

Richard G. Webster, Jr.
Vice President
Regulatory Policy and Strategy

Telephone 215.841.4000 ext 5777
Fax 215.841.6208
www.peco.com
dick.webster@peco-energy.com

PECO
2301 Market Street, S15
Philadelphia, PA 19103

November 15, 2012

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Second Floor
Harrisburg, Pennsylvania 17120

Re: PUC Docket No. M-2008-2069887
Energy Efficiency and Conservation Program Final Annual Report
June 1, 2011 through May 31, 2012

Dear Secretary Chiavetta:

In accordance with the Commission's Secretarial Letter dated May 25, 2011, enclosed is PECO's 2012 Final Annual Energy Efficiency & Conservation Report for the program year of June 1, 2011 through May 31, 2012.

PECO is providing a copy of the report to the Act 129 Statewide Evaluator (GDS Associates, Inc.) and is also posting the report on the PECO website.

Please acknowledge receipt of the foregoing on the enclosed copy of this letter.

If you have any further questions regarding this matter, please call me at 215-841-5777.

Sincerely,



cc: C. Walker-Davis, Director, Office of Special Assistants
P. Diskin, Director, Bureau of Technical Utility Services
M. C. Lesney, Director, Bureau of Audits
J. E. Simms, Director, Bureau of Investigation & Enforcement
Office of Consumer Advocate
Office of Small Business Advocate
McNees, Wallace & Nurick

enclosures

**Final Annual Report
to the
Pennsylvania Public Utility Commission**

**For the Period
June 2011 Through May 2012
Program Year 3**

**For Pennsylvania Act 129 of 2008
Energy Efficiency and Conservation Plan**

Prepared by Navigant Consulting, Inc.

For

PECO

November 15, 2012

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Acronyms

ARRA	American Recovery and Reinvestment Act of 2009
C&I	Commercial and Industrial
CATI	Computer-Aided Telephone Interview
CDD	Cooling Degree Day
CFL	Compact Fluorescent Lamp
CI	Confidence Interval
CPITD	Cumulative Program/Portfolio Inception to Date
CPITD-Q	Cumulative Program/Portfolio Inception Through Current Quarter
CSP	Conservation Service Provider or Curtailment Service Provider
CVR	Conservation Voltage Reduction
CVRf	Conservation Voltage Reduction factor
DER	Distributed Energy Resources
DLC	Direct Load Control
DR	Demand Response
DSF	Demand Savings Factor
EDC	Electric Distribution Company
EE&C	Energy Efficiency and Conservation
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, Measurement, and Verification
ESF	Energy Savings Factor
GNI	Government, Non-Profit, Institutional
HDD	Heating Degree Day
HVAC	Heating, Ventilating, and Air Conditioning

IPMVP	International Performance Measurement and Verification Protocol
IQ	Incremental Quarter
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light Emitting Diode
LEEP	Low-Income Energy Efficiency Program
LIURP	Low-Income Usage Reduction Program
M&V	Measurement and Verification
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-Gross
PA PUC	Pennsylvania Public Utility Commission
PY1	Program Year 2009, from June 1, 2009, to May 31, 2010
PY2	Program Year 2010, from June 1, 2010, to May 31, 2011
PY3	Program Year 2011, from June 1, 2011, to May 31, 2012
PY4	Program Year 2012, from June 1, 2012, to May 31, 2013
PYX QX	Program Year X, Quarter X
PYTD	Program Year to Date
SAE	Statistically Adjusted Engineering (analysis)
SEER	Seasonal Energy Efficiency Rating
SEI	Smart Equipment Incentive
SWE	Statewide Evaluator
TRC	Total Resource Cost

TRM Technical Reference Manual

Report Definitions

Note: Definitions provided in this section are limited to terms critical to understanding values presented in this report. For other definitions, please refer to the Act 129 glossary.

REPORTING PERIODS

Cumulative Program Inception to Date (CPITD)

Refers to the period of time since the start of the Act 129 programs. CPITD is calculated by totaling all program year results, including the current program year to date results. For example, CPTID results for PY3 Q3 is the sum of PY1, PY2, PY3 Q1, PY3 Q2, and PY3 Q3 results.

Incremental Quarter (IQ)

Refers to the current reporting quarter only. Activities occurring during previous quarters are not included. For example, IQ results for PY3 Q3 will only include results that occurred during PY3 Q3 and not PY2 Q2.

Program Year to Date (PYTD)

Refers to the current reporting program year only. Activities occurring during previous program years are not included. For example, PYTD results for PY3 Q3 will only include results that occurred during PY3 Q1, PY3 Q2, and PY3 Q3. It will not include results from PY1 and PY2.

SAVINGS TYPES

Preliminary

Qualifier used in all reports except the final annual report to signify that evaluations are still in progress and that results have not been finalized. Most often used with “realization rate” or “verified gross savings”.

Reported Gross

Refers to results of the program or portfolio determined by the program administrator (e.g., the EDC or the program implementer). Also known as *ex ante*, or “before the fact” (using the annual evaluation activities as the reference point).

Verified Gross

Refers to results of the program or portfolio determined by the evaluation activities. Also known as *ex post*, or “after the fact” (using the annual evaluation activities as the reference point).

TRC COMPONENTS¹

Administration Costs

Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical costs.

EDC Costs

Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenditures only.

Management Costs

Includes the EDC program management, CSP program management, general management oversight, and major accounts.

¹ All TRC definitions are subject to the 2011 Total Resource Cost Test Order.

Participant Costs

Per the 2011 Total Resource Cost Test Order, the net participant costs are the costs for the end-use customer.

Total TRC Costs

Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

Total TRC Benefits

Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

1 Overview of Portfolio

Pennsylvania Act 129 of 2008, signed on October 15, 2008, mandated energy savings and coincident peak demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania. Each EDC submitted energy efficiency and conservation (EE&C) plans—which were approved by the Pennsylvania Public Utility Commission (PA PUC)—pursuant to these goals. This report documents the progress and effectiveness of the EE&C accomplishments for PECO through the fourth quarter of Program Year 3 (PY3), defined as June 1, 2011, through May 31, 2012, as well as the cumulative accomplishments of the programs since inception.

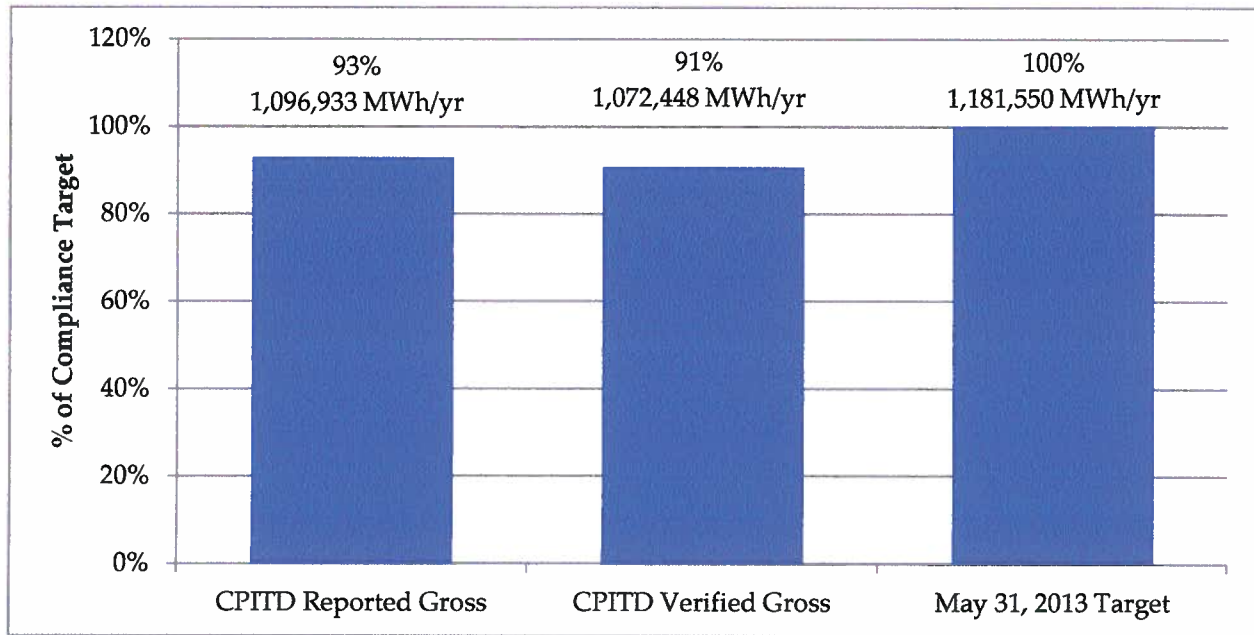
Navigant Consulting, Inc. (Navigant), has evaluated the programs, which included measurement and verification of the savings. The final verified savings for PY3 and the cumulative verified savings since inception of the programs are included in this final annual report.

This report is organized into two major sections. The first section provides an overview of activities for the entire portfolio. This includes summary information and portfolio-level details regarding the progress towards compliance goals, energy and demand impacts, net-to-gross (NTG) ratios, finances, and cost-effectiveness. The following sections include program-specific details, including program updates, impact evaluation findings, and process evaluation findings.

1.1 Summary of Progress Toward Compliance Targets

The energy savings² compliance target for PECO is 1,181,550 MWh/year and must be achieved by May 31, 2013, per Act 129. Based on CPITD verified gross energy savings,³ PECO has achieved 91 percent of the energy savings compliance target. These figures are shown in Figure 1-1. The PUC will determine compliance using CPITD verified gross energy savings.

Figure 1-1. Portfolio CPITD Energy Savings

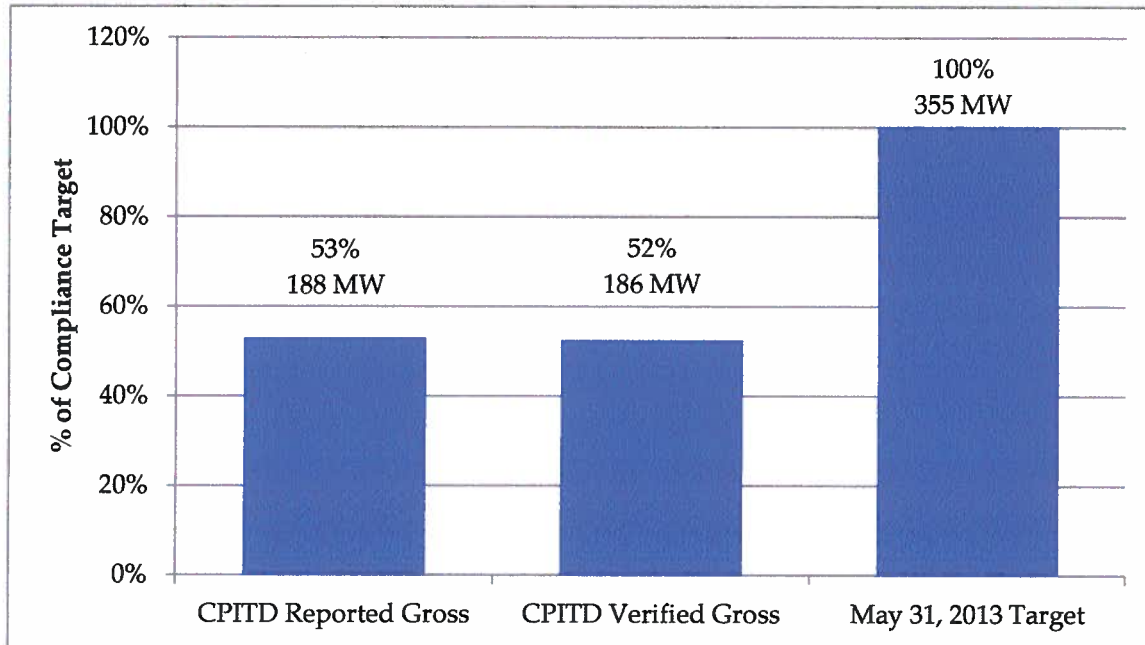


² Herein, energy savings refers to annualized energy savings and is measured in kWh/year or MWh/year. Energy savings are reported at the meter.

³ See the "Report Definitions" section for an explanation of how CPITD verified gross savings are calculated.

The system peak demand reduction⁴ compliance target for PECO is 355 MW per Act 129 and must be achieved by September 30, 2012. Based on CPITD-verified gross demand reduction,⁵ PECO has achieved 52 percent of the demand reduction compliance target. These figures are shown in Figure 1-2. Note that this percentage includes no demand reduction from PECO's dispatchable demand response programs. PECO is not claiming demand reduction from these programs in PY3. The PUC will determine compliance using CPITD-verified gross demand reduction.

Figure 1-2. Portfolio CPITD Peak Demand Reduction



⁴ Herein, demand reduction refers to the EDC's system peak demand reduction in the EDC's top 100 hours of highest demand, as defined by the PA PUC and is measured in kW or MW.

⁵ See the "Report Definitions" section for an explanation of how CPITD-verified gross savings are calculated.

Act 129 mandates that the number of measures offered to the low-income sector be proportionate to the low-income sector's share of total energy usage.⁶ There are 17 measures available to the low-income sector. The measures offered to the low-income sector therefore comprise 14 percent of the total measures offered. This exceeds the fraction of the electric consumption of the utility's low-income households divided by the total electricity consumption in the PECO territory (3.1 percent). These values are shown in Table 1-1.

Table 1-1. Low-Income Sector Compliance Metrics

	Low-Income Sector	All Sectors	% Low-Income
Number of Measures Offered	17	124	14
Electric Consumption (MWh/yr)	1,215,463	38,644,120	3.1

The CPITD reported gross energy savings for low-income sector programs (excluding low-income participation in non-low-income programs) is 79,367 MWh/yr; this is 7.2 percent of the CPITD total portfolio reported gross energy savings.

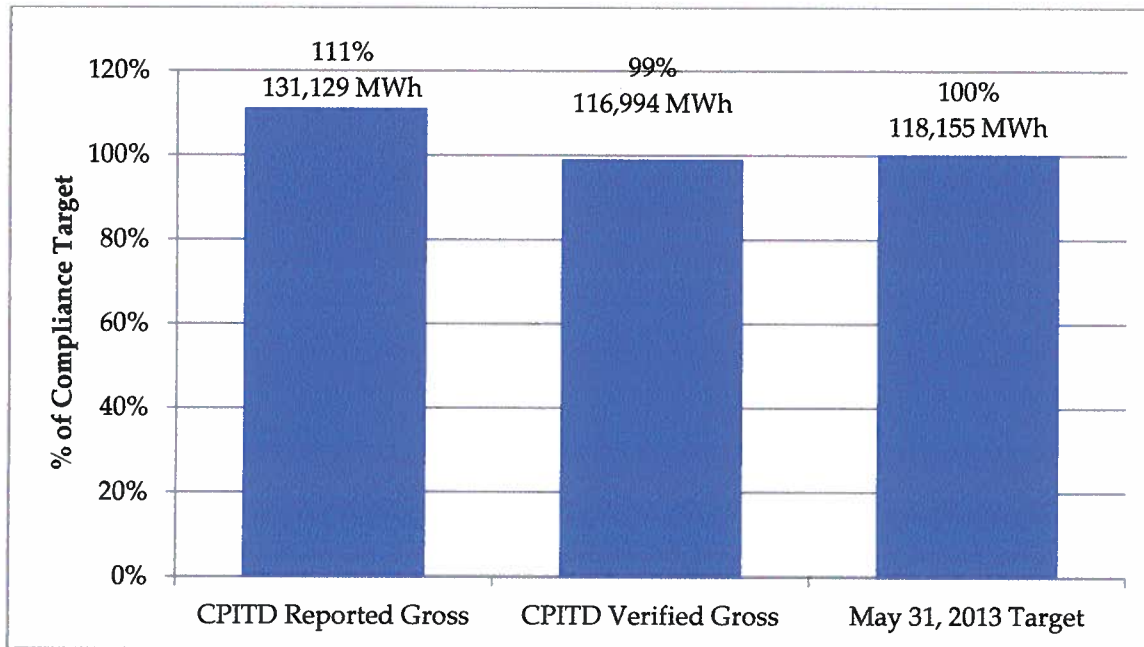
The CPITD verified gross energy savings achieved for low-income programs (excluding low-income participation in non-low-income programs) is 78,232 MWh/yr; this is 7.3 percent of the CPITD total portfolio verified gross energy savings.

⁶ Act 129 includes a provision requiring electric distribution companies to offer a number of energy conservation measures to low-income households that are "proportionate to those households' share of the total energy usage in the service territory." 66 Pa.C.S. §2806.1(b)(i)(G). The legislation contains no provisions regarding targets for participation, or energy or demand savings.

Act 129 mandates that a minimum of 10 percent of the required energy and demand targets be obtained from units of federal, state, and local governments, including municipalities, school districts, institutions of higher education, and nonprofit entities. Herein, this group is referred to as the government, nonprofit, and institutional (GNI) sector.

The energy savings compliance target for the GNI sector for PECO is 118,155 MWh/yr, which must be obtained by May 31, 2013. Based on CPITD verified gross energy savings,⁷ PECO achieved 99 percent of the target. These values are shown in Figure 1-3.

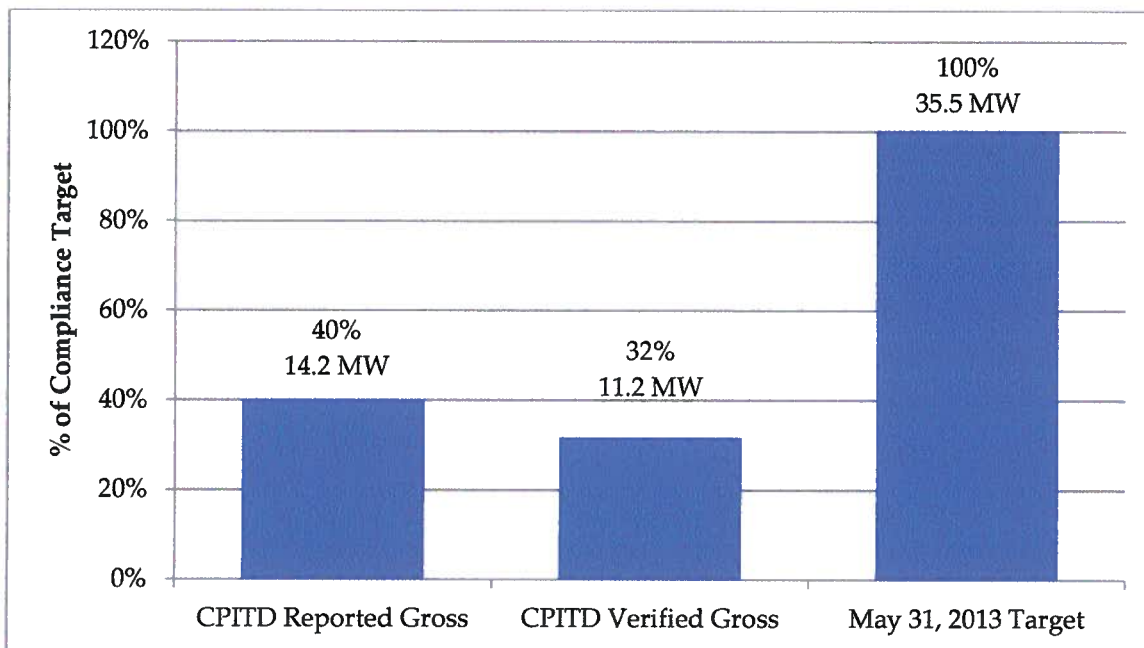
Figure 1-3. GNI CPITD Energy Savings



⁷ See the "Report Definitions" section for an explanation of how CPITD verified gross savings are calculated.

The peak demand reduction compliance target for the GNI sector for PECO is 35.5 MW. Based on CPITD verified gross demand reduction, PECO achieved 32 percent of the target. These values are shown in Figure 1-4. Note that neither the Reported nor Verified savings include demand reduction from the DR capacity that has been installed in the GNI sector but was not dispatched in PY3.

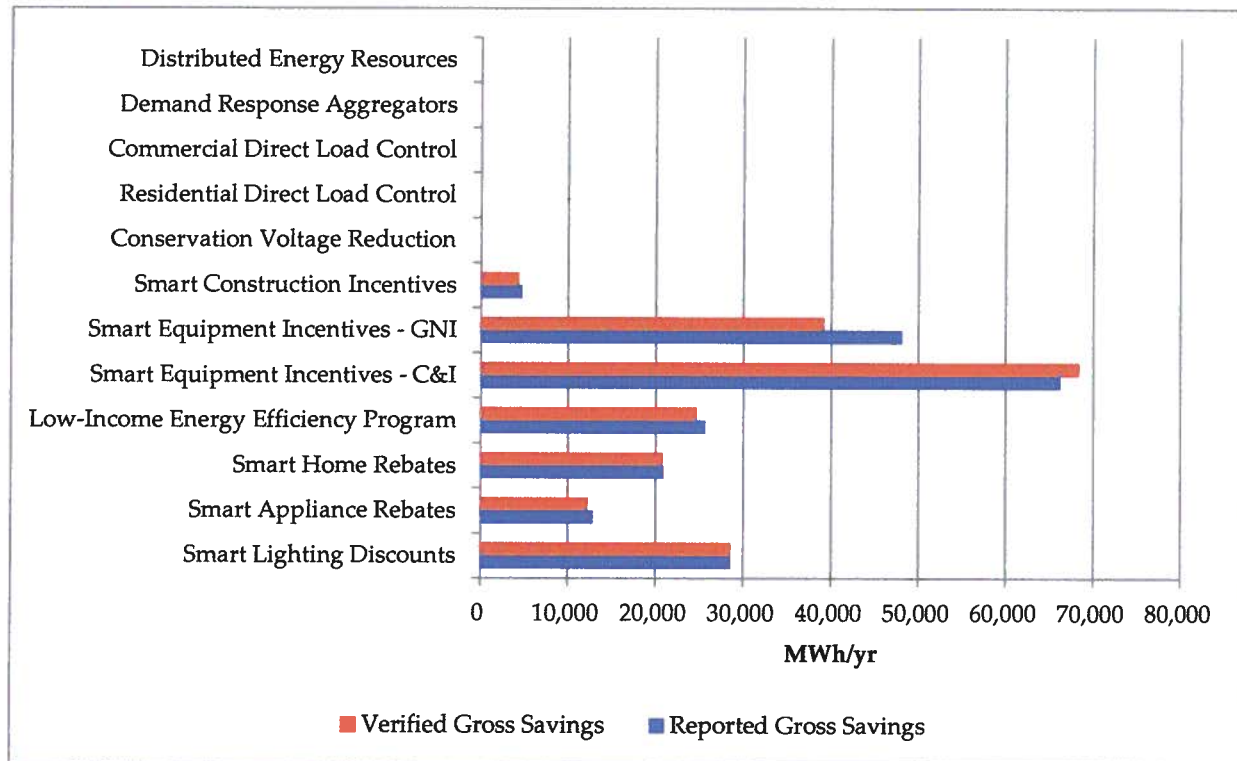
Figure 1-4. GNI CPITD Peak Demand Reduction



1.2 Summary of Energy Impacts

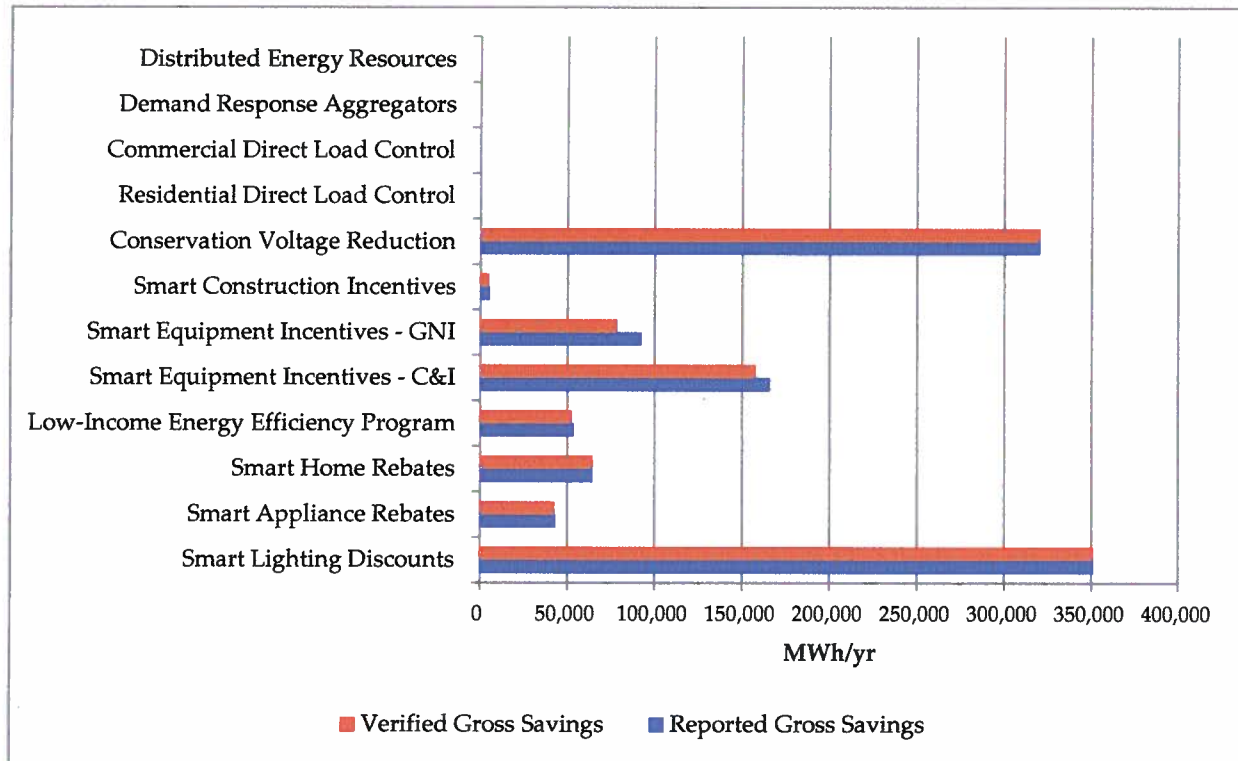
A summary of the reported and verified energy savings by program for the program year is presented in Figure 1-5.

