.5	0.0%
Program Total	**3,897**	**116.4%**	**0.5**	**5.7%**

Table 217: ATI Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	2,270	104.0%	0.5	7.6%
Freezers	407	118.1%	0.5	8.9%
RACs	162	100.5%	0.5	9.9%
Dehumidifiers	147	114.7%	0.5	11.2%
Mini Friges	19	157.9%	0.5	27.2%
Refrigerators - Midstream	98	82.2%	0.5	14.7%
Freezers - Midstream	3	94.6%	0.5	72.0%
Program Total	**3,107**	**105.8%**	**0.5**	**5.7%**

Table 218: ATI Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	786	100.8%	0.5	10.1%
Freezers	142	103.4%	0.5	14.7%
RACs	36	96.6%	0.5	15.0%
Dehumidifiers	99	119.8%	0.5	16.1%
Mini Friges	14	166.8%	0.5	32.2%
Refrigerators - Midstream	0	100.0%	0.5	0.0%
Freezers - Midstream	0	100.0%	0.5	0.0%
Program Total	**1,077**	**103.6%**	**0.5**	**7.7%**

Table 219: ATI Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	3,091	106.3%	0.5	7.3%
Freezers	550	123.3%	0.5	10.3%
RACs	209	105.4%	0.5	8.4%
Dehumidifiers	262	127.7%	0.5	12.5%
Mini Friges	37	128.2%	0.5	17.0%
Refrigerators - Midstream	592	79.0%	0.5	14.1%
Freezers - Midstream	0	100.0%	0.5	0.0%
Program Total	**4,741**	**106.2%**	**0.5**	**5.2%**

J.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 220, Table 221, Table 222, and Table 223 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 220: ATI Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.52	112.7%	0.5	7.5%
Freezers	0.08	142.6%	0.5	9.4%
RACs	0.53	107.1%	0.5	8.5%
Dehumidifiers	0.05	122.3%	0.5	12.3%
Mini Friges	0.00	149.0%	0.5	16.1%
Refrigerators - Midstream	0.00	100.0%	0.5	0.0%
Freezers - Midstream	0.00	100.0%	0.5	0.0%
Program Total	**1.19**	**112.7%**	**0.5**	**5.0%**

Table 221: ATI Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.40	104.0%	0.5	7.6%
Freezers	0.07	118.1%	0.5	8.9%
RACs	0.40	95.1%	0.5	9.9%
Dehumidifiers	0.04	116.2%	0.5	11.2%
Mini Friges	0.00	158.0%	0.5	27.2%
Refrigerators - Midstream	0.02	82.2%	0.5	14.7%
Freezers - Midstream	0.00	94.6%	0.5	72.0%
Program Total	**0.94**	**101.5%**	**0.5**	**5.3%**

Table 222: ATI Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.14	100.8%	0.5	10.1%
Freezers	0.03	103.4%	0.5	14.7%
RACs	0.08	95.5%	0.5	15.0%
Dehumidifiers	0.02	125.7%	0.5	16.1%
Mini Friges	0.00	166.9%	0.5	32.2%
Refrigerators - Midstream	0.00	100.0%	0.5	0.0%
Freezers - Midstream	0.00	100.0%	0.5	0.0%
Program Total	**0.27**	**102.3%**	**0.5**	**7.0%**

Table 223: ATI Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.55	106.3%	0.5	7.3%
Freezers	0.10	123.2%	0.5	10.3%
RACs	0.51	104.6%	0.5	8.4%
Dehumidifiers	0.07	125.3%	0.5	12.5%
Mini Friges	0.01	128.3%	0.5	17.0%
Refrigerators - Midstream	0.10	79.0%	0.5	14.1%
Freezers - Midstream	0.00	100.0%	0.5	0.0%
Program Total	**1.33**	**105.8%**	**0.5**	**4.6%**

Note that the overall precision for the ATI initiative is the combined precision of the low income, non-low-income, and nonresidential components. The combined precisions for each EDC are shown in Table 224 below.

Table 224: ATI Initiative Sampling Precisions

EDC	Relative Precision at 85% C.L., Energy	Relative Precision at 85% C.L., Demand
Met-Ed	6.5%	5.9%
Penelec	6.5%	6.0%
Penn Power	8.2%	7.6%
West Penn Power	6.1%	5.5%

J.2 NET IMPACT EVALUATION

J.2.1 Net Impact Evaluation Methodology

The ADM team conducted net impact evaluation for the Appliance Recycling initiative in PY13. The net-to-gross evaluation for the Appliance Recycling program followed the participant self-report methodology outlined in the PA Evaluation Framework. Net-to-gross was estimated for the program for each EDC.

The participant self-report methodology was implemented following the common approach outlined in Appendix B of the Phase IV evaluation framework. Tetra Tech added a question to identify customers who would have kept the recycled unit at least a year longer, since program results represent first-year annual savings. This clarifies that customers who respond they would have removed the unit, but at some point in the future, are really more appropriately characterized as keeping the unit for at least the program year in question. Individual free-ridership rates from the participant survey were weighted to adjust for sampling differences, non-response, and claimed energy savings to calculate overall estimates.

The Appliance Recycling program is not designed to promote spillover since it does not push customers to implement energy efficiency projects outside of FirstEnergy's programs. Because the participant survey is already lengthy, containing both gross and net impact questions, the evaluation team did not collect spillover information from customers. Moreover, because the Companies offer incentives for efficient new refrigerators and freezers, it is possible that the most likely spillover may overlap with gross impacts for the Efficient Products program and lead to undesired double-counting of net impacts.

J.2.2 Sampling

The sample designs from study for the four EDCs are shown in Table 225, Table 226, Table 227, and Table 228 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 225: ATI Initiative Net-to-Gross Sampling for Met-Ed

Stratum	Population Size	Target Sample Size	Achieved Sample Size	Response Rate
All	6,143	160	139	21.7%
Program Total	**6,143**	**160**	**139**	**21.7%**

Table 226: ATI Initiative Net-to-Gross Sampling for Penelec

Stratum	Population Size	Target Sample Size	Achieved Sample Size	Response Rate
All	5,444	143	165	28.9%
Program Total	**5,444**	**143**	**165**	**28.9%**

Table 227: ATI Initiative Net-to-Gross Sampling for Penn Power

Stratum	Population Size	Target Sample Size	Achieved Sample Size	Response Rate
All	1,947	77	86	28.0%
Program Total	**1,947**	**77**	**86**	**28.0%**

Table 228: ATI Initiative Net-to-Gross Sampling for WPP

Stratum	Population Size	Target Sample Size	Achieved Sample Size	Response Rate
All	6,673	154	155	25.2%
Program Total	**6,673**	**154**	**155**	**25.2%**

J.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 229, Table 230, Table 231, and Table 232 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 229: ATI Initiative Net-to-Gross Results for Met-Ed

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All	4,537	61.0%	0.0%	39.0%	12.2%
Program Total	**4,537**	**61.0%**	**0.0%**	**39.0%**	**12.2%**

Table 230: ATI Initiative Net-to-Gross Results for Penelec

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All	3,287	35.0%	0.0%	65.0%	11.2%
Program Total	**3,287**	**35.0%**	**0.0%**	**65.0%**	**11.2%**

Table 231: ATI Initiative Net-to-Gross Results for Penn Power

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All	1,116	62.0%	0.0%	38.0%	15.5%
Program Total	**1,116**	**62.0%**	**0.0%**	**38.0%**	**15.5%**

Table 232: ATI Initiative Net-to-Gross Results for WPP

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All	5,035	30.0%	0.0%	70.0%	11.6%
Program Total	**5,035**	**30.0%**	**0.0%**	**70.0%**	**11.6%**

Appendix K Evaluation Detail – Residential Upstream Electronics Initiative

The Companies did not offer this program component in PY14.

Appendix L Evaluation Detail – Residential HVAC Initiative

The Residential HVAC initiative provides rebates to customers who purchase high efficiency HVAC equipment, Tune-Up an existing HVAC system, install a new smart thermostat, bathroom fan, or circulating pump.

Participants are defined as each separate measure rebated. Thus, the rebate application, rather than the customer, is the sampling unit for gross impact evaluation.

L.1 Gross Impact Evaluation

L.1.1 Gross Impact Evaluation Methodology

Each component of gross impact evaluation is described below. The gross impact evaluation included customer surveys for verification purposes, coupled with documentation reviews to support detailed TRM calculations for sampled projects. The desk review process is described below.

Table 233 lists the data sources for gross impact calculation algorithms.

Table 233: Data Sources for the Res HVAC Initiative Gross Impact Evaluation

Measure	TRM Parameter	Data Source
All Measures	Appliance Age	Tracking and Reporting System
All HVAC Equipment	AHRI or Model # (to get other TRM parameters)	Invoice Inspections and Tracking Data
All HVAC Equipment	Heating Capacity	Tracking and Reporting System
All HVAC Equipment	Cooling Capacity	Tracking and Reporting System
HVAC Maintenance	Heating Capacity	Invoice Inspections
HVAC Maintenance	Cooling Capacity	Invoice Inspections
All	SEER/EER/HSPF/COP	AHRI database reference
Minisplits	EFLH	ZIP lookup and survey for room type
Minisplits	Baseline Type	Customer Surveys
Bathroom Fans	HOU and CF	IMP defaults
Smart Thermostats	Install Type	Application Review
Smart Thermostats	Thermostat Type	Application Review
Smart Thermostats	Heating System Type	Application Review
Smart Thermostats	Cooling System Type	Application Review
Smart Thermostats	Baseline Thermostat Type	Application Review

L.1.1.1 Determination of Verification Rate

ADM conducted verification surveys on a random sample of customers selected from the tracking and reporting data. Nearly all contacted customers verified that they have purchased and installed the stated HVAC measures. The verification rates are used to inform measure-level realization rates.

L.1.1.2 Invoice and Application Review

ADM obtained invoices and applications from Franklin Energy Services. For each application, ADM verified that the manufacturer name and model number in the tracking and reporting

system matches those on the invoice and rebate application. In general, all sampled measures were matched to qualifying product lists. ADM independently retrieved the attributes necessary for TRM and IMP calculations from various supporting databases which were compiled for this purpose. These include the AHRI database and manufacturer websites.

L.1.1.3 Calculation Review using TRM algorithm and parameters

For HVAC measures with partially deemed TRM (or IMP) protocols, the T&R system reported impacts with one savings scenario rather than with specific scenarios that occur in measure implementation. For example, values from planning assumptions for capacity and efficiency are used rather than HVAC system-specific values. In general, the per-unit savings reported by the ICSP are rather conservative (the assumed average efficiency levels or capacities are lower than actual average values). For all reviewed records, ADM used project-specific attributes to calculate "On-TRM" impacts.

The average per-unit gross verified impact for a given measure is the product of the measure-specific verification rate as determined from customer surveys, and the average calculated impacts as described above.

The following provide additional details into the calculation review procedure:

CACs and ASHPs

Central HVAC systems were looked up on the AHRI database to determine individual measure attributes for use in the TRM algorithms. These attributes include heating and cooling capacities, and seasonal efficiency ratios (SEER and HSPF). EFLHs and CFs were taken from the TRM based on the reported zip code or zip code obtained through participant surveys if the reported zip code was overridden by the respondent. Baseline efficiencies were taken as TRM defaults assuming a replace on burnout scenario rather than early retirement[16].

GSHPs

Ground-source heat pump make and model numbers, or AHRI certificate numbers, are cross-referenced on the AHRI database to determine equipment parameters for use in the TRM algorithm. EFLHs and CFs were determined through zip code lookups as provided in the T&R data or with zip codes from survey data if overridden by respondents. Other TRM default values used include GSHPDF, GSER, GSOP, and GSPK. Baseline efficiencies were also taken as TRM defaults for a replace on burnout scenario with an ASHP as the baseline system.

For GSHP units larger than 65 kBtuh, the commercial algorithm in section 3.2.3 of the TRM was used to calculate impacts. Here the baseline efficiencies were taken from TRM table 3-38. In these cases, the replace on burnout scenario assumes kWh_{pump} and kW_{pump} for the baseline ASHP are zero.

[16] Although early retirements are eligible and do occur in the program, the downstream rebate program does not have any special provisions, such as mandatory pre-inspections, to accommodate early retirement. For this program, early retirement is viewed by ADM as a phenomenon that may increase net impacts, but not gross impacts.

Mini-Splits

Ductless mini-splits (ACs and heat pumps) were also looked up on AHRI similar to the other HVAC system types, and CFs were determined with zip code lookups, but several additional steps were taken to determine gross impacts. EFLHs were determined through the TRM classification of "primary zone" or "secondary zone". Participant survey responses were used to determine the TRM classification based on which room the systems were installed in as rebate applications do not include this information. The baseline system type was determined from participant surveys. Several response fields were considered to determine the baseline including whether the mini-split installation supplemented an existing HVAC system. In cases where there was no existing heating or cooling, or the respondent did not know what type of existing system they had, the baseline was taken to be an ASHP. Baseline efficiencies were taken from TRM tables 2-8 and 2-12 according to the type of baseline system.

Thermostats

Smart thermostats were evaluated according to the protocol in section 2.2.11 of the 2021 PA TRM. ADM evaluators reviewed invoices and application materials to determine the heating and cooling system types, the installation scenario described in the TRM, and baseline thermostats.

Furnace Fans

High-efficiency furnace fan energy savings relied on the deemed values in the TRM. EFLHs and CFs were taken from the TRM based on the reported zip code or zip code obtained through participant surveys if the reported zip code was overridden by the respondent. ADM used the results of participant surveys to determine the verification rate and the faction with central heating. For homes without central cooling, the kWh_{cool} term in the TRM algorithm was taken to be zero.

HVAC Maintenance

Default TRM parameters were used for HVAC Tune-Up calculations. Heating and cooling capacities were determined from the rebate application for sampled units. For tune-ups performed on AC units, the kWh_{heat} term in the TRM algorithm was taken to be zero.

Bathroom Fans

ADM used the IMP for bathroom fans with hours of use and CF for intermittent operation. Fan flow rates and efficacies were obtained from ENERGY STAR® based on reported model numbers.

Circulation Pumps

ADM used TRM Section 3.3.5 to calculate impacts for ECM circulation pumps, but with residential heating EFLH.

PTACs and PTHPs

As there were only three PTACs and zero PTHPs reported, ADM elected to pass these measures through the evaluation process with no activity.

L.1.2 Sampling

Each measure was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 234, Table 235, Table 236, and Table 237.

Table 234: Res HVAC Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Minisplit	329	29	20
ASHP	330	27	24
Smart Thermostat	359	5	26
GSHP	36	1	3
CAC	406	26	33
Furnace Fan	240	24	17
Tune-Up	179	44	22
Circulating Pump	3	0	0
Bathroom Fan	51	1	3
ASHP wDHW	0	0	0
Quality Install	0	0	0
PTAC	0	0	0
PTHP	0	0	0
Program Total	**1,933**	**157**	**148**

Table 235: Res HVAC Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Minisplit	412	34	25
ASHP	90	6	9
Smart Thermostat	62	2	10
GSHP	18	0	2
CAC	29	2	3
Furnace Fan	171	10	18
Tune-Up	327	12	24
Circulating Pump	4	0	1
Bathroom Fan	43	2	2
ASHP wDHW	0	0	0
Quality Install	0	0	0
PTAC	0	0	0
PTHP	0	0	0
Program Total	**1,156**	**68**	**94**

Table 236: Res HVAC Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Minisplit	42	4	5
ASHP	36	6	8
Smart Thermostat	54	2	14
GSHP	11	0	6
CAC	67	4	16
Furnace Fan	196	12	32
Tune-Up	117	18	23
Circulating Pump	1	0	0
Bathroom Fan	33	1	2
ASHP wDHW	0	0	0
Quality Install	0	0	0
PTAC	0	0	0
PTHP	0	0	0
Program Total	**557**	**47**	**106**

Table 237: Res HVAC Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Minisplit	220	27	20
ASHP	294	34	17
Smart Thermostat	177	3	15
GSHP	40	2	6
CAC	143	7	15
Furnace Fan	563	34	33
Tune-Up	720	59	21
Circulating Pump	5	0	0
Bathroom Fan	59	2	3
ASHP wDHW	0	0	0
Quality Install	0	0	0
PTAC	0	0	0
PTHP	0	0	0
Program Total	**2,221**	**168**	**130**

L.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 238, Table 239, Table 240, and Table 241 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 238: Res HVAC Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	349	231.3%	0.5	15.6%
ASHP	355	100.5%	0.5	14.2%
Smart Thermostat	203	83.3%	0.5	13.6%
GSHP	79	113.6%	0.5	39.8%
CAC	146	92.3%	0.5	12.0%
Furnace Fan	46	94.4%	0.5	16.8%
Tune-Up	27	107.6%	0.5	14.4%
Circulating Pump	1	100.0%	0.5	100.0%
Bathroom Fan	2	69.2%	0.5	40.3%
ASHP wDHW	0	100.0%	0.5	100.0%
Quality Install	0	100.0%	0.5	100.0%
PTAC	0	100.0%	0.5	100.0%
PTHP	0	100.0%	0.5	100.0%
Program Total	**1,208**	**135.2%**	**0.5**	**8.8%**

Table 239: Res HVAC Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	444	95.3%	0.5	14.0%
ASHP	110	96.6%	0.5	22.8%
Smart Thermostat	34	71.9%	0.5	20.9%
GSHP	44	141.5%	0.5	48.0%
CAC	8	83.0%	0.5	39.4%
Furnace Fan	31	94.0%	0.5	16.1%
Tune-Up	26	88.9%	0.5	14.1%
Circulating Pump	1	97.1%	0.5	62.4%
Bathroom Fan	2	41.3%	0.5	49.7%
ASHP wDHW	0	100.0%	0.5	100.0%
Quality Install	0	100.0%	0.5	100.0%
PTAC	0	100.0%	0.5	100.0%
PTHP	0	100.0%	0.5	100.0%
Program Total	**700**	**96.7%**	**0.5**	**10.5%**

