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November 15, 2011

**Via Federal Express**

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

**RECEIVED**

NOV 15 2011

PA PUBLIC UTILITY COMMISSION  
SECRETARY'S BUREAU

**Re: PUC Docket No. M-2008-2069887  
Energy Efficiency and Conservation Program Final Annual Report  
June 1, 2010 through May 31, 2011**

Dear Secretary Chiavetta:

In accordance with the Commission's Secretarial Letter dated May 25, 2011, enclosed are an original and eight copies of PECO's 2011 Final Annual Energy Efficiency & Conservation Report for the program year of June 1, 2010 through May 31, 2011.

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

# Annual Report to the Pennsylvania Public Utility Commission

For the Period  
June 2010 through May 2011  
Program Year Two

For Pennsylvania Act 129 of 2008  
Energy Efficiency and Conservation Plan

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PA PUBLIC UTILITY COMMISSION  
SECRETARY'S BUREAU

Prepared by Navigant Consulting, Inc.

For

PECO Energy Company

November 15, 2011

## Table of Contents

<b>1</b>	<b>OVERVIEW OF PORTFOLIO</b> .....	<b>3</b>
1.1	SUMMARY OF PORTFOLIO IMPACTS.....	6
1.2	SUMMARY OF ENERGY IMPACTS BY PROGRAM.....	7
1.3	SUMMARY OF DEMAND IMPACTS BY PROGRAM.....	11
1.4	SUMMARY OF EVALUATION.....	15
<b>2</b>	<b>PORTFOLIO RESULTS BY SECTOR</b> .....	<b>23</b>
2.1	RESIDENTIAL EE SECTOR.....	25
2.2	RESIDENTIAL LOW-INCOME EE SECTOR.....	29
2.3	COMMERCIAL AND INDUSTRIAL EE SECTOR.....	31
2.4	GOVERNMENT AND NONPROFIT EE SECTOR.....	33
<b>3</b>	<b>DEMAND REDUCTION</b> .....	<b>36</b>
<b>4</b>	<b>PORTFOLIO RESULTS BY PROGRAM</b> .....	<b>39</b>
4.1	PECO SMART LIGHTING DISCOUNTS PROGRAM.....	39
4.2	LOW-INCOME ENERGY EFFICIENCY PROGRAM.....	42
4.3	RESIDENTIAL SMART APPLIANCE RECYCLING PROGRAM.....	46
4.4	SMART HOME REBATES PROGRAM.....	52
4.5	SMART EQUIPMENT INCENTIVES PROGRAM FOR COMMERCIAL AND INDUSTRIAL CUSTOMERS.....	55
4.6	SMART EQUIPMENT INCENTIVES PROGRAM FOR GOVERNMENT AND NONPROFIT CUSTOMERS.....	62
4.7	CONSERVATION VOLTAGE REDUCTION (CVR) PROGRAM.....	65
4.8	RESIDENTIAL DIRECT LOAD CONTROL.....	72
4.9	COMMERCIAL DIRECT LOAD CONTROL.....	75
4.10	SMART CONSTRUCTION INCENTIVES PROGRAM.....	78
	<b>SUMMARY</b> .....	<b>83</b>
	<b>APPENDIX A: ADJUSTMENTS TO THE PY1 SMART EQUIPMENT INCENTIVE PROGRAM</b>	
	<b>GROSS AND VERIFIED SAVINGS</b> .....	<b>A-1</b>

## Acronyms

C & I	Commercial and Industrial
CATI	Computer-Aided Telephone Interview
CFL	Compact Fluorescent Lamp
CPITD	Cumulative Program/Portfolio Inception to Date
CVR	Conservation Voltage Reduction
CVRf	Conservation Voltage Reduction factor
DLC	Direct Load Control
EDC	Electric Distribution Company
EE&C	Energy Efficiency and Conservation
EM&V	Evaluation, Measurement, and Verification
HVAC	Heating, Ventilating, and Air Conditioning
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
PUC	Public Utility Commission
PY1	Program Year One
PY2	Program Year Two
PYTD	Program/Portfolio Year to Date
SEER	Seasonal Energy Efficiency Rating
SWE	Statewide Evaluator
TRC	Total Resource Cost
TRM	Technical Reference Manual

## 1 Overview of Portfolio

Pennsylvania Act 129 of 2008, signed on October 15, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania. Each EDC submitted energy efficiency and conservation (EE&C) plans—which were approved by the Pennsylvania Public Utility Commission (PUC)—pursuant to these goals. This report documents the progress and effectiveness of the EE&C accomplishments for PECO in Program Year Two (PY2), defined as June 1, 2010 through May 31, 2011, as well as the cumulative accomplishments of the programs since inception.

### Compliance goal progress as of the end of the reporting period<sup>1</sup>:

#### Cumulative Portfolio Energy Impacts

- The Cumulative Program/Portfolio Inception to Date (CPITD) reported gross energy savings is 889,859 megawatt-hours (MWh).
- The CPITD verified energy savings is 873,192 MWh.<sup>2</sup>
- PECO achieved 222 percent of the 393,850 MWh May 31, 2011 energy savings compliance target, based on verified energy savings.
- PECO achieved 74 percent of the 1,181,550 MWh May 31, 2013, energy savings compliance target, based on verified energy savings.

#### Portfolio Demand Reduction<sup>3</sup>

- The Total Committed demand reduction for PY2 is 172.1 megawatts (MW).
- The CPITD reported gross demand reduction is 151.2 MW.
- The CPITD verified demand reduction is 149.2 MW.<sup>4</sup>
- PECO achieved 42 percent of the 355 MW May 31, 2013 demand reduction compliance target, based on verified demand reduction.

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<sup>1</sup> Percentage of the compliance target achieved, which is calculated using verified Cumulative Program/Portfolio Inception to Date values (or preliminary verified value, if not available) divided by the compliance target value.

<sup>2</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE. As of the date of publication, this includes 713,313 MWh for PY2 and 159,879 MWh for PY1.

<sup>3</sup> Demand reduction includes both the demand savings from the installation of energy efficiency measures and the demand reduction associated with dispatchable MW resources.

<sup>4</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE. As of the date of publication, this includes 136.7 MW for PY2 and 12.5 MW for PY1 (the latter value is higher than reported in the PY1 Annual Report due to the subsequent approval of the savings protocol for the LEEP program and corrections to tracking system errors in the Smart Equipment Incentives program).