Figure 1-5. PYTD Gross Energy Savings by Program



A summary of the cumulative reported and verified energy savings by program is presented in Figure 1-6.

Figure 1-6. CPITD Gross Energy Savings by Program



A summary of energy impacts by program through PY3 is presented in Table 1-2 and Table 1-3.

Table 1-2. EDC Reported Participation and Gross Energy Savings by Program

Program	Participants			Reported Gross Impact (MWh/Year)		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Residential	2,855	75,692	310,157	6,889	62,376	564,683
Smart Lighting Discounts Program ¹	52,784	591,009	7,416,539	2,525	28,580	351,040
Smart Appliance Recycling Program	839	7,920	27,743	1,357	12,848	43,293
Smart Home Rebates Program ²	2,016	67,772	282,414	3,008	20,948	64,628
Residential Conservation Voltage Reduction	N/A	N/A	N/A	-	-	105,723
Low-Income Energy Efficiency Program Total ³	3,294	11,632	22,134	8,396	25,667	79,367
Low-Income Energy Efficiency Program	3,294	11,632	22,134	8,396	25,667	53,738
Low-Income Conservation Voltage Reduction	N/A	N/A	N/A	-	-	25,630
Non-Residential	286	1,523	4,094	41,360	119,032	452,883
Commercial and Industrial Total	189	1,148	3,290	21,325	70,936	321,753
Smart Equipment Incentives - Retrofit	179	734	2,874	21,004	66,094	165,793
Smart Equipment Incentives - Multi-tenant ⁴	6	361	361	10	139	139
Smart Equipment Incentives -Appliance Recycling	1	9	9	1	16	16
Smart Construction Incentives	3	44	46	311	4,688	5,231
C&I Conservation Voltage Reduction	N/A	N/A	N/A	-	-	150,575
Government /Nonprofit Total	97	375	804	20,035	48,095	131,129
Smart Equipment Incentives - Retrofit	89	275	702	15,179	39,440	83,541
Smart Equipment Incentives - Multi-tenant ⁴	-	74	74	-	144	144
Smart Equipment Incentives -Appliance Recycling	-	5	5	-	33	33
Smart Equipment Incentives - New Construction	8	21	23	4,856	8,479	8,967
GNI Conservation Voltage Reduction	N/A	N/A	N/A	-	-	38,445

Program	Participants			Reported Gross Impact (MWh/Year)		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Demand Reduction	8,456	39,988	81,292	-	-	-
Residential Direct Load Control	7,749	37,437	78,651	-	-	-
Commercial Direct Load Control	512	2,356	2,446	-	-	-
Permanent Load Reduction	-	-	-	-	-	-
Demand Response Aggregators	193	193	193	-	-	-
Distributed Energy Resources	2	2	2	-	-	-
Total Portfolio	14,891	128,835	417,677	56,646	207,074	1,096,933
NOTES:						
¹ Participation numbers shown are the numbers of discounted lamps sold. These are excluded from total portfolio participation numbers. The CPITD participant value reported here includes 17,856 lamps that were inadvertently removed from PY2 cumulative participation values, although their costs and savings were reported correctly in all previous reports. ² Participant values exclude sales of ENERGY STAR lighting fixtures and LED lamps, for which upstream rebates are provided. ³ Act 129 includes a provision requiring electric distribution companies to offer a number of energy efficiency measures to low-income households that are "proportionate to those households' share of the total energy usage in the service territory." 66 Pa.C.S. §2806.1(b)(i)(G). The legislation contains no provisions regarding targets for participation, or energy or demand savings. Participation includes only those receiving the Weatherization Audit. ⁴ The participation values shown here reflect the number of project IDs reported in the tracking data, rather than the number of billing account IDs. The values reported here better reflect the number of participating households, rather than the number of multi-family buildings in which the participants live.						

Table 1-3. Verified Gross Energy Savings by Program

Program	PYTD Reported Gross Energy Savings (MWh/ Year)	PYTD Energy Realization Rate	PYTD Verified Gross Energy Savings (MWh/ Year)	PYTD Confidence	PYTD Achieved Precision	CPITD Verified Gross Energy Savings (MWh/ Year)
Smart Lighting Discounts Program	28,580	1.00	28,580	85%	0%	351,039
Smart Appliance Recycling Program	12,848	0.96	12,309	85%	4%	43,293
Smart Home Rebates Program	20,948	0.99	20,819	85%	0%	64,499
Residential Conservation Voltage Reduction	-	N/A	-	N/A	N/A	105,723
Low-Income Energy Efficiency Program	25,667	0.96	24,652	85%	6%	52,533
Low-Income Conservation Voltage Reduction	-	N/A	-	N/A	N/A	25,630
Smart Equipment Incentives-C&I	66,249	1.03	68,409	85%	8%	157,836
Smart Construction Incentives ¹	4,688	1.04	4,385	85%	1%	4,848
C&I Conservation Voltage Reduction	-	N/A	-	N/A	N/A	150,575
Smart Equipment Incentives - GNI	48,096	0.81	39,155	85%	20%	77,320
GNI Conservation Voltage Reduction	-	N/A	-	N/A	N/A	38,445
Residential Direct Load Control	-	N/A	-	N/A	N/A	-
Commercial Direct Load Control	-	N/A	-	N/A	N/A	-
Demand Response Aggregators	-	N/A	-	N/A	N/A	-
Distributed Energy Resources	-	N/A	-	N/A	N/A	-
TOTAL PORTFOLIO	207,075	0.96	198,309	90%	5.6%	1,072,448

NOTES:

¹Reported and verified savings are for new construction projects in the C&I sector only. Savings from new construction projects in the GNI sector are reported under SEI-GNI. All new construction projects were combined into a single population for evaluation purposes, and the realization rate presented here reflects the realization rate for the combined population. Four PY2 projects were also included in the sample frame for PY3. These projects are reflected in this table in the CPITD verified column but not the PYTD reported or verified columns.

1.3 Summary of Fuel Switching Impacts

PECO customers conducted a small number of projects in PY3 in which services originally provided by electricity were converted to run on natural gas. Table 1-4 summarizes the numbers and electricity savings resulting from these projects for each program where they occurred.

Table 1-4. Fuel Switching Project Summary

Program Name	Technology	Number of Projects	Electric Consumption Savings	Rebates Paid
SHR	High-Efficiency Gas Furnaces	30	962,194	\$19,800
	ENERGY STAR Gas Storage Tank Water Heaters	4	16,316	\$1,000
SEI C&I	Conversion of electric baseboard to gas and conversion of air source heat pumps to gas-fired boiler heating.	1	477,357	\$38,189

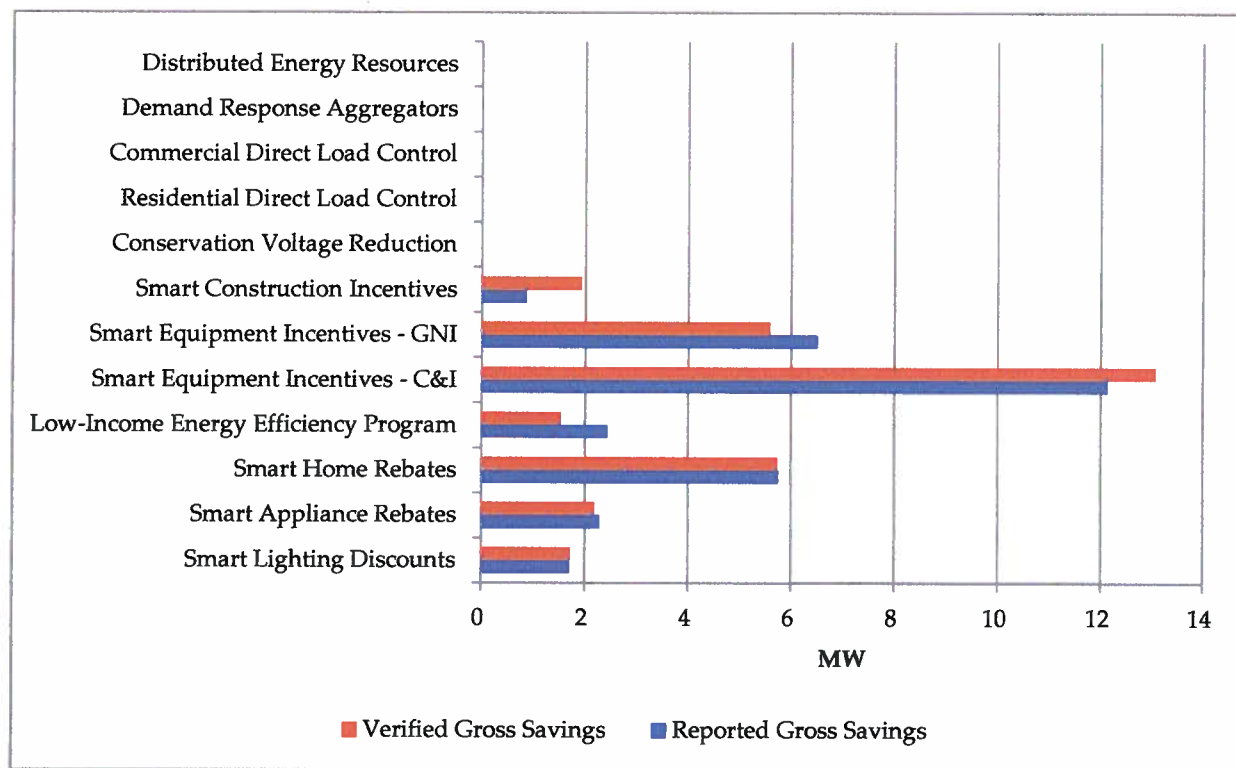
1.4 Summary of Demand Impacts

A summary of the reported and verified demand reduction by program for the program year is presented in Figure 1-7. In developing reported and verified demand savings, PECO has used peak line loss factors specific to the rate class for each participating customer. This is a departure from previous PECO quarterly and annual reports, which utilized annual average line loss factors. Peak line loss factors are appropriate for determining generator-level demand reductions during PECO's top 100 load hours. For non-residential programs, PECO utilized program-specific line loss factors, weighting rate-class line loss factors by the proportion of demand savings coming from participants in each rate class. This step was unnecessary for residential programs because all residential participants are in the same rate class. The peak line loss factors are presented in Table 1-5.

Table 1-5. Weighted Peak Line Loss Factors by Program

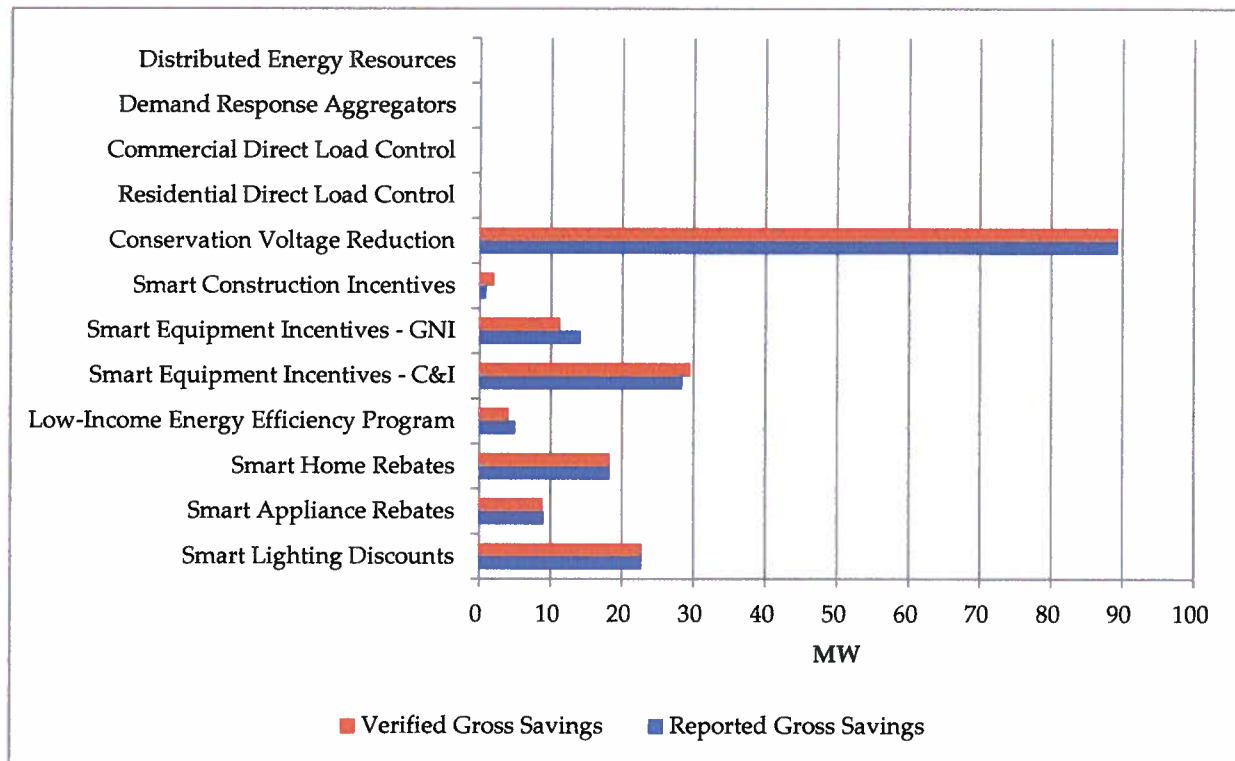
Program	Weighted Peak Line Loss Factor
SLD, SAR, SHR, and LEEP	1.1916
SEI C&I	1.111
SEI GNI	1.117
SCI	1.113

Figure 1-7. PYTD Reported Demand Reduction by Program



A summary of the cumulative reported and verified demand reduction by program is presented in **Figure 1-8**.

Figure 1-8. CPITD Reported Demand Reduction by Program



A summary of demand reduction impacts by program through PY3 is presented in Table 1-6 and Table 1-7

Table 1-6. EDC Reported Participation and Gross Demand Reduction by Program

Program	Participants				Reported Gross Impact (MW)		
	IQ	PYTD	CPIITD	IQ	PYTD	CPITD	
Residential	2,855	75,692	310,157	1.1	9.8	50.1	
Smart Lighting Discounts Program ¹	52,784	591,009	7,416,539	0.1	1.7	22.8	
Smart Appliance Recycling Program	839	7,920	27,743	0.2	2.3	9.1	
Smart Home Rebates Program ²	2,016	67,772	282,414	0.8	5.8	18.3	
Low-Income Energy Efficiency Program Total ³	3,294	11,632	22,134	0.7	2.4	5.1	
Low-Income Energy Efficiency Program	3,294	11,632	22,134	0.7	2.4	5.1	
Non-Residential	286	1,523	4,094	6.6	19.5	43.5	
Commercial and Industrial Total	189	1,148	3,290	3.8	13.0	29.3	
Smart Equipment Incentives - Retrofit	179	734	2,874	3.7	12.1	28.3	
Smart Equipment Incentives - Multi-tenant ⁴	6	361	361	0.0	0.0	0.1	
Smart Equipment Incentives - Appliance Recycling	1	9	9	0.0	0.0	0.0	
Smart Construction Incentives	3	44	46	0.1	0.9	0.9	
Government /Nonprofit Total	97	375	804	2.8	6.5	14.2	
Smart Equipment Incentives - Retrofit	89	275	702	2.1	5.3	12.9	
Smart Equipment Incentives - Multi-tenant ⁴	0	74	74	0.0	0.0	0.0	
Smart Equipment Incentives - Appliance Recycling	0	5	5	0.0	0.0	0.0	
Smart Equipment Incentives - New Construction	8	21	23	0.7	1.2	1.2	

Program	Participants				Reported Gross Impact (MW)		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD	
Demand Reduction	8,456	39,988	81,292	0	0	89.3	
Conservation Voltage Reduction	0	0	NA	0.0	0.0	89.3	
Residential Direct Load Control	7,749	37,437	78,651	0.0	0.0	0.0	
Commercial Direct Load Control	512	2,356	2,446	0.0	0.0	0.0	
Permanent Load Reduction	0	0	0	0.0	0.0	0.0	
Demand Response Aggregators	193	193	193	0.0	0.0	0.0	
Distributed Energy Resources	2	2	2	0.0	0.0	0.0	
Total Portfolio	14,891	128,835	417,677	8.4	31.7	187.9	

NOTES:

¹Participation numbers shown are the numbers of discounted lamps sold. These are excluded from total portfolio participation numbers. The CPITD participant value reported here includes 17,856 lamps that were inadvertently removed from PY2 cumulative participation values, although their costs and savings were reported correctly in all previous reports.

²Participant values exclude sales of ENERGY STAR lighting fixtures and LED lamps, for which upstream rebates are provided.

³Act 129 includes a provision requiring electric distribution companies to offer a number of energy efficiency measures to low-income households that are "proportionate to those households' share of the total energy usage in the service territory." 66 Pa.C.S. §2806.1(b)(i)(G). The legislation contains no provisions regarding targets for participation, or energy or demand savings. Participation includes only those receiving the Weatherization Audit.

⁴The participation values shown here reflect the number of project IDs reported in the tracking data, rather than the number of billing account IDs. The values reported here better reflect the number of participating households, rather than the number of multi-family buildings in which the participants live.

Table 1-7. PYTD Verified Gross Demand Reduction by Program

Program	PYTD Reported Gross Demand Savings (MW)	PYTD Demand Realization Rate	PYTD Verified Gross Demand Savings (MW)	PYTD Confidence	PYTD Achieved Precision	CPITD Verified Gross Demand Savings (MW)
Smart Lighting Discounts Program	1.7	1.0	1.7	85%	0%	22.8
Smart Appliance Recycling Program	2.3	1.0	2.2	85%	5%	8.9
Smart Home Rebates Program	5.8	1.0	5.7	85%	0%	18.2
Low-Income Energy Efficiency Program	2.4	0.6	1.5	85%	14%	4.1
Smart Equipment Incentives-C&I	12.1	1.1	13.1	85%	13%	29.5
Smart Construction Incentives	0.9	1.9	1.9	85%	29%	2.0
Smart Equipment Incentives - GNI	6.5	0.9	5.6	85%	26%	11.2
Conservation Voltage Reduction	-	N/A	-	N/A	N/A	89.3
Residential Direct Load Control	-	N/A	-	N/A	N/A	-
Commercial Direct Load Control	-	N/A	-	N/A	N/A	-
Demand Response Aggregators	-	N/A	-	N/A	N/A	-
Distributed Energy Resources	-	N/A	-	N/A	N/A	-
TOTAL PORTFOLIO	31.7	1.00	31.7	90%	8.3%	186.0

1.5 Summary of PY3 Net-to-Gross Ratios

Per the 2011 TRC Order, EDCs are required to conduct Net-to-Gross research. NTG ratios are not applied to gross savings and are not used for compliance purposes, but are used for future program planning purposes. Table 1-8 presents a summary of NTG ratios by program.

Table 1-8. PY3 NTG Ratios by Program

Program Name	NTG Ratio PY3 ¹	NTG Categories Included ⁸
Smart Lighting Discounts Program	38.1%	Free ridership, Non-participant spillover, Participant spillover
Smart Appliance Recycling Program	64.0%	Free ridership
Smart Home Rebates Program	90.0%	Free-ridership, participant spillover
Low-Income Energy Efficiency Program	100.0%	Assumed to be 1 since this is a Low-Income direct install program
Smart Equipment Incentives C&I	57% - 70%	Free ridership
Smart Equipment Incentives GNI	51% - 62%	Free ridership
Smart Construction Incentives	29.6%	Free-ridership, participant spillover
PORTFOLIO	56.8% - 57.1%	
¹ The net-to-gross ratio for the Smart Equipment Incentives program (both C&I and GNI) was nearing completion when this report was submitted. The ranges shown for each sector bracket the possible final values.		

⁸ For example, free ridership, non-participant spillover, participant spillover.

1.6 Summary of Portfolio Finances and Cost-Effectiveness

A breakdown of the portfolio finances is presented in Table 1-9.

Table 1-9. Summary of Portfolio Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$3,327	\$21,827	\$50,293
EDC Incentives to Trade Allies	\$513	\$2,211	\$9,754
Subtotal EDC Incentive Costs	\$3,840	\$24,038	\$60,047
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$5,718	\$24,072	\$45,735
Management ^[2]	\$1,590	\$8,519	\$23,106
Marketing ^[3]	\$1,312	\$3,437	\$8,511
Technical Assistance	\$1,481	\$4,568	\$9,927
Subtotal EDC Implementation Costs	\$10,100	\$40,595	\$87,278
EDC Evaluation Costs	\$1,032	\$2,512	\$5,339
SWE Audit Costs	N/A	N/A	N/A
Total EDC Costs^[4]	\$14,972	\$67,146	\$152,664
Participant Costs^[5]	N/A	\$62,489	\$189,716
Total TRC Costs^[6]	\$4,557	\$105,956	\$282,333
Total Lifetime Energy Benefits	N/A	\$151,792	\$917,065
Total Lifetime Capacity Benefits	N/A	\$16,941	\$108,261
Total TRC Benefits^[7]	N/A	\$169,959	\$1,053,185
TRC Ratio^[8]	N/A	1.60	3.73

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that

are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

1.7 Summary of Cost-Effectiveness by Program

TRC ratios are calculated by comparing the total TRC benefits and the total TRC costs. **Table 1-10** shows the TRC ratios by program and other factors used in the TRC ratio calculation.

Table 1-10. PYTD TRC Ratios by Program

Program	TRC Benefits (\$1,000)	TRC Costs (\$1,000)	TRC Ratio	Discount Rate	Line Loss Factor
Smart Lighting Discounts Program	\$20,479	\$2,970	6.90	7.6	1.076 for energy, 1.1916 for demand
Smart Appliance Recycling Program	\$10,251	\$1,475	6.65	7.6	1.076 for energy, 1.1916 for demand
Smart Home Rebates Program	\$28,468	\$18,577	1.53	7.6	1.076 for energy, 1.1916 for demand
Low-Income Energy Efficiency Program	\$14,177	\$6,385	2.22	7.6	1.076 for energy, 1.1916 for demand
Smart Equipment Incentives C&I	\$57,915	\$26,189	2.21	7.6	1.076 for energy, 1.111 for demand
Smart Equipment Incentives GNI	\$33,544	\$18,128	1.85	7.6	1.076 for energy, 1.117 for demand
Smart Construction Incentives	\$5,126	\$2,435	2.11	7.6	1.076 for energy, 1.113 for demand
Conservation Voltage Reduction	\$0	\$442	0	7.6	N/A
Residential Direct Load Control	\$0	\$16,320	0	7.6	N/A
Commercial Direct Load Control	\$0	\$2,557	0	7.6	N/A
Demand Response Aggregators	\$0	\$9,239	0	7.6	N/A
Distributed Energy Resources	\$0	\$1,003	0	7.6	N/A

2 Low-Income Energy Efficiency Program

The purpose of LEEP is to educate and assist eligible residential customers with making their homes more energy efficient. The program builds upon the Low-Income Usage Reduction Program (LIURP) objective: to make low-income customers' energy bills more affordable by helping to reduce energy usage. LEEP was built on the existing LIURP infrastructure for outreach and delivery of services. The same contractor (CMC Energy Services) delivers both LIURP and LEEP.

There are five program components aimed at distinct groups that have the following goals:

1. Double the number of participants over the 2008 LIURP level by 2013, providing in-home audits and education and direct installation of measures for customers, primarily with household incomes below 150 percent of the Federal Poverty Level (FPL). There is no inherent difference between LEEP and LIURP (Component 1).
2. Increase by up to ten the number of CFLs installed for LIURP participants (Component 2).
3. Include electric efficiency improvements (up to ten CFLs) with weatherization improvements provided through weatherization programs other than LIURP (Component 3).
4. Install refrigerators as part of the LIURP audit as provided for funding in Act 129 (Component 4).
5. Make additional weatherization repairs, part of the Project H.O.M.E. also funded through Act 129 (Component 5).

Note that audits done as part of LEEP are similar to LIURP, which has provided energy efficiency services and energy education to PECO's low-income customers since 1988.⁹

2.1 Program Updates

During PY3, the goal for the monthly number of participants increased from 600 to 1,000 audits. However, the program implementer, CMC, was able to meet these increased program goals.

⁹ PECO Energy has implemented a set of Universal Services Programs to meet requirements set by Pennsylvania's electric and gas restructuring legislation and various Public Utility Commission orders and agreements. The Universal Services Programs include: 1) a CAP payment assistance program that is designed to make energy bills more affordable by furnishing payment subsidies; 2) a LIURP program that is designed to make energy bills more affordable by helping to reduce usage; and 3) a CARES program that is designed to assist households in developing appropriate strategies for maintaining energy service.

2.2 Impact Evaluation Gross Savings

Savings for Component 1 were calculated separately from Components 2 through 5.

2.2.1 Component 1

The LEEP Component 1 (audit) is subdivided into two measure groups (electric base load and electric heat) and two measure types (basic and major), plus additional CFLs, to appropriately differentiate estimated energy savings. The measure groups are defined as follows:

- ***Electric Baseload – Basic Measure:*** This includes measures such as CFLs (4), refrigerator removal, air-conditioning (AC) maintenance, faucet aerator, showerhead, water heater pipe insulation, and water heater tank insulation.
- ***Electric Baseload – Major Measure:*** This includes the same measures as the Electric Baseload – Basic Measure plus room/wall AC replacement, refrigerator replacement, electric water heater replacement,¹⁰ and water heater timers (electric water heaters only).
- ***Electric Heat – Basic Measure:*** This includes the same measures as the Electric Baseload – Basic Measure plus duct and pipe insulation, and programmable thermostats.
- ***Electric Heat – Major Measure:*** This includes the same measures as the Electric Heat – Basic Measure plus blower door guided air sealing, heat pump installation/replacement, and insulation installation.

Program Year 1 began on June 1, 2009, and ended May 31, 2010. Because the billing analysis requires one year of post-participation data, results of the billing analysis will not be complete in time for inclusion in the annual report. Therefore, stipulated values for Component 1 (audits) are taken from a custom measure protocol approved by the Statewide Evaluator (SWE) on September 30, 2010. For PY1, evaluated gross energy savings for LEEP were based on a stipulated energy savings value based on the four-year average of the 2005–2008 PECO Energy LIURP Evaluation Final Reports, differentiated by measure group and type. For subsequent program years (PY2 and thereafter), the gross impact evaluated energy savings will be determined using a four-year rolling average, using the latest four years of available annual billing regression analysis of previous program years.