Table 240: Res HVAC Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	43	246.5%	0.5	30.2%
ASHP	43	100.1%	0.5	22.4%
Smart Thermostat	19	97.3%	0.5	16.6%
GSHP	24	138.1%	0.5	19.8%
CAC	22	96.4%	0.5	15.7%
Furnace Fan	35	97.0%	0.5	11.6%
Tune-Up	12	229.5%	0.5	13.5%
Circulating Pump	0	100.0%	0.5	100.0%
Bathroom Fan	1	75.0%	0.5	49.3%
ASHP wDHW	0	100.0%	0.5	100.0%
Quality Install	0	100.0%	0.5	100.0%
PTAC	0	100.0%	0.5	100.0%
PTHP	0	100.0%	0.5	100.0%
Program Total	**199**	**142.6%**	**0.5**	**12.2%**

Table 241: Res HVAC Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	269	228.8%	0.5	15.4%
ASHP	312	93.8%	0.5	17.0%
Smart Thermostat	116	89.8%	0.5	17.8%
GSHP	87	146.5%	0.5	27.1%
CAC	43	95.3%	0.5	17.6%
Furnace Fan	104	92.1%	0.5	12.2%
Tune-Up	78	103.9%	0.5	15.5%
Circulating Pump	1	100.0%	0.5	100.0%
Bathroom Fan	2	63.2%	0.5	40.5%
ASHP wDHW	0	100.0%	0.5	100.0%
Quality Install	0	100.0%	0.5	100.0%
PTAC	0	100.0%	0.5	100.0%
PTHP	0	100.0%	0.5	100.0%
Program Total	**1,012**	**134.4%**	**0.5**	**8.5%**

L.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 242, Table 243, Table 244, and Table 245 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 242: Res HVAC Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	0.02	265.3%	0.5	15.6%
ASHP	0.03	83.2%	0.5	14.2%
Smart Thermostat	0.02	95.2%	0.5	13.6%
GSHP	0.02	113.3%	0.5	39.8%
CAC	0.07	92.2%	0.5	12.0%
Furnace Fan	0.01	102.2%	0.5	16.8%
Tune-Up	0.01	99.9%	0.5	14.4%
Circulating Pump	0.00	100.0%	0.5	100.0%
Bathroom Fan	0.00	51.1%	0.5	40.3%
ASHP wDHW	0.00	100.0%	0.5	100.0%
Quality Install	0.00	100.0%	0.5	100.0%
PTAC	0.00	100.0%	0.5	100.0%
PTHP	0.00	100.0%	0.5	100.0%
Program Total	**0.19**	**113.1%**	**0.5**	**7.0%**

Table 243: Res HVAC Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	0.02	238.5%	0.5	14.0%
ASHP	0.01	91.6%	0.5	22.8%
Smart Thermostat	0.00	95.7%	0.5	20.9%
GSHP	0.01	166.6%	0.5	48.0%
CAC	0.00	76.9%	0.5	39.4%
Furnace Fan	0.01	80.3%	0.5	16.1%
Tune-Up	0.02	77.8%	0.5	14.1%
Circulating Pump	0.00	100.0%	0.5	62.4%
Bathroom Fan	0.00	30.6%	0.5	49.7%
ASHP wDHW	0.00	100.0%	0.5	100.0%
Quality Install	0.00	100.0%	0.5	100.0%
PTAC	0.00	100.0%	0.5	100.0%
PTHP	0.00	100.0%	0.5	100.0%
Program Total	**0.07**	**145.3%**	**0.5**	**10.5%**

Table 244: Res HVAC Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	0.00	491.9%	0.5	30.2%
ASHP	0.00	106.0%	0.5	22.4%
Smart Thermostat	0.00	99.1%	0.5	16.6%
GSHP	0.00	137.2%	0.5	19.8%
CAC	0.01	95.3%	0.5	15.7%
Furnace Fan	0.01	100.4%	0.5	11.6%
Tune-Up	0.01	129.4%	0.5	13.5%
Circulating Pump	0.00	100.0%	0.5	100.0%
Bathroom Fan	0.00	55.5%	0.5	49.3%
ASHP wDHW	0.00	100.0%	0.5	100.0%
Quality Install	0.00	100.0%	0.5	100.0%
PTAC	0.00	100.0%	0.5	100.0%
PTHP	0.00	100.0%	0.5	100.0%
Program Total	**0.04**	**130.7%**	**0.5**	**8.7%**

Table 245: Res HVAC Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Minisplit	0.02	195.6%	0.5	15.4%
ASHP	0.03	73.8%	0.5	17.0%
Smart Thermostat	0.01	99.5%	0.5	17.8%
GSHP	0.02	62.7%	0.5	27.1%
CAC	0.03	94.3%	0.5	17.6%
Furnace Fan	0.03	99.2%	0.5	12.2%
Tune-Up	0.04	109.9%	0.5	15.5%
Circulating Pump	0.00	100.0%	0.5	100.0%
Bathroom Fan	0.00	46.7%	0.5	40.5%
ASHP wDHW	0.00	100.0%	0.5	100.0%
Quality Install	0.00	100.0%	0.5	100.0%
PTAC	0.00	100.0%	0.5	100.0%
PTHP	0.00	100.0%	0.5	100.0%
Program Total	**0.17**	**102.1%**	**0.5**	**6.6%**

L.2 NET IMPACT EVALUATION

L.2.1 Net Impact Evaluation Methodology

A net impact evaluation was not conducted in PY13. Net impact evaluation results from the Phase III evaluation effort will be applied to the initiative for PY13 and PY14. The net-to-gross evaluation for the downstream HVAC measures, conducted in PY8 and PY11, was based on self-report data from program participants. The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY13 and PY14.

L.2.2 Sampling

Tetra Tech sampled randomly from all participants on record in the Companies' tracking and reporting systems in early PY11Q4. The sample designs for the four EDCs are shown in Table 246, Table 247, Table 248, and Table 249 for Met-Ed, Penelec, Penn Power, and WPP respectively. The achieved sample sizes and response rates are from the PY11 NTG effort.

Table 246: Res HVAC Initiative Net-to-Gross Sampling for Met-Ed

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	2,952	72	26.2%
Program Total	**2,952**	**72**	**26.2%**

Table 247: Res HVAC Initiative Net-to-Gross Sampling for Penelec

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	2,155	79	28.4%
Program Total	**2,155**	**79**	**28.4%**

Table 248: Res HVAC Initiative Net-to-Gross Sampling for Penn Power

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	1,935	67	24.7%
Program Total	**1,935**	**67**	**24.7%**

Table 249: Res HVAC Initiative Net-to-Gross Sampling for WPP

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	4,320	62	2.2%
Program Total	**4,320**	**62**	**2.2%**

L.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 250, Table 251, Table 252, and Table 253 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 250: Res HVAC Initiative Net-to-Gross Results for Met-Ed

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	1,632	50.4%	1.1%	50.7%	12.7%
Program Total	**1,632**	**50.4%**	**1.1%**	**50.7%**	**12.7%**

Table 251: Res HVAC Initiative Net-to-Gross Results for Penelec

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	677	48.6%	0.9%	52.3%	12.2%
Program Total	**677**	**48.6%**	**0.9%**	**52.3%**	**12.2%**

Table 252 Res HVAC Initiative Net-to-Gross Results for Penn Power

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	283	52.8%	7.6%	54.8%	13.0%
Program Total	**283**	**52.8%**	**7.6%**	**54.8%**	**13.0%**

Table 253 Res HVAC Initiative Net-to-Gross Results for WPP

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	1,360	48.3%	0.3%	52.0%	13.7%
Program Total	**1,360**	**48.3%**	**0.3%**	**52.0%**	**13.7%**

Appendix M Evaluation Detail – Residential Appliances and LI Residential Appliances Initiative

Residential Appliances and LI Appliances are combined into a single initiative in ADM's PY14 evaluation plan. While the program process is the same between the two, the measures and rebate levels differ. Incentives for the low-income component are increased by $25 per appliance, while there are no specific income-qualified incentives for heat-pump and solar water heaters, variable speed pool-pumps or ceiling fans.

Participants are defined as each separate appliance rebated. Thus, the rebate application, rather than the customer, is the sampling unit for gross impact evaluation.

M.1 Gross Impact Evaluation

M.1.1 Gross Impact Evaluation Methodology

Each component of gross impact is described below.

M.1.1.1 Verification Surveys

ADM performed telephone and online surveys on a random sample of customers selected from the tracking and reporting data. Nearly all contacted customers verified that they have purchased and installed the stated appliances. The verification rates are used to inform measure-level realization rates.

M.1.1.2 Invoice and Application Review

ADM obtained invoices and applications from the ICSP, Franklin Energy Services. For each application, ADM verified that the manufacturer name and model number in the tracking and reporting system matches those on the invoice and rebate application. In general, all sampled appliances were matched to the qualifying ENERGY STAR® product lists. ADM independently retrieved the attributes necessary for TRM calculations from the ENERGY STAR® database. In certain cases, the make or model numbers were entered in with minor typographic errors or with missing or inserted dashes, spaces, or other delimiting characters. In such cases, manual correction of the make or model numbers results in positive identification of the involved equipment in the supporting databases.

M.1.1.3 Saving Calculations with TRM Algorithms and Parameters

For measures with partially deemed TRM (or IMP) protocols, the T&R system reported impacts with one savings scenario rather than with specific scenarios that occur in measure implementation. For example, values from planning assumptions for capacity and efficiency are used rather than rebate-specific values For all reviewed records, ADM used project-specific attributes to calculate "On-TRM" impacts.

The average per-unit gross verified impact for a given measure is the product of the measure-specific verification rate (as determined from customer surveys or retailer invoice details) and the average calculated impacts as described above.

As there were only fifteen ceiling fans reported, ADM elected to pass these measures through the evaluation process with no activity.

Table 254 lists the data sources for gross impact calculation algorithms.

Table 254: Data Sources for the Res Appliances Initiative Gross Impact Evaluation

Measure	TRM Parameter	Data Source
All Measures	Verification Rate	Participant Surveys
All Measures	Capacity	Energy Star Database - Model Lookup
All Measures	ETDF	TRM Default
Clothes Washer	Configuration	Energy Star Database
Clothes Washer	IMEF_base	Federal Standard - Configuration Lookup
Clothes Washer	Cycles per year	TRM Default
Clothes Washer	CW_base / CW_ee	TRM Default
Clothes Washer	DHW_base / DHW_ee	TRM Default
Clothes Washer	%ElectricDHW	Participant Surveys
Clothes Washer	Dryer_base / Dryer_ee	TRM Default
Clothes Washer	%ElectricDryer	Participant Surveys
Clothes Washer	%dry/wash	TRM Default
Clothes Washer	time per cycle / CF	TRM Default
Clothes Dryer	Fuel / Configuration	Energy Star Database
Clothes Dryer	CEF_base	Federal Standard - Configuration Lookup
Clothes Dryer	Wash Cycles per year	TRM Default
Clothes Dryer	%dry/wash	TRM Default
Clothes Dryer	Load_avg	TRM - Configuration Lookup
Clothes Dryer	time per cycle /CF	TRM Default
Refrigerator/Freezer	Product Class	Energy Star Database
Refrigerator/Freezer	Adjusted Volume	Energy Star Database
Dehumidifier	HOU / CF	TRM Default
Dehumidifier	L/kWh_base / L/kWh_ee	TRM - Capacity Lookup
Air Purifier	Annual Consumption	TRM Default
Air Purifier	HOU / CF	TRM Default
Dishwasher	Annual Consumption	TRM Default
Dishwasher	Water Heater Fuel	Application / TRM Default
Pool Pump	HOU / Volume	TRM Default
Pool Pump	Energy Factor	Energy Star Database
Room Air Conditione	HOU / CF	TRM - Zip Code Lookup
HPWH	EF_ee	Energy Star Database
HPWH	F_derate	TRM Default
Smart Thermostat	EFLH Heat/Cool	Customer Zip Code
Smart Thermostat	Previous Thermostat	Application / Participant Surveys
Smart Thermostat	HVAC Equipment Type	Application / Participant Surveys

The gross realization rates for energy savings were driven primarily by differences between project-specific TRM calculations for sampled projects and the reported energy savings in the tracking and reporting system. Verification rates were not a major driver of realization rates.

M.1.2 Sampling

Each measure was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 255, Table 256, Table 257, and Table 258.

Table 255: Res Appliances Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Air Purifier	150	5	10
Ceiling Fan	11	1	0
Clothes Dryer	532	30	19
Clothes Washer	842	33	25
Dehumidifier	234	20	14
Dishwasher	990	28	23
Freezer	104	7	9
Heat Pump Water Heater	111	8	6
Mini Refrigerator	0	0	0
Pool Pump	83	6	4
Refrigerator	1,038	32	24
Room Air Conditioner	177	17	12
Smart Thermostat	739	27	30
Low-Income Total	**217**	**24**	**40**
Non Low-Income Total	**4,794**	**190**	**136**
Program Total	**5,011**	**214**	**176**

Table 256: Res Appliances Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Air Purifier	66	4	8
Ceiling Fan	6	0	0
Clothes Dryer	304	19	21
Clothes Washer	542	27	31
Dehumidifier	227	26	18
Dishwasher	683	39	25
Freezer	84	7	7
Heat Pump Water Heater	40	5	8
Mini Refrigerator	0	0	0
Pool Pump	13	0	2
Refrigerator	761	46	26
Room Air Conditioner	126	16	12
Smart Thermostat	412	31	23
Low-Income Total	**276**	**34**	**41**
Non Low-Income Total	**2,988**	**186**	**140**
Program Total	**3,264**	**220**	**181**

Table 257: Res Appliances Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Air Purifier	53	1	13
Ceiling Fan	3	0	0
Clothes Dryer	150	8	14
Clothes Washer	274	17	25
Dehumidifier	105	12	17
Dishwasher	307	29	23
Freezer	36	3	4
Heat Pump Water Heater	4	0	2
Mini Refrigerator	0	0	0
Pool Pump	11	0	3
Refrigerator	323	26	22
Room Air Conditioner	30	2	4
Smart Thermostat	283	27	29
Low-Income Total	**77**	**10**	**26**
Non Low-Income Total	**1,502**	**115**	**130**
Program Total	**1,579**	**125**	**156**

Table 258: Res Appliances Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size (Survey)	Achieved Sample Size (Desk Review)
Air Purifier	100	9	9
Ceiling Fan	8	1	0
Clothes Dryer	537	34	19
Clothes Washer	862	36	26
Dehumidifier	310	36	15
Dishwasher	1,119	45	32
Freezer	103	16	9
Heat Pump Water Heater	71	1	3
Mini Refrigerator	0	0	0
Pool Pump	43	2	3
Refrigerator	1,164	47	29
Room Air Conditioner	117	6	12
Smart Thermostat	887	35	32
Low-Income Total	**269**	**36**	**48**
Non Low-Income Total	**5,052**	**232**	**141**
Program Total	**5,321**	**268**	**189**

M.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 259, Table 260, Table 261, and Table 262 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 259: Res Appliances Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	99	98.6%	0.5	22.0%
Ceiling Fan	0	100.0%	0.5	68.6%
Clothes Dryer	14	100.5%	0.5	12.8%
Clothes Washer	103	189.5%	0.5	12.3%
Dehumidifier	48	111.5%	0.5	15.4%
Dishwasher	27	96.2%	0.5	13.4%
Freezer	3	127.2%	0.5	22.9%
Heat Pump Water Heater	159	109.8%	0.5	24.5%
Mini Refrigerator	0	0.0%	0.5	100.0%
Pool Pump	126	156.7%	0.5	28.3%
Refrigerator	68	89.9%	0.5	12.5%
Room Air Conditioner	8	107.5%	0.5	16.6%
Smart Thermostat	258	89.9%	0.5	12.9%
Low-Income Total	**29**	**116.5%**	**0.5**	**na**
Non Low-Income Total	**885**	**116.5%**	**0.5**	**na**
Program Total	**914**	**116.5%**	**0.5**	**7.9%**

Table 260: Res Appliances Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	49	100.0%	0.5	23.9%
Ceiling Fan	0	100.0%	0.5	100.0%
Clothes Dryer	8	94.2%	0.5	15.2%
Clothes Washer	60	152.3%	0.5	12.6%
Dehumidifier	46	106.7%	0.5	13.3%
Dishwasher	18	96.9%	0.5	11.2%
Freezer	3	118.2%	0.5	26.1%
Heat Pump Water Heater	61	110.6%	0.5	22.8%
Mini Refrigerator	0	0.0%	0.5	100.0%
Pool Pump	20	135.1%	0.5	46.8%
Refrigerator	52	80.5%	0.5	10.3%
Room Air Conditioner	4	93.8%	0.5	16.8%
Smart Thermostat	106	70.0%	0.5	12.4%
Low-Income Total	**29**	**101.2%**	**0.5**	**na**
Non Low-Income Total	**398**	**101.2%**	**0.5**	**na**
Program Total	**426**	**101.2%**	**0.5**	**6.6%**