- PECO achieved 51.4 percent of the 355 MW May 31, 2013 demand reduction compliance target based on CPITD verified plus unverified, committed savings.<sup>5</sup>

#### **Low-Income Sector**

- There are 15 measures offered to the low-income sector, and another 25 measures offered by other programs in the residential sector (which are also available to low-income customers). The measures offered to the low-income sector therefore comprise 37.5 percent of the total measures offered. As required by Act 129, this exceeds the fraction of total electricity consumption in the PECO service area that is used by low-income households (8.05 percent).<sup>6</sup>
- The CPITD reported gross energy savings for low-income sector programs is 53,701 MWh.<sup>7</sup>
- The CPITD verified energy savings for low-income sector programs is 53,580 MWh comprising savings from both CFLs and home energy audits.<sup>7</sup>

#### **Government, Nonprofit, and Institutional Sectors**

- The CPITD reported gross energy savings for government and nonprofit sector programs is 82,546 MWh.<sup>8</sup>
- The CPITD verified energy savings for government and nonprofit sector programs is 77,355 MWh.<sup>8</sup>
- Achieved 196 percent of the 39,385 MWh May 31, 2011, energy reduction compliance target for this sector, based on verified energy savings.
- Achieved 66 percent of the 118,155-MWh May 31, 2013, energy reduction compliance target for this sector, based on verified energy savings.

#### **Program Year Portfolio Highlights as of the End of the Reporting Period**

- The Program Year to Date (PYTD) reported gross energy savings is 732,226 MWh.
- The PYTD verified net energy savings is 713,313 MWh.
- The PYTD reported gross demand reduction is 138.7MW.
- The PYTD verified net demand reduction is 136.7 MW.

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<sup>5</sup> Unverified, Reported Gross MW from PY2 program activity is 33.4 MW. This committed capacity is from the Residential and Commercial Direct Load Control programs, which has not yet been verified.

<sup>6</sup> 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.

<sup>7</sup> This value includes 25,630 MWh allocated to the low income sector from the CVR program. CVR savings are allocated to each sector on the basis of each sector’s contribution to total energy consumption.

<sup>8</sup> This value includes 38,445 MWh allocated to the Government, Nonprofit, and Institutional sectors from the CVR program. CVR savings are allocated to each sector on the basis of each sector’s contribution to total energy consumption.

- The PYTD reported participation is 272,099 participants.<sup>9</sup>

The savings listed above reflect results from ten programs, as shown in Table 1-1. Most of these programs started in the fourth quarter (Q4) of Program Year One (PY1).

**Table 1-1. Programs Evaluated**

<b>Program</b>	<b>Launch</b>
PECO Smart Lighting Discounts	October 2009
Low-Income Energy Efficiency Program (LEEP)	January 2010
PECO Smart Appliance Recycling	March 2010
PECO Smart Home Rebates	March 2010
PECO Smart Equipment Incentives – Commercial and Industrial (C&I)	March 2010
PECO Smart-Equipment Incentives – Government & Nonprofit	March 2010
Conservation Voltage Reduction	February 2010
Residential Direct Load Control	June 2010
C&I Direct Load Control	June 2010
PECO Smart Construction Incentives	February 2011

PECO has launched, or may launch, up to five more programs in PY3, as shown in Table 1-2.

**Table 1-2. New Programs for PY3**

<b>Program</b>	<b>Expected or Actual Launch</b>
Residential New Construction	To be determined
Demand-Response Aggregator Contracts	October 2011
Distributed Resources	October 2011
Residential Whole Home Performance	To be determined
Permanent Load Reduction	June 2011

<sup>9</sup> Participation excludes sales of compact fluorescent lamps (totaling 3,965,086) in the Smart Lighting Discounts program and light emitting diode lamps and Energy Star lighting fixtures (totaling 23,556) in the Smart Home Rebates program

## 1.1 Summary of Portfolio Impacts

A summary of the portfolio's reported impacts is presented in Table 1-3.

**Table 1-3. EDC Reported Portfolio Impacts Through the End of the Reporting Period**

Impact Type	Total Energy Savings (MWh)	Total Demand Reduction (MW)
Reported Gross Impact: Incremental Quarterly	118,001	12.5
Reported Gross Impact: Program Year to Date	732,226	138.7
Reported Gross Impact: Cumulative Portfolio Inception to Date	889,859	151.2
Unverified Ex Post Savings <sup>1</sup>	0	0.0
Estimated Impact: Projects in Progress	0	33.4
Estimated Impact: PYTD Total Committed	732,226	172.1
PYTD Verified Impact <sup>2</sup>	713,313	136.7
PYTD Net Impact <sup>3</sup>	713,313	136.7
Verified Savings: Cumulative Portfolio Inception to Date	873,192	149.2
<b>NOTES:</b>		
<sup>1</sup> Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.		
<sup>2</sup> Portfolio Verified Impact calculated by aggregating Program PYTD Verified Impacts. Program PYTD Verified Impacts are calculated by multiplying Program PYTD Reported Gross Impacts by program realization rates.		
<sup>3</sup> Portfolio Net Impact calculated by aggregating Program Net Impacts. Program Net Impacts are calculated by multiplying Program PYTD Verified Impacts by program Net-to-Gross ratios.		

A summary of total evaluation adjusted impacts for the portfolio is presented in Table 1-4.

**Table 1-4. Verified Portfolio Total Evaluation Adjusted Impacts through the End of the Reporting Period**

TRC Category	IQ	PYTD	CPITD
TRC Benefits (\$000)	N/A	\$749,046	\$925,140
TRC Costs (\$000)	N/A	\$150,293	\$172,001
TRC Benefit-Cost Ratio		<b>4.98</b>	<b>5.38</b>

PECO's EE&C performance levels through the end of PY2 have well exceeded expectations. This is attributable to customers, for the first time, having utility sponsored rebates and incentives available across a broad range of measures. Additionally, the availability of low cost measures, such as CFL's, has allowed customers to participate with a very low up-front cost. We do forecast the cost per MWh saved to increase over the remaining program years as