¹⁰ Note that most existing water heaters are gas; therefore, water heater replacement will be a small overall component of the program.

2.2.1.1 Methodology

The LEEP PY1 billing analysis consists of monthly usage data and program tracking data for PY1 (June 2009 – May 2010) and PY2 (June 2010 – May 2011) Component 1 participants. Program enrollment began in January 2010 (PY1 Q3). The billing analysis incorporated usage data for monthly billing cycles ending between January 1, 2009, and May 31, 2011. Participants are excluded from the billing analysis if any of the following criteria are met:

- Engineering estimated savings are unavailable.
- Billing data are unavailable.
- The program tracking database records an audit but no additional measures.
- The participant received measures from Components 2, 3, or 4.

The billing analysis included 8,939 participants: 531 electric heat participants and 8,408 electric baseload participants. Figure 2-1 and Figure 2-2 show the rollout of electric heat and electric baseload participants, respectively, that were included in the billing analysis. Note the low number of electric heat participants in PY1. As indicated in the figures, program enrollment occurred fairly steadily over the course of the year. A “rolling enrollment” of this type provides the opportunity to examine the effect of a program via regression analysis, because, except for the first and last months of the study period, each month involves a mix of customers who have already enrolled in the program and those who have not yet enrolled. Navigant assumed that late participants and early participants are, on average, the same in terms of their energy consumption in the absence of the program. Under this assumption, the “late” participants effectively serve as unbiased comparison households for the “early” participants in the regression analysis.

Figure 2-1. Program Rollout of Electric Heat Participants

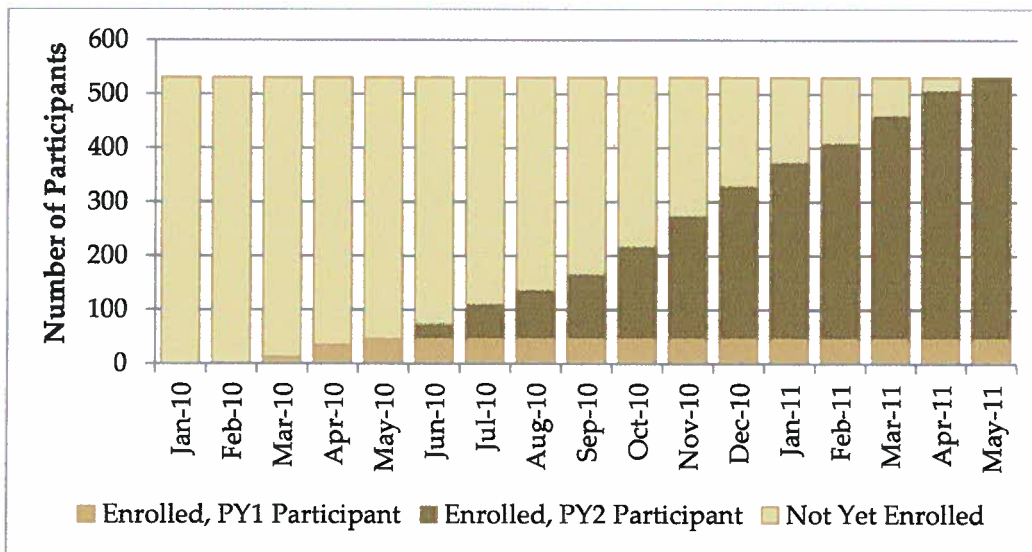
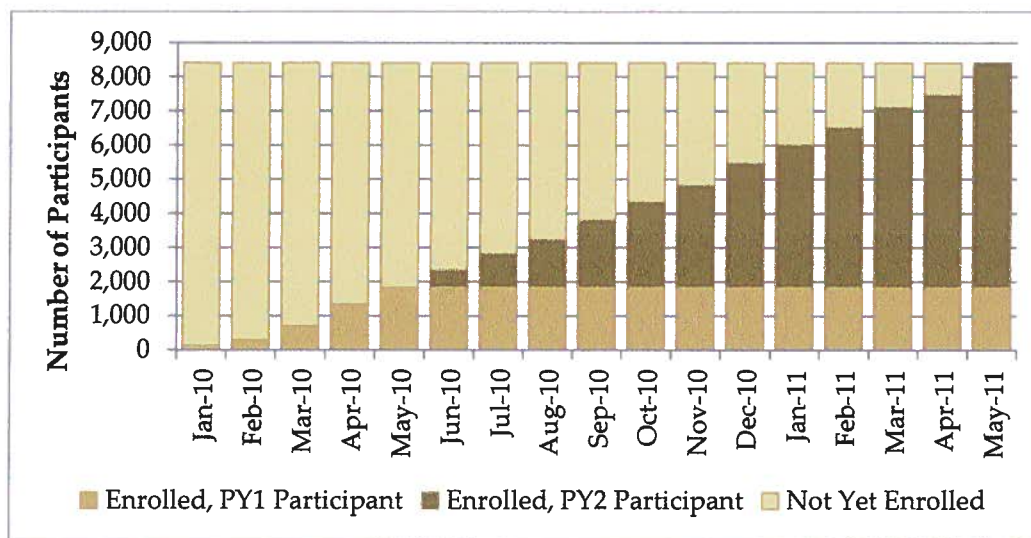


Figure 2-2. Program Rollout of Electric Baseload Participants

Navigant estimated a fixed effects regression model. The regression equation included a unique constant term for each participant (the “fixed effect”) to implicitly account for participant-specific characteristics that affect energy usage but are constant over time, such as the square footage of the residence and indoor temperature preferences. Average daily usage (kWh) is a function of heating degree days (HDDs) and cooling degree days (CDDs), the participant-specific engineering estimate of savings, and the interactions between these variables. This model specification allows both usage and program savings to vary with weather conditions. Navigant estimated separate models for electric heat customers and electric baseload customers. Because the regression includes the participant-specific engineering estimates of savings, the regression equation is called a Statistically Adjusted Engineering (SAE) analysis.

2.2.1.2 Results

The regression parameter estimates, estimated separately for electric baseload and electric heat participants, appear below in Table 2-1. A t-statistic greater than 1.65 in absolute value indicates the parameter is statistically significantly different from zero at the 90 percent confidence level. All parameters from the electric baseload model are statistically significant at the 90 percent level, with the exception of Basic*HDD. Five of the eight parameters from the electric heat model are statistically significant at the 90 percent level. The three statistically insignificant parameters are Major*HDD, Major*CDD, and Basic*CDD; statistical insignificance can be attributed to the relatively small number of electric heat participants.

Table 2-1. Regression Model Parameter Estimates

Parameter	Electric Baseload			Electric Heat		
	Estimate	Standard Error	T-Statistic	Estimate	Standard Error	T-Statistic
HDD	0.393	0.0057	68.52	2.636	0.0678	38.88
CDD	1.654	0.0124	132.97	2.036	0.0737	27.62
Major	-0.829	0.0922	-9.00	-0.431	0.1265	-3.40
Basic	-1.089	0.1100	-9.91	3.079	1.1030	2.79
Major*HDD	0.009	0.0052	1.74	-0.003	0.0086	-0.31
Basic*HDD	0.010	0.0063	1.53	-0.211	0.0729	-2.89
Major*CDD	-0.086	0.0239	-3.61	-0.023	0.0218	-1.06
Basic*CDD	0.040	0.0167	2.38	0.115	0.0892	1.29
<i>Source: Navigant analysis</i>						

Weather-normalized, annualized savings estimates and 85 percent confidence intervals (CIs) from the billing analysis are given in Table 2-2. Navigant estimates savings of 396 kWh for Electric Baseload – Basic participants, 1,011 kWh for Electric Baseload – Major participants, -523 kWh for Electric Heat – Basic participants, and 1,410 kWh for Electric Heat – Major participants. Note that all savings estimates are statistically significantly different from zero at the 85 percent confidence level. The negative estimate of savings for Electric Heat – Basic is due to the small number of participants in this category; therefore, Navigant did not use this savings estimate in the analysis.

Table 2-2. Billing Analysis Savings Estimates and Confidence Intervals

Measure	Estimated Savings (kWh)	85% CI, Lower	85% CI, Upper
Electric Baseload - Basic	396	347	445
Electric Baseload - Major	1,011	880	1,142
Electric Heat - Basic	-523	-1,037	-10
Electric Heat - Major	1,410	996	1,825
<i>Source: Navigant analysis</i>			

The purpose of the SAE regression analysis is to provide a realization rate on the engineering estimates of energy and demand savings. The realization rate is calculated via:

Equation 1. Realization Rate Formula

$$RR = \frac{SAE \text{ estimated savings}}{\text{Average engineering estimated savings included in SAE analysis}}$$

The realization rate is then multiplied by the average engineering estimate of energy and demand savings to obtain the adjusted annual savings estimates for LEEP PY1.¹¹ The realization rates on engineering estimates and adjusted savings estimates appear in Table 2-3. Because the SAE regression was not meaningful for Electric Heat – Basic participants, Navigant applied the realization rate from the Electric Baseload – Basic participants to the Electric Heat – Basic participants.

Table 2-3. Realization Rates on Engineering Estimates and Adjusted Savings Estimates

Measure	Realization Rate	Adjusted Savings Estimate (kWh)
Electric Baseload - Basic	83%	398
Electric Baseload - Major	102%	1,346
Electric Heat - Basic	83%	462
Electric Heat - Major	55%	1,727
<i>Source: Navigant analysis</i> <i>Note: Electric Heat – Basic realization rate is set to the Electric Baseload – Basic realization rate due to the small number of Electric Heat – Basic participants.</i>		

Per the protocol, these savings must be averaged with the three previous years of LIURP savings estimates. An important distinction between the LEEP and LIURP programs is that the LEEP program includes additional CFLs. To appropriately compare the LEEP results to the LIURP results, Navigant followed these steps:

1. Subtract the savings from the additional CFLs from the savings estimates given in Table 2-3.
2. Average the LEEP savings estimates without the additional CFLs with the three previous years of LIURP savings.

¹¹ This step is necessary because the mean engineering estimate of savings included in the billing analysis is different than the mean engineering estimate of savings, as a result of participants being excluded from the regression model due to missing or incorrect data.

3. Add back the savings from the additional CFLs.

The relevant numbers for this calculation appear in Table 2-4, with the final verified LEEP and LIURP savings values bolded in the final column.

Table 2-4. LIURP Savings and Verified LEEP Savings

Measure	LEEP Savings Estimate with Additional CFLs (kWh)	LEEP Savings without Additional CFLs (kWh)	LIURP 2007 Savings Estimate	LIURP 2008 Savings Estimate	LIURP 2009 Savings Estimate	Average of LEEP and LIURP Savings without Additional CFLs (kWh)	Average of LEEP and LIURP Savings with Additional CFLs (kWh)
Electric Baseload - Basic	398	271	775	606	991	661	787
Electric Baseload - Major	1,346	1,220	1,504	1,581	1,616	1,480	1,607
Electric Heat - Basic	462	336	382	1,018	1,572	827	953
Electric Heat - Major	1,727	1,601	1,374	2,381	1,706	1,765	1,892

Source: Navigant Analysis

2.2.2 Components 2 and 3

Components 2 and 3 (CFLs) gross kWh and kW savings are calculated across all rebated bulbs based on the following equations, as presented in the Technical Reference Manual (TRM):

$$\text{Electricity Impact (kWh)} = ((\text{CFL}_{\text{watts}} \times (\text{CFL}_{\text{hours}} \times 365)) / 1000) \times \text{ISR}_{\text{CFL}}$$

$$\text{Peak Demand Impact (kW)} = (\text{CFL}_{\text{watts}}) \times \text{Light CF} \times \text{ISR}_{\text{CFL}}$$

where:

$\text{CFL}_{\text{watts}}$ = Average delta watts per purchased ENERGY STAR® CFL

$\text{CFL}_{\text{hours}}$ = Average hours of use per day per CFL

ISR_{CFL} = In-service rate per CFL

Light CF = Summer demand coincidence factor.

Assumptions regarding the inputs from the TRM are presented in Table 3-1.

Table 2-5. TRM Inputs for CFLs

Parameter	Type	Value
CFL _{watts}	Variable	Calculated
CFL _{hours}	Fixed	3.0
ISR _{CFL}	Fixed	84%
Light CF	Fixed	5%

Source: Pennsylvania Public Utility Commission. 2010. *Technical Reference Manual for Pennsylvania Act 129 Energy Efficiency and Conservation Program and Act 213 Alternative Energy Portfolio Standards*

LEEP installed 13-W CFL bulbs, which were assumed to replace 60-W incandescent bulbs, and 19-W, which were assumed to replace 75-W or 23-W CFL bulbs, which were assumed to replace 100-W incandescent bulbs.

2.2.3 Components 4 and 5

The savings analysis for Components 4 and 5 was based on the number of measures installed, as documented in both the program database and further verified in the site visits. According to program records, a total of 836 refrigerators were installed as part of Component 4 in PY3. There were also 18 weatherization projects completed under Component 5, which included making minor repairs to heating equipment. The savings for Components 4 and 5 were calculated based on the approved deemed values as provided for in the TRM, as summarized in Table 2-6.

Table 2-6. Summary of Savings for Components 4 and 5

Components 4 & 5 Savings Summary	Projects Completed	Total Measure kW	Total Measure kWh	Total kW	Total kWh
Component 4- Refrigerator Replacement	836	142.891	1,155,595	142.891	1,155,595
Component 5- Project H.O.M.E.	18	4.661	7,742	4.661	7,742
Source: LEEP PY3 Program Database					

Table 2-7 reinforces the fact that this program only serves low-income residential customers, while Table 2-8 illustrates the steady increase in participation relative to the new monthly goals. Overall, participation increased 52 percent in PY3, compared to the previous participation rates.

Table 2-7. CPITD Low-Income Energy Efficiency Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	0	0	0	0
Low-Income	22,134	53,738	5.1	\$9,926
Commercial and Industrial	0	0	0	0
Government and Non-Profit	0	0	0	0
CPITD Total	22,134	53,738	5.1	\$9,926

Table 2-8. Low-Income Energy Efficiency Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	1,794	6,382	0.6	769
PY3 Q2	2,945	4,207	0.5	1,056
PY3 Q3	3,599	6,681	0.6	1,261
PY3 Q4	3,294	8,396	0.7	1,481
PY3 Total	11,632	25,667	2.4	4,568
CPITD Total	22,134	53,738	5.1	9,926

Table 2-9. Low-Income Energy Efficiency Program Sampling Strategy for PY3

Stratum	Strata Boundaries	Population Size	Assumed Coefficient of Variation (Cv) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
Component 1 - Electric Baseload Measures	340-1,160 kWh	11,393	n/a	85/15	census	8,408	Statistically Adjusted Engineering Model/Billing Analysis
Component 1 - Electric Heat	1,110-1,884 kWh	239	n/a	85/15	census	531	
Program Total		11,632		85/15	census	8,939	

Table 2-10 and Table 2-11 summarize the impact evaluation findings for LEEP in PY3 for both energy and demand.

Table 2-10. PY3 Low-Income Energy Efficiency Program Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings (MWh)	Energy Realization Rate	Observed Coefficient of Variation (Cv) or Proportion ¹	Relative Precision	Verified Gross Energy Savings (MWh)
Electric Baseload-Basic	8,328	90%	0.04	12%	75,30
Electric Baseload-Major	3,017	92%	0.08	13%	27,82
Electric Heat-Basic	34	135%	0.04	12%	46
Electric Heat-Major	318	103%	0.21	29%	327
Component 2	940	100%	0.00	0%	940
Component 3	11,866	100%	0.00	0%	11,863
Component 4	1,156	100%	0.00	0%	1,156
Component 5	8	100%	0.00	0%	8
Program Total	25,667	96%	0.04	6%	24,652
NOTES: ¹ The program total precision and CV values for LEEP reflect the precision and CV for Component 1 measures only. Components 2-5 are deemed measures. Therefore, they have a precision of 0% and would lower the program total precision and CV. Navigant did not calculate the program total precision, and CV due to differences in units of measurement. Component 1 results are at the participant level, whereas Components 2-5 results are at the measure level.					

Table 2-11. PY3 Low-Income Energy Efficiency Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Savings (MW)	Demand Realization Rate	Observed Coefficient of Variation (Cv) or Proportion ¹	Relative Precision	Verified Gross Demand Savings (MW)
Electric Baseload-Basic	1.1	20%	0.09	12%	0.2
Electric Baseload-Major	0.4	97%	0.10	13%	0.4
Electric Heat-Basic	0.0	31%	0.09	12%	0.0
Electric Heat-Major	0.0	55%	0.24	29%	0.0
Component 2	0.1	100%	0.00	0%	0.1
Component 3	0.6	100%	0.00	0%	0.6
Component 4	0.2	100%	0.00	0%	0.2
Component 5	0.0	100%	0.00	0%	0.0
Program Total	2.4	62%	0.09	13%	1.5
NOTES: ¹ The program total precision and CV values for LEEP reflect the precision and CV for Component 1 measures only. Components 2-5 are deemed measures. Therefore they have a precision of 0% and would lower the program total precision and CV. Navigant did not calculate the program total precision and CV due to differences in units of measurement. Component 1 results are at the participant level, whereas Components 2-5 results are at the measure level.					

2.3 Impact Evaluation Net Savings

It is industry practice to assume that there is not free ridership or spillover in low-income programs.

2.4 Process Evaluation

Process evaluation activities consisted primarily of in-depth interviews with utility and implementation contractor staff as well as weatherization agencies, and telephone surveys of participants. The in-depth interviews with the program staff were completed in PY1 and the interviews with the weatherization contractors were completed in the fourth quarter of PY3. The telephone surveys of participants were completed in PY4.

2.4.1 In-Depth Interviews

The interviews with the program staff and implementation contractor indicated that the LEEP program continues to operate smoothly. The third-party implementation contractor is meeting its quota each quarter, despite an increase in the number of required audits.

The major concern expressed in these in-depth interviews with program staff, weatherization agencies, and the third-party implementer was how best to offer this program in a way that compliments rather than competes with existing weatherization activities at both the state and federal levels. The influx of funding from the American Recovery and Reinvestment Act of 2009 (ARRA) meant that the local agencies were overloaded with both new funds and new applicants; therefore, PECO's contribution, especially concerning CFLs, was limited. Going forward, PECO may need to explore new ways in which to work effectively with these local weatherization agencies.

2.4.2 On-Site Visits

In accordance with the PY3 Evaluation Plan, the Navigant team also completed a nested sample of 23 field visits. The goals for conducting on-site visits were to assess overall measure persistence and identify any additional participant spillover. Since the measure installations were conducted by a third party, the installation rates were expected to be relatively high, as is typical for low-income direct install programs. Therefore, a smaller sample was most appropriate given there would be little variation among respondents. Furthermore, the site visits focused on those participants who received major measures, such as a blower door test, a new refrigerator, and electric heating or cooling equipment.

The site visits found that the majority of measures were still in place. However, the site visits also revealed that there were a large number of additional CFLs in differing wattage categories than those captured in the program database. The site visits revealed that there were an additional 52 light bulbs installed in wattages ranging from 9 W to 26 W.

2.4.3 Customer Surveys

The Navigant team also conducted a total of 118 customer interviews that assessed overall customer satisfaction with the program operations and the effectiveness of customer education. Participant telephone surveys also provided information on realization rates of LEEP audit measures (Component 1) and of extra CFLs installed during LIURP audits (Component 2). Overall, customer satisfaction with the LEEP program is high, with an average satisfaction rating of 9.10 out of 10.

The program participants also reported the types of measures they received as part of their participation in the LEEP program. The program participants also indicated if the measures installed were still in place. Based on the findings from the customer surveys of 118 program participants, the LEEP program has a very high installation rate, with CFLs accounting for the largest percentage of measures installed for LEEP participants. A smaller number of respondents (n = 27) reported receiving measures from the other component groups such as water conservation items (i.e., low-flow showerheads and faucet aerators; 18 percent) or additional energy savings items such as water heater blankets or water pipe insulation. Thirteen percent of the survey respondents received new refrigerators as part of this program.

Table 2-12 displays these summary findings.

Based on the findings from the customer surveys of 118 program participants, the LEEP program has a very high installation rate, with CFLs accounting for the largest percentage of measures installed for LEEP participants. A smaller number of respondents (n = 27) reported receiving measures from the other component groups such as water conservation items (i.e., low-flow showerheads and faucet aerators; 18 percent) or additional energy savings items such as water heater blankets or water pipe insulation. Thirteen percent of the survey respondents received new refrigerators as part of this program.

Table 2-12. Results of Telephone Surveys

Measures Installed During Visit	Number Reporting Measures Installed	Number Reporting Measures Still in Place?	Number Reporting Measures Removed
CFLS	99	98	1
Low-Flow Showerheads	15	14	1
Faucet Aerator	7	7	0
Water Heater Blanket	4	3	1
Water Heater Pipe Insulation	5	5	0
Thermostat	2	2	0
Smoke Detector	14	14	0
Refrigerator	4	4	0
Insulation/Caulking	6	6	0
Other	11	10	1
Total	167	163	4
Persistence Rate	98%		

Table 2-13 summarizes the types of energy savings actions reported by these respondents. Most are the low-cost/no-cost activities emphasized in the program's educational materials, such as turning off lights (47 percent), reducing the use of air conditioners (36 percent) and other appliances (16 percent). However, only three respondents indicated making additional energy efficiency purchases of equipment such as buying more CFLs (5 percent), which is not surprising given that these are low-income customers.

Table 2-13. Additional Energy Savings Actions Taken by Respondents

What additional energy savings actions have you taken?	Total Responding	Percent Responding
Turn off lights	29	47%
Reduced use of the air conditioner	22	36%
Reduce use of appliances	4	6%
Unplug appliances	10	16%
Seal windows/doors/insulation/weatherize	9	15%
Reduced use of TV	8	13%
I turn off what I'm not using.	6	10%
I bought more CFLs.	3	5%
Other	4	7%
Total	62	100%

Overall, 62 respondents (52 percent) indicated they had undertaken 95 energy savings activities on their own, directly as a result of participation in the LEEP program. These findings further suggest that this program is leading to longer term changes in participant behavior regarding energy usage.

2.5 Financial Reporting

A breakdown of the program finances is presented in Table 2-14.

Table 2-14. Summary of Low-Income Energy Efficiency Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$0	\$0	\$0
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$0	\$0	\$0
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$255	\$984	\$1,981
Management ^[2]	\$73	\$335	\$991
Marketing ^[3]	\$167	\$341	\$372
Technical Assistance	\$1,481	\$4,568	\$9,927
Subtotal EDC Implementation Costs	\$1,975	\$6,227	\$13,270
EDC Evaluation Costs	\$65	\$158	\$355
SWE Audit Costs	N/A	N/A	N/A
Total EDC Costs^[4]	\$2,040	\$6,385	\$13,625
Participant Costs^[5]	\$0	\$0	\$0
Total TRC Costs^[6]	\$2,040	\$6,385	\$13,625
Total Lifetime Energy Benefits	N/A	\$13,791	\$34,228
Total Lifetime Capacity Benefits	N/A	\$358	\$1,120
Total TRC Benefits^[7]	N/A	\$14,177	\$36,701
TRC Ratio^[8]	N/A	2.22	2.69

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that

are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

3 Smart Lighting Discounts Program

The PECO Smart Lighting Discounts Program helps PECO's residential customers become conscious about their energy use by encouraging and facilitating their adoption of CFLs. The program achieves this goal by providing incentives to increase the market share of ENERGY STAR-qualified CFLs sold through retail sales channels, as well as by distributing educational materials that will increase customer awareness, acceptance, and proper disposal of energy-efficient lighting technology. PECO launched the program in October 2009.

3.1 Program Updates

The Smart Lighting Discounts program underwent a change in strategy in PY3 that resulted in a dramatic reduction in overall program bulb sales and a strong focus on specialty CFLs within the reduced program structure. The ramp down was initiated in June 2011, and monthly bulb sales rates generally stabilized at their lower level as of October 2011. The new program strategy has steady, monthly energy savings targets that are approximately 96 percent lower than the PY2 monthly savings. During the ramping down of the program from PY2 to PY3 and the shift toward increasing emphasis on specialty CFLs, one retailer who had participated in PY2 left the program, and all others remained.

The program continues to feature in-store tabling events and community events, though at a reduced frequency from prior program years. PECO also continues to offer print materials that educate consumers about CFLs, as well as about changing lighting options as a result of the Energy Independence and Security Act of 2007 (EISA) implementation. The program has continued to exclusively feature CFLs as specified by the 2009 Act 129 PUC filing. The possibility of expanding the program to include LED lighting will be considered after the period addressed by the current filing ends in May 2013.

3.2 Impact Evaluation Gross Savings

Gross kWh and kW savings are calculated across all rebated bulbs, based on the following equations as presented in the TRM:

$$\text{Electricity Impact (kWh)} = ((\text{CFL}_{\text{watts}} \times (\text{CFL}_{\text{hours}} \times 365))/1000) \times \text{ISR}_{\text{CFL}}$$

$$\text{Peak Demand Impact (kW)} = (\text{CFL}_{\text{watts}}) \times \text{Light CF} \times \text{ISR}_{\text{CFL}}$$

where:

$\text{CFL}_{\text{watts}}$ = Average delta watts per purchased ENERGY STAR® CFL

$\text{CFL}_{\text{hours}}$ = Average hours of use per day per CFL

ISR_{CFL} = In-service rate per CFL

Light CF = Summer demand coincidence factor.

Assumptions regarding the inputs from the TRM are presented in Table 3-1.