Table 261: Res Appliances Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	44	96.3%	0.5	17.3%
Ceiling Fan	0	100.0%	0.5	100.0%
Clothes Dryer	4	106.3%	0.5	18.3%
Clothes Washer	32	145.6%	0.5	13.7%
Dehumidifier	21	109.5%	0.5	16.0%
Dishwasher	8	96.3%	0.5	12.7%
Freezer	1	149.6%	0.5	33.9%
Heat Pump Water Heater	3	108.5%	0.5	36.0%
Mini Refrigerator	0	0.0%	0.5	100.0%
Pool Pump	17	159.7%	0.5	35.5%
Refrigerator	22	96.0%	0.5	13.5%
Room Air Conditioner	1	156.1%	0.5	33.5%
Smart Thermostat	88	97.5%	0.5	12.7%
Low-Income Total	**12**	**109.6%**	**0.5**	**na**
Non Low-Income Total	**229**	**109.6%**	**0.5**	**na**
Program Total	**241**	**109.6%**	**0.5**	**6.8%**

Table 262: Res Appliances Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	71	100.0%	0.5	22.9%
Ceiling Fan	0	100.0%	0.5	67.3%
Clothes Dryer	15	108.5%	0.5	12.0%
Clothes Washer	104	149.2%	0.5	11.7%
Dehumidifier	63	114.7%	0.5	11.3%
Dishwasher	31	100.0%	0.5	10.5%
Freezer	3	155.9%	0.5	16.5%
Heat Pump Water Heater	110	112.5%	0.5	40.7%
Mini Refrigerator	0	0.0%	0.5	100.0%
Pool Pump	65	128.4%	0.5	40.1%
Refrigerator	78	94.4%	0.5	10.3%
Room Air Conditioner	4	69.1%	0.5	19.7%
Smart Thermostat	292	92.6%	0.5	11.9%
Low-Income Total	**39**	**108.3%**	**0.5**	**na**
Non Low-Income Total	**798**	**108.3%**	**0.5**	**na**
Program Total	**837**	**108.3%**	**0.5**	**8.2%**

M.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 263, Table 264, Table 265, and Table 266 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 263: Res Appliances Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	0.01	98.6%	0.5	22.0%
Ceiling Fan	0.00	100.0%	0.5	68.6%
Clothes Dryer	0.00	101.8%	0.5	12.8%
Clothes Washer	0.01	189.2%	0.5	12.3%
Dehumidifier	0.01	111.5%	0.5	15.4%
Dishwasher	0.00	96.3%	0.5	13.4%
Freezer	0.00	127.9%	0.5	22.9%
Heat Pump Water Heater	0.01	109.8%	0.5	24.5%
Mini Refrigerator	0.00	0.0%	0.5	100.0%
Pool Pump	0.04	146.8%	0.5	28.3%
Refrigerator	0.01	90.1%	0.5	12.5%
Room Air Conditioner	0.02	110.9%	0.5	16.6%
Smart Thermostat	0.03	83.4%	0.5	12.9%
Low-Income Total	**0.01**	**118.5%**	**0.5**	**na**
Non Low-Income Total	**0.16**	**118.5%**	**0.5**	**na**
Program Total	**0.16**	**118.5%**	**0.5**	**10.4%**

Table 264: Res Appliances Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	0.01	100.0%	0.5	23.9%
Ceiling Fan	0.00	100.0%	0.5	100.0%
Clothes Dryer	0.00	91.7%	0.5	15.2%
Clothes Washer	0.01	152.1%	0.5	12.6%
Dehumidifier	0.01	106.7%	0.5	13.3%
Dishwasher	0.00	96.9%	0.5	11.2%
Freezer	0.00	118.9%	0.5	26.1%
Heat Pump Water Heater	0.01	110.6%	0.5	22.8%
Mini Refrigerator	0.00	0.0%	0.5	100.0%
Pool Pump	0.01	130.6%	0.5	46.8%
Refrigerator	0.01	80.7%	0.5	10.3%
Room Air Conditioner	0.01	94.7%	0.5	16.8%
Smart Thermostat	0.01	80.7%	0.5	12.4%
Low-Income Total	**0.01**	**103.0%**	**0.5**	**na**
Non Low-Income Total	**0.07**	**103.0%**	**0.5**	**na**
Program Total	**0.07**	**103.0%**	**0.5**	**7.4%**

Table 265: Res Appliances Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	0.01	96.3%	0.5	17.3%
Ceiling Fan	0.00	100.0%	0.5	100.0%
Clothes Dryer	0.00	107.7%	0.5	18.3%
Clothes Washer	0.00	145.3%	0.5	13.7%
Dehumidifier	0.01	109.5%	0.5	16.0%
Dishwasher	0.00	96.4%	0.5	12.7%
Freezer	0.00	150.5%	0.5	33.9%
Heat Pump Water Heater	0.00	108.5%	0.5	36.0%
Mini Refrigerator	0.00	0.0%	0.5	100.0%
Pool Pump	0.01	150.9%	0.5	35.5%
Refrigerator	0.00	96.3%	0.5	13.5%
Room Air Conditioner	0.00	138.8%	0.5	33.5%
Smart Thermostat	0.01	98.3%	0.5	12.7%
Low-Income Total	**0.00**	**113.8%**	**0.5**	**na**
Non Low-Income Total	**0.04**	**113.8%**	**0.5**	**na**
Program Total	**0.04**	**113.8%**	**0.5**	**8.5%**

Table 266: Res Appliances Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Air Purifier	0.01	100.0%	0.5	22.9%
Ceiling Fan	0.00	100.0%	0.5	67.3%
Clothes Dryer	0.00	108.1%	0.5	12.0%
Clothes Washer	0.01	148.9%	0.5	11.7%
Dehumidifier	0.02	114.8%	0.5	11.3%
Dishwasher	0.00	100.0%	0.5	10.5%
Freezer	0.00	156.8%	0.5	16.5%
Heat Pump Water Heater	0.01	112.5%	0.5	40.7%
Mini Refrigerator	0.00	0.0%	0.5	100.0%
Pool Pump	0.02	122.2%	0.5	40.1%
Refrigerator	0.01	94.7%	0.5	10.3%
Room Air Conditioner	0.01	70.5%	0.5	19.7%
Smart Thermostat	0.04	100.7%	0.5	11.9%
Low-Income Total	**0.01**	**109.0%**	**0.5**	**na**
Non Low-Income Total	**0.13**	**109.0%**	**0.5**	**na**
Program Total	**0.14**	**109.0%**	**0.5**	**9.0%**

M.2 NET IMPACT EVALUATION

M.2.1 Net Impact Evaluation Methodology

Tetra Tech conducted net impact evaluation for this initiative in PY14. The net-to-gross evaluation for the downstream Appliances measures was based on self-report data from program participants. This followed the self-report methodologies for free-ridership and spillover from the PA Evaluation Framework. Participants were randomly sampled since the savings for these sub-programs are relatively small and do not qualify for the higher level of rigor of high-impact measures. Individual free-ridership and spillover rates from the participant survey were weighted to adjust for sampling differences, non-response, and claimed energy savings to calculate overall estimates.

Overall NTG ratios were comparable to those found in the Phase III evaluation. An NTG ratio of 100% is used for reporting net impacts and for cost effectiveness testing for the Low-Income Appliances Initiative.

M.2.2 Sampling

Tetra Tech sampled randomly from all participants on record in the Companies' tracking and reporting systems in early PY8Q4. The sample designs for the four EDCs are shown in Table 267, Table 268, Table 269, and Table 270 for Met-Ed, Penelec, Penn Power, and WPP. The achieved sample sizes and response rates in the table below are from the PY11 net impact evaluation effort.

Table 267: Res Appliances Initiative Net-to-Gross Sampling for Met-Ed

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	5,858	69	25.0%
Program Total	**5,858**	**69**	**25.0%**

Table 268: Res Appliances Initiative Net-to-Gross Sampling for Penelec

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	4,207	71	25.5%
Program Total	**4,207**	**71**	**25.5%**

Table 269: Res Appliances Initiative Net-to-Gross Sampling for Penn Power

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	2,103	74	26.4%
Program Total	**2,103**	**74**	**26.4%**

Table 270: Res Appliances Initiative Net-to-Gross Sampling for WPP

Stratum	Population Size	Achieved Sample Size	Response Rate
All Rebates	5,997	72	25.7%
Program Total	**5,997**	**72**	**25.7%**

M.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 271, Table 272, Table 273, and Table 274 for Met-Ed, Penelec, Penn Power, and WPP.

Table 271: Res Appliances Initiative Net-to-Gross Results for Met-Ed

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	1,031	42.4%	9.4%	67.0%	13.0%
Program Total	**1,031**	**42.4%**	**9.4%**	**67.0%**	**13.0%**

Table 272: Res Appliances Initiative Net-to-Gross Results for Penelec

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	402	52.1%	0.1%	48.0%	12.8%
Program Total	**402**	**52.1%**	**0.1%**	**48.0%**	**12.8%**

Table 273: Res Appliances Initiative Net-to-Gross Results for Penn Power

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	251	49.8%	0.6%	50.8%	12.6%
Program Total	**251**	**49.8%**	**0.6%**	**50.8%**	**12.6%**

Table 274: Res Appliances Initiative Net-to-Gross Results for WPP

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
All Rebates	864	50.0%	0.6%	50.6%	12.7%
Program Total	**864**	**50.0%**	**0.6%**	**50.6%**	**12.7%**

Appendix N Evaluation Detail – Residential Midstream Appliances Initiative

In this initiative, rebates are paid to retailers for point-of-sale discounts on the purchase price for dehumidifiers, heat pump water heaters, ceiling fans, air purifiers, room air conditioners, and smart thermostats at participating stores. Residential customers do not file rebate applications; instead, retailers discount the appliances and invoice for rebates with point-of-sale data files as supporting documentation.

Some measures are offered in both the downstream and midstream offerings. Double-dipping is not allowed by the program, meaning that customers who purchase program measures at participating retail stores for the midstream program are not eligible to submit a mail-in rebate. For income-qualified customers, the downstream offering already has increased rebates available. If an income-qualified customer were to purchase an eligible appliance through the midstream offering, they could apply for an additional rebate, referred to as an 'enhanced rebate.' The ICSP, Franklin Energy has processes to ensure only eligible customers receive a rebate

Participants are defined as each separate appliance rebated. Additional rebates provided to LI customers are not included in the participation counts. Thus, the rebate application, rather than the customer, is the sampling unit for gross impact evaluation.

N.1 Gross Impact Evaluation

N.1.1 Gross Impact Evaluation Methodology

Each component of gross impact is described below.

N.1.1.1 Invoice and Application Review

For midstream appliances, ADM obtained retailer invoices with supporting documentation containing details of the rebated appliance models. Each model on the invoices was matched to the ENERGY STAR® database to obtain measure attributes. A census of the reported models was researched in this way.

N.1.1.2 Saving Calculations with TRM Algorithms and Parameters

For all reviewed records, ADM used model-specific attributes to calculate “On-TRM” impacts.

The average per-unit gross verified impact for a given measure is the product of the measure-specific verification rate (as determined from customer surveys or retailer invoice details) and the average calculated impacts as described above. The gross realization rates for energy savings were driven primarily by the reported energy savings in the tracking and reporting system. The reported impacts are based on market-average efficiency and capacity attributes while the verified impacts are calculated with model-specific attributes as derived from the ENERGY STAR® database.

N.1.2 Sampling

Each measure was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 275, Table 276, Table 277, and Table 278.

Table 275: Res Midstream Appliances Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size (Desk Review)
Dehumidifier	9,004	9,004
Heat Pump Water Heater	1,095	1,095
Ceiling Fan	698	698
Air Purifier	1,144	1,144
Room Air Conditioner	5,939	5,939
Smart Thermostat	2,196	2,196
Program Total	**20,076**	**20,076**

Table 276: Res Midstream Appliances Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size (Desk Review)
Dehumidifier	11,495	11,495
Heat Pump Water Heater	208	208
Ceiling Fan	489	489
Air Purifier	1,023	1,023
Room Air Conditioner	5,719	5,719
Smart Thermostat	1,452	1,452
Program Total	**20,386**	**20,386**

Table 277: Res Midstream Appliances Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size (Desk Review)
Dehumidifier	4,436	4,436
Heat Pump Water Heater	91	91
Ceiling Fan	306	306
Air Purifier	495	495
Room Air Conditioner	1,278	1,278
Smart Thermostat	978	978
Program Total	**7,584**	**7,584**

Table 278: Res Midstream Appliances Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size (Desk Review)
Dehumidifier	10,134	10,134
Heat Pump Water Heater	227	227
Ceiling Fan	502	502
Air Purifier	905	905
Room Air Conditioner	3,875	3,875
Smart Thermostat	1,681	1,681
Program Total	**17,324**	**17,324**

N.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 279, Table 280, Table 281, and Table 282 for Met-Ed, Penelec, Penn Power, and WPP respectively. In general, gross realization rates were near 100% for both energy and demand.

Table 279: Res Midstream Appliances Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	1,843.1	102.9%	0.5	0.0%
Heat Pump Water Heater	1,977.2	112.4%	0.5	0.0%
Ceiling Fan	27.9	97.0%	0.5	0.0%
Air Purifier	651.4	100.0%	0.5	0.0%
Room Air Conditioner	171.0	70.0%	0.5	0.0%
Smart Thermostat	670.7	100.0%	0.5	0.0%
Program Total	**5,341**	**104.6%**	**0.5**	**0.0%**

Table 280: Res Midstream Appliances Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	2,353.0	102.7%	0.5	0.0%
Heat Pump Water Heater	364.7	112.8%	0.5	0.0%
Ceiling Fan	19.5	103.1%	0.5	0.0%
Air Purifier	540.2	99.8%	0.5	0.0%
Room Air Conditioner	105.8	71.6%	0.5	0.0%
Smart Thermostat	299.3	100.0%	0.5	0.0%
Program Total	**3,682**	**102.2%**	**0.5**	**0.0%**

Table 281: Res Midstream Appliances Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	908.0	103.6%	0.5	0.0%
Heat Pump Water Heater	157.5	113.5%	0.5	0.0%
Ceiling Fan	12.2	99.4%	0.5	0.0%
Air Purifier	293.3	100.0%	0.5	0.0%
Room Air Conditioner	29.8	70.7%	0.5	0.0%
Smart Thermostat	222.8	100.0%	0.5	0.0%
Program Total	**1,624**	**102.8%**	**0.5**	**0.0%**

Table 282: Res Midstream Appliances Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	2,074.4	102.7%	0.5	0.0%
Heat Pump Water Heater	387.0	113.2%	0.5	0.0%
Ceiling Fan	20.1	100.3%	0.5	0.0%
Air Purifier	490.0	100.0%	0.5	0.0%
Room Air Conditioner	80.6	77.4%	0.5	0.0%
Smart Thermostat	390.6	100.0%	0.5	0.0%
Program Total	**3,443**	**102.6%**	**0.5**	**0.0%**

N.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 283, Table 284, Table 285, and Table 286 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 283: Res Midstream Appliances Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	0.5	102.9%	0.5	0.0%
Heat Pump Water Heater	0.2	112.4%	0.5	0.0%
Ceiling Fan	0.0	100.9%	0.5	0.0%
Air Purifier	0.1	100.0%	0.5	0.0%
Room Air Conditioner	0.4	68.5%	0.5	0.0%
Smart Thermostat	0.1	100.0%	0.5	0.0%
Program Total	**1.18**	**93.6%**	**0.5**	**0.0%**

Table 284: Res Midstream Appliances Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	0.6	102.7%	0.5	0.0%
Heat Pump Water Heater	0.0	112.8%	0.5	0.0%
Ceiling Fan	0.0	102.9%	0.5	0.0%
Air Purifier	0.1	99.8%	0.5	0.0%
Room Air Conditioner	0.2	73.8%	0.5	0.0%
Smart Thermostat	0.0	100.0%	0.5	0.0%
Program Total	**1.03**	**95.8%**	**0.5**	**0.0%**

Table 285: Res Midstream Appliances Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	0.2	103.6%	0.5	0.0%
Heat Pump Water Heater	0.0	113.5%	0.5	0.0%
Ceiling Fan	0.0	102.9%	0.5	0.0%
Air Purifier	0.0	100.0%	0.5	0.0%
Room Air Conditioner	0.1	70.3%	0.5	0.0%
Smart Thermostat	0.0	100.0%	0.5	0.0%
Program Total	**0.40**	**97.6%**	**0.5**	**0.0%**

Table 286: Res Midstream Appliances Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Dehumidifier	0.6	102.8%	0.5	0.0%
Heat Pump Water Heater	0.0	113.2%	0.5	0.0%
Ceiling Fan	0.0	109.1%	0.5	0.0%
Air Purifier	0.1	100.0%	0.5	0.0%
Room Air Conditioner	0.2	75.9%	0.5	0.0%
Smart Thermostat	0.1	100.0%	0.5	0.0%
Program Total	**0.91**	**97.1%**	**0.5**	**0.0%**

N.2 NET IMPACT EVALUATION

N.2.1 Net Impact Evaluation Methodology

A net impact evaluation was not conducted in PY14. Net impact evaluation results from the Phase III evaluation effort are applied to the initiative for PY14. Tetra Tech conducted net impact evaluation for appliances in PY8 and again in PY11. The net-to-gross evaluation for the downstream Appliances measures was based on self-report data from program participants. The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY14.

N.2.2 Sampling

Tetra Tech sampled randomly from all participants on record in the Companies' tracking and reporting systems in early PY8Q4. The sample designs for the four EDCs are shown in Table 287. The achieved sample sizes and response rates in the table below are from the PY11 net impact evaluation effort.

Table 287: Res Appliances Initiative Net-to-Gross Sampling

EDC	Stratum	Population Size	Achieved Sample Size	Response Rate
Met-Ed	All Rebates	5,858	69	25.0%
Met-Ed Total		**5,858**	**69**	**25.0%**
Penelec	All Rebates	4,207	71	25.5%
Penele Total		**4,207**	**71**	**25.5%**
Penn Power	All Rebates	2,103	74	26.4%
Penn Power Total		**2,103**	**74**	**26.4%**
WPP	All Rebates	5,997	72	25.7%
WPP Total		**5,997**	**72**	**25.7%**

N.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 288.