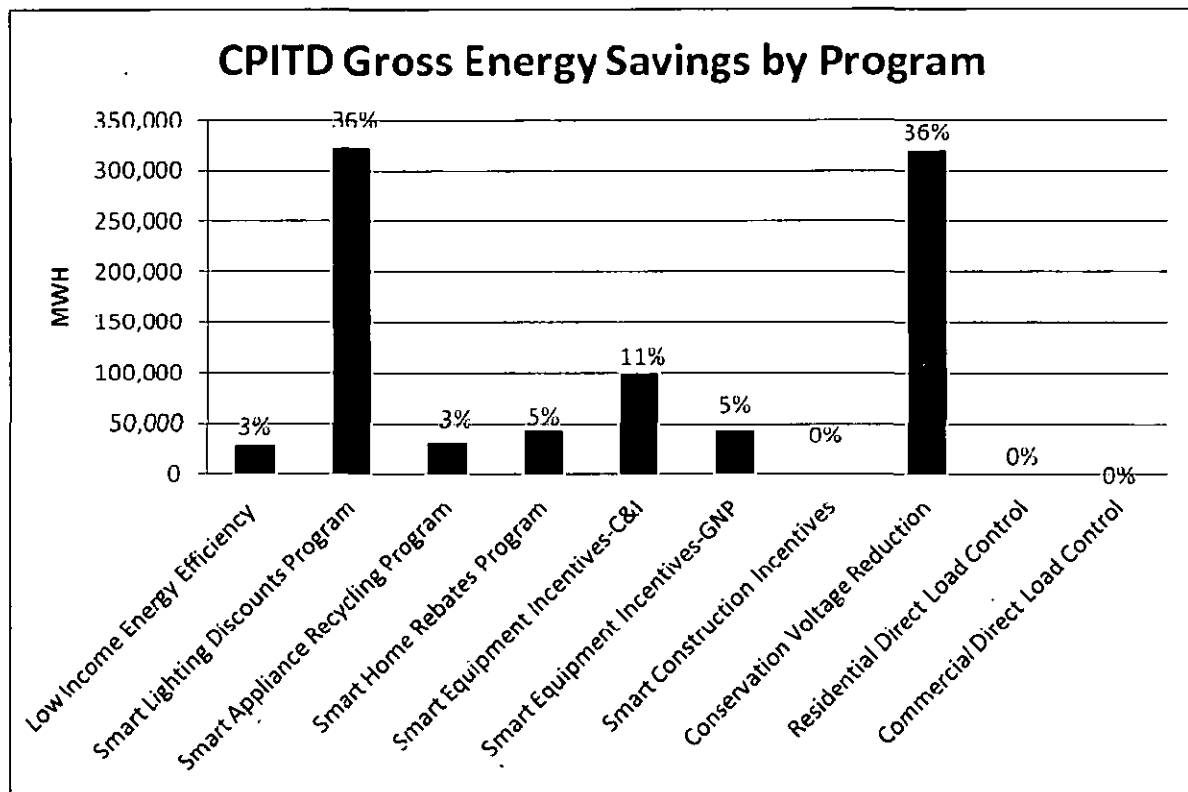


emphasis is shifted to more expensive technologies required to achieve MWh savings. Driving performance will become increasingly more challenging for the remainder of this Act 129 plan cycle, and certainly for subsequent plan cycles given regulatory changes and available EE&C technologies in the future.

## 1.2 Summary of Energy Impacts by Program

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

**Figure 1-1. CPITD Reported Gross Energy Savings by Program through the End of the Reporting Period**



A summary of energy impacts by program through the fourth quarter of PY2 is presented in Table 1-5 and Table 1-6. Note that savings from efficiency projects at multi-tenant properties are included in the savings results for the C&I and Government / Nonprofit programs.

Following publication of PECO's Annual Report for PY1, PECO identified energy savings algorithms in the tracking system not completely aligned with the TRM. This affected energy savings estimates for the Smart Equipment Incentives Government / Nonprofit program. The CPITD values in Table 1-5 reflect the values fully aligned with the TRM. Appendix A provides complete substantiation of the modifications.

**Table 1-5. EDC Reported Participation and Gross Energy Savings by Program through the End of the Reporting Period**

Program	Participants			Reported Gross Impact (MWh)		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Low-Income Energy Efficiency Program <sup>(1,2,3)</sup>	9,458	18,133	22,783	7,564	24,664	28,071
Smart Lighting Discounts Program <sup>4</sup>	1,075,859	3,965,086	6,825,530	51,316	189,248	322,459
Smart Appliance Recycling Program	3,602	16,771	19,823	943	25,908	30,446
Smart Home Rebates Program <sup>5</sup>	78,951	193,542	214,642	16,151	40,701	43,680
Smart Equipment Incentives-C&I <sup>6</sup>	572	2,078	2,140	25,747	88,244	99,699
Smart Equipment Incentives-Government / Nonprofit <sup>7,8</sup>	131	402	427	15,249	42,058	44,101
Smart Construction Incentives <sup>9</sup>	4	4	4	1,031	1,031	1,031
Conservation Voltage Reduction	0	83	83	0	320,372	320,372
Residential Direct Load Control	15,206	41,079	41,214	0	0	0
Commercial Direct Load Control	0	90	90	0	0	0
<b>TOTAL PORTFOLIO</b>	<b>107,924</b>	<b>272,099</b>	<b>301,123</b>	<b>118,001</b>	<b>732,226</b>	<b>889,859</b>

**NOTES:**

<sup>1</sup>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.

<sup>2</sup>Participation includes unique account numbers receiving measures from Components 1 and 2 for PY1 and Components 1 - 5 for PY2.

<sup>3</sup>Reported Gross savings reflect average LIURP savings for the years 2005 - 2008, per the approved savings protocol.

<sup>4</sup>The Reported Gross savings values shown do not incorporate CVR savings allocated to the Low Income sector. These savings are allocated in the CPITD Verified Savings for this program in Table 1-7.

<sup>5</sup>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.

<sup>6</sup>Savings for SHR program includes savings from sales of 23,556 LED lamps and lighting fixtures in PY 2010 and 29,093 for the Cumulative Program Inception to Date. The number of LED lamps and lighting fixtures are excluded from the participant numbers. In addition, participant numbers account for individual measures, regardless of how many measures were purchased by one customer.

<sup>7</sup>Savings values shown include savings from commercial multi-tenant accounts.

<sup>8</sup>The CPITD Reported Gross Impact shown for this program reflects an increase of 5 MWh in PY1 savings from that embedded in the PY2 Q3 report and an increase of 660 MWh from the CPITD savings presented for this program in the PY1 Annual Report. These changes are due to corrections of tracking system errors identified following the publication of those reports. Appendix A provides complete substantiation of the necessary changes. Savings values shown include savings from government, nonprofit, or institutional multi-tenant accounts.

<sup>9</sup>The Reported Gross savings values shown do not incorporate CVR savings allocated to the Government/Nonprofit sector. These savings are allocated in the CPITD Verified Savings for this program in Table 1-7.

<sup>10</sup>There were four projects completed in this program in PY2, two were in the C&I sector and two were in the government/institutional/nonprofit (GIN) sector. New construction savings in the C&I sector were 543 MWh, and savings in the GIN sector totaled 489 MWh.