Table 3-1. TRM Inputs for CFLs

Parameter	Type	Value
CFL _{watts}	Variable	Calculated
CFL _{hours}	Fixed	3.0
ISR _{CFL}	Fixed	84%
Light CF	Fixed	5%

Source: Pennsylvania Public Utility Commission. 2010. Technical Reference Manual for Pennsylvania Act 129 Energy Efficiency and Conservation Program and Act 213 Alternative Energy Portfolio Standards

For rebated bulbs that were sold prior to June 1, 2011, but were not invoiced until PY3, the peak demand impact calculation did not include the ISR_{CFL} factor, as the 2010 PA TRM specified an in-service rate of 1.0 specifically in the calculation of demand savings. For these bulbs a modified peak demand savings calculation was applied:

$$\text{Peak Demand Impact (kW) for bulbs sold < June 1, 2011} = (\text{CFL}_{\text{watts}}) \times \text{Light CF}$$

The number of bulbs distributed through the program is derived from the Residential Lighting tracking database provided to the evaluation team as part of the PECO Smart Data System extract. Displaced watts (or delta watts) are calculated as the difference between the wattage of the equivalent incandescent bulb and the wattage of the new CFL, also as reported in the program tracking data.

In the case of the Smart Lighting Discounts program, the calculation of gross energy and demand savings consists of two steps: 1) Verifying program tracking data against scanned manufacturer invoices for program bulb sales, and 2) Calculating gross energy and demand savings by applying the savings parameter values described above to each record in the tracking data and summing across all records.

Table 3-2 shows the cumulative lamp sales, gross energy savings, gross demand savings, and incentives totals since program inception. All participation and savings from the Smart Lighting Discount program are assigned to the residential sector.

Table 3-2. CPITD Smart Lighting Discounts Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	7,416,539	351,040	22.8	8,106
Low-Income	0	0	0	0
Small Commercial and Industrial	0	0	0	0
Large Commercial and Industrial	0	0	0	0
Government and Non-Profit	0	0	0	0
CPITD Total	7,416,539	351,040	22.8	8,106

Table 3-3 shows the reported results by quarter. The large proportion of participants and savings in PY3 Q1 is indicative of the ramp-down period described above, during which monthly program sales were reduced to approximately 4 percent of their PY2 levels. The table below also details the reported gross energy savings, reported gross demand reduction, and incentives for each quarter.

Table 3-3. Smart Lighting Discounts Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	473,381	22,742	1.4	504
PY3 Q2	39,820	2,127	0.1	55
PY3 Q3	25,024	1,186	0.1	38
PY3 Q4	52,784	2,525	0.1	75
PY3 Total	591,009	28,580	1.7	672
CPITD Total	7,416,539	351,040	22.8	8,106

Because the verification process consists of checking the program tracking data against manufacturer invoices, rather than performing savings measurement and verification activities for a subset of participants, there is no sampling methodology or strata designations associated with the Smart Lighting Discounts program savings verification. In the one case where the evaluation team identified a discrepancy between the program tracking data and the scanned invoices, during Q2, PECO identified an error in the tracking system and rectified it. Consequently, Table 3-4 shows that both the target sample size and the achieved sample size are the whole population size of program bulbs for the year.

Table 3-4. Smart Lighting Discounts Program Sampling Strategy for PY3

Stratum	Strata Boundaries	Population Size	Assumed Coefficient of Variation (C _v) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
All Program Bulbs	No boundary. All program bulbs	591,009	N/A	85%/±0.00%	591,009	591,009	Verify program bulb sales against manufacturer invoices, apply deemed savings parameters to calculate savings.
Program Total		591,009	N/A	85%/±0.00%	591,009	591,009	

Using the verification approach described above, the evaluation team calculated PY3 gross energy savings as 28,580,246 kWh. This agrees with the program reported energy savings value of 28,580,263 kWh to within 0.0001 percent, or effectively identical calculations. Similarly, the evaluation team calculated PY3 gross demand savings as 1,543 kW. This agrees with the program reported energy savings value of 1,541.1 kWh to within 0.1% percent. Thus, the verification process yields a realization rate of 100 percent for energy savings, as shown in Table 3-5, and a realization rate of 100 percent for demand savings also, as shown in Table 3-6.

Table 3-5. PY3 Smart Lighting Discounts Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings	Energy Realization Rate	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Energy Savings
All Program Bulbs	28,580	100%	0	85%/±0.00%	28,580
Program Total	28,580	100%	0	85%/±0.00%	28,580

Table 3-6. PY3 Smart Lighting Discounts Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Reduction (MW)	Demand Realization Rate	Observed Coefficient of Variation (Cv) or Proportion	Relative Precision	Verified Gross Demand Reduction (MW)
All Program Bulbs	1.71	100%	0	85%/±0.00%	1.71
Program Total	1.71	100%	0	85%/±0.00%	1.71

3.3 Impact Evaluation Net Savings

Due to the dramatic reduction in size of the Smart Lighting Discounts program in PY3, it was not feasible to develop an estimated net-to-gross ratio based specifically on PY3 sales. As discussed in the SLD Program Update section above, the small number of program participants would have necessitated an extremely large sample size for general population phone surveys or for in-store intercepts to identify a sufficient number of program participants and generate these estimates with statistical confidence. Instead, the PY2 sales-weighted net-to-gross ratio was used to calculate PY3 net savings. The PY2 NTG ratio was calculated as the simple average of the values arising from four NTG methods: General population telephone survey (NTG 0.44 for standard CFLs, 0.40 for specialty CFLs), in-store intercept survey (NTG 0.35 for all CFLs), trade ally surveys (NTG 0.40 for standard CFLs, 0.35 for specialty CFLs), and revealed preference purchase modeling (NTG 0.35 for all CFLs).

Of the four NTG estimation methods employed in PY2, the only method that specifically captures spillover is the general population telephone survey. Two types of spillover were estimated for the PY2 general population self-report method; participant and non-participant spillover. Spillover for both participants and non-participants includes all adoptions of energy-efficient lighting measures that are influenced by the program, but are not done through the program (i.e., are not rebated).

The participant and non-participant surveys fielded as part of the PY2 evaluation gathered information on CFL lighting installations that were made by program participants and non-participants for which they did not receive a program rebate. The information collected included the following:

- The quantity and type of the efficient lighting equipment installed without a rebate
- The degree of self-reported influence of the program on the decision to purchase the efficient lighting equipment
- Whether the customer received any rebates whatsoever for the installation or purchase of high-efficiency lighting equipment (to confirm the measure was not rebated)

Lighting purchases were considered a spillover adoption if the following conditions were met:

- The lighting product was energy efficient.
- The degree of self-reported influence of the program on the purchase of the energy-efficient lighting equipment was sufficiently high to reasonably conclude that the adoption would not have occurred in absence of the program. Additionally, for non-participants, this required that the customer was aware of the Smart Lighting Discounts program prior to making the purchase.
- The customer did not receive any rebates whatsoever for the efficient lighting purchase.

The PY2 participant spillover rate was calculated by summing the spillover adoptions over all program participants and then dividing it by the total number of purchases made through the program. The PY2 non-participant spillover rate was calculated in a similar manner as participant spillover, except the spillover adoptions were divided by the number of surveyed customers. This value then was applied to the appropriate population of non-participating customers to estimate the number of spillover adoptions occurring in that population.

The overall PY2 spillover rate, which was folded into the PY2 general population telephone Survey NTG estimates by bulb type cited above, was less than 1 percent (0.65 percent).

To generate the PY3 overall NTG estimate, the evaluation team applied each of the PY2 NTG estimates by bulb type to the PY3 distribution of standard and specialty CFL sales. The sales-weighted NTG ratio for PY3 arising from these values is 0.38, the same as the sales-weighted value from PY2.

3.4 Process Evaluation

For the process evaluation, the evaluation team utilized a 601-point general population phone survey in PY3. The sample for this phone survey was a random sample of PECO customers. Because of the dramatically reduced size of the Smart Lighting Discounts program in PY3, no attempt was made to specifically identify program participants in these surveys. Rather, the process component of the PY3 Smart Lighting Discounts Program evaluation focuses on general PECO customer familiarity and satisfaction with CFLs, reasons customers purchase CFLs, use and storage of CFLs, and customer knowledge of alternative energy-efficient lighting choices (e.g., LEDs and energy-efficient incandescent bulbs). The process evaluation of PECO's Smart Lighting Discounts Program also addresses customer awareness of the changes in lighting standards to phase out 40 W and 100 W incandescent bulbs in the next few years.

In addition to the general population phone survey, Navigant conducted four interviews with key lighting program staff at PECO and ECOS. Navigant interviewed all key PECO and ECOS staff that has been instrumental in the rollout of this lighting program. Based on a review of survey findings and in-depth interviews, the following process-related findings have been made regarding the Smart Lighting Discounts program.

1. **CFL Awareness:** In PY3, a total of 95 percent of PECO customers are aware of CFLs, based on the responses from the general population survey. Unaided (without a description of what CFLs are), 86 percent were aware of CFLs. An additional 9 percent were aware of CFLs once they were described. This finding is similar to what was found in both PY1 and PY2. This high level of CFL awareness is a precondition for effective advertising campaigns about discounted CFLs and the energy-saving benefits they provide.
2. **Sources of Awareness:** Based on the survey results, customers noted that they first became aware of CFLs by seeing them on display in stores, from the television, and by word of mouth. This supports the strategy of marketing and outreach campaigns to educate PECO's customers about CFLs and their benefits over the use of incandescent bulbs.
3. **Familiarity with CFLs:** Customers were asked about their level of familiarity with CFLs. Approximately 85 percent of customers who were asked stated that they were somewhat or very familiar with this bulb type. Program staff indicated that questions at community events have migrated from a focus on how much energy might be saved and on concerns about mercury to questions about LEDs and EISA. This indicates that consumers are largely familiar with issues surrounding CFLs and are beginning to educate themselves about changes to the entire lighting market.
4. **Installation of CFLs:** Based on the findings of the general population survey, 82 percent of respondents stated that they currently have CFLs installed in their homes. The main reasons customers have chosen to install CFLs in their homes are to decrease the amount of energy used, to save money on their electric bills, and because CFLs last longer than incandescent bulbs.
5. **Satisfaction with CFLs:** The general population survey results show that 82 percent of respondents who purchased CFLs are generally satisfied with them (i.e., based on satisfaction ratings of 6 or higher on a 10-point scale). This is similar to the satisfaction with CFLs found in PY2.
6. **LED Awareness:** All respondents were asked about their familiarity with LEDs. Based on the survey findings, 58 percent of respondents were aware of LEDs that could be used to replace light bulbs in standard sockets.
7. **Installation of LEDs:** A total of 29 percent of PECO customers who were aware of LEDs stated that they currently have LEDs installed in their home. Some of the reasons these customers installed LEDs were similar to the reasons customers installed CFLs: to save money on electric bills, to decrease the amount of energy used, and because they last longer than incandescent bulbs. Additionally, those who have installed LEDs also noted that they have better lighting quality than other bulbs.
8. **Awareness of Energy-Efficient Incandescent Bulbs:** Approximately 37 percent of all respondents stated that they were aware of a new type of incandescent bulb that looks like a standard incandescent light bulb that produces the same amount of light but uses one-third less energy. Program staff indicated that they have seen some shift from CFLs

toward energy-efficient halogens, especially during the presidential primary race when concerns were raised that the government was outlawing incandescent bulbs as part of EISA. At community events, program staff indicated much of their time was spent clarifying the lighting provisions in EISA.

9. **Installation of Energy-Efficient Incandescent Bulbs:** Of the PECO customers who are aware of energy-efficient incandescent bulbs, less than 20 percent have them installed in their homes.
10. **Satisfaction with PECO:** During the PY2 surveys all respondents were asked about their satisfaction with PECO. A total of 86 percent were satisfied or very satisfied with the utility (i.e., they gave a satisfaction rating of 6 or higher). When asked whether their satisfaction with PECO had changed as a result of learning about the Smart Lighting Discounts Program, most respondents (80 percent) stated that it had remained the same.

3.5 Financial Reporting

A breakdown of the program finances is presented in Table 3-7.

Table 3-7. Summary of Smart Lighting Discounts Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$0	\$0	\$0
EDC Incentives to Trade Allies	\$75	\$672	\$8,106
Subtotal EDC Incentive Costs	\$75	\$672	\$8,106
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$110	\$501	\$2,114
Management ^[2]	\$74	\$284	\$782
Marketing ^[3]	\$325	\$778	\$3,234
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$509	\$1,563	\$6,130
EDC Evaluation Costs	\$121	\$294	\$694
SWE Audit Costs			
Total EDC Costs^[4]	\$704	\$2,528	\$14,929
Participant Costs^[5]	N/A	\$1,113	\$16,624
Total TRC Costs^[6]	N/A	\$2,970	\$23,447
Total Lifetime Energy Benefits	N/A	\$18,959	\$248,175
Total Lifetime Capacity Benefits	N/A	\$478	\$6,275
Total TRC Benefits^[7]	N/A	\$20,479	\$280,688
TRC Ratio^[8]	N/A	6.90	11.97

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that

are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

4 Smart Appliance Recycling Program

The Smart Appliance Recycling program began operation in March 2010. The program offers free pickup and recycling services for older, working refrigerators and freezers, and room air conditioners that households no longer want. Program savings are based on the accelerated removal, dismantling, and recycling of these older, inefficient units. In exchange for participating in the program, PECO pays participants an incentive for each removed unit (up to a maximum of two recycled refrigerators or freezers).

The program has two components, JACO recycling and retailer pickups. The JACO recycling component concentrates on removal of existing secondary units from homes and apartments. The retailer component of the program focuses on preventing former primary refrigerators, freezers, and room air conditioners from being retained and used as secondary units when customers purchase new units. Through the program, units are removed from customers' homes, and retailers' facilities to a collection facility and disassembled for environmentally responsible disposal and recycling. There is no charge to the customer for the appliance pickup and recycling.

4.1 Program Updates

The design of the Smart Appliance Recycling program has remained largely the same as in previous program years, with the exception of the program incentive level. On November 1, 2011, the incentive was reduced from \$35/unit to \$15/unit. This was part of a broader strategy by PECO to reduce incentives across most of its programs. The lower incentive level has resulted in a significant drop in participation levels, which are now less than half the levels seen prior to this incentive reduction.

4.2 Impact Evaluation Gross Savings

The impact evaluation of the Appliance Recycling program is based on an in-depth review and analysis of tracking data, application of the deemed savings factors approved by the SWE and published in the TRM or a related work paper, and a separate verification of units being picked up by the program via telephone survey. The verification was based on a screening question in the telephone survey to verify the appliances were picked up as reported in the program tracking database. The first and second waves of participant telephone surveys, for all PY3 participants, were completed in early March and mid-September 2012, respectively.

The energy (kWh) and demand (kW) savings for this program are straightforward. All values in the calculation are deemed, with the exception of the verification factor, which is derived from the telephone survey. Per the TRM, separate savings factors are applied for replaced units (reflecting somewhat lower savings) and non-replaced units (incorporating somewhat higher savings). Verified savings are equal to the number of recycled units times the TRM savings per

unit times the verification factor. Program participation, savings, and incentives through the end of PY3 are presented in Table 4-1. Table 4-2 presents PY3 results on a quarterly basis.

Table 4-1. CPITD Smart Appliance Recycling Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	27,743	43,293	9.1	1,033
Low-Income	0	0	0	0
Commercial and Industrial	0	0	0	0
Government and Non-Profit	0	0	0	0
CPITD Total	27,743	43,293	9.1	1,033

Table 4-2. Smart Appliance Recycling Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	3,685	5,901	1.1	138
PY3 Q2	2,466	4,112	0.8	87
PY3 Q3	930	1,478	0.2	15
PY3 Q4	839	1,357	0.2	13
PY3 Total	7,920	12,848	2.3	252
CPITD Total	27,743	43,293	9.1	1,033

The sample for the telephone survey was drawn to achieve 90/10 confidence/precision levels on an annual basis. As shown in Table 4-3, the target sample size for the telephone survey in PY3 was 250 completed surveys. In total, 255 surveys were completed, slightly higher than the target.

Table 4-3. Smart Appliance Recycling Program Sampling Strategy for PY3

Stratum	Strata Boundaries	Population Size	Assumed Coefficient of Variation (C _v) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
Population	N/A	8,821	0.35	85/15	250	255	Phone survey
Program Total	N/A	8,821	0.35	85/15	250	255	Phone survey

Table 4-4 and Table 4-5 present evaluation results for energy and demand, respectively.

Table 4-4. PY3 Smart Appliance Recycling Program Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings	Energy Realization Rate	Observed Coefficient of Variation (Cv) or Proportion	Relative Precision	Verified Gross Energy Savings
Population	12,847	95.8%	0.53	4%	12,309
Program Total	12,847	95.8%	0.53	4%	12,309

Table 4-5. PY3 Smart Appliance Recycling Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Reduction	Demand Realization Rate	Observed Coefficient of Variation (Cv) or Proportion	Relative Precision	Verified Gross Demand Reduction
Population	2.3	95.8%	0.53	4%	2.2
Program Total	2.3	95.8%	0.53	4%	2.2

4.3 Impact Evaluation Net Savings

The net-to-gross ratio for this program is based on free ridership only, as there is no plausible hypothesis for program-induced spillover. Free ridership for this program is associated with that fraction of units that would, in the program's absence, have been disposed of using a method that would have permanently removed the unit from the grid. Such methods include taking the unit to a landfill, where it would have been destroyed, or having another recycler pick it up and dismantle it. The source for this information is the telephone survey of program participants discussed previously.

The verified NTG ratios for PY3 of 0.64 for refrigerators and 0.65 for freezers (or 0.64 across the entire program), are somewhat lower than the verified NTG values in PY2 of 0.81 for refrigerators and 0.77 for freezers. Further analysis of survey data is needed to determine the causal factors.

4.4 Process Evaluation

The process evaluation component of the Smart Appliance Recycling evaluation focuses on program awareness/marketing, reasons for participation, and satisfaction with program processes, including sign-up, appliance pickup, incentive levels, and receipt of the refund check. Data sources for the process evaluation include the telephone survey of program participants (N = 255) and discussions with program staff.

Although telephone survey data collection is now complete, the full data analysis is still underway. Preliminary process findings, based on survey results, are below.

4.4.1 Marketing

When asked where they had heard of the program, over one-third of the participants (37 percent) recalled seeing the program mentioned in a bill insert. Another 22 percent heard about the program via word of mouth. This latter finding is evidence of the program maturing, and ultimately it will be able to sell itself with little additional effort, as is the case with similar, mature programs in other states.. Other sources where participants heard of the program include advertising in the newspaper (3 percent), the PECO website (5 percent), and retailers (9 percent), among others.

4.4.2 Reasons for Participating

Participants were asked why they chose the PECO Smart Appliance Recycling Program to dispose of their appliance instead of some other disposal method. Three reasons which received nearly an equal number of responses were: the cash incentive (cited by 27 percent of respondents), the convenience of the home pickup (26 percent), and the environmental benefits of the program, which were cited by 25 percent as a main reason for participating. The percentage of those selecting the incentive as a top reason has fallen off sharply from PY2 (when 40 percent named it). More than likely, this is evidence of the effect the reduced incentive level has had on participants' reasons for getting involved in the program.

4.4.3 Satisfaction with The Program

Overall, 95% of participants were very satisfied with their experience with the Smart Appliance Recycling Program, as indicated by satisfaction scores of 8, 9 or 10 on a 0 to 10-point satisfaction scale. Nearly three-fourths (71 percent) rated their satisfaction with the program a perfect 10. These ratings are similar to those provided in PY2.

The program was well administered. Participants reported a high degree of satisfaction with the sign-up process and appliances were picked up and payments processed in timely fashion. One of JACO's performance metrics is that the appliance pickup wait time averages 14 days from the first call to when the appliance is picked up. Importantly, nearly all participants surveyed (90 percent) said they were able to schedule a pickup date that was convenient for them.

Overall, 94 percent of respondents were satisfied with the collection team who came to pick up the appliance, providing satisfaction scores of 8, 9 or 10 on a 0 to 10-point satisfaction scale. Nearly 80 percent rated their satisfaction a perfect 10 out of 10.

Three-fourths of respondents (75 percent) said that they were very satisfied with the amount of the incentive payment. A total of 11 respondents reported being dissatisfied with the size of the payment as indicated by scores of 1, 2, 3, and 4. Another 44 respondents (17 percent) had

neutral satisfaction ratings of 5, 6, and 7. As would be expected, satisfaction with the incentive is somewhat lower in PY3, due to the reduced level.

4.5 Financial Reporting

A breakdown of the program finances is presented in Table 4-6.

Table 4-6. Summary of Smart Appliance Recycling Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$13	\$252	\$1,032
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$13	\$252	\$1,032
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$75	\$720	\$2,535
Management ^[2]	\$54	\$261	\$746
Marketing ^[3]	\$97	\$154	\$559
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$226	\$1,135	\$3,840
EDC Evaluation Costs	\$36	\$88	\$178
SWE Audit Costs			
Total EDC Costs^[4]	\$275	\$1,475	\$5,050
Participant Costs^[5]	\$13	\$252	\$1,032
Total TRC Costs^[6]	\$275	\$1,475	\$5,050
Total Lifetime Energy Benefits	N/A	\$9,570	\$35,493
Total Lifetime Capacity Benefits	N/A	\$681	\$2,984
Total TRC Benefits^[7]	N/A	\$10,251	\$38,477
TRC Ratio^[8]	N/A	6.96	7.62

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

5 Smart Home Rebates (SHR) Program

The Smart Home Rebates Program offers PECO residential customers rebates for the purchase of qualifying energy-efficient appliances, heating and cooling equipment, and LED lamps and lighting fixtures. The program provides promotional and marketing materials and support to participating retailers and contractors to encourage their promotion of rebated products. For non-lighting measures, customers submit applications via web or mail. Each application includes accompanying proof-of-purchase receipts or invoices. For qualifying lighting measures, PECO provides manufacturers with a cost buy-down, which is passed on to the customer as a discounted price.

Program measures include the following: attic/roof insulation; high-efficiency electric water heaters; LED lamps; whole-house fans; insulation; ground-source heat pumps; air source heat pumps; ENERGY STAR windows, room air conditioners; dehumidifiers; central air conditioning (14.5, 15, and 16 seasonal energy efficiency ratio [SEER]); refrigerators; freezers; clothes washers; dishwashers; lighting fixtures; heat pump water heaters; high-efficiency gas water heaters (fuel switching); and high-efficiency gas furnaces (fuel switching from baseboard or heat pump).

5.1 Program Updates

The Smart Rebates Program remained largely unchanged in PY3 with three exceptions. First, the program did not offer rebates for consumer electronics after Q2 and shifted its focus to heating, ventilating, and air conditioning equipment. Second, the program began to include ENERGY STAR Most Efficient, a program element that identifies and advances the models with the greatest efficiency within each product category. Finally, PECO discontinued the White Roof measure during PY3 because the basis for energy savings was not well established.

5.2 Impact Evaluation Gross Savings

5.2.1 Gross Impact Methodology

All PY3 savings for the Smart Home Rebates Program are deemed or partially deemed as established by the 2011 TRM. Navigant staff calculated energy savings and demand reduction per the algorithms of that TRM using data from the program's tracking system and comparing the results with PECO's claimed savings. This was the same practice as applied by the evaluation of PY2 savings. As an added level of rigor for the evaluation of PY3, however, Navigant staff reviewed a sample of project files (where available) to confirm that this documentation matched the data in the tracking system.

5.2.2 Strata and Disposition of Savings

The Smart Home Rebates Program offers 22 types of equipment, appliances, lighting products and consumer electronics. Table 5-1 provides the categorization of these measures by product type. Navigant used this categorization for sample stratification.

Table 5-1. Impact Evaluation Strata Descriptions

Stratum Name	Equipment Types	Number of Measures	Proportion of Energy Savings	Proportion of Demand Reduction
HVAC	air source heat pumps, central air conditioners and ENERGY STAR high-efficiency gas furnaces	7,282	41%	63%
Ground Source Heat Pumps	ground source heat pumps	427	14%	6%
ENERGY STAR Appliances	clothes washers, dehumidifiers, dishwashers, high-efficiency water heaters (gas and electric), heat pump water heaters, freezers, refrigerators, and room air conditioners	39,902	20%	18%
ENERGY STAR Lighting	LEDs and fixtures	17,633	5%	1%
Consumer Electronics	televisions, desk top computers, advanced power strips	20,086	20%	12%
Other	Insulation, white roofs, whole house fan, and ENERGY STAR Windows	73	<1%	<1%

While ground source heat pumps are heating, ventilating, and air-conditioning (HVAC) equipment, their high per-unit savings justified its own stratum.

For ENERGY STAR Lighting measures, the PY1 and PY2 evaluations did not include number of installed measures in the totals for participation. The justification for this exclusion was that PECO paid the rebates “upstream” to manufacturers and it was not possible to ascertain how many participants benefited from the multi-pack fixtures and bulbs. The previous evaluations did not apply this practice to Consumer Electronics measures because PECO paid “mid-stream” rebates to retailers for products that were unitary (i.e., not multi-pack) and the previous evaluations could reasonably designate each rebated sale as one unit of participation. In the evaluation of gross savings for PY3, Navigant has continued these practices. For these reasons, the total number of measures does not match the total level of participation (67,770) for the program year.

As shown in Table 5-2, participation, energy savings, and demand reduction are all residential in nature.

Table 5-2. CPITD Smart Home Rebates Program Reported Results by Sector

Sector	Participants ¹	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	282,412	64,628	18.3	20,410
Low-Income	0	0	0	0
Commercial and Industrial	0	0	0	0
Government and Non-Profit	0	0	0	0
CPITD Total	282,412	64,628	18.3	20,410

¹Participant values exclude sales of ENERGY STAR lighting fixtures and LED lamps, for which upstream rebates are provided.

Table 5-3. Smart Home Rebates Program Reported Results by Quarter

Reporting Period	Participants ¹	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	37,505	8,396	2.4	2003
PY3 Q2	26,208	6,212	1.7	1,514
PY3 Q3	2,041	3,332	0.8	621
PY3 Q4	2,016	3,008	0.8	584
PY3 Total	67,770	20,948	5.8	4,722
CPITD Total	282,412	64,628	18.3	20,410

¹Participant values exclude sales of ENERGY STAR lighting fixtures and LED lamps, for which upstream rebates are provided.