Table 288: Res Appliances Initiative Net-to-Gross Results

EDC	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Met-Ed	5,588	52.8%	0.0%	47.2%	13.0%
Penelec	3,762	46.9%	0.0%	53.1%	12.8%
Penn Power	1,668	56.0%	0.0%	44.0%	12.6%
WPP	3,532	49.2%	0.0%	50.8%	12.7%

Appendix O Evaluation Detail – Low-Income Residential Appliance Recycling Sub-Initiative

O.1 Gross Impact Evaluation

Gross impact evaluation for the Low-Income Appliance Recycling (LI ATI) Sub-Initiative included customer verification surveys and TRM calculations of measure-level impacts. There are four distinct measures offered by the program: refrigerator recycling, freezer recycling, room AC (RAC) recycling, and dehumidifier recycling.

O.1.1 Gross Impact Evaluation Methodology

ADM's gross impact evaluation methodology was identical for all four EDCs. A TRM-based calculation was performed for each entry in the tracking and reporting system. The parameter values from the TRM (or for dehumidifiers, IMP) algorithms were taken from project-specific data from the tracking and reporting system when applicable, from TRM defaults, or from customer verification surveys. For refrigerators and freezers, measure attributes that participants would readily recall were determined from participant surveys, and the average parameter values were applied to all measures. Apart from measure verification, these attributes include the part-use factor, the location in the home where the appliance was used, and for refrigerators, whether the appliance was a primary or secondary unit. Technical attributes of the appliances, such as the age, capacity, and configuration, as collected by ARCA, were taken from program tracking and reporting data. TRM or IMP default parameters were used tor room air conditioners (RACs) and dehumidifiers. Table 289 lists the data sources for gross impact calculation algorithms.

Table 289: Data Sources for the LI ATI Initiative Gross Impact Evaluation

Measure	TRM Parameter	Data Source
Refrigerator, Freezer	Appliance Age	Tracking and Reporting System
Refrigerator, Freezer	Pre-1990	Tracking and Reporting System
Refrigerator, Freezer	Appliance Size / Capacity	Tracking and Reporting System
Refrigerator, Freezer	Configuration/Type	Tracking and Reporting System
Refrigerator	Primary Usage	Participant Surveys
Refrigerator, Freezer	Part Use Factor	Participant Surveys
Refrigerator, Freezer	In Unconditioned Space?	Participant Surveys
Refrigerator, Freezer	CDD and HDD	TRM - Zip Code Lookup
RAC	Capacity	Tracking and Reporting System
RAC	EER	TRM Default
RAC	RAC EFLH	TRM - Zip Code Lookup
RAC	CF	TRM - Zip Code Lookup
Dehumidifier	Capacity	Tracking and Reporting System
Dehumidifier	Region (to determine kWh)	TRM - Zip Code Lookup
All Measures	Verification Rate	Participant Surveys

The gross realization rates for energy savings were driven primarily by part-use factors for refrigerators and freezers as determined through verification surveys, and by the unit energy consumptions for refrigerators and freezers, as determined through measure attributes recorded in the tracking and reporting system.

O.1.2 Sampling

Each measure was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 290, Table 291, Table 292, and Table 293. The population sizes and sample sizes represent individual appliances rather than individual customers. Most surveys were conducted online, with telephone surveys employed to meet sample quotas if only a few more sample points were needed. Note that the overall precision for the ATI initiative is the combined precision of the low income, non-low-income, and nonresidential components. The combined precisions for each EDC are shown in Table 224 in Appendix J.

Table 290: LI ATI Sub-Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	429	23	Survey (phone + online)
Freezers	85	12	
RACs	358	22	
Dehumidifiers	24	3	
Mini Friges	26	2	
Program Total	**922**	**62**	

Table 291: LI ATI Sub-Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	484	24	Survey (phone + online)
Freezers	103	13	
RACs	406	43	
Dehumidifiers	30	1	
Mini Friges	13	2	
Program Total	**1,036**	**83**	

Table 292: LI ATI Sub-Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	115	35	Survey (phone + online)
Freezers	32	3	
RACs	68	8	
Dehumidifiers	3	1	
Mini Friges	2	0	
Program Total	**220**	**47**	

Table 293: LI ATI Sub-Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
Refrigerators	456	31	Survey (phone + online)
Freezers	97	12	
RACs	370	40	
Dehumidifiers	27	4	
Mini Friges	22	1	
Program Total	**972**	**88**	

O.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 294, Table 295, Table 296, and Table 297 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 294: LI ATI Sub-Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	393	118.4%	0.5	15.0%
Freezers	50	146.2%	0.5	20.8%
RACs	34	123.1%	0.5	15.4%
Dehumidifiers	17	97.8%	0.5	41.6%
Mini Friges	6	168.8%	0.5	50.9%
Program Total	**500**	**121.5%**	**0.5**	**11.9%**

Table 295: LI ATI Sub-Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	445	116.9%	0.5	14.7%
Freezers	67	100.6%	0.5	20.0%
RACs	41	87.9%	0.5	11.0%
Dehumidifiers	15	117.4%	0.5	72.0%
Mini Friges	3	108.4%	0.5	50.9%
Program Total	**571**	**112.9%**	**0.5**	**12.2%**

Table 296: LI ATI Sub-Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	106	113.1%	0.5	12.2%
Freezers	20	102.9%	0.5	41.6%
RACs	7	96.0%	0.5	25.5%
Dehumidifiers	2	109.8%	0.5	72.0%
Mini Friges	0	100.0%	0.5	100.0%
Program Total	**135**	**110.6%**	**0.5**	**11.4%**

Table 297: LI ATI Sub-Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	423	122.2%	0.5	12.9%
Freezers	62	120.8%	0.5	20.8%
RACs	37	109.6%	0.5	11.4%
Dehumidifiers	9	206.6%	0.5	36.0%
Mini Friges	5	117.7%	0.5	72.0%
Program Total	**536**	**122.5%**	**0.5**	**10.5%**

O.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 298, Table 299, Table 300, and Table 301 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 298: LI ATI Sub-Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.07	118.4%	0.5	15.0%
Freezers	0.01	146.2%	0.5	20.8%
RACs	0.07	123.4%	0.5	15.4%
Dehumidifiers	0.00	98.8%	0.5	41.6%
Mini Friges	0.00	169.0%	0.5	50.9%
Program Total	**0.15**	**122.2%**	**0.5**	**9.8%**

Table 299: LI ATI Sub-Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.08	116.9%	0.5	14.7%
Freezers	0.01	100.6%	0.5	20.0%
RACs	0.10	83.0%	0.5	11.0%
Dehumidifiers	0.00	117.7%	0.5	72.0%
Mini Friges	0.00	108.5%	0.5	50.9%
Program Total	**0.20**	**98.4%**	**0.5**	**8.7%**

Table 300: LI ATI Sub-Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.02	113.1%	0.5	12.2%
Freezers	0.00	102.9%	0.5	41.6%
RACs	0.02	91.1%	0.5	25.5%
Dehumidifiers	0.00	120.2%	0.5	72.0%
Mini Friges	0.00	100.1%	0.5	100.0%
Program Total	**0.04**	**103.2%**	**0.5**	**11.9%**

Table 301: LI ATI Sub-Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Refrigerators	0.07	122.2%	0.5	12.9%
Freezers	0.01	120.8%	0.5	20.8%
RACs	0.09	105.3%	0.5	11.4%
Dehumidifiers	0.00	193.2%	0.5	36.0%
Mini Friges	0.00	117.8%	0.5	72.0%
Program Total	**0.18**	**114.5%**	**0.5**	**8.0%**

O.2 Net Impact Evaluation

O.2.1 Net Impact Evaluation Methodology

As with other programs that target income-qualified participants, an NTG ratio of 100% is used for calculation of portfolio-level net verified impacts and for net-level TRC calculations.

Appendix P Evaluation Detail – Residential Low-Income Direct Install Initiative

The Low-Income direct install initiative is comprised of three subprograms: WARM – Plus, WARM – Extra Measure, and WARM Multifamily. Each subprogram is implemented by FirstEnergy. Each sub program offers similar measures to its participants.

Participants are defined as the number of unique project numbers in the program. Participants can receive numerous measures installed over the course of the program year. Participants must have a gross household income at or below 150% of the 2022 Federal Income Poverty Guideline (FPIG).

To join this program, new participants must submit their most recent Household Income Tax Return and pay stubs for the last 30 days to FirstEnergy contractors to verify their income. FirstEnergy also maintains a list of known Low-Income customers to verify the customer's income.

P.1 Gross Impact Evaluation

P.1.1 Gross Impact Evaluation Methodology

Gross impact evaluation for the LI DI Initiative involved using TRM calculations for measures installed throughout the program. Unique measure calculations were performed in accordance with the 2021 PA TRM for each measure type. The impact evaluation process is described below.

P.1.1.1 Determination of In-Service Rates

In-service rates are calculated by using QA/QC forms created by a third-party inspector. Inspectors verified measure installations during a site visit after the project was completed. The verified installed quantities were compared to reported quantities to develop the in-service rates.

In PY8, ADM performed ride along site visits with three different QA/QC contractors to ensure that the contractors were performing the QA/QC visit properly. It was found that the QA/QC contractors were indeed looking for the right measures and measure quantities. ADM verified the same quantity of measures as the QA/QC contractors. ADM continues to rely on QA/QC contractors' inspections to determine in-service rates for measures.

In-service rates were used in all savings calculations except air sealing and attic insulation measures.

P.1.1.2 TRM Calculations

For lighting measures, efficient and baseline lamp wattages are stated in the reported data and supporting documents. The hours of use are assumed to be the TRM defaults of 3 or 2.5 hours, depending on the proportion of lamps in a household that are retrofitted. TRM defaults were used for other portions of the calculation.

TRM defaults were used for the LED Nights Lights.

For refrigerator and freezer measures, each installation was assigned a category number using model numbers provided in supporting documentation. If the name and description fields contradicted each other, the description field was used because the description column is more accurate and detailed. The appliance age-based variables of the savings calculations for recycling come from supporting documentation if available, or from the appliance recycling program otherwise. Input values for other variables come from the determined category number of the appliance. All appliances were assumed to be primary appliances and are installed within conditioned space.

For domestic hot water measures, first the water heater type was verified. The housing type identified in the customer tracking data is used in showerhead and aerator measure savings calculations. The heat pump water heater measure calculation uses the efficient energy factor rating and volume stated in the customer tracking data or found in the supporting documentation. TRM defaults are assumed when specific values are not known or found.

Project audit forms were used to determine heating and cooling equipment types for accounts which received attic insulation. Once the heating and cooling equipment type was verified, the attic insulation savings calculation was completed. Insulation area, Rbase, Ree were provided in the project documentation. The HDDs, CDDs, and $EFLH_{cool}$ were found using the zip code lookup table to the projects reference city.

Residential air sealing measures used $CFM50_{post}$ and $CFM50_{pre}$ values found in the project audit forms. The heating equipment type was found in the customer tracking data and the cooling equipment type was in project audit forms.

The default savings values were used for the smart strip plug outlets. The equip name or description columns were used to find the quantity of the plugs on the smart strips. Projects which have multiple smart strips installed were assigned the savings values for the “Unspecified use or multiple purchased” smart strips. The description column indicates if the smart strip was installed on an entertainment center. Descriptions which included phrases such as “TV”, “Living room”, or “entertain” were considered entertainment center installations.

P.1.2 Sampling

The sampling strategy for gross impact evaluation is summarized in Table 302, Table 303, Table 304, and Table 305 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 302: LI DI Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High Savings	1,900	183	11	TRM Analysis + On-Site Verification
Medium Savings	1,050	341	14	
Low Savings	0	643	19	
Program Total		**1,167**	**44**	

Table 303: LI DI Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High Savings	1,350	218	19	TRM Analysis + On-Site Verification
Medium Savings	700	438	18	
Low Savings	0	1,159	20	
Program Total		**1,815**	**57**	

Table 304: LI DI Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High Savings	1,650	98	16	TRM Analysis + On-Site Verification
Medium Savings	900	170	16	
Low Savings	0	392	16	
Program Total		**660**	**48**	

Table 305: LI DI Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
High Savings	1,950	293	20	TRM Analysis + On-Site Verification
Medium Savings	1,050	453	21	
Low Savings	0	1,024	16	
Program Total		**1,770**	**57**	

P.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 306, Table 307, Table 308, and Table 309 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 306: LI DI Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,900	420	101.9%	0.5	21%
Medium Savings	1,050	352	101.1%	0.5	19%
Low Savings	0	252	101.2%	0.5	16%
Program Total		**1,024**	**101.4%**	**0.5**	**11.5%**

Table 307: LI DI Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,350	485	97.7%	0.5	16%
Medium Savings	700	478	99.0%	0.5	17%
Low Savings	0	446	100.7%	0.5	16%
Program Total		**1,409**	**99.1%**	**0.5**	**9.3%**

Table 308: LI DI Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,650	186	101.3%	0.5	16%
Medium Savings	900	178	103.9%	0.5	17%
Low Savings	0	151	101.1%	0.5	18%
Program Total		**515**	**102.1%**	**0.5**	**9.9%**

Table 309: LI DI Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,950	648	100.8%	0.5	16%
Medium Savings	1,050	551	100.8%	0.5	15%
Low Savings	0	488	98.8%	0.5	18%
Program Total		**1,688**	**100.2%**	**0.5**	**9.3%**

P.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown Table 310, Table 311, Table 312, and Table 313 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 310: LI DI Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,900	0.05	102.4%	0.5	21%
Medium Savings	1,050	0.05	101.6%	0.5	19%
Low Savings	0	0.03	101.4%	0.5	16%
Program Total		**0.13**	**101.8%**	**0.5**	**11.4%**

Table 311: LI DI Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,350	0.06	97.2%	0.5	16%
Medium Savings	700	0.06	99.0%	0.5	17%
Low Savings	0	0.05	100.8%	0.5	16%
Program Total		**0.17**	**98.9%**	**0.5**	**9.3%**

Table 312: LI DI Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,650	0.02	101.3%	0.5	16%
Medium Savings	900	0.02	104.5%	0.5	17%
Low Savings	0	0.02	101.0%	0.5	18%
Program Total		**0.07**	**102.4%**	**0.5**	**9.9%**

Table 313: LI DI Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
High Savings	1,950	0.09	101.7%	0.5	16%
Medium Savings	1,050	0.08	100.7%	0.5	15%
Low Savings	0	0.07	98.7%	0.5	18%
Program Total		**0.23**	**100.5%**	**0.5**	**9.3%**

P.2 Net Impact Evaluation

P.2.1 Net Impact Evaluation Methodology

An independent net impact evaluation was not conducted for this initiative.

Appendix Q Evaluation Detail – LI EE Kits Sub-Initiative

Q.1 Gross Impact Evaluation

The Low Income EE Kits initiative has two sub-components: Low-income EE Kits and the Low-Income School Education program, both administered by AMCG. Both program components are similar to their non-income-qualified counterparts described in Appendix E . Other than minor differences in kit contents, the low-income EE Kit program components differ from the general EE Kit program components in the way customers are targeted and enrolled. The Low Income EE Kit program targets customers that are income qualified in the Companies' customer information systems databases. The Low-Income Schools program targets schools in low-income areas.

Q.1.1 Gross Impact Evaluation Methodology

ADM's gross impact evaluation methodology was identical to the process described for EE Kits in Appendix E. The gross realization rates and underlying in-service rates were generally higher for the Low-Income EE kits. ISRs for showerheads, aerators, and night lights are appreciably higher for the low-income subgroup.

Q.1.2 Sampling

Each kit type was treated as a separate stratum within the sampling initiative. The sample designs for the four EDCs are shown in Table 314, Table 315, Table 316, and Table 317. Note that the overall precision for the EE Kits initiative is the combined precision of the low income and non-low-income components. The combined precisions for each EDC are shown in Table 163 in Appendix E.

Table 314: LI EE Kits Sub-Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
LI EE Kits - Electric	4,963	39	Survey (phone + online)
LI EE Kits - Standard	3,005	30	
LI School Education Kits	1,221	225	
Program Total	**9,189**	**294**	

Table 315: LI EE Kits Sub-Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
LI EE Kits - Electric	3,431	40	Survey (phone + online)
LI EE Kits - Standard	2,275	37	
LI School Education Kits	1,800	410	
Program Total	**7,506**	**487**	

Table 316: LI EE Kits Sub-Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
LI EE Kits - Electric	206	3	Survey (phone + online)
LI EE Kits - Standard	256	9	
LI School Education Kits	0	0	
Program Total	**462**	**12**	

Table 317: LI EE Kits Sub-Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
LI EE Kits - Electric	5,194	67	Survey (phone + online)
LI EE Kits - Standard	3,166	36	
LI School Education Kits	3,386	427	
Program Total	**11,746**	**530**	

Q.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 318, Table 319, Table 320, and Table 321 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 318: LI EE Kits Sub-Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	1,243	96.9%	1.00	23%
LI EE Kits - Standard	614	95.8%	1.00	26%
LI School Education Kits	270	101.7%	1.00	9%
Program Total	**2,128**	**97.2%**	**1.00**	**15.4%**

Table 319: LI EE Kits Sub-Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	793	121.9%	1.00	23%
LI EE Kits - Standard	432	85.8%	1.00	23%
LI School Education Kits	405	96.7%	1.00	6%
Program Total	**1,630**	**106.1%**	**1.00**	**13.7%**

Table 320: LI EE Kits Sub-Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	25	99.7%	1.00	83%
LI EE Kits - Standard	44	113.0%	1.00	47%
LI School Education Kits	0	0.0%	1.00	0%
Program Total	**69**	**108.2%**	**1.00**	**41.8%**

Table 321: LI EE Kits Sub-Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	1,270	126.7%	1.00	17%
LI EE Kits - Standard	638	87.8%	1.00	24%
LI School Education Kits	770	101.1%	1.00	7%
Program Total	**2,679**	**110.1%**	**1.00**	**10.7%**

Q.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 322, Table 323, Table 324, and Table 325 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 322: LI EE Kits Sub-Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	0.13	107.7%	1.00	23%
LI EE Kits - Standard	0.07	98.1%	1.00	26%
LI School Education Kits	0.03	94.4%	1.00	9%
Program Total	**0.23**	**103.1%**	**1.00**	**15.6%**

Table 323: LI EE Kits Sub-Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	0.08	125.0%	1.00	23%
LI EE Kits - Standard	0.04	92.2%	1.00	23%
LI School Education Kits	0.04	95.2%	1.00	6%
Program Total	**0.17**	**108.8%**	**1.00**	**13.7%**

Table 324: LI EE Kits Sub-Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	0.00	108.2%	1.00	83%
LI EE Kits - Standard	0.00	99.7%	1.00	47%
LI School Education Kits	0.00	0.0%	1.00	0%
Program Total	**0.01**	**102.6%**	**1.00**	**42.5%**

Table 325: LI EE Kits Sub-Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
LI EE Kits - Electric	0.14	131.2%	1.00	17%
LI EE Kits - Standard	0.08	92.9%	1.00	24%
LI School Education Kits	0.09	103.0%	1.00	7%
Program Total	**0.31**	**113.2%**	**1.00**	**10.5%**

Q.2 Net Impact Evaluation

A net impact evaluation was not conducted for the LI EE Kits Initiative.