**Table 1-6. EDC Reported Gross Energy Savings by Program through the End of the Reporting Period**

Program	Unverified Ex Post Savings	Projects In Progress (MWh)	PYTD Total Committed (MWh)	EE&C Plan Estimate for Program Year (MWh)	Percent of Estimate Committed (%)
Low-Income Energy Efficiency Program <sup>1,2</sup>	0	0	50,294	16,143	312
Smart Lighting Discounts Program	0	0	189,248	88,301	214
Smart Appliance Recycling Program	0	0	25,908	22,483	115
Smart Home Rebates Program	0	0	40,701	35,149	116
Smart Equipment Incentives-C&I	0	0	88,244	100,131	88
Smart Equipment Incentives-Government / Nonprofit <sup>3</sup>	0	0	80,503	58,823	137
Smart Construction Incentives	0	0	1,031	0	n/a
Conservation Voltage Reduction <sup>4</sup>	0	0	256,298	110,000	233
Residential Direct Load Control	0	0	0	2,756	0
Commercial Direct Load Control	0	0	0	758	0
<b>TOTAL PORTFOLIO</b>	0	0	732,226	434,544	169
<b>NOTES:</b>					
<sup>1</sup> 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. Reported Gross savings reflect average LIURP savings for the years 2005 - 2008, per the approved savings protocol.					
<sup>2</sup> The PYTD Total Committed savings values shown include 25,630 MWh allocated to the Low Income sector from implementation of CVR.					
<sup>3</sup> The PYTD Total Committed savings values shown include 38,445 MWh allocated to the Government/Nonprofit sector from implementation of CVR.					
<sup>4</sup> PYTD Total Committed Savings shown for CVR are net of savings amounts allocated to the Low Income and Government/Nonprofit sectors. These amounts total 64,075 MWh.					

A summary of evaluation-verified energy impacts by program is presented in Table 1-7.

**Table 1-7. Verified Energy Savings by Program through the End of the Reporting Period**

Program	PYTD Reported Gross Impact (MWh)	Realization Rate	PYTD Verified Impact (MWh)	Net-to-Gross Ratio	PYTD Net Impact (MWh) <sup>2</sup>	Verified Savings CPITD (MWh)
Low-Income Energy Efficiency Program <sup>1,2</sup>	24,664	1.00	24,543	1	24,543	53,580
Smart Lighting Discounts Program	189,248	1.00	189,248	1	189,248	322,459
Smart Appliance Recycling Program	25,908	1.00	25,908	1	25,908	30,394
Smart Home Rebates Program	40,701	1.00	40,701	1	40,701	43,680
Smart Equipment Incentives-C&I <sup>3</sup>	88,244	0.86	76,022	1	76,022	89,427
Smart Equipment Incentives-Government / Nonprofit <sup>3,4</sup>	42,058	0.87	36,519	1	36,519	77,355
Smart Construction Incentives <sup>5</sup>	1,031	n/a	n/a	1	n/a	n/a
Conservation Voltage Reduction <sup>6</sup>	320,372	1.00	320,372	1	320,372	256,298
Residential Direct Load Control	0	n/a	n/a	1	n/a	n/a
Commercial Direct Load Control	0	n/a	n/a	1	n/a	n/a
<b>TOTAL PORTFOLIO</b>	<b>732,226</b>	<b>0.97</b>	<b>713,313</b>	<b>1.00</b>	<b>713,313</b>	<b>873,192</b>

**NOTES:**

<sup>1</sup>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. Preliminary PYTD Verified Impact savings reflect average LIURP savings for the years 2006 - 2009, per the approved savings protocol.

<sup>2</sup>CPITD Verified Savings for the LEEP program include 25,630 MWh allocated to the Low-Income sector from the CVR program.

<sup>3</sup>The values shown for CPITD Verified Savings for the C&I and Government/Nonprofit programs are higher by 1,052 MWh and 683 MWh respectively from those reported in the PY2 Third Quarter Report. Tracking system errors discovered subsequent to the publication of that report revealed higher gross savings in the Government/Nonprofit program for PY1 than previously reported. Correction of the measure-level gross savings for PY1 necessitated recalculation of realization rates for PY1. Because the C&I and Government/Nonprofit program were evaluated as a single program in PY1, the change in realization rates affects verified PY1 savings for both programs. Appendix A provides complete substantiation of the necessary changes.

<sup>4</sup>CPITD Verified Savings for the Smart Equipment Incentives Government/Nonprofit program include 38,445 MWh allocated to the Low-Income sector from the CVR program.

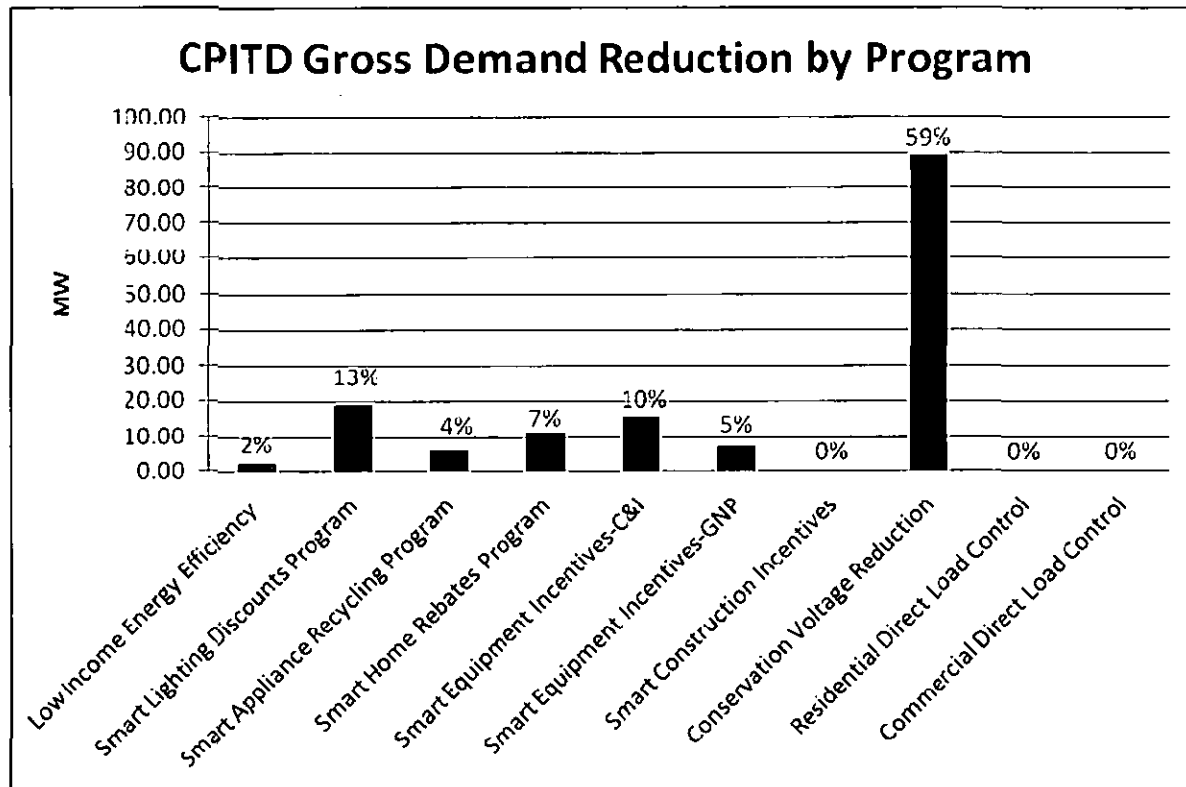
<sup>5</sup>Navigant did not conduct an impact evaluation for the Smart Construction Incentives program in PY2, due to low participation. Verified savings for the four PY2 participants will be based on PY3 realization rates.