5.2.3 Gross Savings Findings

For the HVAC, Ground Source Heat Pump, ENERGY STAR Appliances, and “Other” strata, the impact evaluation included two phases. The first phase was a census comparing savings data in the tracking system to savings calculation algorithms in the TRM. This comparison provided an assurance that the *ex ante* savings were in compliance with accepted measurement and verification methods and is identical to the impact evaluation effort for PY2. The comparison did not find significant errors in data or calculations for these strata.

The second phase was a review of project files for a sample of measures from each of these four strata. The sampling approach for SHR is shown in Table 5-4. This review found no significant difference between tracking system data and file data for the HVAC and ENERGY STAR Appliance strata. For the Ground Source Heat Pump stratum, however, the review found the inclusion of unincented desuperheaters. Since PECO did not incent the savings from these desuperheaters, the savings (11 kW and 58 MWh) could not be counted toward program goals in the *ex post* estimate of energy savings and demand reduction.

In the “Other” stratum, the review found the inclusion of 6 MWh from the White Roof measure. PECO discontinued this measure during the course of PY3 because the basis for savings was not sufficiently established. In addition, the review found a minor difference (<1 MWh) in the calculation of insulation energy savings. Neither the insulation difference nor the 6 MWh are included in the estimate of *ex post* savings.

Because the Consumer Electronics and ENERGY STAR Lighting measures are “mid” and “upstream” buy-down efforts, respectively, there are no project files with participant data to consult; therefore, the impact evaluation of these strata consisted of a comparison of all tracking data values with TRM algorithms. Navigant conducted this same procedure for PY2 to estimate gross energy savings and demand reduction.

While this comparison found no differences for the Consumer Electronics stratum, Navigant did find significant differences in the ENERGY STAR Lighting Stratum. Upon review of the ENERGY STAR Lighting measures, Navigant found that PECO had based the claimed savings for this measure on a CFL bulb algorithm. Navigant recalculated savings based on an interim TRM measure for LEDs and compared the results to the claimed savings. Among other differences, the LED protocol had a deemed incandescent bulb base watts based on the lumens of the LED bulb. As a result, the base watts for 79 percent of the bulbs were lowered from 65 to 60, reducing the overall savings. The result was a reduction of 21 percent for demand savings and 6 percent for energy savings.

Table 5-4. Smart Home Rebates Program Sampling Strategy for PY3

Stratum	Strata Boundaries	Population Size	Assumed Coefficient of Variation (C _v) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
HVAC	N/A	7,293	0.50	Census	Census	7,293	Census for comparison of tracking data to TRM and sample of project files
Ground Source Heat Pump	N/A	413	0.50	Census	Census	413	Census for comparison of tracking data to TRM and sample of project files
Appliances	N/A	40,827	0.25	Census	Census	40,827	Census for comparison of tracking data to TRM and sample of project files
Other	N/A	75	0.50	Census	Census	75	Census for comparison of tracking data to TRM and sample of project files
Lighting	N/A	816	0.25	Census	Census	816	Census for comparison of tracking data to TRM
Consumer Electronics	N/A	6,349	0.50	Census	Census	6,349	Census for comparison of tracking data to TRM
Program Total ¹		55,773		85/15	55,773	55,773	
¹ The total number of installed measures for the Smart Home Rebates Program was 67,770. The population size above reflects the number of tracking data records for each strata.							

5.2.4 Energy Savings and Demand Reduction by Stratum

Energy savings by stratum are described in Table 5-5 and show the high realization rates for most of the strata. The only exception is the “Other” stratum and this lower rate is due primarily to the mid-program year elimination of the White Roof measure.

The differences between *ex ante* and *ex post* savings were less than 1 percent for both energy and demand. This minimal difference is due to the deemed and partially deemed nature of the program’s measures as well as accurate accounting of these measures. The realization rate for energy savings was 99.4 percent and the realization rate for demand was 99.5 percent.

This is not an unexpected result since the evaluation of gross energy savings and demand reduction is a comparison of PECO’s calculation of claimed savings to Navigant’s computation of savings based on the application of tracking data to the 2011 TRM algorithms.

Table 5-5. PY3 Smart Home Rebates Program Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings	Energy Realization Rate	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Energy Savings
HVAC	8,524	1	0.00	0%	8,527
Ground Source Heat Pumps	3,027	0.98	0.00	0%	2,970
Appliances	4,265	1	0.00	0%	4,265
Other	27	0.66	0.08	0%	18
Lighting	1,003	0.94	0.01	0%	939
Consumer Electronics	4,102	1	0.00	0%	4,101
Program Total	20,948	0.99		0%	20,819

¹Navigant conducted a census of both the ENERGY STAR Lighting and the Consumer Electronics claimed savings and compared calculations based on tracking data and the 2011 TRM to estimate the respective realization rates. For the other strata, Navigant made a similar comparison and also reviewed project files. The high Coefficient of Variation for Lighting is due to the adjustment described in Section 5.2.3.

Table 5-6 shows the programs demand reduction impacts. As with energy savings, the realization rates were high for each stratum and the variability in ENERGY STAR Lighting is due to the recalculation of LED savings.

Table 5-6. PY3 Smart Home Rebates Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Reduction	Demand Realization Rate	Observed Coefficient of Variation (Cv) or Proportion	Relative Precision	Verified Gross Demand Reduction
HVAC	3.6	1.00	0	0.0%	3.6
Ground Source Heat Pumps	0.4	0.96	0.01	0.0%	0.3
Appliances	1.0	1.00	0	0.0%	1.0
Other	0.0	1.00	0	0.0%	0.0
Lighting ¹	0.1	0.79	0.01	0.0%	0.1
Consumer Electronics ¹	0.7	1.00	0	0.0%	0.7
Program Total	5.8	1.00		0.0%	5.7

¹Navigant conducted a census of both the ENERGY STAR Lighting and the Consumer Electronics claimed savings and compared calculations based on tracking data and the 2011 TRM to estimate the respective realization rates. For the other strata, Navigant made a similar comparison and also reviewed project files. The high Coefficient of Variation for Lighting is due to the adjustment described in Section 5.2.3.

5.3 Impact Evaluation Net Savings

As detailed in the next section, the evaluation team conducted a telephone survey of 200 PY3 participants. The survey included a battery of net-to gross questions.

5.3.1 Free Ridership

Twelve out of 200 respondents (6 percent) reported that they had purchased the product before hearing about the PECO rebates. Another 20 respondents (10 percent) had ordered the measure before learning about the rebates. Based on this analysis, a total of 32 respondents were clearly not influenced by SHR and are indeed free riders. These findings suggest that free ridership rates are at 16%, which is consistent with the findings from last year.

5.3.2 Spillover

Fifty-eight of the 200 survey respondents reported installing a total of 206 additional measures on their own, without receiving a rebate. CFLs accounted for 53% of the additional measures installed, with respondents installing a total of 110 CFLs on their own. Five respondents installed a total of 69 windows while three respondents installed a total of six doors.

However, if the additional measures installed did not, in fact, save electricity, they cannot be attributed towards spillover for the SHR Program. Since there is no way to verify that all of the additional measures installed were qualifying measures, the only measures that were credited

towards spillover were the lighting equipment. Using these criteria, staff identified 12 participants (6 percent) who had taken actions producing spillover savings that saved electricity. This spillover rate is consistent with last year's reported levels.

5.3.3 Net-to-Gross

Although this analysis used an NTG value of 1.0 for compliance purposes for PY2, based on the customer survey estimates of free ridership of 16 percent and self-reported spillover of additional measures (that in fact save electricity) of 6 percent, the Navigant team conservatively estimated that the NTG is 100%-16% (free ridership) + 6% (spillover) = 90%.

5.4 Process Evaluation

5.4.1 Process Evaluation Methodology

The process evaluation activities include reviewing program plans and documentation, and conducting Computer-Aided Telephone Interview telephone surveys with Smart Home Rebates Program participants, survey interviews with participant and nonparticipant retailers and contractors, and in-depth interviews with PECO program staff and ECOVA program implementers. Table 5-7 summarizes these activities

Table 5-7. Process Evaluation Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Targeted Sample Size	Achieved Sample Size	Timing
In-depth Phone Interviews	PECO Program Staff	Contacts from PECO	Relevant PECO Staff	2	2	May 2012
In-depth Phone Interviews	PY3 Trade Allies	PECO Tracking Database	Random Sample by Project Level kWh (3 strata)	14 Participating and Non-participating trade allies	11	October 2012
Program Participating Customers CATI Surveys	PY3 SHR Participants	PECO Tracking Database	Random Sample of 2,400	200	200	August 2012

5.4.2 Process Evaluation Findings

In general, the process evaluation found the program to be effective and well run. Specific findings include the following:

Measures and Installation - The CATI survey of 200 participants found that 85 percent installed one qualifying measure and 15 percent had installed two or more rebated measures. In all cases, the survey respondents stated that their rebated measures were installed and in use.

Participant Satisfaction - Survey respondents indicated that participant overall satisfaction with the program remains high (averaging 8.92 on a scale of 1 to 10) and comparable to previous program years.

Awareness of Other PECO Programs - Survey respondents learned about the Smart Home Rebates program in a variety of ways. Of note, the percentage mentioning store staff increased significantly from PY2 (i.e., 12 percent vs. 30 percent). However, the PY3 respondents were significantly less likely to mention learning about the program from installation contractors compared to PY2 survey respondents (i.e., 43 vs. 28 percent). These findings suggest that awareness regarding the PECO program has increased among retail staff while it has declined among contractors or installers.

Outreach to and Coordination with Trade Allies - One of the few challenges in evaluating the Smart Home Rebates program was the limited amount of current contact information for retailers and installation contractors. When requested, the program's implementation contractor was unable to provide such contact information in a timely manner. Updated contact information would allow for more effective management of outreach to trade allies as well as reduce barriers to evaluation.

5.5 Financial Reporting

A breakdown of the program finances is presented in Table 5-8.

Table 5-8. Summary of Smart Home Rebates Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$584	\$4,722	\$20,410
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$584	\$4,722	\$20,410
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$366	\$2,089	\$6,781
Management ^[2]	\$136	\$721	\$2,076
Marketing ^[3]	\$248	\$915	\$2,417
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$749	\$3,724	\$11,273
EDC Evaluation Costs	\$136	\$330	\$678
SWE Audit Costs			
Total EDC Costs^[4]	\$1,469	\$8,776	\$32,361
Participant Costs^[5]		\$14,522	\$74,424
Total TRC Costs^[6]	\$885	\$18,577	\$86,375
Total Lifetime Energy Benefits	N/A	\$24,951	\$77,659
Total Lifetime Capacity Benefits	N/A	\$3,471	\$10,416
Total TRC Benefits^[7]	N/A	\$28,468	\$88,151
TRC Ratio^[8]	N/A	1.53	1.02

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

6 Smart Equipment Incentives: Commercial & Industrial Program

The purpose of the Smart Equipment Incentives (SEI) Commercial and Industrial (C&I) program is to increase awareness of energy savings opportunities and assist customers in acting on those opportunities to decrease energy usage in commercial and industrial facilities and in master-metered multifamily residential buildings. This program offers incentives to customers who install high-efficiency electric equipment and engages equipment suppliers and contractors to promote the incentive-eligible equipment.

The program provides incentives for the following equipment categories: HVAC, Lighting, Drives and Motors, Refrigeration, and Custom Solutions. In addition, the program provides incentives for ENERGY STAR® appliances and HVAC equipment in multi-tenant master-metered buildings and appliance recycling for C&I customers. The program launched March 1, 2010, although incentives were also offered for projects completed between July 1, 2009, and February 28, 2010. In PY3, the C&I program incented a total of 1,104 projects covering C&I retrofit projects (734 projects), C&I multi-tenant projects (361 projects), and C&I appliance recycling projects (9 projects).

PECO's three-year energy efficiency plan separates the program efforts targeting private C&I businesses from the program efforts targeting the government and nonprofit sectors. For the limited post-launch period of PY1, the marketing and implementation of the Smart Equipment Incentives program was not differentiated between C&I and Government/Nonprofit to a degree that made it necessary to conduct separate evaluations. For PY2 and PY3, C&I and government programs are sufficiently differentiated that the two programs are now being evaluated separately. Although PECO initiated a wait list for customers applying for incentives on or after October 1, 2011, PY3 was a complete program year and the evaluation was unaffected by this change.

6.1 Program Updates

The Smart Equipment Incentives C&I program remained unchanged for the first quarter of PY3 (June–August 2011) and for the first month of the second quarter (September 2011). However, as of October 1, 2011, PECO initiated a wait list for customers applying for the C&I retrofit and C&I multi-tenant incentives, which remained in effect for the remainder of the program year due to savings projections meeting the program goals.

Due to the wait list and subsequent flood of applications ahead of the October 1, 2011 deadline, the program has shifted its marketing message from that of an incentive-based program to more of an educational message focusing on energy savings in general. PECO staff has shifted their efforts to working through the waitlisted applications with a focus on quantifying the potential savings for long-term planning. The Smart Equipment Incentives C&I program is currently not guaranteeing the availability of funds for any project submitted on or after October 1, 2011.

In addition, the C&I appliance recycling program lowered the incentive available on November 1, 2011, from \$35 to \$15 per appliance recycled.

6.2 Impact Evaluation Gross Savings

This section details the M&V methodology, sample design, and evaluation findings for the Smart Equipment Incentives C&I program impact evaluation.

6.2.1 M&V Methodology

The evaluation of the Smart Equipment Incentives Commercial and Industrial program consists of three sub-components: C&I retrofit projects, C&I multi-tenant projects, and C&I appliance recycling projects. The M&V methodology for the Smart Equipment Incentives Commercial and Industrial program was very similar to the PY2 methodology. The primary modification was that the C&I multi-tenant projects were evaluated separately from the C&I retrofit projects. The C&I multi-tenant projects were evaluated similarly to the Smart Home Rebates program due to the similarity of measures. Likewise, the SEI Appliance Recycling projects were evaluated similarly to the Residential Smart Appliance Recycling program due to the similarity of measures. The remainder of this section focuses on the C&I retrofit M&V methodology.

Measurement and verification in PY3 included on-site data collection for most sampled sites. Sampled sites that met the following criteria received phone verification instead of on-site verification: 1) the project was a small partially deemed project where the TRM or an Interim Measure Protocol (IMP) applies, 2) the project had relatively small savings (i.e., those in stratum 3), and 3) the project documentation was complete and verified that the measures were installed.

Gross impacts for demand and energy were verified through different approaches for the three categories of measures in this program: 1) deemed, 2) partially deemed, and 3) custom measures. The measures in these categories are defined by the TRM¹² plus interim protocols approved by the PA PUC through the Statewide Evaluator.

If a measure was deemed, the impacts for the measure were provided in the TRM or in an approved Interim TRM Measure Protocol. The evaluation approach for deemed measures was to verify both quantity and that the measure installed matched the TRM-required specifications.

If a measure was partially deemed, the TRM or approved IMP provided the algorithms and default assumptions for calculating impacts and the variables to be verified. Depending on the

¹² Pennsylvania Public Utility Commission, *Technical Reference Manual (TRM) for Pennsylvania Act 129 Energy Efficiency and Conservation Program and Act 213 Alternative Energy Portfolio Standards*, June 2011.

complexity of the partially deemed measure, the verification followed either a Basic or Enhanced level of rigor as described in the applicable protocols and the Audit Plan.¹³ Evaluation of all partially deemed projects included an application and file review and development of a site-specific M&V plan (SSMVP). Site visits or phone interviews were performed following the activities laid out in the SSMVP and verified savings calculated using the variables determined through the site visit or phone interview in accordance with the TRM or IMP.

Projects that included custom measures (defined as measures not included in the TRM or in an IMP, or measures that were initially reported as TRM measures, but determined through the evaluation to be custom) were similarly evaluated using an application review, development of a SSMVP, and site visit. The primary difference was that there were no deemed variables and all custom measures followed an Enhanced Rigor level of effort.

The evaluation included ex post engineering-based estimates of gross annual energy and summer peak demand impacts for each sampled project. Evaluation of PY3 projects included a review of program-tracking data and supporting documentation (invoices, spec sheets) before developing a site-specific M&V plan and conducting a site inspection or phone interview. The focus of the data collection was to verify and/or update the assumptions that feed into analyses of measure-level savings. Data collection included verification of installation quantity, operating schedule and system loading conditions, validation of baseline selection, assessment of persistence, and verification that the systems are functioning and operating as planned, and if not, how the current operation differs from planned operation, taking into account daily, weekly, and seasonal variations. The Enhanced Rigor level site evaluations generally included performing on-site measurement and/or obtaining customer-stored data to support downstream M&V calculations. Measurement included spot measurements, run-time hour data logging, and post-installation interval metering depending on the needs of the project. Customer-supplied data from energy management systems or supervisory control and data acquisition systems was used when available.

The peak kW savings estimation methodology was consistent with PECO requirements for each project and utilized the approved Act 129 peak demand calculators, where applicable. For projects that involved billing analysis, the evaluation team performed a weather normalized regression analysis to estimate savings for these projects and for some projects only monthly billing data was available. Instead of using the monthly billing data for the peak demand savings estimates and realization rate, the evaluation team modified the analysis for these

¹³ The Statewide Evaluation Team: GDS Associates, Inc., Nexant, & Mondre Energy; contracted under the Pennsylvania Public Utility Commission RFP 2009-1 for the Statewide Evaluator, *Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs*, November 4, 2011.

projects to set the demand realization rate equal to the energy realization rate. We believe using this method is the best proxy for the likely demand realization rate.

6.2.2 Sample Design

The sample design for PY3 C&I retrofit projects used stratified ratio estimation similar to the method used in PY1 and PY2. Based on a combined paid annual population of 734 projects, the final verified sample size is 25 projects for the program year, with samples allocated by participation from each quarter and by strata. The final verified sample size exceeds the required 85/15 confidence and precision at the program level. A maximum of up to 48 samples was planned for based on an assumed participation of 2,000 projects. With actual PY3 project data, the final sample design included 28 sample points selected to target an 85/10 confidence and precision. The purpose of designing the sample to exceed the requirements of 85/15 confidence and precision was to ensure the evaluation would meet the requirements in the event it was not possible to verify all sites.

During the impact evaluation, three of the sampled projects could not be verified due to customer non-response (two projects) and erroneous logger data (one project). One of these projects was a Stratum 2 project and two of these projects were Stratum 3 projects. None of them were included in the final program analysis. As this possibility was planned for, this did not drastically affect the final analysis results and the evaluation was able to exceed the precision and confidence targets of 85/15 at the program level.

The strata boundaries were defined with Q1 data, Q2 data, and pipeline data at the end of Q2. The boundaries were defined to include the top 33 percent of reported kWh savings in Stratum 1, the middle 33 percent of reported kWh savings in Stratum 2, and the lower 33 percent of reported kWh savings in Stratum 3. In addition, the team discovered during the file review that one sampled project contained over 100 individual sites and was given its own Stratum, Stratum 4. Discussions with PECO revealed that this project was an exception, and all other projects are located at one site. Due to the method used to define the strata boundaries early in the process, at the end of PY3, Strata 1, 2, and 3 contain more or less than 33% of the total PY3 reported kWh savings.

The sample was pulled in three stages: after Q2 with Q1 and Q2 data, after Q3, and after Q4. During each stage, the sample design was reviewed and adjustments were made as needed to ensure the evaluation would meet the target confidence and precision. This process included reviewing the projects in the pipeline and estimating the number of projects that would complete prior to the end of PY3. The percentage of total sample pulled from each stage was based on the number of completed projects in that stage. Lastly, in the Q3 and Q4 stages, the team included all projects in sample design but only pulled projects with greater than 2 percent of aggregate program savings. This process was not completed for the Q1/Q2 stage.

6.2.3 Evaluation Findings

The Smart Equipment Incentives Commercial and Industrial program contributes to the impacts in the Commercial and Industrial sector. Therefore, in Table 6-1, the impacts from C&I retrofit projects, C&I multi-tenant projects, and C&I appliance recycling projects are combined and shown under the Commercial and Industrial sector. This program does not impact other sectors; thus, those rows in the table are blank.

Table 6-1. CPITD Smart Equipment Incentives: Commercial & Industrial Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	0	0	0	0
Low-Income	0	0	0	0
Commercial and Industrial	3,244	165,948	28.3	11,967
Government and Non-Profit	0	0	0	0
CPITD Total	3,244	165,948	28.3	11,967

Table 6-2 shows the reported results by quarter. The participation from the C&I retrofit projects was relatively constant across all four quarters (between 176 and 203 participants each quarter). However, the participation from the C&I multi-tenant projects was highest in the first two quarters (150 participants in Q1 and 142 participants in Q2) and then declined in the second two quarters (36 participants in Q3 and 6 participants in Q4). Nine C&I appliance recycling projects are attributed to PY3. The table below also details the reported gross energy savings, reported gross demand reduction, and incentives for each quarter.

Table 6-2. Smart Equipment Incentives: Commercial & Industrial Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	354	14,435	3	1,256
PY3 Q2	318	11,963	2	1,013
PY3 Q3	242	18,827	3	1,579
PY3 Q4	186	21,015	4	1,603
PY3 Total	1,104	66,248	12.1	5,450
CPITD Total	3,244	165,948	28.3	11,968

Table 6-3 shows the sampling strategy for the Smart Equipment Incentives Commercial and Industrial program. The sample for the C&I retrofit projects is discussed in detail in Section

6.2.2. The C&I multi-tenant and C&I appliance recycling sample is also shown in the table below. The sample used for the C&I multi-tenant projects is the same as that for the Smart Home Rebates program. The sample used for the C&I appliance recycling projects is the same as that for the Residential Smart Appliance Recycling program.

Table 6-3. Smart Equipment Incentives: Commercial & Industrial Program Sampling Strategy for PY3

Stratum	Stratum Boundaries	Population Size	Assumed Coefficient of Variation (C _v) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
Smart Equipment Incentives - Retrofit: Stratum 1 - High Savings	>900,000 kWh	8	0.4	85/15	6	6	On-site verification
Smart Equipment Incentives - Retrofit: Stratum 2 - Mid Savings	180,001 – 900,000 kWh	86	0.4	85/18	11	10	On-site verification
Smart Equipment Incentives - Retrofit: Stratum 3 - Low Savings	≤180,000 kWh	639	0.4	85/20	10	8	On-site/phone verification
Smart Equipment Incentives - Retrofit: Stratum 4 - Large Single Project with Multiple Sites	Not applicable	1	0.4	85/0	1	1	Phone verification
Smart Equipment Incentives - Multi-tenant ¹	N/A	361	.5	85/15	361	361	Reviewed tracking database for 361 projects for compliance to TRM and sampled 14 project files to ascertain quality and consistence of tracking data

Smart Equipment Incentives - Appliance Recycling ²	N/A	8,821	0.35	85/15	250	255	Phone survey
Program Total		1,095		85/10	389	386	

NOTES:

¹The Smart Equipment Incentives - Multi-tenant projects account for 0.2% of total savings in the SEI C&I program. Evaluation consisted of a review of tracking data to the 2011 TRM and a review of files from 14 projects.

²The values presented here are for the impact evaluation of the residential Smart Appliance Recycling program. The results of the impact evaluation of that program were applied to the nine appliances recycled in the C&I sector in PY3. Because the SAR population size and the target and achieved sample sizes pertain to the SAR evaluation, these numbers are excluded from the program total values.

Table 6-4 and Table 6-5 show the reported and verified savings for the Smart Equipment Incentives Commercial and Industrial program. From the evaluation, the team found the energy realization rate for the C&I retrofit program to be 1.03 (85 percent confidence/8 percent precision) and the demand realization rate to be 1.08 (85 percent confidence/14 percent precision).

The evaluation found that projects with variable frequency drives (VFDs) and energy management systems (EMS) consistently had verified savings that were either higher or lower than the reported savings. The assumptions used to calculate the ex ante peak demand savings for VFDs only assume peak demand savings at very high flow rates. However, the evaluation found that peak demand savings occur at a range of flow rates. Therefore, the ex ante calculations underestimated demand savings and the demand realization rates for most of the VFD projects; four out of five of the sampled projects with VFDs were higher than 1.0. Additionally, the ex ante peak demand savings are calculated for the top 100 hours, while the PA Act 129 Peak Demand Savings calculator assumes the peak demand proxy periods covering roughly 700 hours.

For the EMS measures, the primary reason for the high demand realization rates is that our method of calculation was fundamentally different than the ex ante methodology. The team used a weather normalized billing analysis as compared to a prescriptive approach taken by the implementer. The EMS ex ante savings calculations assume 2 kWh per square foot of floor area and 0.0001 kW per square foot of floor area. Therefore, the ex ante savings are extremely rough and a high degree of variability in site-specific actual savings is to be expected from this measure.

As discussed above, the C&I multi-tenant projects were evaluated similarly to the Smart Home Rebates program due to the similarity of measures. The evaluation found the energy and demand realization rates for these measures to be 1.0 for both rates. Similarly, the C&I appliance recycling projects were evaluated in the same manner as the Residential Smart Appliance Recycling program due to the similarity of measures. The evaluation found the energy and demand realization rates, or verification rates, to be 0.96 for both rates for these projects.

The total verified gross energy savings for the C&I retrofit, C&I multi-tenant, and C&I appliance recycling projects is 68,409 MWh. The total verified gross demand savings for the C&I retrofit, C&I multi-tenant, and C&I appliance recycling projects is 13.1 MW.

Table 6-4. PY3 Smart Equipment Incentives: Commercial & Industrial Program Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings	Energy Realization Rate ¹	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Energy Savings
Smart Equipment Incentives - Retrofit: Stratum 1 - High Savings	14,195	0.89	0.23	20%	12,584
Smart Equipment Incentives - Retrofit: Stratum 2 - Mid Savings	26,770	1.12	0.31	46%	30,060
Smart Equipment Incentives - Retrofit: Stratum 3 - Low Savings	24,005	1.02	0.22	36%	24,569
Smart Equipment Incentives - Retrofit: Stratum 4 - Large Single Project with Multiple Sites	1,123	0.93	0.00	0%	1,042
Smart Equipment Incentives - Multi-tenant	139	1.00	0.14	0%	139
Smart Equipment Incentives - Appliance Recycling	16	0.96	0.53	5%	15
Program Total	66,248	1.03		8%	68,409

¹The PYTD Energy Realization Rate for Smart Equipment Incentives - Appliance Recycling is from the Smart Appliance Recycling - Residential program.