Appendix R Evaluation Detail – Commercial and Industrial Prescriptive Initiative

R.1 GROSS IMPACT EVALUATION

The Commercial and Industrial Prescriptive (C&I Prescriptive) initiative is administered by Franklin Energy Services and includes four components: Downstream lighting, midstream lighting, downstream non-lighting, and midstream non-lighting.

Gross impact evaluation for C&I Prescriptive Initiative involved stratified sampling, on-site verifications, and project-specific data collection and calculations. For the lighting sub-initiatives, evaluation activities also include TRM Appendix C calculations with primary data collection for lighting hours of use for medium savings and high savings projects, and application of TRM deemed hours of operation for low savings projects.

R.1.1 Gross Impact Evaluation Methodology

As a first step, projects are categorized into one of the four components described above. Projects are clearly defined by subprogram names, which simplifies the process. The evaluation method for each component is described below.

R.1.1.1 Downstream Lighting

As a first step, projects are placed into one of three sampling strata as described in the next section. Each sampled lighting project first undergoes a desk review. The desk review includes reconciliation of invoices, fixture specification sheets (cut sheets), and re-calculating reported savings using TRM algorithms and/or ex-ante assumptions and identifying key parameters to be researched in the M&V plan. One aspect of the desk review is to transfer the calculation data into the PA TRM's Appendix C calculator. Although the Companies' implementation vendor processes rebates with an independent calculator that mirrors the TRM's Appendix C calculations (augmented with worksheets to suit rebate application purposes), the transferring of the data to ADM's version of Appendix C is an evaluation step to ensure that all verified impacts for lighting projects are derived using the 2021 TRM's Appendix C.

Evaluation of all but the simplest of projects requires a site-specific M&V plan (SSMVP). The first step in the M&V planning process is to check that the project is sufficiently documented. For example, contractors working on large projects often have detailed, space-by-space inventories of the baseline and new lighting fixtures. If such detailed information is found to be lacking, ADM analysts will contact the applicant or the contractor directly, or through a request to the ICSP, and ask if such documentation is available.

The desk review and M&V plan inform the data acquisition activities needed to evaluate the sampled project. For most lighting projects, the default activities are on-site verification and logging hours of use. Most lighting projects are metered unless there is a good reason not to meter.

In cases where projects have limited scope and complexity, the desk review process may indicate that an on-site visit would not add sufficient value to the evaluation effort. In such cases, a verification interview may suffice to reduce uncertainty regarding the project. Where loggers are used, data analysis is finalized following their retrieval. Billing analysis is a viable option for certain projects, and in some cases the verified results are determined wholly or partially by billing analysis.

R.1.1.1 Midstream Lighting

Once a project has been sampled, evaluation activities are similar to those described for downstream lighting projects. The business name and address where the lighting equipment will be installed is recorded for each project, so surveys and site inspections are possible, similar to the downstream component. Midstream lighting projects tend to be much smaller in scope than downstream projects (of 34 sampled projects, only two exceeded 100 MWh in reported energy savings). ADM determined hours of use with lighting loggers for the sole sampled project with reported impacts above 250 MWh.

R.1.1.2 Downstream Non-Lighting

As with lighting projects, each sampled prescriptive project undergoes a desk review prior to M&V activities. The desk review includes a full documentation review and if needed, additional topical research. Some projects may require M&V plans and additional verification activities, but most projects can be evaluated through documentation review. The prescriptive non-lighting projects (both downstream and midstream) accounted for less than 2% of nonresidential impacts in PY14. Due to the low evaluation risk posed by these projects, desk reviews were identified as the most appropriate impact evaluation activity.

R.1.1.3 Midstream Non-Lighting

Once a project has been sampled, evaluation activities are similar to those described for downstream non-lighting projects.

Figure 7 shows the fraction of verified energy savings, as averaged over the four PA Companies, by primary evaluation activities.

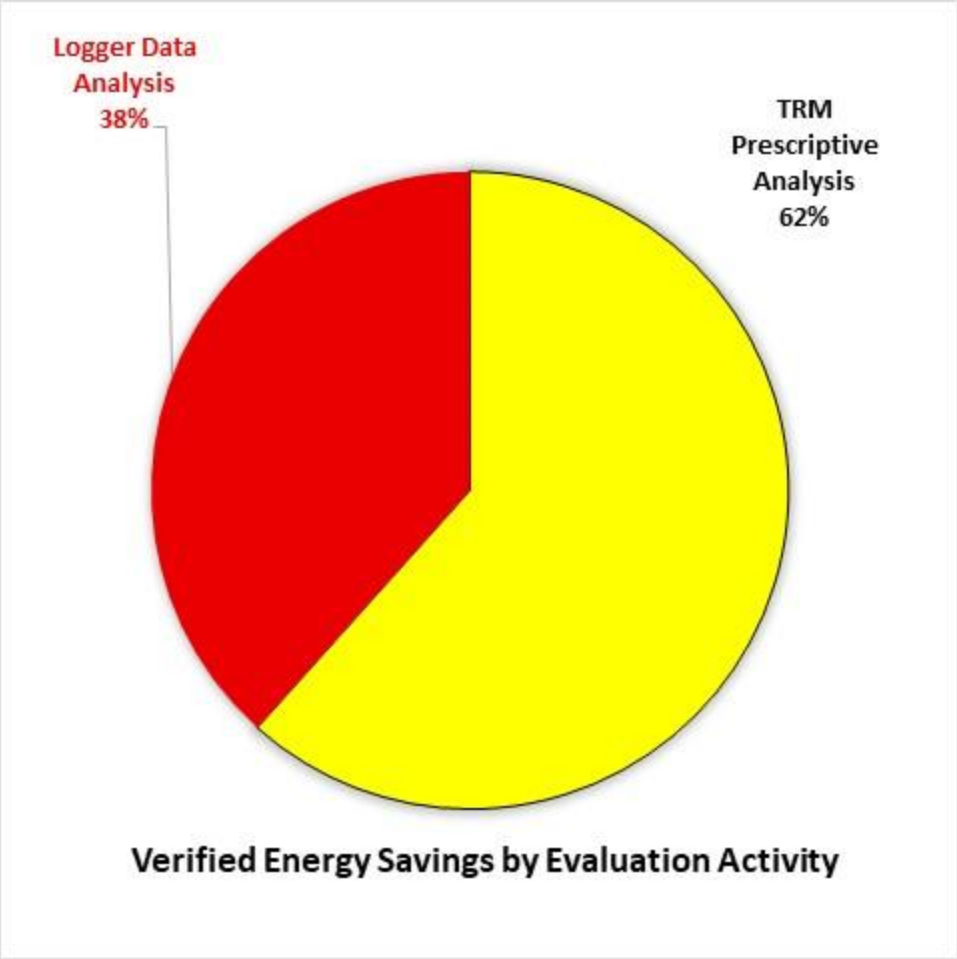


Figure 7: Fraction of verified energy savings by evaluation activity.

As a final step in the evaluation process, ADM analysts determine the incremental material and labor costs. In estimating the material and labor costs, preference is given first to invoices, then to the SWE incremental cost database, and then to the cost values from the CA DEER database, then to the costs used in the EDCs' EE&C plans. Incremental costs for downstream lighting projects are evaluated under the "early replacement" scenario unless the project is a new construction or remodeling project. Incremental costs for midstream projects are evaluated under the "replace on burnout" scenario.

R.1.2 Sampling

In PY14, only the downstream lighting component had the volume and heterogeneity to motivate savings-based stratification. Downstream lighting projects were placed into three strata. The first stratum or "certainty" stratum consists of projects that are expected to result in energy savings in excess of 750 MWh. All of these projects are sampled for evaluation, and nearly all of them are evaluated prior to rebate approval. Therefore, the gross realization rate for the certainty stratum is essentially 100% by design, although reported impacts may at times be lower than the 750 MWh threshold, as the threshold is on ex ante MWh, while ex post MWh

are reported for these projects. The remaining projects are placed into two sampling strata according to their reported energy impacts. The sample design is not optimized for efficiency in the sense of achieving the desired precision with the absolute minimum number of sample points. Rather, the sample is designed to facilitate specific evaluation protocols that are based on energy savings thresholds. For example, projects in the certainty stratum are evaluated with the highest level of rigor, and evaluated in advance of rebate approval to ensure that customers' incentives are determined from verified energy savings. The smallest projects, those with expected impacts under 120 MWh, are placed in a separate stratum. For these projects, hours of use may be determined by logging, customer interviews, or application of deemed hours in the PA TRM depending on the level of uncertainty in lighting schedules and how closely the business schedule aligns with the archetypal building types in the TRM . In addition to downstream lighting, there are three strata, one each for midstream lighting, downstream non-lighting, and midstream non-lighting. The sample designs for the four EDCs are shown in Table 326, Table 327, Table 328, and Table 329.

Table 326: CI Prescriptive Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Downstream Lighting-C	750	3	3	Desk Review, On-Site Verification
Downstream Lighting-2	120	26	5	
Downstream Lighting-1	0	117	10	
Downstream Nonlighting	0	24	5	
Midstream Lighting	0	322	10	
Midstream Nonlighting	0	0	0	
Program Total	**n/a**	**492**	**33**	

Table 327: CI Prescriptive Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Downstream Lighting-C	750	1	1	Desk Review, On-Site Verification
Downstream Lighting-2	120	30	5	
Downstream Lighting-1	0	183	8	
Downstream Nonlighting	0	26	6	
Midstream Lighting	0	652	10	
Midstream Nonlighting	0	4	1	
Program Total	**n/a**	**896**	**31**	

Table 328: CI Prescriptive Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Downstream Lighting-C	750	0	0	Desk Review, On-Site Verification
Downstream Lighting-2	120	9	4	
Downstream Lighting-1	0	71	11	
Downstream Nonlighting	0	9	4	
Midstream Lighting	0	63	7	
Midstream Nonlighting	0	0	0	
Program Total	**n/a**	**152**	**26**	

Table 329: CI Prescriptive Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Downstream Lighting-C	750	5	5	Desk Review, On-Site Verification
Downstream Lighting-2	120	47	7	
Downstream Lighting-1	0	178	9	
Downstream Nonlighting	0	74	6	
Midstream Lighting	0	554	7	
Midstream Nonlighting	0	1	1	
Program Total	**n/a**	**859**	**35**	

R.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 330, Table 331, Table 332, and Table 333 for Met-Ed, Penelec, Penn Power, and WPP respectively. Figure 8 plots the verified energy savings against the reported energy savings for all evaluated prescriptive projects for the program year. The figure includes data points from all four EDCs and is designed to show the reader the correspondence between reported and verified impacts. The relative precision values in the following tables are calculated with a coefficient of variation of 0.4, as prescriptive projects tend to have homogeneous realization rates.

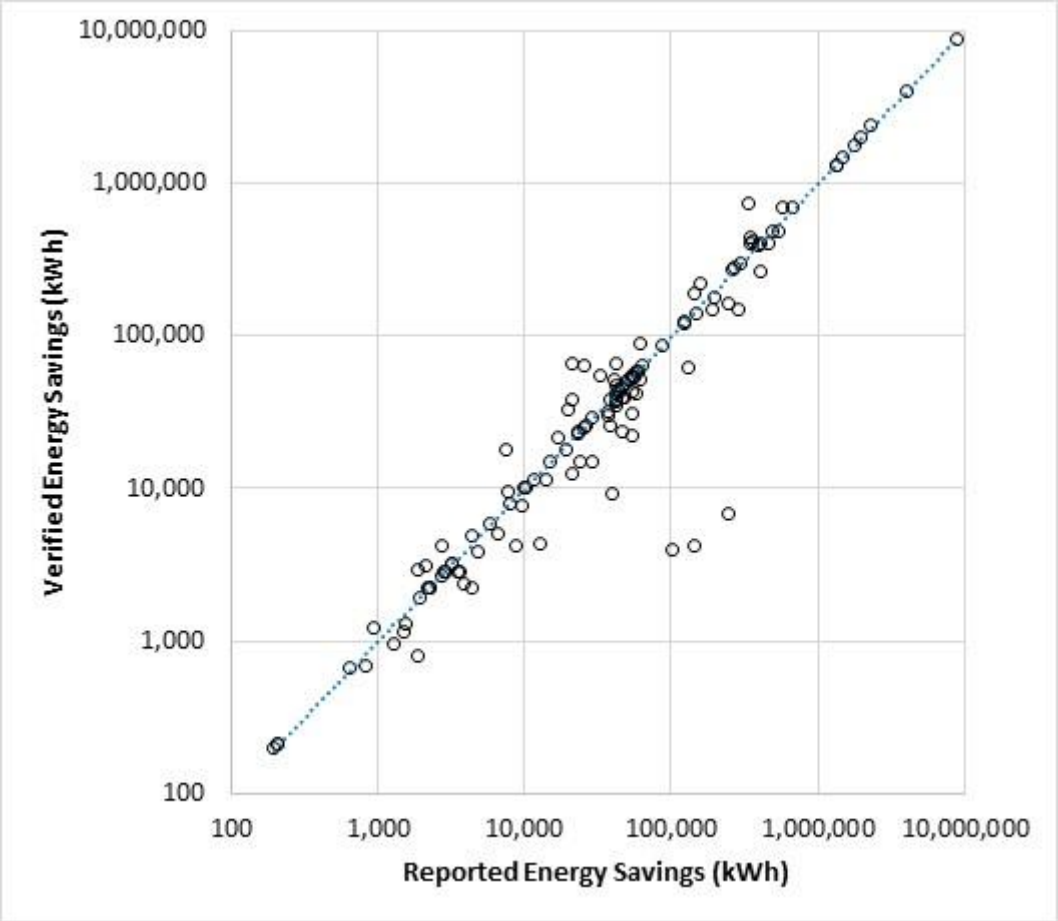


Figure 8: Verified vs. Reported Energy Savings for Sampled Prescriptive Projects.