<sup>6</sup>CPITD Verified Savings shown for the CVR program exclude a total of 64,075 MWh allocated to the Low Income and Government/Nonprofit sectors.

### 1.3 Summary of Demand Impacts by Program

A summary of the reported demand reduction by program is presented in Figure 1-2.

**Figure 1-2. Reported Demand Reduction by Program through the End of the Reporting Period**



A summary of demand reduction impacts by program through the fourth quarter of PY2 is presented in Table 1-8 and Table 1-9. Note that savings from efficiency projects at multi-tenant properties are included in the savings results for the C&I and Government / Nonprofit programs.



**Table 1-8. Participation and Reported Gross Demand Reduction by Program through the End of the Reporting Period**

Program	Participants			Reported Gross Impact (MW) <sup>9</sup>		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Low-Income Energy Efficiency Program <sup>1,2</sup>	9,458	18,133	22,783	0.6	2.1	2.4
Smart Lighting Discounts Program <sup>3</sup>	1,075,859	3,965,086	6,825,530	3.0	11.2	19.0
Smart Appliance Recycling Program	3,602	16,771	19,823	0.1	5.1	6.1
Smart Home Rebates Program <sup>4</sup>	78,951	193,542	214,642	3.0	10.5	11.3
Smart Equipment Incentives-C&I <sup>5</sup>	572	2,078	2,140	3.8	13.2	15.7
Smart Equipment Incentives-Government / Nonprofit <sup>6</sup>	131	402	427	1.8	7.1	7.3
Smart Construction Incentives <sup>7</sup>	4	4	4	0.1	0.1	0.1
Conservation Voltage Reduction	0	83	83	0.0	89.3	89.3
Residential Direct Load Control <sup>8</sup>	15,206	41,079	41,214	0.0	0.0	0.0
Commercial Direct Load Control <sup>8</sup>	0	90	90	0.0	0.0	0.0
<b>TOTAL PORTFOLIO</b>	<b>107,924</b>	<b>272,099</b>	<b>301,123</b>	<b>12.5</b>	<b>138.7</b>	<b>151.2</b>

**NOTES:**

<sup>1</sup>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)(C). The legislation contains no provisions regarding targets for participation, or energy or demand savings. Participation includes unique account numbers receiving measures from Components 1 and 2 for PY1 and Components 1 - 5 for PY2.

<sup>2</sup>LEEP reporting through the first quarter of PY2 was based on CMC Energy Services reports of audits completed by job type and number of bulbs installed by wattage and program delivery component. As part of developing the program tracking system, PECO staff found some discrepancies with timing and reporting, and made revisions to more accurately represent the savings.

<sup>3</sup>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.

<sup>4</sup>Savings for SHR program includes savings from sales of 23,556 LED lamps and lighting fixtures in PY 2010 and 29,093 for the Cumulative Program Inception to Date. The number of LED lamps and lighting fixtures are excluded from the participant numbers. In addition, participant numbers account for individual measures, regardless of how many measures were purchased by one customer.

<sup>5</sup>Includes savings from commercial multi-tenant accounts.

<sup>6</sup>Includes savings from government, nonprofit, or institutional multi-tenant accounts.

<sup>7</sup>Savings value includes 0.05 MW in the Government/Institutional/Nonprofit sector and 0.01 MW in the C&I sector.

<sup>8</sup>No load control events were called in PY2.

<sup>9</sup> Gross reported MW savings values have been adjusted in this report to account for line losses. PECO's peak period line losses are 7.1 percent, so MW savings have been adjusted by a factor of  $1/(1-.071) = 1.076$ .

**Table 1-9. Reported Gross Demand Reduction by Program through the End of the Reporting Period**

Program	Unverified Ex Post Savings <sup>2</sup>	Projects In Progress (MW)	PYTD Total Committed (MW)	EE&C Plan Estimate for Program Year (MW)	Percent of Estimate Committed (%)
Low-Income Energy Efficiency Program <sup>1</sup>	0.0	0.0	2.1	1.1	187
Smart Lighting Discounts Program	0.0	0.0	11.2	4.8	233
Smart Appliance Recycling Program	0.0	0.0	5.1	4.4	116
Smart Home Rebates Program	0.0	0.0	10.5	1.5	703
Smart Equipment Incentives-C&I	0.0	0.0	13.2	22.9	58
Smart Equipment Incentives-Government / Nonprofit	0.0	0.0	7.1	13.4	53
Smart Construction Incentives	0.0	0.0	0.1	0.0	n/a
Conservation Voltage Reduction	0.0	0.0	89.3	11.3	791
Residential Direct Load Control <sup>3</sup>	0.0	33.1	33.1	32.9	101
Commercial Direct Load Control <sup>3</sup>	0.0	0.4	0.4	7.6	5
<b>TOTAL PORTFOLIO</b>	0.0	33.4	172.1	99.9	172
NOTES:					
<sup>1</sup> 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.					
<sup>2</sup> Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.					
<sup>3</sup> No load control events were called during PY2.					



A summary of evaluation adjusted demand impacts by program is presented in Table 1-10.