Table 6-5. PY3 Smart Equipment Incentives: Commercial & Industrial Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Reduction	Demand Realization Rate	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Demand Reduction
Smart Equipment Incentives - Retrofit: Stratum 1 - High Savings	1.4	1.22	0.40	14%	1.7
Smart Equipment Incentives - Retrofit: Stratum 2 - Mid Savings	5.6	1.03	0.22	10%	5.8
Smart Equipment Incentives - Retrofit: Stratum 3 - Low Savings	4.9	1.13	0.57	32%	5.4
Smart Equipment Incentives - Retrofit: Stratum 4 - Large Single Project with Multiple Sites	0.2	0.93	0.00	0%	0.2
Smart Equipment Incentives - Multi-tenant	0.05	1.00	0.01	0%	0.05
Smart Equipment Incentives - Appliance Recycling	0.002	0.96	0.53	5%	0.002
Program Total	12.1	1.1			13.1

6.3 Impact Evaluation Net Savings

The primary objective of the net savings analysis was to determine the program's net effect on customers' electricity usage. After gross program impacts have been assessed, net program

impacts are derived by estimating a NTG ratio that quantifies the percentage of the gross program impacts that can reliably be attributed to the program. The NTG ratio is generally calculated by estimating free ridership and spillover, using the following equation:

$$\text{NTG Ratio} = 1 - \text{Free-ridership Rate} + \text{Spillover Rate}$$

Free ridership was assessed using a customer self-report approach following a framework that was developed for evaluating net savings of California's 2006-2008 non-residential energy efficiency programs. This method calculates free ridership using data collected during participant phone surveys concerning the following three items:

1. A Timing and Selection score that reflects the influence of the most important various program and program-related elements in the customer's decision to implement the specific program measure at this time.
2. A Program Influence score that reveals the perceived importance of the program (whether rebate, recommendation, or other program intervention) relative to non-program factors in the customers' decision to implement the specific program measure. This score is cut in half if they learned about the program after they decided to implement the measures.
3. A No-Program score that captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available. This score accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program qualifying measures at a later date if the program had not been available.

Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure. The rationale for using the maximum value is to capture the most important element in the participant's decision-making process.

The calculation of free ridership for the program is a multi-step process. The participant survey covered a battery of questions used to assess a net-to-gross ratio for a specific end use and project. Responses were used to calculate a Timing and Selection score, a Program Influence score, and a No-Program score for each project covered through the survey. These three scores can be given values of 0 to 10, where a lower score indicates a higher level of free ridership. The calculation then averaged those three scores to come up with a measure-level free-ridership score. If the customer had additional measures at the same site as part of the same project, the survey asked whether the responses also apply to the other measures. If that was the case, the entire project was given the same score. If the customer has additional projects at other sites covering the same or other end uses, the survey asked whether the responses also applied to the other projects. If that is the case, the additional projects are also given the same score.

In addition, responses to other survey questions allowed Navigant to assess whether spillover may be occurring and the type of equipment involved, but do not offer enough detail to quantify the spillover. Spillover could be quantified through follow-up questioning and site visits on potential spillover occurrences as reported by the participants.

The evaluation team completed a total of 35 interviews for the SEI C&I retrofit program participating customers covering the free-ridership and spillover questions. Analysis of the NTG data for SEI C&I participant surveys is currently underway and the expected range of the kWh-weighted NTG (net of free ridership) ratio is 0.57 – 0.70.

6.4 Process Evaluation

Navigant conducted four primary research activities to perform the process evaluation. These activities consisted of in-depth phone interviews with PECO program management and KEMA implementation staff, CATI surveys with participating contractors, CATI surveys with program participants with projects in the wait list, and CATI surveys with program participants.

Table 6-6 provides a summary of the principal data sources contributing to the process evaluation of the PY3 Smart Equipment Incentives C&I Program. For each data element listed, the table provides the targeted population, the sample frame, sampled completes, and timing of data collection. The tracking data for this evaluation was extracted from a copy of the PECO online database delivered electronically to the evaluation team on a quarterly basis.

Table 6-6. PY3 Smart Equipment Incentives Program Process Evaluation Principal Data Sources

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Targeted Sample Size	Achieved Sample Size	Timing
In-depth Phone Interviews	PECO Program Staff	Contacts from PECO	Business Program Managers and staff	3	3	May 2012
	Program Implementers	Contacts from PECO	KEMA Program Implementation Staff	3	3	June 2012
Contractor CATI Surveys	PY3 Contractors	PECO Tracking Database	Stratified Random Sample by Project Level kWh (3 strata)	32 Participating Contractors	30 Contractors	October 2012
Wait-list CATI Surveys	PY3 Program Customers with projects in the wait list	PECO Wait list	Stratified Random Sample by Project Level kWh (4 strata)	18 Customers	18 Customers	September 2012

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Targeted Sample Size	Achieved Sample Size	Timing
Program Participating Customers CATI Surveys	PY3 C&I Participants	PECO Tracking Database	Stratified Random Sample by Project Level kWh and Measure type (3 strata each for lighting and non-lighting participants)	32 Lighting unique participating customers; 18 Non-lighting unique participating customers	35 Customers	October 2012
	PY3 GNI Participants (shown in the C&I section to be comprehensive)	PECO Tracking Database	Stratified Random Sample by Project Level kWh and Measure type (4 strata for lighting and 3 strata for non-lighting participants)	39 Lighting unique participating customers; 18 Non-lighting unique participating customers	43 Customers	October 2012

The activities conducted during the process evaluation are further described in the following sections.

6.4.1 PECO Program Management Staff and KEMA Staff Interviews

The evaluation team conducted three in-depth interviews with PECO staff and three in-depth interviews with key members of the Smart Equipment Incentives program implementation contractor team, KEMA, during the months of May and June 2012. The interviews were designed to enable the evaluation team to ask closed-ended questions about the program's administration and delivery during the program year (PY3) and also to obtain "real-time" information about current program activity through asking open-ended questions that created a "free-flowing" conversation. To inform these interviews, the evaluation team reviewed current program reporting documents, marketing materials, and customer materials, such as the Wait-list Policies and Procedures document.

The evaluation team gleaned the following findings during the in-depth interviews:

- The announcement of the wait list caused a high inflow of applications at the beginning of the PY3 program cycle, and PECO and KEMA staff effectively worked together to modify the process for handling project applications.
- Marketing efforts during PY3 shifted from an incentive-based marketing strategy to a customer education strategy.

- KEMA and PECO both made a concerted effort to enter the customer decision-making process sooner to lower free ridership.
- PECO worked to implement the Navigant suggested changes on the tracking system.
- Preliminary findings indicate that participating contractors are more dissatisfied with the wait list than customers. They recognize that the program is a sales tool for them and in some cases had hired staff to sell the program to customers.

6.4.2 Participating Contractor Survey

Computer-Aided Telephone Interview survey data was collected from participating contractors to support the process evaluation efforts, particularly focusing on the impact of the wait-list, program marketing, and participation questions, and administration and delivery questions. The participating contractor survey was conducted at the contractor level; thus, the survey covered both SEI C&I and SEI GNI projects. In total, 219 contractors completed 732 SEI projects¹⁴ in PY3.

The target of complete interviews is 32 contractors, which represent 54 percent of the total SEI C&I retrofit projects in PY3 (399 projects). A total of 30 contractor interviews were completed by the evaluation team in October 2012.

6.4.3 Wait-list Customer Survey

The Navigant team (Itron CATI center) conducted 18 CATI surveys with wait-listed customers to determine the level of customer satisfaction with the program, as well as the effects of the wait list on the level of future program participation.

PECO's database of wait-listed customers had a total of 176 customers with 363 projects.¹⁵ In order to avoid an overlap with the contractor CATI survey, the evaluation team cleaned the database and eliminated all the projects that had a contractor as the contact name in the database. The final wait-list sample pool had 131 customers and 182 projects. This survey also covered both SEI C&I and SEI GNI projects; thus, the results are at the SEI program level and will not be split by C&I and GNI.

Preliminary findings indicate that about two-thirds of wait-listed customers are dissatisfied with the wait list. The top two reasons for dissatisfaction are shortage of funds and lack of communication from PECO. Many customers claim they would like to have regular status

¹⁴ Total number of projects does not include projects without contractor contact information. Navigant eliminated 277 projects that did not have complete contact information in the database.

¹⁵ Navigant eliminated four projects that did not have complete contact information in the database.

updates of where they are in the process. Additionally, the results show that customers are confused with the concept of the wait list.

6.4.4 Program Participating Customer Survey

A participating customer CATI survey was also conducted for the PY3 Smart Equipment Incentives program. The survey assessed all of the parameters necessary to calculate free ridership and net-to-gross. Additional data was collected to support the process evaluation (such as program design and implementation, program marketing and awareness, and customer satisfaction), a qualitative assessment of spillover, and business demographics for the process component of the evaluation.

These surveys were conducted for both the SEI C&I retrofit program and the SEI GNI retrofit program. The target of complete interviews is 50 SEI C&I. The evaluation team completed 35 SEI C&I participating customer interviews in October 2012. These surveys are split between two individual samples, C&I covering lighting project participants and non-lighting/ custom project participants. The primary goal of splitting the programs into two samples was to determine if there is a significant difference in the participant decision-making process and participant satisfaction between the lighting participants and non-lighting/custom participants.

The sampling unit for the process evaluation was the unique participating customers; it does not include projects where the primary contact person in the database is a contractor.¹⁶ The rationale for contacting unique participating customers is to get project information from the final decision maker. Overall, 228 unique participant contacts completed 544 C&I projects¹⁷ in PY3.

The surveys were designed to achieve 85/15 confidence/precision individually and exceed that when combined to the program level.

¹⁶ There are 194 projects with a contractor as the primary contact person in the database. These were not included in the sample.

¹⁷ Total number of projects does not include projects without customer contact information. Navigant reviewed PECO's database file and eliminated 19 C&I projects from the sample pool, which had incomplete contact information or no contact information.

6.5 Financial Reporting

A breakdown of the program finances is presented in Table 6-7.

Table 6-7. Summary of Smart Equipment Incentives: Commercial & Industrial Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$1,603	\$5,450	\$11,967
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$1,603	\$5,450	\$11,967
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$781	\$2,797	\$6,666
Management ^[2]	\$139	\$595	\$1,697
Marketing ^[3]	\$137	\$561	\$1,006
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$1,058	\$3,954	\$9,370
EDC Evaluation Costs	\$299	\$726	\$1,355
SWE Audit Costs			
Total EDC Costs^[4]	\$2,960	\$10,130	\$22,692
Participant Costs^[5]		\$21,509	\$54,526
Total TRC Costs^[6]	\$1,357	\$26,189	\$65,251
Total Lifetime Energy Benefits	N/A	\$50,802	\$117,009
Total Lifetime Capacity Benefits	N/A	\$7,070	\$15,429
Total TRC Benefits^[7]	N/A	\$57,915	\$132,526
TRC Ratio^[8]	N/A	2.21	2.03

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that

are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

7 Smart Equipment Incentives: Government, Nonprofit, Institutional Program

The purpose of the Smart Equipment Incentives Government, Nonprofit, Institutional (GNI) program is to increase the energy efficiency of government and public facilities. This program provides all of the same services offered within the Commercial and Industrial segment of the SEI program; the GNI program, however, only offers incentives to government, nonprofit and institutional customers who install high-efficiency electric equipment. The program engages equipment suppliers and contractors to promote the incentive-eligible equipment. The SEI GNI program also enables customers to capture opportunities to reduce consumption by retrofitting street lighting and traffic signal lights. The GNI program was also to provide assistance with obtaining facility audits, but this portion of the program has not been used to date.

Consistent with the program delineations mentioned in the preceding paragraph, PECO's three-year energy efficiency plan separates the program efforts targeting private C&I businesses from the program efforts targeting the government and nonprofit sectors. For the limited post-launch period of PY1, the marketing and implementation of the Smart Equipment Incentives program was not differentiated between C&I and Government/Nonprofit to a degree that made it necessary to conduct separate evaluations. Since, PY2, the C&I and GNI programs are sufficiently differentiated that the two programs are being evaluated separately. During PY3, PECO initiated a wait list for customers applying for incentives on or after October 1, 2011. The results of this wait list are discussed in later sections.

7.1 Program Updates

The GNI Smart Equipment Incentives program remained unchanged for the first quarter of PY3 (June, July, and August 2011) and for the first month of the second quarter (September 2011). However, as of October 1, 2011, PECO initiated a wait list for customers applying for incentives; this wait list remained in effect for the remainder of the program year. PECO instituted this wait list as it appeared from savings projections that the Phase I program goals were achieved.

Due to the inception of the wait list and the subsequent flood of applications ahead of the October 1, 2011 deadline, the program has shifted its marketing message from that of an incentive-based program to more of an educational message focusing on energy efficiency opportunities in general. PECO staff has shifted their efforts toward working through the "wait-listed" applications, with a focus on quantifying the potential savings for goal attainment and long-term planning.

The GNI Smart Equipment Incentives program is currently not guaranteeing the availability of funds for any Retrofit, Multi-tenant, or New Construction projects submitted on or after October 1, 2011. In addition, the GNI Appliance Recycling program lowered the incentive available on November 1, 2011, from \$35 to \$15 per appliance recycled.

In previous years, the evaluation team conducted desk and invoice reviews for the multi-tenant projects; these multi-tenant projects were not evaluated as part of the SEI program for PY3, but were instead evaluated in conjunction with the PECO Smart Home Rebates program, as the customers and measures are more similar to that residential program. Likewise, projects submitted under the SEI GNI New Construction program were evaluated as part of the Smart Construction Incentive (SCI) program due to measure similarities.

Appliance recycling projects conducted in the GNI sector were evaluated under the Residential Smart Appliance Recycling (SAR) Program, although the benefits and costs of these projects are attributed to the SEI GNI program. Although there was no wait list for the SAR program, participation dropped significantly due to reduction in the incentive levels from \$35 to \$15 beginning November 1, 2011.

7.2 Impact Evaluation Gross Savings

This section details the sample design, M&V methodology and evaluation findings for the Smart Equipment Incentives GNI Retrofit program gross impact evaluation.

Table 7-1 shows the impacts from GNI Retrofit projects, GNI Multi-tenant projects, GNI New Construction Projects, and GNI Appliance Recycling projects combined and shown under the GNI sector.

Table 7-1.

CPITD Smart Equipment Incentives: GNI Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	0	0	0	0
Low-Income	0	0	0	0
Commercial and Industrial	0	0	0	0
Government and Non-Profit	804	92,685	14.2	9,027
CPITD Total	804	92,685	14.2	9,027

Table 7-2 shows the reported results by quarter. In PY3, the program incentivized a total of 375 projects covering 275 SEI GNI retrofit projects, 74 GNI Multi-tenant (MT) projects, 21 SEI GNI New Construction (GNI NC) projects, and 5 SEI Appliance Recycling projects. The table below also details the reported gross energy savings, reported gross demand reduction, and incentives for each quarter.

Table 7-2. Smart Equipment Incentives: GNI Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	75	3,073	0.4	193
PY3 Q2	81	8,479	1.1	942
PY3 Q3	104	12,853	1.7	1,205
PY3 Q4	110	23,658	3.3	2,015
PY3 Total	375	48,095	6.5	4,355
CPITD Total	804	92,685	14.2	9,027

7.2.1 Sample Design

The sample design for PY3 used stratified ratio estimation similar to the method used in PY1 and PY2. Based on a combined paid annual population of 275 projects, the final evaluated sample size was 21 projects for the program year, with samples allocated by participation from each quarter and by strata. Strata 1, 2, and 3 were divided based upon ex ante kWh savings values. The strata boundaries defined for sampling purposes were as follows:

- 900,000 kWh < Stratum 1
- 250,000 kWh < Stratum 2 ≤ 900,000 kWh
- 0 kWh ≤ Stratum 3 ≤ 250,000 kWh

Stratum 4 contains municipal street and traffic lighting projects and did not have a stratum boundary.

Three stages of dynamic sampling were utilized for evaluation of the PY3 SEI GNI program. Sampled projects were selected from 1) a combined Q1 and Q2 population, 2) the Q3 population and 3) the Q4 population. All projects were included in the sample design population estimates, but only the projects with greater than 2 percent of the savings for Q3 and Q4 were selected for the sampled M&V points. Statistical confidence and precision is based on the sample size relative to the population. For the gross impact analysis, the precision levels for the sampling effort are shown below.

Table 7-3. Smart Equipment Incentives: GNI Program Sampling Strategy for PY3

Stratum	Strata Boundaries	Population Size	Assumed Coefficient of Variation (C _v) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
SEI GNI Retrofit - Stratum 1	>900,000 kWh	11	0.4	85 / 25	5	5	On-site verification
SEI GNI Retrofit - Stratum 2	250,000 - 900,000 kWh	26	0.4	85 / 29	5	5	On-site verification
SEI GNI Retrofit - Stratum 3	≤250,000 kWh	217	0.4	85 / 27	6	6	On-site verification
SEI GNI Retrofit - Stratum 4 - Municipal Lighting	N/A	21	0.4	85 / 29	5	5	Desk Review
SEI GNI - Multi-Tenant ¹	N/A	74	0.5	85 / 15	74	73	Reviewed tracking database for 73 projects for compliance to TRM and sampled 4 project files to ascertain quality and consistence of tracking data
SAR - GNI ²	N/A	8,821	0.4	85 / 15	250	255	Phone survey
SEI GNI - New Construction - High ³	>1.5 MWh	2	0.5	85 / 0	2	2	On-site verification
SEI GNI - New Construction - Medium ³	>0.47 MWh, <1.5 MWh	6	0.5	85 / 0	6	6	On-site verification
SEI GNI - New Construction - Low ³	<0.47 MWh	61	0.5	85 / 33	6	6	File review analysis
Program Total		418		85 / 15	109	108	
NOTES:							

¹ Smart Equipment Incentives - Multi-tenant projects account for 0.2% of total savings in the SEI GIN program. Evaluation developed a strata, separate from retrofit projects, that consisted of a review of tracking data to the 2011 TRM deemed savings as well as a review of files from 4 projects.

² Smart Equipment Incentives - Appliance Recycling sampling strategy: The values presented here are for the impact evaluation of the residential Smart Appliance Recycling program. The results of the impact evaluation of that program were applied to the five appliances recycled in the GIN sector in PY3. Because the SAR population size and the target and achieved sample sizes pertain to the SAR evaluation, these numbers are excluded from the program total values.

³ Smart Equipment Incentives - New Construction sampling strategy for PY3 is for the broader Smart Construction Incentives program; the sample frame includes both C&I (46 projects) and GIN (23 projects) projects for PY2 (4 projects) and PY3 (65 projects).

7.2.2 M&V Methodology

The evaluation of the SEI GNI program consisted of four sub-components: GNI Retrofit projects, GNI Multi-tenant projects, GNI New Construction projects, and GNI Appliance Recycling projects. The M&V methodology for the SEI GNI Retrofit program was very similar to the PY2 methodology; however, as mentioned above, the GNI multi-tenant projects were evaluated under the Smart Home Rebates program due to measure similarities. Likewise, projects submitted under the SEI GNI New Construction program were evaluated as part of the SCI NC program. The SEI GNI Appliance Recycling projects were evaluated similarly to the Residential Smart Appliance Recycling program.

For the SEI GNI Retrofit projects, gross impacts for demand and energy were verified through different approaches for the three categories of measures in this program: 1) deemed, 2) partially deemed, and 3) custom measures. The measures in these categories were defined by the TRM.

The evaluation approach for deemed measures was to verify that both the quantity and the measure(s) installed match TRM-required specifications. The only fully deemed measures in the SEI GNI sector were the municipal traffic lighting installations. If a measure was partially deemed, the TRM provided the algorithms, relevant variables, and default assumptions for calculating impacts, which were then verified through an application review, site-specific M&V, and an update of the TRM-based calculations using TRM-based spreadsheet tools. Projects that include custom measures as defined by the TRM were evaluated through an application review and implementation of SSMVPs involving M&V site visits and custom calculations.

A site-specific M&V analysis was performed for the 16 Strata 1-3 SEI GNI projects. SSMVPs were based on International Performance Measurement and Verification Protocol (IPMVP) protocols, options A through C. The M&V analysis methods vary from project to project, depending on the complexity of the measures installed, the size of the associated savings, and the availability and reliability of existing data. On-site data collection included verifying the measure installation and that the efficiency measures are functioning and operating as planned (and if not, then in what way(s) there is a variance from the reported operation). On-site audits also included collecting data via metering (or obtaining facility-logged data) to support M&V calculations. Measurement included spot measurements, run-time data logging, and power measurements. Billing data was also requested and collected from PECO on a monthly and 15-minute interval basis. A primary focus of the data collection efforts was to verify and/or update the assumptions that feed into TRM tools or engineering algorithms of measure-level savings. Billing data was used to perform analyses for whole building retrofit measures involving EMS systems at several sites.

The peak kW savings estimation methodology was consistent with PECO requirements for each project and utilized the approved Act 129 peak demand calculators, where applicable. For project that involved billing analysis, the evaluation team performed a weather normalized

regression analysis to estimate savings for these projects and only monthly billing data was available. Instead of using the monthly billing data for the peak demand savings estimates and realization rate, the evaluation team modified the analysis for these projects to set the demand realization rate equal to the energy realization rate. We believe using this method is the best proxy for the likely demand realization rate.

Additionally, the evaluation team performed a thorough review of the pre- and post-operating conditions and selected an appropriate baseline condition for each measure based on the available information.

These calculations started with an engineering review of the algorithms used by the program to calculate energy savings and the inputs that feed into those algorithms.

For the five stratum 4 municipal lighting projects, desk reviews were completed to assess the reasonableness of savings estimates and application of the TRM. For one of the five municipal lighting projects, phone verification, in addition to the desk review, was also performed to evaluate the project savings.

Based on the site-specific evaluations of the 21 sampled projects in PY3 for the GNI retrofit program, the gross impact results yielded an energy realization rate of 0.75, with a peak demand realization rate of 0.69.

The evaluation team provided PECO the site-specific M&V reports for the verified projects. These site-specific impact evaluation reports summarize the ex ante savings, the ex post M&V plan, the data collected at the site, and all of the calculations and parameters used to estimate savings.

Relative precision levels for the SEI GNI retrofit measures for verified gross energy savings were 18 percent and 16 percent for demand, which are higher than the targeted relative precision of 15 percent. The main reason behind the higher relative precision levels was a wide range of variance in the realization rates of the sampled projects. This range was greater than was seen in PY2, when lighting projects were much more common. Stratum 1 energy realization rates for the SEI GNI retrofit program varied from 35 percent to 112 percent, resulting in a stratum-level relative precision of 32 percent. Stratum 2 had a relative precision of 58 percent due to realization rates ranging from 16 percent to 121 percent. Stratum 3 had a relative precision of 42 percent with realization rates ranging from 46 percent to 100 percent, while stratum 4 involving municipal lighting projects had a low relative precision of 0.1 percent with all sampled projects at almost 100 percent realization rates. Table 7-4 presents the strata-level and program-level relative precision levels for verified gross energy savings.

Table 7-4. PY3 Smart Equipment Incentives: GNI Program Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings (MWh)	Energy Realization Rate	Observed Coefficient of Variation (C_v) or Proportion	Relative Precision	Verified Gross Energy Savings (MWh)
SEI GNI Retrofit - Stratum 1	13,596	82%	0.55	32%	11,168
SEI GNI Retrofit - Stratum 2	10,543	73%	0.81	58%	7,661
SEI GNI Retrofit - Stratum 3	10,900	60%	0.60	42%	6,507
SEI GNI Retrofit - Stratum 4 – Municipal Lighting	4,401	100%	0.00	0%	4,402
SEI GNI - Multi-Tenant ¹	144	100%	0.00	0%	144
SAR - GNI ²	33	96%	0.53	4%	32
SEI GNI - New Construction - High ³	5,206	121%	0.18	0%	6,288
SEI GNI - New Construction - Medium ³	2,020	0.85	0.52	0%	1,710
SEI GNI - New Construction - Low ³	1,253	0.99	0.27	4%	1,244
Program Total	48,096	81%		19.9%	39,155
NOTES: ¹ The SEI GNI - Multi-tenant projects account for 0.2% of total savings in the SEI GNI program. Evaluation developed a strata, separate from retrofit projects, that consisted of a review of tracking data to the 2011 TRM deemed savings as well as a review of files from 4 projects. ² The PYTD Demand Realization Rate for Smart Equipment Incentives - Appliance Recycling is the from the Smart Appliance Recycling - Residential program, and is referred to as a Verification Rate. ³ Note: Sample frame includes both CI (46 projects) and GNI (23 projects) projects for PY2 (4 projects) and PY3 (65 projects). This table only contains reported and verified savings for the PY3 GNI projects, but reflects overall realization rates, coefficients of variation, and relative precision.					

The relative precision for demand for the SEI GNI Retrofit program was higher than expected due to a higher degree of variance in stratum-level realization rates. Stratum 1 demand realization rates varied from 6 percent to 99 percent, resulting in a stratum-level relative precision of 29 percent. Stratum 2 had a relative precision of 52 percent due to realization rates ranging from 9 percent to 135 percent. Stratum 3 had a relative precision of 39 percent due to a realization rate range of 46 percent to 100 percent, while stratum 4 projects involving municipal lighting had a low relatively precision of 0.1 percent with all sampled projects at almost 100 percent realization rates. Table 7-5 presents the strata-level and program-level relative precision levels for verified gross peak demand savings.