Table 330: CI Prescriptive Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	6,629	99.9%	0.4	0%
Downstream Lighting-2	120	9,768	102.1%	0.4	23%
Downstream Lighting-1	0	3,451	103.0%	0.4	17%
Downstream Nonlighting	0	319	99.0%	1.6	92%
Midstream Lighting	0	5,002	106.5%	0.6	27%
Midstream Nonlighting	0	0	0.0%	0.4	0%
Program Total	**n/a**	**25,169**	**102.5%**		**10.9%**

Table 331: CI Prescriptive Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	8,938	97.0%	0.4	0%
Downstream Lighting-2	120	8,014	101.0%	0.4	24%
Downstream Lighting-1	0	5,216	90.7%	0.4	20%
Downstream Nonlighting	0	978	43.0%	1.6	82%
Midstream Lighting	0	9,135	133.9%	0.6	27%
Midstream Nonlighting	0	5	100.0%	0.4	50%
Program Total	**n/a**	**32,285**	**105.7%**		**11.6%**

Table 332: CI Prescriptive Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	0	0.0%	0.4	0%
Downstream Lighting-2	120	2,086	92.6%	0.4	21%
Downstream Lighting-1	0	1,717	82.5%	0.4	16%
Downstream Nonlighting	0	88	97.2%	1.6	86%
Midstream Lighting	0	1,155	75.1%	0.6	31%
Midstream Nonlighting	0	0	0.0%	0.4	0%
Program Total	**n/a**	**5,046**	**85.2%**		**12.7%**

Table 333: CI Prescriptive Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	8,184	100.9%	0.4	0%
Downstream Lighting-2	120	12,121	89.5%	0.4	20%
Downstream Lighting-1	0	5,854	79.5%	0.4	19%
Downstream Nonlighting	0	660	20.1%	1.6	90%
Midstream Lighting	0	8,381	184.3%	0.6	32%
Midstream Nonlighting	0	2	41.9%	0.4	0%
Program Total	**n/a**	**35,202**	**111.8%**		**14.1%**

R.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 334, Table 335, Table 336, and Table 337 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 334: CI Prescriptive Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	0.95	98.8%	0.4	0%
Downstream Lighting-2	120	1.59	101.7%	0.4	23%
Downstream Lighting-1	0	0.60	101.6%	0.4	17%
Downstream Nonlighting	0	0.05	101.0%	1.6	92%
Midstream Lighting	0	1.36	97.9%	0.6	27%
Midstream Nonlighting	0	0.00	0.0%	0.4	0%
Program Total	**n/a**	**4.56**	**100.0%**		**11.7%**

Table 335: CI Prescriptive Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	1.18	95.4%	0.4	0%
Downstream Lighting-2	120	1.64	99.2%	0.4	24%
Downstream Lighting-1	0	0.92	92.4%	0.4	20%
Downstream Nonlighting	0	0.14	42.9%	1.6	82%
Midstream Lighting	0	2.49	99.2%	0.6	27%
Midstream Nonlighting	0	0.00	81.0%	0.4	50%
Program Total	**n/a**	**6.36**	**96.3%**		**12.9%**

Table 336: CI Prescriptive Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	0.00	0.0%	0.4	0%
Downstream Lighting-2	120	0.42	68.7%	0.4	21%
Downstream Lighting-1	0	0.34	73.7%	0.4	16%
Downstream Nonlighting	0	0.02	99.8%	1.6	86%
Midstream Lighting	0	0.31	74.1%	0.6	31%
Midstream Nonlighting	0	0.00	0.0%	0.4	0%
Program Total	**n/a**	**1.08**	**72.3%**		**13.1%**

Table 337: CI Prescriptive Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Downstream Lighting-C	750	1.14	100.6%	0.4	0%
Downstream Lighting-2	120	2.04	81.1%	0.4	20%
Downstream Lighting-1	0	1.13	87.4%	0.4	19%
Downstream Nonlighting	0	0.09	29.3%	1.6	90%
Midstream Lighting	0	2.29	93.7%	0.6	32%
Midstream Nonlighting	0	0.00	41.9%	0.4	0%
Program Total	**n/a**	**6.69**	**89.1%**		**13.3%**

R.2 NET IMPACT EVALUATION

R.2.1 Net Impact Evaluation Methodology

Tetra Tech assessed free-ridership through participant customer self-reports following the standardized self-report methodology for downstream programs, enhanced with influential vendor reports. The customer free-ridership portion captures two components: (1) intention to carry out the energy-efficient project without program funds, and (2) influence of the program in the decision to carry out the energy-efficient project. Customer-identified influential vendors were asked a series of questions assessing the program's influence on their recommendations to the customer(s) who identified them as being influential in their decision-making process to support the free-ridership assessment. Like the customer self-report methodology, an influence component score was calculated for each influential vendor specific to each project. If the vendor's influence score is greater than the customer's score from the participant survey, the vendor score replaced the customer score in the self-report free-ridership scoring algorithm, under the rationale that the vendor's recommendation was a program-attributable factor because the vendor, in turn, was influenced by the program.

In addition to free-ridership, the NTG evaluation also assessed both participant spillover and nonparticipant spillover. Participant spillover was assessed through participant customer self-reports. We excluded like-spillover for the Midstream program component as this equipment was likely received at a discounted price and therefore benefited from FirstEnergy's buydown. The evaluation team felt that these midstream customers were likely to get the equipment from the same vendor as their original purchase; therefore, the savings would be double counted if it was reported as spillover. Nonparticipant spillover was estimated from vendor self-report surveys at the program component level (i.e., Prescriptive and EMNC). According to the Pennsylvania Evaluation Framework, total spillover was calculated by summing the participant and vendor-reported nonparticipant spillover rates. Individual free-ridership and spillover rates from the customer and vendor surveys were weighted to adjust for proportional sampling differences, non-response, and claimed energy savings to calculate overall estimates.

The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY14.

R.2.2 Sampling

The sample designs for the four EDCs are shown in Table 338, Table 339, Table 340, and Table 341 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 338: CI Prescriptive Initiative Net-to-Gross Sampling for Met-Ed

Stratum	Population Size	Achieved Sample Size	Response Rate
Downstream Prescriptive	161	41	25%
Midstream Prescriptive	64	16	25%
Program Total	**225**	**57**	**25.3%**

Table 339: CI Prescriptive Initiative Net-to-Gross Sampling for Penelec

Stratum	Population Size	Achieved Sample Size	Response Rate
Downstream Prescriptive	200	70	35%
Midstream Prescriptive	162	39	24%
Program Total	**362**	**109**	**30.1%**

Table 340: CI Prescriptive Initiative Net-to-Gross Sampling for Penn Power

Stratum	Population Size	Achieved Sample Size	Response Rate
Downstream Prescriptive	91	35	38%
Midstream Prescriptive	8	1	13%
Program Total	**99**	**36**	**36.4%**

Table 341: CI Prescriptive Initiative Net-to-Gross Sampling for WPP

Stratum	Population Size	Achieved Sample Size	Response Rate
Downstream Prescriptive	272	97	36%
Midstream Prescriptive	93	20	22%
Program Total	**365**	**117**	**32.1%**

R.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 342, Table 343, Table 344, and Table 345 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 342: CI Prescriptive Initiative Net-to-Gross Results for Met-Ed

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Downstream Lighting	20,155	29.1%	2.1%	73.0%	9.7%
Downstream Nonlighting	315	29.1%	2.1%	73.0%	9.7%
Midstream Lighting	5,329	44.2%	0.0%	55.8%	15.6%
Midstream Nonlighting	0	44.2%	0.0%	55.8%	15.6%
Program Total	**25,799**	**32.2%**	**1.7%**	**69.4%**	**8.0%**

Table 343: CI Prescriptive Initiative Net-to-Gross Results for Penelec

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Downstream Lighting	21,486	37.3%	3.3%	66.0%	6.9%
Downstream Nonlighting	420	37.3%	3.3%	66.0%	6.9%
Midstream Lighting	12,228	34.2%	0.0%	65.8%	10.0%
Midstream Nonlighting	5	34.2%	0.0%	65.8%	10.0%
Program Total	**34,140**	**36.2%**	**2.1%**	**66.0%**	**4.4%**

Table 344 CI Prescriptive Initiative Net-to-Gross Results for Penn Power

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Downstream Lighting	3,346	17.4%	2.1%	84.8%	9.5%
Downstream Nonlighting	86	17.4%	2.1%	84.8%	9.5%
Midstream Lighting	867	25.0%	0.0%	75.0%	67.3%
Midstream Nonlighting	0	25.0%	0.0%	75.0%	67.3%
Program Total	**4,299**	**18.9%**	**1.7%**	**82.8%**	**7.6%**

Table 345 CI Prescriptive Initiative Net-to-Gross Results for WPP

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Downstream Lighting	23,762	42.8%	2.7%	59.9%	5.9%
Downstream Nonlighting	133	42.8%	2.7%	59.9%	5.9%
Midstream Lighting	15,449	24.7%	0.0%	75.3%	14.3%
Midstream Nonlighting	1	24.7%	0.0%	75.3%	14.3%
Program Total	**39,345**	**35.7%**	**1.7%**	**65.9%**	**3.2%**

Appendix S Evaluation Detail – Commercial and Industrial Custom Initiative

S.1 Gross Impact Evaluation

Gross impact evaluation for the Commercial and Industrial Custom (C&I Custom) Initiative involved stratified sampling, on-site verifications, and project-specific data collection and calculations.

S.1.1 Gross Impact Evaluation Methodology

As a first step, projects are placed into one of three sampling strata as described in the next section. As with lighting projects, each sampled custom project undergoes a desk review prior to M&V plan construction. The desk review includes a full documentation review and if needed, additional topical research. Evaluation of most projects requires an M&V plan. The first step in the M&V planning process is to check that the project is sufficiently documented, and that the evaluation engineer can articulate the mechanism or process that will yield the expected energy savings. ADM engineers are encouraged to contact the applicant early on in the M&V planning process to ask for additional documentation, clarification, or even to seek feedback on the feasibility of the proposed data acquisition and analysis methodology. The desk review and M&V plan will depend on the opportunities and constraints posed by each project. However, some defaults or "modes" are discussed for certain categories of projects below:

Air Compressor Projects: In many cases, vendors perform a baseline metering study prior to air compressor upgrades. The data collected from such studies are very useful, provided that they appear to be consistent with the overall project documentation. In many cases it is possible to use metered flow data or power data along with compressor curves to establish the facility's compressed air load profile. The energy usage of the proposed air compressor may then be derived from application of compressor curves to the compressed air load profile. Additional activities such as post-installation metering or a billing analysis may be recommended, depending on project specifics. In some cases, baseline meter data are not available. In these cases, ADM will meter the new air compressor and use compressor curves to establish the underlying compressed air load profile, and then determine the baseline usage through application of the baseline compressor curves and (if needed) compressor staging practices.

Water Pumping Projects: Pumping projects are typically evaluated through billing analysis, using water throughput as the normalizing variable.

Combined Heat and Power (CHP): CHP projects are typically evaluated through trending data analysis. The generator output is typically modeled as a function of explanatory variables that may include weather-related information, calendar day types (especially for universities), and availability of biofuels, if applicable. Parasitic loads are estimated through inspection of trending data, monitoring, or an inspection equipment specifications and operating schedules.

General Process Improvements: For general process improvements, the evaluation determines the change in the energy usage intensity associated with the creation or maintenance of one production unit. Production data are typically provided by the applicant upon ADM's request. Energy usage is measured either through power monitoring, energy management system trending, or billing analysis.

General Space and Process Cooling Improvements: Data acquisition for such projects involves the determination of independent variables that predict the cooling load (units produced, degree-days, etc.) along with utility bills, EMS trending data, or sub-metering. The data analysis may involve regressions or energy simulation models.

In some cases, the desk review process may indicate that an on-site visit would not add sufficient value to the evaluation effort. For example, billing analysis or trending data analysis is a viable option for certain projects. Figure 9 shows the fraction of verified energy savings, as averaged over the four PA Companies, by primary evaluation activities.

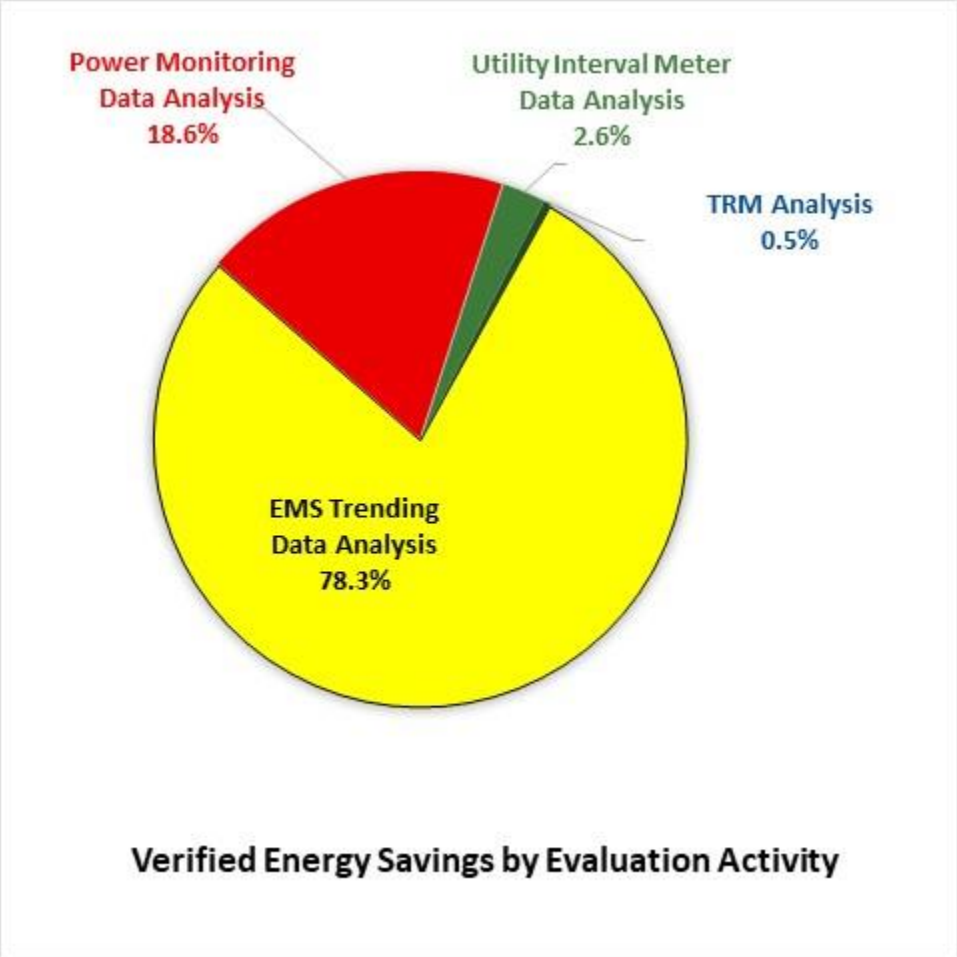


Figure 9: Fraction of verified energy savings by evaluation activity.

As a final step in custom project analysis, ADM analysts determine the incremental material and labor costs. In estimating the material and labor costs, preference is given first to invoices, then

to the SWE incremental cost database, and then to the cost values from the CA DEER database, then to the costs used in the EDCs' EE&C plans.

S.1.2 Sampling

Projects are placed into two strata. The first stratum or "certainty" stratum consists of projects that are expected to result in energy savings in excess of 500 MWh. All of these projects are sampled for evaluation, and nearly all of them are evaluated prior to rebate approval. Therefore, the gross realization rate for the certainty stratum is essentially 100% by design, although reported impacts may at times be lower than the 500 MWh threshold, as the threshold is on ex ante MWh, while ex post MWh are reported for these projects. The remaining projects are placed into one sampling stratum. The sample designs for the four EDCs are shown in Table 346, Table 347, Table 348, and Table 349.

Table 346: CI Custom Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Custom-C	500	2	2	On-Site Verification, Metering
Custom-1	0	11	2	
Program Total	**n/a**	**13**	**4**	

Table 347: CI Custom Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Custom-C	500	0	0	On-Site Verification, Metering
Custom-1	0	17	10	
Program Total	**n/a**	**17**	**10**	

Table 348: CI Custom Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Custom-C	500	0	0	On-Site Verification, Metering
Custom-1	0	3	3	
Program Total	**n/a**	**3**	**3**	

Table 349: CI Custom Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Custom-C	500	1	1	On-Site Verification, Metering
Custom-1	0	30	14	
Program Total	**n/a**	**31**	**15**	

S.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 350, Table 351, Table 352, and Table 353 for Met-Ed, Penelec, Penn Power, and WPP respectively. Figure 10 plots the verified energy savings against the reported energy savings for all evaluated custom projects for the program year. The figure includes data points from all four EDCs and is

designed to show the reader the correspondence between reported and verified impacts. The relative precision values in the following tables are calculated with a coefficient of variation of 0.5.

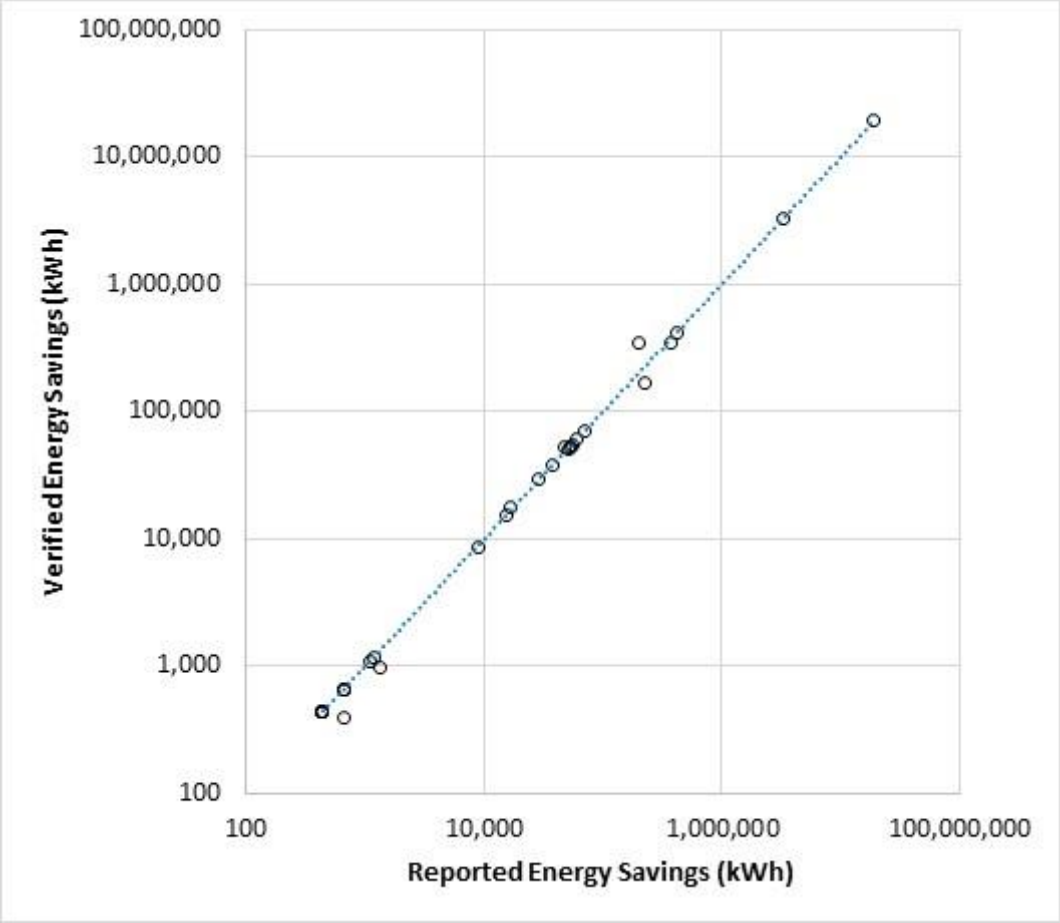


Figure 10: Verified vs. Reported Energy Savings for Sampled Custom Projects.