**Table 1-10. Verified Demand Reduction by Program through the End of the Reporting Period**

Program	PYTD Reported Gross Impact (MW)	Realization Rate	PYTD Verified Impact (MW)	Net-to-Gross Ratio	PYTD Net Impact (MW)	Verified Savings CPITD (MW)
Low-Income Energy Efficiency Program <sup>1</sup>	2.1	1.00	2.1	1.0	2.1	2.3
Smart Lighting Discounts Program	11.2	1.00	11.2	1.0	11.2	19.0
Smart Appliance Recycling Program	5.1	1.00	5.1	1.0	5.1	6.1
Smart Home Rebates Program	10.5	1.00	10.5	1.0	10.5	11.3
Smart Equipment Incentives-C&I	13.2	1.01	13.4	1.0	13.4	15.8
Smart Equipment Incentives-Government / Nonprofit	7.1	0.72	5.1	1.0	5.1	5.3
Smart Construction Incentives <sup>2</sup>	0.1	n/a	n/a	1.0	n/a	0.0
Conservation Voltage Reduction	89.3	1.00	89.3	1.0	89.3	89.3
Residential Direct Load Control	0.0	n/a	n/a	1.0	n/a	0.0
Commercial Direct Load Control	0.0	n/a	n/a	1.0	n/a	0.0
<b>TOTAL PORTFOLIO</b>	138.7	0.99	136.7	1.0	136.7	149.2
NOTES:						
<sup>1</sup> 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)(1)(G). The legislation contains no provisions regarding targets for participation, or energy or demand savings.						
<sup>2</sup> Navigant did not conduct an impact evaluation for the Smart Construction Incentives program in PY2. Verified savings for the four PY2 participants will be based on PY3 realization rates.						

## 1.4 Summary of Evaluation

Realization rates are calculated to adjust reported savings based on statistically significant verified savings measured by independent evaluators. The realization rate is defined as the percentage of reported savings that is achieved, as determined through the independent evaluation review. A realization rate of 1.0, or 100 percent, indicates no difference between the reported and achieved savings. Realization rates are determined by certain attributes relative to one of three protocol types. Fully deemed Technical Reference Manual (TRM) measure realization rates are driven by differences in the number of installed measures. Partially deemed

TRM measure<sup>10</sup> realization rates are driven by (1) differences in the number of installed measures and (2) differences in the variables. Custom measure realization rates are driven by differences in the energy savings between the reported ex ante savings and the verified ex post savings following a site specific M&V plan (SSMVP) as developed by the evaluation contractor. The measure type and appropriate protocol or SSMVP determines the data type that is sampled.

#### 1.4.1 Impact Evaluation

Sample sizes and realization rates for each program are presented in Table 1-11.

**Table 1-11: Summary of Realization Rates and Confidence Intervals (CIs) for kWh**

Program	PYTD Sample Participants	Program Year Sample Participant Target	Realization Rate for kWh	Confidence and Precision for kWh	Realization Rate for kW	Confidence and Precision for kW
Low-Income Energy Efficiency Program <sup>1</sup>	25	25	1.00	90%/±10%	1.00	90%/±10%
Smart Lighting Discounts Program <sup>2</sup>	3,965,086	2,000,000	1.00	100%/±0.00%	1.00	100%/±0.00%
Smart Appliance Recycling Program	16,771	208	1.00	90%/±10%	1.00	90%/±10%
Smart Home Rebates Program	204	200	1.00	90%/±10%	1.00	90%/±10%
Smart Equipment Incentives - C&I	39	40	0.86	85% ±6.96%	1.01	85% ±6.20%
Smart Equipment Incentives-Government / Nonprofit	24	20	0.87	85%/±14.5%	0.72	85%/±20.5%
Smart Construction Incentives	0	0	n/a	n/a	n/a	n/a
Conservation Voltage Reduction	83	83	1.00	100%/±0.00%	1.00	100%/±0.00%
Residential Direct Load Control	n/a	n/a	n/a	n/a	n/a	n/a
Commercial Direct Load Control	n/a	n/a	n/a	n/a	n/a	n/a
<b>TOTAL PORTFOLIO<sup>2</sup></b>	<b>17,146</b>	<b>576</b>	<b>0.97</b>	<b>90%/±1.42%</b>	<b>0.99</b>	<b>90%/± 1.4%</b>
<b>NOTES:</b>						
<sup>1</sup> 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.						
<sup>2</sup> Sample Participants and Sample Participant Targets for the Smart Lighting Discounts program are excluded from the total portfolio numbers, as these reflect numbers of CFL lamps sold.						

<sup>10</sup> TRM measures with stipulated values and variables.

The following paragraphs summarize the impact evaluation methods conducted to derive verified savings for each program.

- **Smart Lighting Discounts.** The M&V completed for the 4<sup>th</sup> quarter report consisted of reviewing the 4<sup>th</sup> quarter tracking data provided to the evaluation team by PECO lighting staff, as well as reviewing all the manufacturer invoices received and approved by PECO and Ecos through the end of May 2011. The data used to estimate the PY2 PYTD savings for this report was from the manufacturer invoices.
- **Low-Income Energy Efficiency Program.** The program has several components, including an audit component and three compact fluorescent lamp (CFL) bulb components. The Navigant team used deemed savings for the CFL components and the approved protocol for home energy audits, which is based on billing analyses of previous participants in PECO's Low Income Usage Reduction Program.
- **Smart Appliance Recycling Program.** Phone surveys were conducted semi-annually to gather data to support the impact element of the Smart Appliance Recycling Program evaluation. Information from the phone survey was used to calculate a part-use factor which was then applied to a gross savings estimate. A total of 200 completes was sought, however, ultimately 208 surveys were conducted. A phone survey of a sample of Q1 and Q2 participants was conducted in February 2011 and repeated in July 2011 for a sample of Q3 and Q4 participants.
- **Smart Home Rebates Program.** Gross savings estimates were based on deemed values and telephone survey-based verification of customer reports for measure installation rates and persistence. We conducted a total of 204 customer surveys to assess overall program satisfaction, determine realization rates, measure persistence, and identify areas for program improvement.
- **Commercial and Industrial Smart Equipment Incentives Program.** The evaluation in PY2 included an impact sample of 39 completed project reviews resulting in verified savings realization rates for kWh and kW exceeding the required 85/15 confidence and precision interval at the program level. A total of 36 projects were selected for on-site verification and three multi-tenant projects were selected for file reviews only as those projects were small and included only fully prescriptive measures requiring a low level of rigor. Projects were sampled in three waves, with the first wave occurring after the close of Q2, the second after Q3, and the last after the close of Q4. Complete project documentation was requested for each sampled project and a site specific M&V plan developed as a guide for the evaluation on-site visit. Using the documentation review and data collected during the on-site M&V visits, ex post savings were estimated for each sampled project and statistical analysis was used to estimate the population level gross realization rates for energy and peak demand savings.
- **Government and Nonprofit Smart Equipment Incentives Program.** The impact evaluation for PY2 included tracking system review, *ex ante* savings analysis, and sample design. The population of 402 projects consisted of 164 LED traffic light projects and 238 projects of other types, including 114 multitenant projects (at 101 unique sites) in the government/non-profit/institutional sector. The measures were stratified by *ex*