Table 7-5. PY3 Smart Equipment Incentives: GNI Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Reduction (MW)	Demand Realization Rate	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Demand Reduction (MW)
SEI GNI Retrofit - Stratum 1	1.5	81%	0.49	29%	1.2
SEI GNI Retrofit - Stratum 2	1.5	41%	0.74	52%	0.6
SEI GNI Retrofit - Stratum 3	1.8	73%	0.59	39%	1.3
SEI GNI Retrofit - Stratum 4 – Municipal Lighting	0.5	100%	0.00	0%	0.5
SEI GNI - Multi-Tenant ¹	0.0	100%	0.00	0%	0.0
SAR - GNI ²	0.0	96%	0.53	3%	0.0
SEI GNI - New Construction - High ³	0.7	133%	0.09	0%	0.881
SEI GNI - New Construction - Medium ³	0.3	143%	0.34	0%	0.367
SEI GNI - New Construction - Low ³	0.3	248%	0.48	75%	0.636
Program Total	6.5	85%		14%	5.6
NOTES: ¹ The SEI GNI - Multi-tenant projects account for 0.2% of total savings in the SEI GNI program. Evaluation developed a strata, separate from retrofit projects, that consisted of a review of tracking data to the 2011 TRM deemed savings as well as a review of files from 4 projects. ² The PYTD Demand Realization Rate for Smart Equipment Incentives - Appliance Recycling is the from the Smart Appliance Recycling - Residential program, and is referred to as a Verification Rate. ³ Smart Equipment Incentives - New Construction measures were evaluated under the Smart Construction Incentives program; the sample frame includes both C&I (46 projects) and GNI (23 projects) projects for PY2 (4 projects) and PY3 (65 projects).					

The evaluation found that projects with variable frequency drives and energy management systems consistently had verified savings that were either higher or lower than the reported savings.

For projects with VFDs, ex ante calculations utilized the TRM-based Motor and VFD tool for calculating savings resulting from installation of the VFDs. A review of the TRM energy savings

factor (ESF) and demand savings factor (DSF) calculation file¹⁸ by the evaluation team showed that the algorithms for demand savings factor appeared to be analyzing demand data only for the temperature bins of 87.5°F, 92.5°F, 97.5°F. The ex ante TRM calculations appear to be taking the average demand savings in the top few bins with performance data from enough bins to add up to the hottest 100 hours. The DSF determined in this way may be resulting in an underestimation of the warm weather savings, as evident from the ex post weather normalized billing analysis, which showed that VFD measures have peak kW savings during the entirety of the Act 129 Weather Dependent Peak Demand calculator¹⁹ prescribed proxy period of about 700 hours. The evaluation team believes that this discrepancy in peak kW determination is a major contributor for the high peak kW realization rates in many projects involving VFD measures. Likewise, the ESF factor is also a source of kWh saving estimation uncertainty. Similar observations were made during the evaluation of the SEI C&I program for this program year.

The findings from the gross impact evaluation suggest that the ex ante approach for derivation of the ESF and DSF for VFDs could be made consistent with the proxy period defined within the Act 129 Weather Dependent Peak Demand calculator. During the net-to-gross interviews with PECO program management staff and the implementation team, there was an indication of potential updates to the ex ante calculation methodologies for VFD measures. Additionally, the implementation team should consider calculation of savings estimates for the VFD measures using a custom approach utilizing weather normalized bins for site-specific operating characteristics (e.g., rated kW, flow) of the VFD-controlled pumps and motors (where applicable). This activity is currently in progress and should be expedited to the extent possible.

For projects involving EMS, the ex ante (non-TRM) calculations utilized assumed savings values of 2 kWh per square foot and 0.0001 kW per square foot,²⁰ which the evaluation team believes may be a viable rule of thumb in certain cases, but for impact evaluations is an inaccurate way of estimating site-specific savings. Usage of these factors has caused an underestimation of peak kW savings due to the installation of EMS measures based on this evaluation, as the EMS systems enable a higher degree of control during the peak season, which can be exploited by customers sensitive to high demand costs. The evaluation team utilized weather normalized billing analysis for savings calculations and these analyses consistently showed higher peak kW savings than were claimed by PECO for such measures.

Due to the diverse nature of EMS measures, the evaluation team thinks that a site-specific custom calculation approach for EMS measures, possibly utilizing a combination of Option C

¹⁸ Appendix F of the PA TRM.

¹⁹ Provided by the EDC for peak demand estimation purposes.

²⁰ Columns AH-AL of the '300' tab of the EDC quarterly tracking database extracts.

(Billing Analysis) and IPMVP Option D (Calibrated Simulation) may yield accurate results instead of using the prescriptive savings values.

7.3 Impact Evaluation Net Savings

Net-to-gross activities were conducted jointly for the SEI C&I and the SEI GNI programs, with representation in each program. The activities were consistent with the approach described for SEI C&I. The primary objective of the net savings analysis was to determine the program's net effect on customers' electricity usage. After gross program impacts have been assessed, net program impacts are derived by estimating an NTG ratio that quantifies the percentage of the gross program impacts that can reliably be attributed to the program. The NTG ratio is generally calculated by estimating free ridership and spillover, using the following equation:

$$\text{NTG Ratio} = 1 - \text{Free-ridership Rate} + \text{Spillover Rate}$$

Free ridership was assessed using a customer self-report approach following a framework that was developed for evaluating net savings of California's 2006-2008 non-residential energy efficiency programs. This method calculates free ridership using data collected during participant phone surveys concerning the following three items:

1. A Timing and Selection score that reflects the influence of the most important various program and program-related elements in the customer's decision to implement the specific program measure at this time.
2. A Program Influence score that reveals the perceived importance of the program (whether rebate, recommendation, or other program intervention) relative to non-program factors in the customers' decision to implement the specific program measure. This score is cut in half if they learned about the program after they decided to implement the measures.
3. A No-Program score that captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available. This score accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program qualifying measures at a later date if the program had not been available.

Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure. The rationale for using the maximum value is to capture the most important element in the participant's decision-making process.

The calculation of free ridership for the program is a multi-step process. The participant survey covered a battery of questions used to assess a net-to-gross ratio for a specific end use and project. Responses were used to calculate a Timing and Selection score, a Program Influence

score, and a No-Program score for each project covered through the survey. These three scores can be given values of 0 to 10, where a lower score indicates a higher level of free ridership. The calculation then averaged those three scores to come up with a measure-level free-ridership score. If the customer had additional measures at the same site as part of the same project, the survey asked whether the responses also apply to the other measures. If that was the case, the entire project was given the same score. If the customer has additional projects at other sites covering the same or other end uses, the survey asked whether the responses also applied to the other projects. If that is the case, the additional projects are also given the same score.

In addition, responses to other survey questions allowed Navigant to assess whether spillover may be occurring and the type of equipment involved, but do not offer enough detail to quantify the spillover. Spillover could be quantified through follow-up questioning and site visits on potential spillover occurrences as reported by the participants.

The evaluation team completed a total of 43 interviews for the SEI GNI – Retrofit program participating customers covering the free-ridership and spillover questions. Analysis of the NTG data for SEI GNI participant surveys is currently underway and the expected range of the kWh-weighted NTG (net of free ridership) ratio is 0.51 – 0.62.

7.4 Process Evaluation

Process evaluation activities were conducted jointly for the SEI C&I and the SEI GNI programs, as many of the administrators and contractors were common. The activities were consistent with the approach described for SEI C&I, although separate inquiries were sometimes pertinent. Navigant conducted four primary research activities to perform the process evaluation. These activities consisted of in-depth phone interviews with PECO program management and KEMA implementation staff, CATI surveys with participating contractor surveys, CATI surveys with program participants with projects in the wait list, and CATI surveys with program participants.

Table 7-6 provides a summary of the principal data sources contributing to the process evaluation of the PY3 Smart Equipment Incentives Program addressing both C&I and GNI. For each data element listed, the table provides the targeted population, the sample frame, sampled completes, and timing of data collection. The tracking data for this evaluation was extracted from a copy of the PECO online database delivered electronically to the evaluation team on a quarterly basis.

Table 7-6. PY3 Smart Equipment Incentives Program Process Evaluation Principal Data Sources

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Targeted Sample Size	Achieved Sample Size	Timing
In-depth Phone Interviews	PECO Program Staff	Contacts from PECO	Business Program Managers and staff	3	3	May 2012
	Program Implementers	Contacts from PECO	KEMA Program Implementation Staff	3	3	June 2012
Contractor CATI Surveys	PY3 Contractors	PECO Tracking Database	Stratified Random Sample by Project Level kWh (3 strata)	32 Participating Contractors	30 Participating Contractors	October 2012
Wait-list CATI Surveys	PY3 Program Customers with projects in the wait-list	PECO Wait-list	Stratified Random Sample by Project Level kWh (4 strata)	18 Customers	18 Customers	September 2012
Program Participating Customers CATI Surveys	PY3 C&I Participants	PECO Tracking Database	Stratified Random Sample by Project Level kWh and Measure type (3 strata each for lighting and non-lighting participants)	32 Lighting unique participating customers; 18 Non-lighting unique participating customers	35 Customers	October 2012
	PY3 GNI Participants (shown in the C&I section to be comprehensive)	PECO Tracking Database	Stratified Random Sample by Project Level kWh and Measure type (4 strata for lighting and 3 strata for non-lighting participants)	39 Lighting unique participating customers; 18 Non-lighting unique participating customers	43 Customers	October 2012

The activities conducted during the process evaluation are further described in the following sections.

7.4.1 PECO Program Management Staff and KEMA Staff Interviews

The evaluation team conducted three in-depth interviews with PECO staff and three in-depth interviews with key members of the Smart Equipment Incentives program implementation

contractor team, KEMA, during the months of May and June 2012. The interviews were designed to enable the evaluation team to ask closed-ended questions about the program's administration and delivery during PY3 and also to obtain "real-time" information about current program activity through asking open-ended questions that created a "free-flowing" conversation. To inform these interviews, the evaluation team reviewed current program reporting documents, marketing materials, and customer materials, such as the Wait-list Policies and Procedures document.

The evaluation team gleaned a few findings during the in-depth interviews:

- The announcement of the wait list caused a high inflow of applications at the beginning of the PY3 program cycle and PECO and KEMA staff effectively worked together to modify the process for handling project applications.
- Marketing efforts during PY3 shifted from an incentive-based marketing strategy to a customer education strategy.
- KEMA and PECO both made a concerted effort to enter the customer decision-making process sooner to lower free ridership.
- PECO worked to implement the Navigant suggested changes on the tracking system.
- Preliminary findings indicate that participating contractors are more dissatisfied with the wait list than customers. They recognize that the program is a sales tool for them and in some cases had hired staff to sell the program to customers.
- Of particular relevance for the GNI program: PECO is currently considering raising the incentive amounts by approximately 10 percent in Phase II in order to sustain and increase participation of GNI customers.

7.4.2 Participating Contractor Survey

Computer-Aided Telephone Interview survey data is being collected from participating contractors to support the process evaluation efforts, particularly focusing on the impact of the wait-list, program marketing and participation questions, and administration and delivery questions. The participating contractor survey was conducted at the contractor level; thus, the survey covered both SEI C&I and SEI GNI projects. In total, 219 contractors completed 732 SEI projects²¹ in PY3.

²¹ Total number of projects does not include projects without contractor contact information. Navigant eliminated 277 projects that did not have complete contact information in the database.

7.4.3 A total of 20 participating contractors were interviewed by the evaluation team as part of this effort. Wait-list Customer Survey

The Navigant team (Itron CATI center) conducted 18 CATI surveys with wait-listed customers to determine the level of customer satisfaction with the program, as well as the effects of the wait list on the level of future program participation.

PECO's database of wait-listed customers had a total of 176 customers with 363 projects.²² In order to avoid an overlap with the contractor CATI survey, the evaluation team cleaned the database and eliminated all the projects that had a contractor as the contact name in the database. The final wait-list sample pool had 131 customers and 182 projects. This survey also covered both SEI C&I and SEI GNI projects; thus, the results will be at the SEI program level and will not be split by C&I and GNI.

Preliminary findings indicate that about two-thirds of wait-listed customers are dissatisfied with the wait list. The top two reasons for dissatisfaction are the discontinuance of incentives and lack of communication from PECO. Many customers claim they would like to have regular status updates of where they are in the process. Additionally, the results show that customers are confused with the concept of the wait list.

7.4.4 Program Participating Customer Survey

A participating customer CATI survey was conducted for the PY3 Smart Equipment Incentives program. The survey assesses all of the parameters necessary to calculate free ridership and net-to-gross. Additional data was collected to support the process evaluation (such as program design and implementation, program marketing and awareness, and customer satisfaction), a qualitative assessment of spillover, and business demographics for the process component of the evaluation.

A total of 43 interviews were completed and covered both lighting project participants (27 total) and non-lighting/custom project participants (16 total). The primary goal of splitting the programs into two samples was to determine if there is a significant difference in the participant decision-making process and participant satisfaction between the lighting participants and non-lighting/custom participants.

The sampling unit for the process evaluation was the unique participating customers; it does not include projects where the primary contact person in the database is a contractor.²³ The

²² Navigant eliminated 4 projects that did not have complete contact information in the database.

²³ There are 194 projects with a contractor as the primary contact person in the database. These were not included in the sample.

rationale for contacting unique participating customers is to get project information from the final decision maker. Overall, 117 unique participant contacts completed 250 projects²⁴ in PY3.

The surveys were designed to achieve 85/15 confidence/precision individually and exceed that when combined to the program level. All CATI surveys are being completed by the Navigant team (Itron CATI center); the survey effort was completed in November 2012. Analysis of the participant survey data is still underway and the expected range of the kWh-weighted NTG (net of free ridership) ratio is 0.51 – 0.62.

²⁴ Total number of projects does not include projects without customer contact information. Navigant reviewed PECO's database file and eliminated 2 GNI projects from the sample pool, which had incomplete contact information or no contact information.

7.5 Financial Reporting

A breakdown of the program finances is presented in Table 7-7.

Table 7-7. Summary of Smart Equipment Incentives: GNI Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$1,526	\$4,261	\$8,931
EDC Incentives to Trade Allies	\$2	\$95	\$95
Subtotal EDC Incentive Costs	\$1,528	\$4,356	\$9,027
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$467	\$1,706	\$3,683
Management ^[2]	\$82	\$334	\$1,028
Marketing ^[3]	\$251	\$349	\$388
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$799	\$2,389	\$5,098
EDC Evaluation Costs	\$144	\$350	\$672
SWE Audit Costs			
Total EDC Costs^[4]	\$2,471	\$7,095	\$14,797
Participant Costs^[5]	N/A	\$15,390	\$31,866
Total TRC Costs^[6]	N/A	\$18,128	\$37,637
Total Lifetime Energy Benefits	N/A	\$29,721	\$64,408
Total Lifetime Capacity Benefits	N/A	\$3,754	\$7,480
Total TRC Benefits^[7]	N/A	\$33,544	\$71,632
TRC Ratio^[8]	N/A	1.85	1.90

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

8 Smart Construction Incentives Program

The purpose of the Smart Construction Incentives program is to greatly improve the energy efficiency of newly constructed facilities and facilities that are completely renovated or reconstructed in the PECO service territory. The program covers both C&I and GNI projects.²⁵ The SCI program provides facility designers and builders with training, design assistance, and prescriptive and custom incentives to incorporate energy-efficient systems and construction practices in facilities that surpass the requirements of state and local energy codes²⁶ or meet the requirements set forth in application material.²⁷

This program launched in February 2011, the second half of PY2 of PECO's Energy Efficiency and Conservation Plan. Four projects were completed in PY2, and in PY3 PECO paid incentives for 65 projects. Program activities through PY3 included some marketing and training offerings in conjunction with the SEI program. The program had planned to launch additional recruiting and training activities to attract program actors such as developers, engineers, and architects. However, these recruitment events were postponed due to the imposition of the wait list for PY3. Throughout late PY2 and PY3, the program provided technical assistance, technical review, and incentive processing for participants.

Due to the limited participation in PY2, Navigant did not conduct an impact evaluation. The four projects paid in PY2 were included in the sample frame for the PY3 impact evaluation and thus have the same gross realization rate and net-to-gross ratios as the PY3 projects, but have been considered separately for the benefit-cost analysis.

8.1 Program Updates

PECO did not make any major updates to program offerings for PY3. Because the program is still relatively new, several changes to program administration were implemented to improve data tracking:

- PECO established a new field in the program database to track incentives paid to design professionals for whole building projects and updated these design incentives for previously paid projects.

²⁵ GNI projects are paid and claimed through the SEI GNI program but implemented through the SCI program.

²⁶ ASHRAE standard 90.1-2007 applies, in general, and is the baseline for savings comparisons.

²⁷ For lighting projects the installed lighting power is lower than the code lighting power density limits by at least 10%.

- PECO corrected the sector designation for several GNI projects previously assigned to the commercial sector.
- PECO shifted the payment of incentives for SCI GNI projects to the SEI GNI program.

8.2 Impact Evaluation Gross Savings

The impact evaluation consisted of a combination of desk review and on-site inspections for a sample of projects. Although the program is small, it encompasses an extensive range of measures and has many complex whole building and custom projects. Navigant used three main approaches for evaluating sampled projects:

- **Desk Review.** Navigant reviewed several prescriptive projects for compliance with the PA TRM. This desk review made use of project applications, associated calculations, and submitted invoices and specification sheets. Measures included new construction lighting, HVAC, and refrigeration measures such as anti-sweat heater controls or LED refrigerated case lighting. We also performed a desk review of one smaller whole building project. For this review, we reviewed simulation model inputs and outputs.
- **Whole Building Verification.** The majority of the projects in the on-site sample were whole building custom projects. Due to the complexity of these projects and the large number of measures they include, Navigant limited site visits to verification only for PY3. Subsequent analysis included comparing model inputs to parameters verified on-site and making adjustments to modeled savings if needed. In some cases, Navigant was able to directly adjust the original models; however, when models were not available, we used measure-specific algorithms from the TRM to determine the percent change in savings.
- **Measurement and Verification.** For two large single-measure projects, Navigant collected usage data from the site. In one case field staff installed lighting loggers to estimate hours of use, and in the other the site provided extensive trend data for a custom HVAC system. Navigant then used this data to adjust ex ante estimates.

For all projects, Navigant paid close attention to baseline choices, which are not always obvious for new construction measures.

Table 8-1 presents the CPTTD reported savings by sector for the SCI program. Note that the GNI projects in the SCI program are processed in the SEI GNI program and are not reflected in the Table 8-1 totals.

Table 8-1. CPITD Smart Construction Incentives Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	0	0	0	0
Low-Income	0	0	0	0
Commercial and Industrial	46	5,231	0.88	\$732
Government and Non-Profit	0	0	0	0
CPITD Total	46	5,231	0.88	\$732

Table 8-2 presents the PY3 reported savings for each quarter.

Table 8-2. Smart Construction Incentives Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	25	3,519	0.64	344
PY3 Q2	14	2,059	0.31	223
PY3 Q3	15	2,422	0.33	494
PY3 Q4 ¹	(10)	(3,312)	(0.41)	(410)
PY3 Total	44	4,688	0.87	651
CPITD Total	46	5,231	0.88	732

¹The negative values shown for Q4 reflect the fact that all CPITD new construction projects in the GNI sector, which had previously been credited to the SCI program, were transferred to the SEI GNI program in PY3 Q4. All benefits and costs associated with those projects are reported under the SEI GNI program.

Due to the small size of the program in PY3, Navigant combined the CI and GNI projects into a single sample frame for the impact evaluation. As mentioned previously, Navigant also included the four projects completed in PY2 for a total of 69 projects. Navigant used a stratified sample design based on project size (gross reported kWh) with approximately one-third of the program savings in each stratum. The sample was conservatively designed to meet 85 percent confidence and 10 percent precision at the program level. Navigant was able to achieve the target sample sizes for all strata as shown in Table 8-3.

Navigant conducted site visits for all “high” and “medium” strata projects, for a total of eight site visits. For whole building projects, which encompassed a wide variety of measures, the visits served to verify at least a sample of the installations for each measure. Navigant used metering and trend data gathering for two large projects.

For the remaining “low” strata projects, Navigant conducted a file review of the ex ante calculations.

Table 8-3. Smart Construction Incentives Program Sampling Strategy for PY3

Stratum	Strata Boundaries	Population Size ¹	Assumed Coefficient of Variation (C _v) or Proportion in Sample Design	Target Levels of Confidence & Precision	Target Sample Size	Achieved Sample Size	Evaluation Activity
High	>1.5 GWh	2	0.5	85/0	2	2	On-site verification and analysis
Medium	>0.47 GWh, <1.5 GWh	6	0.5	85/0	6	6	On-site verification and analysis
Low	<0.47 GWh	61	0.5	85/33	6	6	File review analysis
Program Total	-	69	-	85/15	14	14	-

¹Sample frame includes both CI (46 projects) and GNI (23 projects) projects for PY2 (4 projects) and PY3 (65 projects).

Table 8-4 presents the verified energy savings by stratum and overall.

Table 8-4. PY3 Smart Construction Incentives Program Summary of Evaluation Results for Energy

Stratum	Reported Gross Energy Savings	Energy Realization Rate	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Energy Savings
High	0	N/A	N/A	N/A	0
Medium	1,827	0.85	0.55	0.0%	1,546
Low	2,861	0.99	0.27	3.6%	2,839
Program Total ¹	4,688	1.03		0.7%	4,385

¹Note: Sample frame includes both CI (46 projects) and GNI (23 projects) projects for PY2 (4 projects) and PY3 (65 projects). This table only contains reported and verified savings for the PY3 C&I projects, but reflects overall realization rates, coefficients of variation, and relative precision.

Table 8-5 presents the verified demand reduction by stratum and overall.

Table 8-5. PY3 Smart Construction Incentives Program Summary of Evaluation Results for Demand

Stratum	Reported Gross Demand Reduction (MW)	Demand Realization Rate	Observed Coefficient of Variation (C _v) or Proportion	Relative Precision	Verified Gross Demand Reduction (MW)
High	0.00	1.33	0.09	0.0%	0.00
Medium	0.22	1.43	0.34	0.0%	0.31
Low	0.65	2.48	0.48	75.0%	1.62
Program Total ¹	0.87	1.88		41.1%	1.93

¹Note: Sample frame includes both CI (46 projects) and GNI (23 projects) projects for PY2 (4 projects) and PY3 (65 projects). This table only contains reported and verified savings for the PY3 C&I projects, but reflects overall realization rates, coefficients of variation, and relative precision.

8.3 Impact Evaluation Net Savings

Navigant used a self-report approach to determine the NTG ratio for this program. In new construction projects, design firms are often key decision makers for projects and can provide insight to project decision making. Because of this and the fact that some projects only listed trade ally contact information, Navigant relied on both participant surveys and trade ally interviews to inform the NTG calculation.

In total, Navigant collected attribution data from four trade allies representing 26 projects and nine participants representing 11 projects. Thus, the evaluation collected NTG inputs for a total of 37 of the program's 69 PY2 and PY3 projects. Many of these projects were completed by national retailers who use prototypical building designs for all new construction projects, making attribution responses applicable to several projects.

For each participant, the survey focused on a single project. For participants with multiple projects, Navigant asked about the project with the greatest savings. The attribution questions first asked about the largest measure installed (as quantified by gross reported kWh). At the end of the battery, participants were asked if the decision-making process was different for the other measures installed, if any. If participants indicated that their decision-making process was different for any of the remaining measures, the interviewer repeated the key attribution questions.

Navigant calculated the NTG ratio for the program as:

$$\text{NTG} = 1 - \text{FR} + \text{SO}$$

Where FR = Free-ridership and SO = spillover. The survey respondents did not indicate any spillover and this factor has been set to zero.

The free-ridership battery asked questions designed to inform three program scores, shown in Table 8-6.

Table 8-6. Components of Free-ridership Score

Component	Description	Scoring	Number of Questions
Influence	Rating influence of program and program components on decision	0-10	2
Quantity	Likelihood same quantity of high-efficiency measures installed	0-10 0-100%	2
Efficiency	Likelihood same efficiency level of measures installed	0-10 0-100%	2

For national retailer participants (chain stores), where decision-making often occurs at a national scale, the interviewer asked about both the direct influence of the PECO program as well as PECO's indirect influence as one of many utility rebate programs offered across the country. This is reflected in the Influence scores for these participants.

Navigant normalized each score to a percentage scale and calculated free ridership as follows:

$$FR = 1/3 * ((1 - \text{Influence}) + \text{Quantity} + \text{Efficiency})$$

The NTG ratio of the program for PY2 and PY3 is 0.30.

8.4 Process Evaluation

The process evaluation for PY3 consisted of the following activities:

- In-depth interviews with program staff
- Review of program operations manuals, marketing collateral, and training materials
- Participant surveys
- Trade ally in-depth interviews

8.4.1 Program Staff In-Depth Interviews

Navigant interviewed both the PECO and KEMA project managers early in the evaluation to understand the program's design and history. These interviews were conducted separately. The interviews covered the following topic areas:

- Program roles and responsibilities
- Program goals and objectives
- Program design
- Program implementation and processes
- Marketing and outreach
- Program training
- Barriers and benefits to program participation
- Quality assurance and quality control
- Customer service

Both PECO and KEMA reported that they had been able to work together closely on this program, maintaining a very effective working relationship and communication structure. As reported previously, many program processes leverage the existing procedures already in place for the SEI program.

Program staff were not able to provide much detail on new marketing and outreach activities because nearly all of these efforts were suspended once the program instituted the wait list for PY3. As a result, the program has not been reaching out to the design community as much as planned, and the bulk of trade allies remain contractors also involved with the SEI program.

8.4.2 Review of Program Documentation

Navigant reviewed the following program documents:

- Operations manual
- Training materials
- Marketing material

The operations manual again shows that the program leverages the SEI program procedures for most aspects of implementation. While for the most part this has enabled the SCI program to get up and running more quickly, there are some aspects—such as certain measure definitions where code requirements affect the baseline—that should be updated to reflect new construction offerings.

Navigant's review of the training materials confirmed that, as indicated by program staff, there has been little new construction-specific training to date. KEMA has included information about the program in presentations to account managers to boost program awareness. PECO also provided trade ally training presentations from the SEI program, which included materials introducing the SCI program offerings.

For marketing and outreach, KEMA has developed flyers and case studies to distribute to trade allies and account managers. Both the marketing and training materials accurately describe the program and its opportunities for participants.

8.4.3 Participant Surveys

Navigant surveyed 9 of the 37 unique program participants, representing 12 of the 69 projects completed in PY2 and PY3. Because of the small size of the program and the number of participants with multiple projects, Navigant was unable to complete surveys with more unique participants. As mentioned previously, Navigant also conducted in-depth interviews with four trade allies who were listed as participants in the program tracking data. One of these trade allies represented 24 of the program projects.

The process survey indicated high levels of program satisfaction but also, as indicated in the net impact analysis, high levels of free ridership.