Table 350: CI Custom Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	22,364	100.0%	0.4	0%
Custom-1	0	875	173.4%	0.4	37%
Program Total	**n/a**	**23,239**	**102.8%**		**2.4%**

Table 351: CI Custom Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	0	0.0%	0.4	0%
Custom-1	0	668	101.4%	0.4	12%
Program Total	**n/a**	**668**	**101.4%**		**11.9%**

Table 352: CI Custom Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	0	0.0%	0.4	0%
Custom-1	0	39	101.4%	0.4	0%
Program Total	**n/a**	**39**	**101.4%**		**0.0%**

Table 353: CI Custom Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	421	100.0%	0.4	0%
Custom-1	0	759	88.1%	0.4	11%
Program Total	**n/a**	**1,180**	**92.3%**		**6.4%**

S.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 354, Table 355, Table 356, and Table 357 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 354: CI Custom Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	2.59	100.0%	0.4	0%
Custom-1	0	0.05	112.3%	0.4	37%
Program Total	**n/a**	**2.63**	**100.2%**		**0.8%**

Table 355: CI Custom Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	0.00	0.0%	0.4	0%
Custom-1	0	0.06	101.8%	0.4	12%
Program Total	**n/a**	**0.06**	**101.8%**		**11.9%**

Table 356: CI Custom Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	0.00	0.0%	0.4	0%
Custom-1	0	0.02	97.9%	0.4	0%
Program Total	**n/a**	**0.02**	**97.9%**		**0.0%**

Table 357: CI Custom Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Custom-C	500	0.03	100.0%	0.4	0%
Custom-1	0	0.12	84.2%	0.4	11%
Program Total	**n/a**	**0.15**	**87.3%**		**7.6%**

S.2 NET IMPACT EVALUATION

S.2.1 Net Impact Evaluation Methodology

Tetra Tech assessed free-ridership through participant customer self-reports following the standardized self-report methodology for downstream programs, enhanced with influential vendor reports. The customer free-ridership portion captures two components: (1) intention to carry out the energy-efficient project without program funds, and (2) influence of the program in the decision to carry out the energy-efficient project. Customer-identified influential vendors were asked a series of questions assessing the program's influence on their recommendations to the customer(s) who identified them as being influential in their decision-making process to support the free-ridership assessment. Like the customer self-report methodology, an influence component score was calculated for each influential vendor specific to each project. If the vendor's influence score is greater than the customer's score from the participant survey, the vendor score replaced the customer score in the self-report free-ridership scoring algorithm, under the rationale that the vendor's recommendation was a program-attributable factor because the vendor, in turn, was influenced by the program.

In addition to free-ridership, the NTG evaluation also assessed both participant spillover and nonparticipant spillover. Participant spillover was assessed through participant customer self-reports. Nonparticipant spillover was estimated from vendor self-report surveys at the program component level (i.e., Prescriptive and EMNC). According to the Pennsylvania Evaluation Framework, total spillover was calculated by summing the participant and vendor-reported nonparticipant spillover rates. Individual free-ridership and spillover rates from the customer and vendor surveys were weighted to adjust for proportional sampling differences, non-response, and claimed energy savings to calculate overall estimates.

The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY14.

S.2.2 Sampling

The sample designs for the four EDCs are shown in Table 358, Table 359, Table 360, and Table 361 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 358: CI Custom Initiative Net-to-Gross Sampling for Met-Ed

Stratum	Population Size	Achieved Sample Size	Response Rate
Custom	10	7	70%
Program Total	**10**	**7**	**70%**

Table 359: CI Custom Initiative Net-to-Gross Sampling for Penelec

Stratum	Population Size	Achieved Sample Size	Response Rate
Custom	21	13	62%
Program Total	**21**	**13**	**62%**

Table 360: CI Custom Initiative Net-to-Gross Sampling for Penn Power

Stratum	Population Size	Achieved Sample Size	Response Rate
Custom	5	4	80%
Program Total	**5**	**4**	**80%**

Table 361: CI Custom Initiative Net-to-Gross Sampling for WPP

Stratum	Population Size	Achieved Sample Size	Response Rate
Custom	18	12	67%
Program Total	**18**	**12**	**67%**

S.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 362, Table 363, Table 364, and Table 365 for Met-Ed, Penelec, Penn Power, and WPP respectively. Inspection of stratum-level NTG ratios for all four EDCs suggests that NTG ratios are lower for custom projects than for lighting projects.

Table 362: CI Custom Initiative Net-to-Gross Results for Met-Ed

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Custom	23,881	42.9%	0.0%	57.1%	14.9%
Program Total	**23,881**	**42.9%**	**0.0%**	**57.1%**	**14.9%**

Table 363: CI Custom Initiative Net-to-Gross Results for Penelec

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Custom	677	47.9%	0.0%	52.1%	12.3%
Program Total	**677**	**47.9%**	**0.0%**	**52.1%**	**12.3%**

Table 364: CI Custom Initiative Net-to-Gross Results for Penn Power

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Custom	40	0.0%	0.0%	100.0%	16.1%
Program Total	**40**	**0.0%**	**0.0%**	**100.0%**	**16.1%**

Table 365: CI Custom Initiative Net-to-Gross Results for WPP

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Custom	1,090	50.9%	0.0%	49.1%	12.0%
Program Total	**1,090**	**50.9%**	**0.0%**	**49.11%**	**12.0%**

Appendix T Evaluation Detail – Commercial and Industrial Energy Management and New Construction Initiative

T.1 Gross Impact Evaluation

The Commercial and Industrial Energy Management and New Construction (CI EMNC) initiative has five subcomponents:

- The *Building Tune-Ups* subprogram is a direct-install effort targeting small and medium businesses.
- The *New Construction* subprogram provides design assistance, energy calculations, and incentives for efficient new construction methods and equipment.
- The *Commissioning* subprogram for existing buildings includes both virtual and retro-commissioning components.
- The *Building Improvements* subprogram provides incentives for envelope and equipment upgrades in existing buildings.
- The *Building Operations Certification* (BOC) subprogram provides incentives for qualified personnel to obtain BOC through a certified training program related to the efficient design, operations, and maintenance of buildings.

The Building Tune-Ups and New Construction subprograms completed rebate applications in PY14.

T.1.1 Gross Impact Evaluation Methodology

As a first step, projects from the five subprograms are consolidated into three sub-initiatives by combining the BOC and New Construction components into the *EMNC* sub-initiative, and by combining the Commissioning and Building Improvements projects into the *Building Improvements* sub-initiative. Projects within those sub-initiatives may be stratified according to savings if necessary. Projects are sampled randomly from the population of projects for impact evaluation, with activities for each sub-initiative described below.

T.1.1.1 Building Tune-Up

Each sampled building tune-up project first undergoes a desk review. The desk review includes reconciliation of invoices with fixture or equipment specification sheets (cut sheets) and re-calculating reported savings using TRM algorithms and/or ex-ante assumptions and identifying key parameters to be researched in the M&V plan. The Building Tune-Up program is new for Phase IV. Due to the lack of implementation history, ADM opted for on-site inspections of most sampled projects, despite the fact the most projects had modest scope and limited energy savings.

T.1.1.2 Building Improvements

There were no projects in this sub-initiative in PY14.

T.1.1.3 EMNC

ADM sampled each project for evaluation and reviewed all documents and calculations. The program ICSP, Willdan, has built a process to promote and rebate new construction projects in a uniform manner. The process uses Willdan's Net Energy Optimizer (NEO) building simulation tool to develop baseline, design, and as-built simulation models. The NEO tool is a web-based front-end for the DOE2 simulation engine. Willdan has developed additional features to NEO to facilitate modeling efficiency measures such as machine room-less elevators and efficient food-service equipment. Willdan staff develop the baseline model as well as several design options that feature various energy efficiency measures and design changes. Once the participant selects the desired efficiency features and completes building construction, Willdan staff perform either an on-site or virtual inspection, and gather data to develop the final as-built simulation model. Project documentation includes a final verification report which lists all efficiency measures and provides itemized energy savings for each measure. ADM also requested and received access to online NEO models and DOE2 input and output files, including 8760 hourly energy simulation outputs for all sampled projects and for several projects that are in various phases of construction. If the project includes significant energy savings from lighting, Willdan provides an itemized lighting calculation.

ADM reviewed the baseline and as-build simulation models and performed parallel calculations using TRM algorithms for sampled measures within each project. Energy savings for measures that have prescriptive counterparts in the TRM (this included most measures in PY14) are consistent with TRM calculations, within reasonable tolerances associated with the NEO calculation representing one specific instance or application of a measure, and the TRM representing a typical application of a measure within a market segment. The NEO framework assigns baseline lighting power densities (LPDs) in a manner similar to the TRM's Appendix C lighting calculator. This appears to be a hybrid application of whole-building and space-by-space strategies. For new construction projects that are generally not dominated by savings from the lighting end-use, this is a reasonable and consistent approach. Based on the review findings, the evaluation approach taken in PY14 is to use the simulation output unless significant variances are found for certain measures, in which case ADM would modify the energy and demand impacts with extrinsic calculations.

Figure 11 shows the fraction of verified energy savings, as averaged over the four PA Companies, by primary evaluation activities.

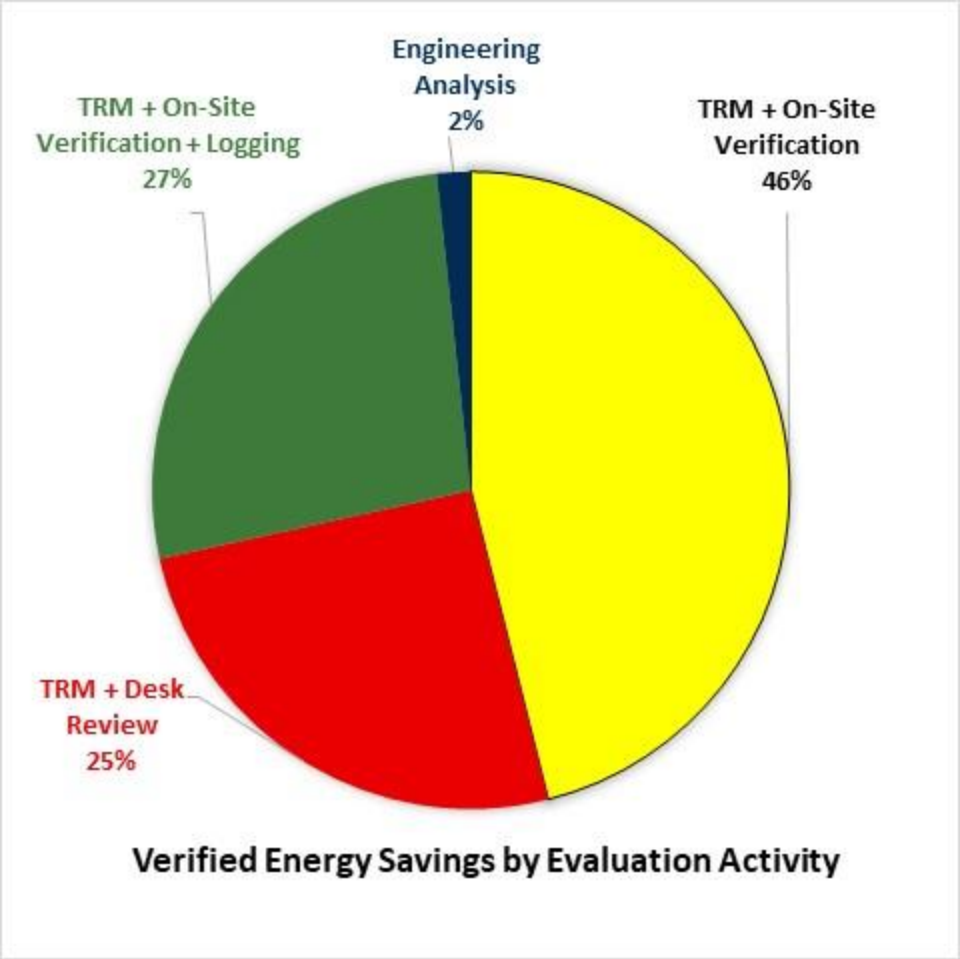


Figure 11: Fraction of verified energy savings by evaluation activity.

As a final step in lighting project analysis, ADM analysts determine the incremental material and labor costs. In estimating the material and labor costs, preference is given first to invoices, then to the SWE incremental cost database, and then to the cost values from the CA DEER database, then to the costs used in the EDCs' EE&C plans.

T.1.2 Sampling

The sample designs for the four EDCs are shown in Table 366, Table 367, Table 368, and Table 369.

Table 366: CI Lighting Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
EMNC	0	0	0	Desk Review; On-Site Verification
Building Tune-Ups	0	295	25	
Program Total	**n/a**	**295**	**25**	

Table 367: CI EMNC Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
EMNC	0	1	1	Desk Review; On-Site Verification
Building Tune-Ups	0	201	24	
Program Total	**n/a**	**202**	**25**	

Table 368: CI EMNC Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
EMNC	0	2	2	Desk Review; On-Site Verification
Building Tune-Ups	0	83	17	
Program Total	**n/a**	**85**	**19**	

Table 369: CI EMNC Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
EMNC	0	6	3	Desk Review; On-Site Verification
Building Tune-Ups	0	226	24	
Program Total	**n/a**	**232**	**27**	

T.1.3 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 370, Table 371, Table 372, and Table 373 for Met-Ed, Penelec, Penn Power, and WPP respectively. Figure 12 plots the verified energy savings against the reported energy savings for all evaluated EMNC projects for the program year. The figure includes data points from all four EDCs and is designed to show the reader the correspondence between reported and verified impacts. The relative precision values in the following tables are calculated with a coefficient of variation of 0.4, but the actual error ratios tend to be somewhat lower than 0.4.

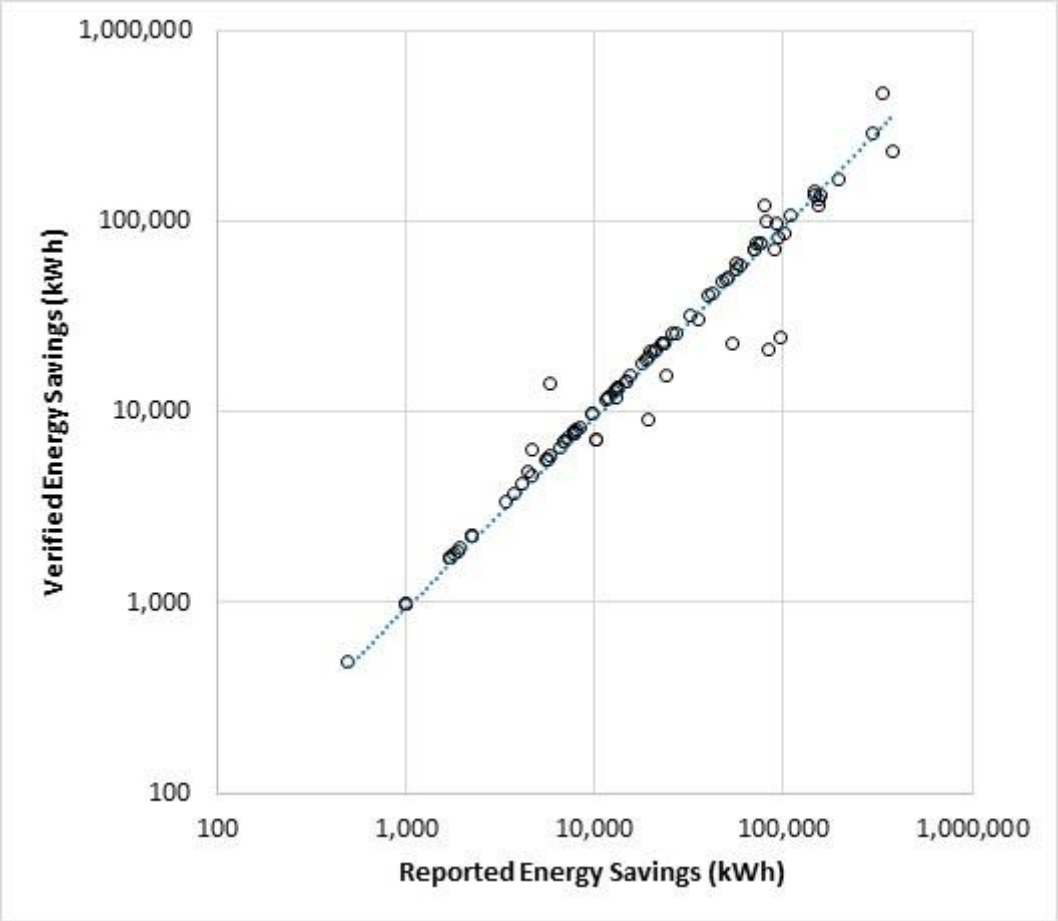


Figure 12: Verified vs. Reported Energy Savings for Sampled EMNC Projects.