*ante* project-level energy savings, and sampling was then conducted. The resulting sample selection was 24 sites: 16 projects for on-site M&V, 6 LED traffic light projects for application review / invoice collection, and 2 multi-tenant sites also for application review and data collection. *Ex post* savings for each sampled project were estimated from site visit M&V data and documentation review, and statistical analysis used to apply results from the sample to estimate a population-level gross realization rate for the Government portion of the Smart Equipment Incentives program. A participating customer phone survey entailed 45 participating projects. The phone survey supported verification efforts, by obtaining participants' self-reported confirmation that the measures as reported in the tracking data were indeed installed as claimed. It also supported gross savings analysis by collecting self reported data for end-use hours of operation and characterization of removed and installed equipment. The survey also gathered information on all of the parameters necessary to estimate actual PY2 free-ridership levels.

- **Conservation Voltage Reduction.** Savings estimates are based on the protocol developed by PECO, Navigant, and the SWE.<sup>11</sup>
- **Direct Load Control.** No control events were called for this program in PY2 so there are no impacts to report. On-site verification of installations was completed during PY2 Q3.
- **Smart Construction Incentives.** Due to late launch and low participation, Navigant did not conduct an impact evaluation for this program in PY2. Verified savings for the four PY2 projects will be estimated using PY3 realization rates.

#### 1.4.2 Process Evaluation

The following paragraphs describe the process evaluation activities conducted for all programs.

- **Smart Lighting Discounts.** Data collection methods used in the process evaluation included the following elements: in-store intercept surveys conducted in March and April 2011, in-depth interviews conducted in March and April 2011 with program staff, program implementer staff (Ecos), and trade allies (Lighting Manufacturers and Participating Corporate Retailers), and a general population telephone surveys conducted in April 2011.
- **Low-Income Energy Efficiency Program.** Process evaluation activities consisted primarily of in-depth interviews with utility and implementation contractor staff, and telephone surveys.
- **Smart Appliance Recycling Program.** Phone survey data was used to support the process element of the Smart Appliance Recycling Program evaluation. A phone survey of a sample of 100 Q1 and Q2 participants was conducted in February 2011 and was repeated in July 2011 for the remaining 100 completes in the sample. Findings from the

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<sup>11</sup> See the SWE-approved protocols: "Conservation Voltage Reduction (CVR) M&V Protocol for Energy Savings", "Conservation Voltage Reduction (CVR) Custom Measurement Protocol for Demand Reduction", and "Measurement & Verification Plan, End Use Conservation Voltage Reduction."

nonparticipant survey were also be used to assess program awareness, determine reasons for nonparticipation, and gather suggestions for how to improve the program.

- **Smart Home Rebates.** Process evaluation included a review of program planning, design, outreach, and implementation based on review of program data and interviews with program staff, implementers, trade allies, and participating customers. In addition, there was a comprehensive audit of the program databases.
- **Commercial and Industrial Smart Equipment Incentives.** The analysis segment of the process evaluation and analysis for PY2 is ongoing, however, all data collection is complete. Process evaluation efforts included two participant CATI surveys, one for customers completing primarily lighting projects (31 completes), and another for non-lighting projects (28 completes). Twelve (12) participating and six (6) non-participating trade ally surveys were also completed. Finally, several in-depth interviews were completed with PECO program management staff and the CSP implementation staff. The participant surveys will be used to estimate program free ridership levels and spillover levels, along with more qualitative analyses such as assessing standard process topics focusing on satisfaction and program delivery issues. Most process activities were completed in collaboration with the Government and Nonprofit program evaluation as the programs were implemented jointly.
- **Government and Nonprofit Smart Equipment Incentives Program.** Process evaluation in PY2 was conducted jointly with the C&I Smart Equipment Incentives Program and included in-depth interviews with program staff and 12 participating and 6 non-participating trade allies. *Sample design and updates of the survey instruments were performed, and surveys for the 45 participants (CATI phone interviews) were conducted for 27 lighting projects and 18 non-lighting projects in the government, institutional and nonprofit sector. Analysis is underway. The participant CATI interviews assessed standard process topics focusing on satisfaction and program delivery issues.*
- **Conservation Voltage Reduction (CVR) Program.** The process evaluation covering PY2 focused on two key areas: (1) review of customer complaints related to service quality and (2) telephone surveys with a sample of those on affected feeders. The analysis of customer complaint data and the telephone surveys was conducted in October-November 2011.
- **Direct Load Control.** In the third quarter of PY2, the process evaluation was completed for both the residential and commercial programs based on telephone interviews conducted with a sample of residential and commercial participants and in-depth interviews with implementers. The focus of the surveys was on process issues related to marketing, enrollment procedures and equipment installation. A total of 69 residential program participants were interviewed for this study on a number of topics including reasons for participating in the program, marketing issues, and satisfaction with the Residential A/C Saver program, program improvements, air conditioning hours of use and thermostat control, acceptance of alternative incentive structures, participation in other smart saver programs, and a firmographics description of program participants.

- **Smart Construction Incentives.** The primary objectives of this evaluation were to determine key process-related program strengths and weaknesses and identify ways in which the program could be improved. Navigant's evaluation method consisted of in-depth face-to-face and phone interviews with PECO program management and KEMA staff.

### 1.4.3 Summary of Finances

The total resource cost (TRC) test demonstrates the cost-effectiveness of a program by comparing the total economic benefits to the total costs. The PUC defined the approach to calculating the TRC.<sup>12</sup> A breakdown of the portfolio finances is presented in Table 1-12.

**Table 1-12. Summary of Portfolio Finances: TRC Test**

	Quarter 4 (\$000)	PYTD (\$000)
EDC Incentives to Participants	\$5,976	\$26,111
EDC Incentives to Trade Allies	\$1,120	\$4,102
<b>Subtotal EDC Incentive Costs</b>	<b>\$7,096</b>	<b>\$30,213</b>
Design & Development	\$0	\$0
Administration <sup>[1]</sup>	\$4,190	\$17,092
Management <sup>[2]</sup>	\$3,298	\$10,268
Marketing	\$1,533	\$3,823
Technical Assistance	\$1,354	\$4,719
<b>Subtotal EDC Implementation Costs</b>	<b>\$10,375</b>	<b>\$35,902</b>
EDC Evaluation Costs	\$234	\$2,062
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	\$111,650
<b>Total Costs</b>	<b>n/a</b>	<b>\$179,827</b>
Annualized Avoided Supply Costs	n/a	\$89,164
Lifetime Avoided Supply Costs	n/a	\$734,943
<b>Total TRC Costs</b>		<b>\$150,293</b>
<b>Total Lifetime Economic Benefits</b>	<b>n/a</b>	<b>\$749,046</b>
<b>Total Lifetime Economic Benefits<sup>[3]</sup></b>	<b>n/a</b>	<b>4.98</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Total Lifetime Economic Benefits include Lifetime Avoided Supply Costs plus any avoided participant costs associated with participating in the program.		