8.4.4 Trade Ally In-Depth Interviews

Navigant completed in-depth interviews with four program trade allies. The trade ally interviews focused on the following areas:

- Program awareness and training
- Program participation
- Marketing and outreach
- Barriers and benefits of participation
- Customer service experience
- Economic and jobs impact on trade allies

The individuals interviewed gave generally positive feedback to the program. However, some did not seem to distinguish the SCI program from PECO's other commercial offerings, indicating that program-specific awareness is still low.

8.4.5 Tracking System, Quality Assurance, and Quality Control Review

Navigant will provide a more detailed review of the program tracking system and quality assurance procedures in the upcoming PY3 research report. Three high-level findings are presented here:

- The SCI program tracking system has seen some changes over the course of the program year, namely the addition of design incentives and ability to designate projects as GNI or C&I. PECO had to make a series of adjustments in order for the system to properly reflect total energy savings. These adjustments, though necessary and well documented,

did make it difficult to analyze program data because each adjusted project had multiple entries in the database.

- During the course of the evaluation, Navigant also observed some inconsistencies within the data on how certain measures were tracked. These inconsistencies did not appear to affect program savings or incentives.

For some projects, Navigant found that project documentation lacked clarity. In many cases, the evaluation team had to request additional information from ICF and KEMA in order to understand the rationale behind choice of baseline or other impact parameters. Navigant recommends improving file organization and documentation to limit this kind of confusion.

8.5 Financial Reporting

A breakdown of the program finances is presented in Table 8-7.

Table 8-7. Summary of Smart Construction Incentives Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$30	\$532	\$613
EDC Incentives to Trade Allies	\$7	\$119	\$119
Subtotal EDC Incentive Costs	\$37	\$651	\$732
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$116	\$210	\$401
Management ^[2]	\$13	\$36	\$113
Marketing ^[3]	\$15	\$49	\$54
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$145	\$295	\$568
EDC Evaluation Costs	\$5	\$13	\$63
SWE Audit Costs			
Total EDC Costs^[4]	\$187	\$959	\$1,363
Participant Costs^[5]	N/A	\$2,127	\$2,471
Total TRC Costs^[6]	N/A	\$2,435	\$3,103
Total Lifetime Energy Benefits	N/A	\$3,996	\$4,483
Total Lifetime Capacity Benefits	N/A	\$1,130	\$1,143
Total TRC Benefits^[7]	N/A	\$5,126	\$5,626
TRC Ratio^[8]	N/A	2.11	1.81

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in

costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

9 Conservation Voltage Reduction Program

The Conservation Voltage Reduction (CVR) program achieves load reductions through changes in voltage regulation parameters at the substation/transformer level. This change involves a *physical adjustment* in transformer settings governing voltage at the substation. By adjusting substation voltage, the program impacts hourly energy flows and capacity, including demand coincident with the system peak period(s), included within the top 100 (peak demand) hours on the system load duration curve. Changes to voltage settings at substation/feeder locations were completed during a four-month period from February through May 2010 in PECO's CVR program.

9.1 Program Updates

The CVR program was fully implemented by the end of PY2. There was no incremental program activity in PY3, so there are no energy or demand savings attributed to the program in PY3.

9.2 Impact Evaluation Gross Savings

Table 9-1 presents cumulative savings from the CVR program activity in PY2. Note that as this program is implemented at PECO's substations, none of PECO's customers actively participate directly in the program, but all ratepayers are its beneficiaries.

Table 9-1. CPITD Conservation Voltage Reduction Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	0	105,723	0	0
Low-Income	0	25,630	0	0
Commercial and Industrial	0	150,575	0	0
Government and Non-Profit	0	38,445	0	0
CPITD Total	0	320,372	89.3	0

9.3 Impact Evaluation Net Savings

As there is no opportunity for PECO customers to undertake the distribution system modifications implemented for this program, and PECO implemented the program in direct response to Act 129, there is no opportunity for free riders or spillover. Therefore, the NTG ratio for this program is 1.0.

9.4 Process Evaluation

The Navigant team completed a telephone survey of residential and commercial customers to assess the effect of the Conservation Voltage Reduction program on customer satisfaction. This was done by comparing the experiences of both residential and commercial customers subject to CVR to the small population of those who are not.

For the residential survey, the sample was pulled proportionally to the disposition of CVR customers within the income segments for both CVR and non-CVR customers. For the commercial survey, the sample was designed to oversample the larger energy-using customers, but was still pulled to get the same number of CVR and non-CVR customers. The resulting sample design is presented below.

Table 9-2. CVR Survey Sample

Residential/ Commercial	CVR	Income Group	Size	Number of Survey Completes	Percent of Survey Completes by Segment
Residential	No	.	-	37	74%
		1	-	9	18%
		2	-	2	4%
		3	-	1	2%
		4	-	1	2%
	Yes	.	-	38	75%
		1	-	9	18%
		2	-	2	4%
		3	-	1	2%
		4	-	1	2%
Commercial	No	-	0-100kW	29	58%
		-	100-500kW	11	22%
		-	>500kW	10	20%
	Yes	-	0-100kW	29	59%
		-	100-500kW	10	20%
		-	>500kW	10	20%

The survey indicated that in general the CVR program is not noticeable to PECO customers. Few customers reported any complaints about electrical service and there was not a significant difference between the customers affected by CVR and those who are not.

As shown in Table 9-3 below, 80 to 90 percent of customers haven't noticed any change (good or bad) in their electrical service over the past 1 to 2 years. Fewer commercial customers have noticed a change in their service when compared to residential customers (8 percent versus 11 percent). Only 4 percent of commercial CVR customers have noticed a change in service and in the question that followed they all reported the change they noticed was an improvement in service. On the other hand, 12 percent of non-CVR commercial customers reported noticing a change in service (but only two of which reported a decline in service). Very few residential customers reported noticing a change in service as well. Only 12 percent of non-CVR and 10 percent of CVR customers noticed a change in service and only 2 non-CVR and 1 CVR customer noted that the change they noticed was a decline in service.

Table 9-3. Customers Noticing a Change in Service

SQ1a. Have you noticed any change, either in terms of improvement or decline during the past 1 to 2 years, in the quality of your electrical service from PECO?	Total			Residential			Commercial		
	Total	Non-CVR	CVR	Total	Non-CVR	CVR	Total	Non-CVR	CVR
Yes	10%	12%	7%	11%	12%	10%	8%	12%	4%
No	86%	82%	89%	84%	84%	84%	87%	80%	94%
Refused	1%	1%	1%	2%	.
Don't know	5%	5%	4%	5%	4%	6%	4%	6%	2%
N	200	100	100	101	50	51	99	50	49

9.5 Financial Reporting

A breakdown of the program finances is presented in Table 9-4.

Table 9-4. Summary of Conservation Voltage Reduction Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$0	\$0	\$0
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$0	\$0	\$0
Design & Development	\$0	\$0	\$0
Administration ^[1]	(\$69)	\$319	\$1,711
Management ^[2]	\$16	\$54	\$159
Marketing ^[3]	\$0	(\$1)	\$0
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	(\$54)	\$371	\$1,869
EDC Evaluation Costs	\$27	\$71	\$140
SWE Audit Costs			
Total EDC Costs^[4]	(\$27)	\$442	\$2,009
Participant Costs^[5]	N/A		\$0
Total TRC Costs^[6]	N/A	\$442	\$2,009
Total Lifetime Energy Benefits	N/A	0	\$335,970
Total Lifetime Capacity Benefits	N/A	0	\$63,414
Total TRC Benefits^[7]	N/A	0	399,384
TRC Ratio^[8]	N/A	0	198.78

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

10 Residential Smart AC Saver Program

The Smart A/C Saver Program is a direct load control program for residential customers based on the installation of digital control units (switches) on qualified central air conditioners. Participants are incented at the rate of \$120/year (\$30 per four summer months per installed device). During peak summer hours, control signals can be sent to reduce air-conditioning load by cycling the compressor 50 percent within each home. The program is designed to provide demand response during PECO's top 100 hours of system peak loads. Switches have been installed in participant homes, and five control events were called during PY3.

10.1 Program Updates

The Residential A/C Saver Program added a total of 37,437 participants in PY3 bringing total participation to 78,651 participants by PY3 year end. PY3 was the first year the Smart A/C Saver Program began calling system-wide events, with a total of two system-wide events being called by the end of the program year.

Both events called in PY3 utilized an adaptive algorithm cycling strategy that reduced participating A/C compressors run time from the hour prior in half. After in-depth analysis of customer response to this strategy by PECO, the cycling strategy was changed to that of a 15/30 cycling strategy. This strategy limits cycling time to a maximum of 15 minutes out of every half hour and more closely aligns with the program design and marketing message to participating customers.

10.2 Impact Evaluation Gross Savings

No savings were claimed for PY3 for the Residential A/C Saver Program.

Table 10-1. CPITD Residential A/C Saver Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	78,651	0	0	8,628
Low-Income	0	0	0	0
Commercial and Industrial	0	0	0	0
Government and Non-Profit	0	0	0	0
CPITD Total	78,651	0	0	8,628

Table 10-2. Residential A/C Saver Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	15,798	-	-	3,606
PY3 Q2	5,763	-	-	4,197
PY3 Q3	8,127	-	-	0
PY3 Q4	7,749	-	-	0
PY3 Total	37,437	-	-	7,803
CPITD Total	78,651	-	-	8,628

10.3 Impact Evaluation Net Savings

The SWE is conducting a statewide assessment of the potential impacts of the PJM payments for DR. Experience indicates that customers do not have the motivation or ability to cycle their HVAC units in the absence of a program.

10.4 Process Evaluation

The primary objective of the process evaluation is to ensure the program is structured to achieve cost-effective savings, while maintaining high levels of market penetration, customer satisfaction, and program efficiency. Navigant conducted in-depth interviews and reviewed program and marketing materials to answer the process-related research questions regarding program design, implementation processes, and marketing.

Navigant conducted participant surveys to gather information on customer demographics, how customers learned of the program, their satisfaction with the installation process, and how they operate their air conditioner on a typical summer day and during heat waves. Beginning in PY3, after customers had experienced control events, Navigant asked if they noticed load control events, and how they and their homes responded to these events.

The program is well run and well liked by customers. In June 2012, enrollments for the program ended and the program entered into a maintenance mode.

10.4.1 Marketing

Bill inserts and direct mail flyers were the most effective methods of marketing the program. These channels will continue to be important conduits for information during the maintenance phase of the program.

10.4.2 Customer Satisfaction

Program participants were very satisfied with all aspects of the Residential A/C Saver Program in PY3, thus influencing the loyalty to the program and helping to create a high level of

satisfaction with PECO. Almost all (95 percent) participants were very satisfied with their experience with the Smart A/C Saver Program, as indicated by satisfaction scores of 8, 9, or 10 on a 0 to 10-point satisfaction scale.

10.4.2.1 Major findings

Satisfaction with the Program was as follows:

- The technician (100%)
- The installation (97%)
- The timeliness of the installation (95%)
- The four bill credits (89%)
- The amount of energy saved (74%)
- Satisfaction with PECO (78%)
- The program overall (95%)
- Satisfaction with control events

Three out of four residential survey participants did not know how many load control days they experienced last summer (79 percent). The most common answer (given by 10 percent of respondents) was that they had experienced two control days. Four percent of respondents did not think they were controlled at all last year.

Sixty-five percent of those respondents who answered the question were satisfied with the number of event days in 2011.

Over 70 percent of the residential respondents would not estimate how many days PECO would call control days in PY4 (73 percent). Of those who were able to guess, answers ranged from 0 to 75. The average number of days anticipated by survey participants, when the answer of 75 days was excluded as an outlier, was 8. With the outlier included in the average number of days, the average increased to 12 control days.

10.5 Financial Reporting

A breakdown of the program finances is presented in Table 10-3.

Table 10-3. Summary of Residential A/C Saver Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	(\$0)	\$7,803	\$8,628
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	(\$0)	\$7,803	\$8,628
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$626	\$3,536	\$7,388
Management ^[2]	\$511	\$4,666	\$12,602
Marketing ^[3]	\$69	\$135	\$305
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$1,205	\$8,336	\$20,294
EDC Evaluation Costs	\$74	\$180	\$424
SWE Audit Costs			
Total EDC Costs^[4]	\$1,280	\$16,320	\$29,347
Participant Costs^[5]	N/A	\$7,803	\$8,628
Total TRC Costs^[6]	N/A	\$16,320	\$29,347
Total Lifetime Energy Benefits	N/A	0	\$0
Total Lifetime Capacity Benefits	N/A	0	\$0
Total TRC Benefits^[7]	N/A	0	0
TRC Ratio^[8]	N/A	0	0

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

11 Commercial Smart AC Saver Program

The Smart A/C Saver Program is a direct load control program available to small commercial customers based on the installation of programmable thermostats in small businesses with qualified air conditioners. Participants are incented at the rate of \$120/year (\$30 per four summer months per installed device). During peak summer hours, control signals can be sent to reduce air-conditioning load within a business. The program is designed to provide demand response during PECO's top 100 hours of system peak loads. Thermostats have been installed in participant businesses, and one control event was called during PY3.

11.1 Program Updates

The Commercial A/C Saver Program added a total of 2,356 participants in PY3, bringing total participation to 2,446 participants by PY3 year end. PY3 was the first year the Smart A/C Saver Program began calling system-wide events, with a total of one system-wide event being called by the end of the program year.

The sole event called in PY3 utilized an adaptive algorithm cycling strategy that reduced participating A/C compressors run time from the hour prior in half. After in-depth analysis of customer response to this strategy by PECO, the cycling strategy was changed to that of a 15/30 cycling strategy. This strategy limits cycling time to a maximum of 15 minutes out of every half hour and more closely aligns with the program design and marketing message to participating customers.

In PY2 the installation of programmable thermostats was suspended while a suitable replacement was identified for the original programmable thermostat, which was recalled by its manufacturer. In PY3, a new model of programmable thermostat was selected for installation at commercial sites.

The tasks of replacing the thermostats and re-launching the program were not implemented until August and September—too late for the PY3 cooling season.

11.2 Impact Evaluation Gross Savings

No savings were claimed for PY3 for the Commercial A/C Saver Program.

Table 11-1. CPITD Commercial A/C Saver Program Reported Results by Sector

Sector	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
Residential	0	0	0	0
Low-Income	0	0	0	0
Commercial and Industrial	2,446	0	0	145
Government and Non-Profit	0	0	0	0
CPITD Total	2,446	0	0	145

Table 11-2. Commercial A/C Saver Program Reported Results by Quarter

Reporting Period	Participants	Reported Gross Energy Savings (MWh/yr)	Reported Gross Demand Reduction (MW)	Incentives (\$1,000)
PY3 Q1	28	-	-	57
PY3 Q2	807	-	-	75
PY3 Q3	1,009	-	-	0
PY3 Q4	512	-	-	0
PY3 Total	2,356	-	-	132
CPITD Total	2,446	-	-	145

11.3 Impact Evaluation Net Savings

The SWE is conducting a statewide study of the potential impact of the PJM payments for DR. Experience indicates that customers do not have the motivation or ability to cycle their HVAC unit in the absence of a program.

11.4 Process Evaluation

The primary objective of the process evaluation is to ensure the program is structured to achieve cost-effective savings, while maintaining high levels of market penetration, customer satisfaction, and program efficiency. Navigant conducted in-depth interviews and reviewed program and marketing materials to answer the process-related research questions regarding program design, implementation processes, and marketing.

Navigant conducted participant surveys to gather information on customer demographics, how customers learned of the program, satisfaction with the installation process, and how they operate their air conditioner on a typical summer day and during heat waves. Beginning in PY3, after customers had experienced control events, Navigant asked if they noticed load control events, and how they and their homes responded to these events.

The program is well run and well liked by customers. In June 2012, enrollments in the program ended and the program entered into a maintenance mode.

11.4.1 Marketing

The largest challenge in PY3 was the marketing of the thermostats to the commercial sector. The tasks of replacing the thermostats and re-launching the program were not implemented until August and September—too late for the PY3 cooling season.

A door-to-door sales team and direct mail flyers were the most effective methods of marketing the program. These channels will continue to be important conduits for information during the maintenance phase of the program.

11.4.2 Customer Satisfaction

Overall, 83 percent of participants were very satisfied with the Smart A/C Saver Program in PY3, as indicated by satisfaction scores of 8, 9, or 10 on a 0 to 10-point satisfaction scale. Over 70 percent of program participants (74 percent) expressed a high degree of satisfaction with PECO in PY3.

11.4.2.1 Major Findings

Satisfaction with the Program was as follows:

- The technician (88%)
- The installation (88%)
- The timeliness of the installation (75%)
- The four bill credits (57%)
- The amount of energy saved (56%)
- Satisfaction with PECO (62%)
- The program overall (70%)

Satisfaction with Control Events

Three out of four survey participants did not know how many load control days they experienced in PY3. The most common answer (given by 15 percent of respondents) was that they had experienced two control days. Six percent of respondents remembered only one control day.

Over 90 percent of those respondents who answered the question were satisfied with the number of event days in PY3.

Almost 60 percent of the respondents could not guess how many days PECO would call control days in PY4. Of those who were able to guess, answers ranged from 0 to 30. The average number of days anticipated by survey participants was eight.

On average, participants reported waiting almost 12 weeks for the installation of the thermostat. One-quarter of the participants who answered the question were on wait-list status over a year.

11.5 Financial Reporting

A breakdown of the program finances is presented in Table 11-3.

Table 11-3. Summary of Commercial A/C Saver Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$0	\$132	\$145
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$0	\$132	\$145
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$416	\$1,923	\$3,013
Management ^[2]	\$134	\$271	\$708
Marketing ^[3]	\$3	\$169	\$176
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$553	\$2,363	\$3,897
EDC Evaluation Costs	\$25	\$61	\$163
SWE Audit Costs			
Total EDC Costs^[4]	\$579	\$2,557	\$4,206
Participant Costs^[5]	N/A	\$132	\$145
Total TRC Costs^[6]	N/A	\$2,557	\$4,206
Total Lifetime Energy Benefits	N/A	0	\$0
Total Lifetime Capacity Benefits	N/A	0	\$0
Total TRC Benefits^[7]	N/A	0	0
TRC Ratio^[8]	N/A	0	0

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

12 Demand Response Aggregator Program

The Demand Response Aggregator (DRA) Program is a demand response load curtailment program for large commercial and industrial customers. It is based on DR performance contracts that PECO signed with three DR aggregators in late 2011 and early 2012. The three DR aggregators are EnerNOC, EnergyConnect, and Comverge. The DR aggregators recruited non-residential PECO customers willing to curtail their demand on a dispatchable basis, with no less than two hours of advance notice. The program was designed to provide demand response during PECO's top 100 hours of system peak loads in the months June through September of 2012 (PY4). The contracted MW and number of dispatchable hours that PECO contracted for with each aggregator are presented in Table 12-1.

Table 12-1. DRA Contracted MW and Hours

Aggregator	Contract MW	Dispatchable Hours
EnergyConnect	100	125
Comverge	31	125
EnerNOC	40	60
Total	171	

Participant load reductions can be behavioral, where participants implement pre-developed utility shedding strategies (i.e., turn off lighting, noncritical equipment such as air conditioning, air compressors), or in some instances participants have EMSs which can automatically shed noncritical load to achieve a desired load drop. Also, some participants utilize standby generation to offset part, or all, of their load during a called curtailment event.

In addition to the contracts it signed with aggregators, PECO also contracted with the firm that developed the system that PJM uses to administer the registration, notification, meter data and settlement process for demand side response resources in its economic and emergency demand response programs (PJM's eLRS). That contractor produced PECO's Demand Response Management System (DRMS), which has much of the same functionality as PJM's system, and importantly, uses the same protocols for calculation of customer baseline loads as the PJM system. By the end of PY3, the aggregators had registered 193 DRA participants in the DRMS.

PECO conducted a two-hour test of the DRA program on May 9, 2012, requiring each aggregator to dispatch no less than 25 percent of its contracted MW. PECO estimates that it achieved a peak demand reduction of 70 MW during this test.

12.1 Program Updates

Toward the end of PY3, PECO modified its contracts with all three aggregators to provide incentives for additional “pay-for-performance” demand reductions when requested by PECO. The incremental MW levels were not specified in these contract amendments, but they did specify that PECO could cap the additional MW dispatched for any event.

12.2 Impact Evaluation Gross Savings

As this program is designed to provide demand reduction only in PY4, PECO claims no energy or demand savings in PY3, and no impact evaluation was conducted in PY3. The evaluation of PY4 demand reduction will utilize PJM protocols to estimate savings for a census of all participants.

12.3 Impact Evaluation Net Savings

As this program is designed to provide demand reduction only in PY4, PECO claims no energy or demand savings in PY3, and no impact evaluation was conducted in PY3. In PY4, net savings will be based on the PY4 impact evaluation and the findings of the DR Attribution Survey being conducted by the SWE.

12.4 Process Evaluation

No process evaluation was conducted in PY3 for this program, and none is anticipated for PY4. PECO has decided not to conduct process evaluation for this program because it is designed to produce demand savings only during the summer of 2012 (PY4), so that any findings from a process evaluation could not be applied to improve performance in a subsequent program year.

12.5 Financial Reporting

A breakdown of the program finances is presented in Table 12-2.

Table 12-2. Summary of Demand Response Aggregator Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$0	\$0	\$0
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$0	\$0	\$0
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$2,544	\$8,745	\$8,745
Management ^[2]	\$178	\$420	\$892
Marketing ^[3]	\$0	(\$6)	\$0
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$2,722	\$9,159	\$9,637
EDC Evaluation Costs	\$33	\$80	\$271
SWE Audit Costs			
Total EDC Costs^[4]	\$2,755	\$9,239	\$9,908
Participant Costs^[5]	N/A	\$0	\$0
Total TRC Costs^[6]	N/A	\$9,239	\$9,908
Total Lifetime Energy Benefits	N/A	0	\$0
Total Lifetime Capacity Benefits	N/A	0	\$0
Total TRC Benefits^[7]	N/A	0	0
TRC Ratio^[8]	N/A	0	0

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

[2] Includes EDC program management, CSP program management, general management oversight, and major accounts.

[3] Includes the marketing CSP and marketing costs by program CSPs.

[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.

13 Distributed Energy Resources Program

The Distributed Energy Resources (DER) program is designed to realize peak demand reductions during PECO's top 100 hours from eligible commercial and industrial customers in the utility's service territory, by providing incentives for customers to run standby generators when requested by PECO. PECO contracted with Comverge to provide 16.5 MW of distributed generation by recruiting and registering PECO customers for this program who were willing to run their generators for up to 125 hours during the months June through September 2012 (PY4).

13.1 Program Updates

During a two-hour test of its demand response programs on May 9, 2012, that required at least 25 percent of the DER resource to be dispatched, the participants registered at the time supplied approximately 4 MW. As of the end of PY3, Comverge had registered two participants in PECO's DRMS. Comverge registered an additional six participants that contributed power during the first quarter of PY4.

Impact Evaluation Gross Savings

As this program is designed to provide demand reduction only in PY4, PECO claims no energy or demand savings in PY3, and no impact evaluation was conducted in PY3. The evaluation of PY4 demand reduction will utilize PJM protocols to estimate savings for a census of all participants.

13.2 Impact Evaluation Net Savings

As this program is designed to provide demand reduction only in PY4, PECO claims no energy or demand savings in PY3, and no impact evaluation was conducted in PY3. In PY4, net savings will be based on the PY4 impact evaluation and the findings of the DR Attribution Survey being conducted by the SWE.

13.3 Process Evaluation

No process evaluation was conducted in PY3 for this program, and none is anticipated for PY4. PECO has decided not to conduct process evaluation for this program because it is designed to produce demand savings only during the summer of 2012 (PY4); therefore, any findings from a process evaluation could not be applied to improve performance in a subsequent program year.

13.4 Financial Reporting

A breakdown of the program finances is presented in Table 13-1.

Table 13-1. Summary of Distributed Energy Resources Program Finances

	Quarter 4 (\$1,000)	PYTD (\$1,000)	CPITD (\$1,000)
EDC Incentives to Participants	\$0	\$0	\$0
EDC Incentives to Trade Allies	\$0	\$0	\$0
Subtotal EDC Incentive Costs	\$0	\$0	\$0
Design & Development	\$0	\$0	\$0
Administration ^[1]	\$0	\$413	\$413
Management ^[2]	\$159	\$467	\$1,063
Marketing ^[3]	\$0	(\$5)	\$0
Technical Assistance	\$0	\$0	\$0
Subtotal EDC Implementation Costs	\$159	\$875	\$1,476
EDC Evaluation Costs	\$52	\$127	\$274
SWE Audit Costs			
Total EDC Costs^[4]	\$212	\$1,003	\$1,751
Participant Costs^[5]	N/A	\$0	\$0
Total TRC Costs^[6]	N/A	\$1,003	\$1,751
Total Lifetime Energy Benefits	N/A	0	\$0
Total Lifetime Capacity Benefits	N/A	0	\$0
Total TRC Benefits^[7]	N/A	0	0
TRC Ratio^[8]	N/A	0	0

NOTES

Per PUC direction, TRC inputs and calculations are required in the Annual Report only and should comply with the 2011 Total Resource Cost Test Order approved July 28, 2011. Please see the "Report Definitions" section of this report for more details.

[1] Includes the administrative CSP (rebate processing), tracking system, and general administration and clerical cost.

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[4] Per the 2011 Total Resource Cost Test Order, the Total EDC Costs refer to EDC incurred expenses only.

[5] Per the 2011 Total Resource Cost Test Order, the net Participant Costs are the costs for the end-use customer or program costs that are proxies for participant costs. These include incentives paid to appliance recycling and Demand Response participants.

[6] Total TRC Costs includes EDC Evaluation Costs, Total EDC Costs, and Participant Costs.

[7] Total TRC Benefits equals the sum of Total Lifetime Energy Benefits and Total Lifetime Capacity Benefits plus any benefit associated with avoided incandescent purchases made due to the longer useful life of energy-efficient lighting as compared to the baseline measure. Based upon verified gross kWh and kW savings. Benefits include: avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction.

[8] TRC Ratio equals Total TRC Benefits divided by Total TRC Costs.