Table 370: CI EMNC Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	0	0.0%	0.4	0%
Building Tune-Ups	0	3,693	97.6%	0.4	11%
Program Total	**n/a**	**3,693**	**97.6%**	**0.4**	**11.0%**

Table 371: CI EMNC Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	79	152.6%	0.4	0%
Building Tune-Ups	0	5,574	84.0%	0.4	11%
Program Total	**n/a**	**5,653**	**85.0%**	**0.4**	**10.8%**

Table 372: CI EMNC Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	429	127.1%	0.4	0%
Building Tune-Ups	0	3,170	85.7%	0.4	12%
Program Total	**n/a**	**3,599**	**90.6%**	**0.4**	**10.4%**

Table 373: CI EMNC Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	441	95.5%	0.4	24%
Building Tune-Ups	0	6,773	88.7%	0.4	11%
Program Total	**n/a**	**7,214**	**89.1%**	**0.4**	**10.5%**

T.1.4 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 374, Table 375, Table 376, and Table 377 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 374: CI EMNC Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	0.00	0.0%	0.4	0%
Building Tune-Ups	0	0.61	97.0%	0.4	11%
Program Total	**n/a**	**0.61**	**97.0%**	**0.4**	**11.0%**

Table 375: CI EMNC Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	0.01	193.6%	0.4	0%
Building Tune-Ups	0	0.88	70.5%	0.4	11%
Program Total	**n/a**	**0.89**	**71.6%**	**0.4**	**10.8%**

Table 376: CI EMNC Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	0.08	59.4%	0.4	0%
Building Tune-Ups	0	0.65	91.7%	0.4	12%
Program Total	**n/a**	**0.74**	**88.0%**	**0.4**	**11.5%**

Table 377: CI EMNC Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
EMNC	0	0.07	86.4%	0.4	24%
Building Tune-Ups	0	1.00	88.8%	0.4	11%
Program Total	**n/a**	**1.07**	**88.6%**	**0.4**	**10.5%**

T.2 NET IMPACT EVALUATION

T.2.1 Net Impact Evaluation Methodology

Tetra Tech assessed free-ridership through participant customer self-reports following the standardized self-report methodology for downstream programs, enhanced with influential vendor reports. The customer free-ridership portion captures two components: (1) intention to carry out the energy-efficient project without program funds, and (2) influence of the program in the decision to carry out the energy-efficient project. Customer-identified influential vendors were asked a series of questions assessing the program's influence on their recommendations to the customer(s) who identified them as being influential in their decision-making process to support the free-ridership assessment. Like the customer self-report methodology, an influence component score was calculated for each influential vendor specific to each project. If the vendor's influence score is greater than the customer's score from the participant survey, the vendor score replaced the customer score in the self-report free-ridership scoring algorithm, under the rationale that the vendor's recommendation was a program-attributable factor because the vendor, in turn, was influenced by the program.

In addition to free-ridership, the NTG evaluation also assessed both participant spillover and nonparticipant spillover. Participant spillover was assessed through participant customer self-reports. Nonparticipant spillover was estimated from vendor self-report surveys at the program component level (i.e., Prescriptive and EMNC). According to the Pennsylvania Evaluation Framework, total spillover was calculated by summing the participant and vendor-reported nonparticipant spillover rates. Individual free-ridership and spillover rates from the customer and vendor surveys were weighted to adjust for proportional sampling differences, non-response, and claimed energy savings to calculate overall estimates.

The following sections provide information related to the historical net impact evaluation effort that informs the initiative's NTG values for PY14.

T.2.2 Sampling

The sample designs for the four EDCs are shown in Table 378, Table 379, Table 380, and Table 381 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 378: CI EMNC Initiative Net-to-Gross Sampling for Met-Ed

Stratum	Population Size	Achieved Sample Size	Response Rate
EMNC	79	34	43%
Program Total	79	34	43%

Table 379: CI EMNC Initiative Net-to-Gross Sampling for Penelec

Stratum	Population Size	Achieved Sample Size	Response Rate
EMNC	98	32	33%
Program Total	98	32	33%

Table 380: CI EMNC Initiative Net-to-Gross Sampling for Penn Power

Stratum	Population Size	Achieved Sample Size	Response Rate
EMNC	42	11	26%
Program Total	**42**	**11**	**26%**

Table 381: CI EMNC Initiative Net-to-Gross Sampling for WPP

Stratum	Population Size	Achieved Sample Size	Response Rate
EMNC	120	35	29%
Program Total	**120**	**35**	**29%**

T.2.3 Net Impact Evaluation Results

The PYTD verified gross energy impacts, free ridership, spillover, net-to-gross ratios, and relative precisions for net-to-gross are shown in Table 382, Table 383, Table 384, and Table 385 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 382: CI EMNC Initiative Net-to-Gross Results for Met-Ed

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
EMNC	3,606	2.2%	0.0%	100.0%	9.3%
Program Total	**3,606**	**2.2%**	**0.0%**	**97.8%**	**9.3%**

Table 383: CI EMNC Initiative Net-to-Gross Results for Penelec

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
EMNC	4,805	16.2%	0.0%	100.0%	10.4%
Program Total	**4,805**	**16.2%**	**0.0%**	**83.8%**	**10.4%**

Table 384 CI EMNC Initiative Net-to-Gross Results for Penn Power

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
EMNC	3,262	2.7%	0.0%	100.0%	18.7%
Program Total	**3,262**	**2.7%**	**0.0%**	**97.3%**	**18.7%**

Table 385 CI EMNC Initiative Net-to-Gross Results for WPP

Stratum	PYVTD MWh	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
EMNC	6,428	8.2%	18.2%	100.0%	10.2%
Program Total	**6,428**	**8.2%**	**18.2%**	**110.0%**	**10.2%**

Appendix U Evaluation Detail – Commercial and Master-Metered Multifamily Direct Install Initiative

The Commercial Master-Metered Multifamily Direct Install (CI MF) Initiative targets master-metered communities that house income-qualified tenants. A participant in this program is defined as a unique address in the program, multiple projects can be installed at one address. This program consists of brief energy audits performed by CLEAResult along with energy efficiency measures directly installed in customers' dwelling units and in common areas. The audit is used to identify low-cost energy savings opportunities, with associated energy savings measures directly installed in the unit during the audit. Low-cost measures installed in PY14 included light bulbs, refrigerator replacement, nightlights, smart power strips, energy saving showerheads and aerators, LED exit signs, and common area lighting. Refrigerator replacement and lighting upgrades were the two most significant measures.

U.1 Gross Impact Evaluation

Each sampled project first undergoes a desk review. The desk review includes reconciliation of invoices with fixture or equipment specification sheets (cut sheets), re-calculating reported savings using TRM algorithms and/or ex-ante assumptions, and identifying key parameters to be researched in the M&V plan. ADM opted for on-site inspections for about two-third of sampled projects, as weighted by reported savings.

U.1.1 Sampling

Table 386, Table 387, Table 388, and Table 389 show sample sizes for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 386: CI MF Initiative Gross Impact Sample Design for Met-Ed

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Multifamily-1	750	3	3	Desk Review, On-Site Verification, Logging HOU
Program Total	**n/a**	**3**	**3**	

Table 387: CI MF Initiative Gross Impact Sample Design for Penelec

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Multifamily-1	750	35	14	Desk Review, On-Site Verification, Logging HOU
Program Total	**n/a**	**35**	**14**	

Table 388: CI MF Initiative Gross Impact Sample Design for Penn Power

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Multifamily-1	750	0	0	Desk Review, On-Site Verification, Logging HOU
Program Total	**n/a**	**0**	**0**	

Table 389: CI MF Initiative Gross Impact Sample Design for WPP

Stratum	MWh Threshold	Population Size	Achieved Sample Size	Evaluation Activity
Multifamily-1	750	52	17	Desk Review, On-Site Verification, Logging HOU
Program Total	**n/a**	**52**	**17**	

U.1.2 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 390, Table 391, Table 392, and Table 393 for Met-Ed, Penelec, Penn Power, and WPP respectively. Figure 13 plots the verified energy savings against the reported energy savings for all projects evaluated in the program year. The figure includes data points from all four EDCs and is designed to show the reader the correspondence between reported and verified impacts.

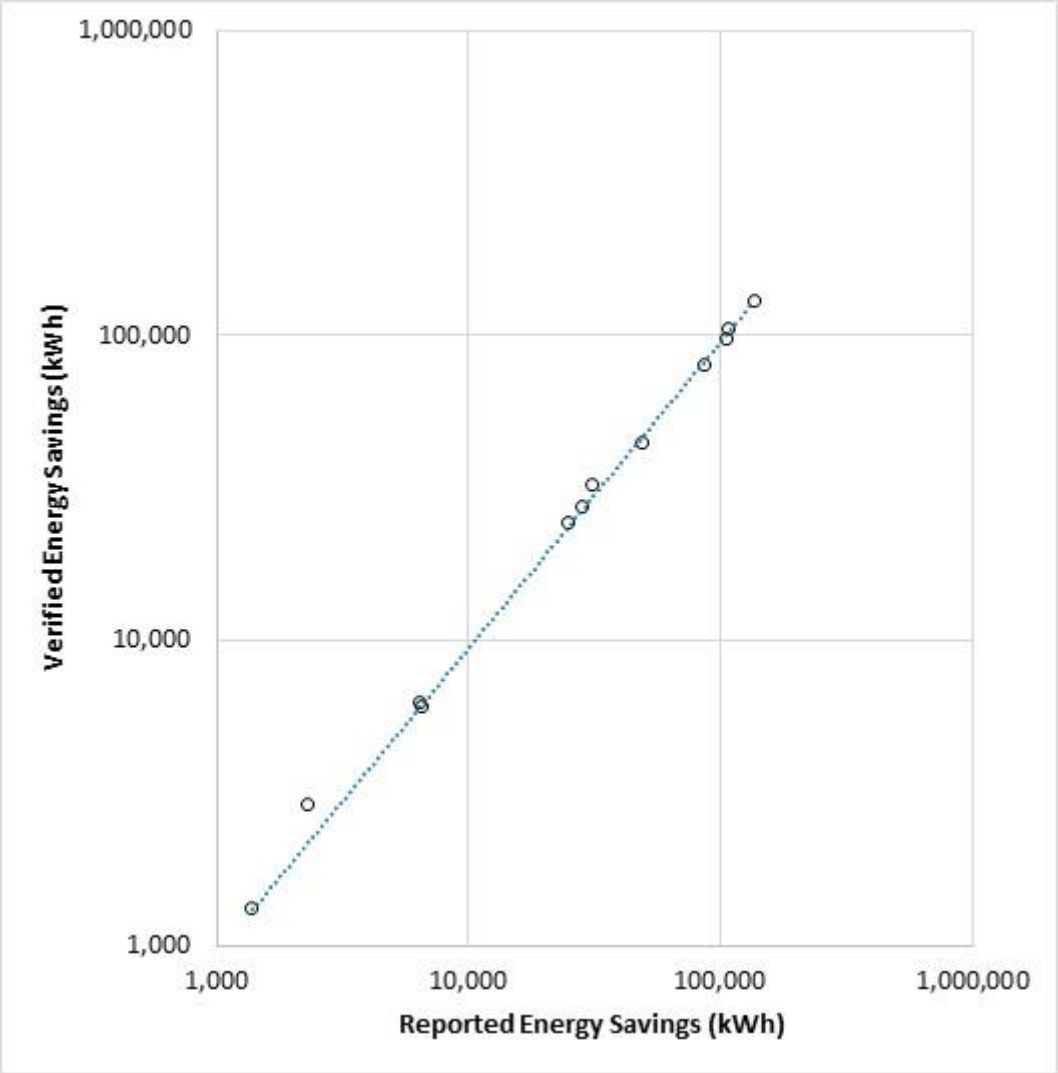


Figure 13: Verified vs. Reported Energy Savings for Sampled Multifamily Projects.

Table 390: CI MF Initiative Energy Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	125	91.6%	0.5	0%
Program Total	**n/a**	**125**	**91.6%**	**0.5**	**0.0%**

Table 391: CI MF Initiative Energy Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	550	90.2%	0.5	15%
Program Total	**n/a**	**550**	**90.2%**	**0.5**	**13.4%**

Table 392: CI MF Initiative Energy Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	0	0.0%	0.5	0%
Program Total	**n/a**	**0**	**100.0%**	**0.5**	**0.0%**

Table 393: CI MF Initiative Energy Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	769	81.5%	0.5	14%
Program Total	**n/a**	**769**	**81.5%**	**0.5**	**11.7%**

U.1.3 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 394, Table 395, Table 396, and Table 397 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 394: CI MF Initiative Demand Gross Realization Rates for Met-Ed

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	0.02	92.3%	0.5	0%
Program Total	**n/a**	**0.02**	**92.3%**	**0.5**	**0.0%**

Table 395: CI MF Initiative Demand Gross Realization Rates for Penelec

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	0.08	90.2%	0.5	15%
Program Total	**n/a**	**0.08**	**90.2%**	**0.5**	**13.4%**

Table 396: CI MF Initiative Gross Realization Rates for Penn Power

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	0.00	0.0%	0.5	0%
Program Total	**n/a**	**0.00**	**100.0%**	**0.5**	**0.0%**

Table 397: CI MF Initiative Demand Gross Realization Rates for WPP

Stratum	MWh Threshold	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
Multifamily-1	750	0.09	60.2%	0.5	14%
Program Total	**n/a**	**0.09**	**60.2%**	**0.5**	**8.6%**

U.2 Net Impact Evaluation

A net impact evaluation was not conducted for the CI MF Initiative. NTG is deemed at 1.0 since this initiative exclusively serves low-income customers.

Appendix V Evaluation Detail – C&I Appliance Recycling Sub-Initiative

V.1 Gross Impact Evaluation

Gross impact evaluation for the C&I Appliance Recycling sub-initiative consisted of applying realization rates from the broader initiative-level evaluation which includes the dominant residential and low-income residential components.

V.1.1 Sampling

Table 398, Table 399, Table 400, and Table 401 show sample sizes for Met-Ed, Penelec, Penn Power, and WPP respectively. A census of sites was not selected for customer surveys. Rather, tracking and reporting data were reviewed for consistency in formulation with the residential components so that the realization rates from the residential surveys could be applied. Note that the overall precision for the ATI initiative is the combined precision of the low income, non-low-income, and nonresidential components. The combined precisions for each EDC are shown in Table 224 in Appendix J.

Table 398: C&I ATI Initiative Gross Impact Sample Design for Met-Ed

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
ApplianceRecycling-1	52	52	T&R Review, Deem RR from ATI
Program Total	**52**	**52**	

Table 399: C&I ATI Initiative Gross Impact Sample Design for Penelec

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
ApplianceRecycling-1	42	42	T&R Review, Deem RR from ATI
Program Total	**42**	**42**	

Table 400: C&I ATI Initiative Gross Impact Sample Design for Penn Power

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
ApplianceRecycling-1	13	13	T&R Review, Deem RR from ATI
Program Total	**13**	**13**	

Table 401: C&I ATI Initiative Gross Impact Sample Design for WPP

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
ApplianceRecycling-1	61	61	T&R Review, Deem RR from ATI
Program Total	**61**	**61**	

V.1.2 Results for Energy

The gross realization rates for energy, along with relative precisions, are shown in Table 402, Table 403, Table 404, Table 405, and for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 402: C&I ATI Initiative Energy Gross Realization Rates for Met-Ed

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	58	116.4%	0.5	0.0%
Program Total	**58**	**116.4%**	**0.5**	**0.0%**

Table 403: C&I ATI Initiative Energy Gross Realization Rates for Penelec

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	43	105.8%	0.5	0.0%
Program Total	**43**	**105.8%**	**0.5**	**0.0%**

Table 404: C&I ATI Initiative Energy Gross Realization Rates for Penn Power

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	34	103.6%	0.5	0.0%
Program Total	**34**	**103.6%**	**0.5**	**0.0%**

Table 405: C&I ATI Initiative Energy Gross Realization Rates for WPP

Stratum	PYRTD MWh/yr	Energy Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	63	106.2%	0.5	0.0%
Program Total	**63**	**106.2%**	**0.5**	**0.0%**

V.1.3 Results for Demand

The gross realization rates for demand, along with relative precisions, are shown in Table 406, Table 407, Table 408, and Table 409 for Met-Ed, Penelec, Penn Power, and WPP respectively.

Table 406: C&I ATI Initiative Demand Gross Realization Rates for Met-Ed

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	0.01	112.7%	0.5	0.0%
Program Total	**0.01**	**112.7%**	**0.5**	**0.0%**

Table 407: C&I ATI Initiative Demand Gross Realization Rates for Penelec

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	0.01	101.5%	0.5	0.0%
Program Total	**0.01**	**101.5%**	**0.5**	**0.0%**

Table 408: C&I ATI Initiative Gross Realization Rates for Penn Power

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	0.01	102.3%	0.5	0.0%
Program Total	**0.01**	**102.3%**	**0.5**	**0.0%**

Table 409: C&I ATI Initiative Demand Gross Realization Rates for WPP

Stratum	PYRTD MW/yr	Demand Realization Rate	CV	Relative Precision at 85% C.L.
ApplianceRecycling-1	0.02	105.8%	0.5	0.0%
Program Total	**0.02**	**105.8%**	**0.5**	**0.0%**

V.2 Net Impact Evaluation

V.2.1 Net Impact Evaluation Methodology

An independent net impact evaluation was not conducted for this initiative because the initiative accounts for less than 0.1% of portfolio impacts, as averaged for the four PA Companies. The Net-to-Gross ratios for the C&I Appliance Recycling program were taken to be the same as the Net-to-Gross ratios for the residential component of the Appliance Recycling program.

Appendix W Report Validation

W.1 LINKED IMAGES

Most tables and charts in this report are images that are generated within an excel file. The last image should reflect the time and date of report compilation.

Table 410: Report Update Timestamp

Tables and Charts Updated on 09/22/23, at 10:29

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Final Annual Report to the Pennsylvania Public Utility Commission and Act 129 Statewide Evaluator; Phase IV Program Period June 1, 2021 to May 31, 2022 for Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company and West Penn Power Company	:	**Docket No. M-2020-3020820** **M-2020-3020821** **M-2020-3020822** **M-2020-3020823**

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing document upon the parties via listed below by e-mail.

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