<sup>12</sup> Pennsylvania Public Utility Commission. June 18, 2009 "Implementation of Act 129 of 2008 – Total Resource Cost (TRC) Test, Docket No. M 2009-2108601 Order."

**Table 1-13. Summary of Portfolio Budget by Program**

<b>Program</b>	<b>TRC Benefits (\$000)</b>	<b>TRC Costs (\$000)</b>	<b>TRC Benefit- Cost Ratio</b>
Low-Income Energy Efficiency Program	\$20,062	\$6,068	3.31
Smart Lighting Discounts Program	\$150,552	\$12,526	12.02
Smart Appliance Recycling Program	\$23,965	3,023	7.93
Smart Home Rebates Program	\$55,730	\$62,291	0.89
Smart Equipment Incentives-C&I	\$62,518	\$34,974	1.79
Smart Equipment Incentives-Government / Nonprofit	\$36,836	\$17,707	2.08
Conservation Voltage Reduction	\$399,384	\$1,522	262
Residential Direct Load Control	n/a	\$10,710	n/a
Commercial Direct Load Control	n/a	\$1,259	n/a
Smart Construction Incentives	n/a	\$213	n/a
<b>Portfolio</b>	<b>\$749,046</b>	<b>\$150,293</b>	<b>4.98</b>



## 2 Portfolio Results by Sector

The EE&C Implementation Order issued on January 15, 2009, states requirements for specific sectors on page 11. In order to comply with these requirements, each program has been categorized into one of the following sectors:

1. Residential EE (excluding Low-Income)
2. Residential Low-Income EE
3. Commercial and Industrial EE
4. Government and Nonprofit EE

Summaries of portfolio gross energy savings and gross demand reduction by sector are presented in Figure 2-1 and Figure 2-2. Note that in Figure 2-1, energy savings from the CVR program have been allocated to each sector on the basis of each sector's contribution to total energy consumption.

Figure 2-1. PYTD Reported Gross Energy Savings by Sector

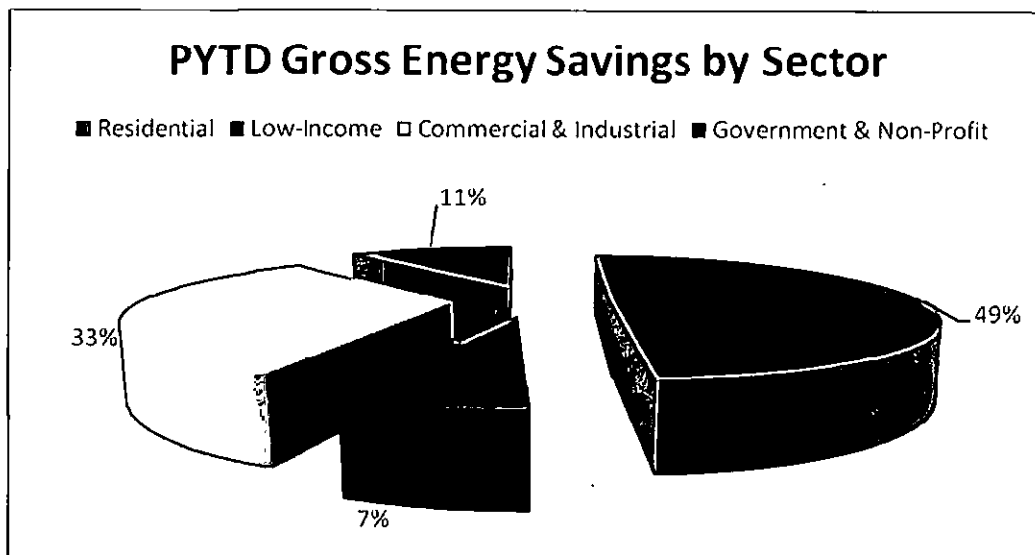


Figure 2-2. PYTD Reported Gross Demand Reduction by Sector<sup>13</sup>

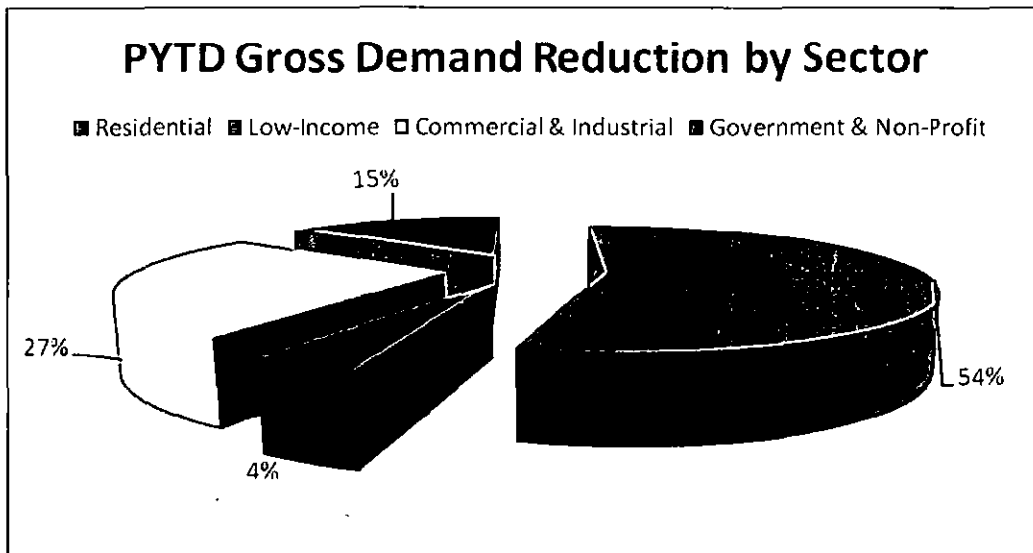


Table 2-1. Reported Gross Energy Savings by Sector through the End of the Reporting Period

Market Sector	Reported Gross Impact (MWh) <sup>1</sup>			Projects in Progress	Total Committed	Unverified Ex Post Savings <sup>3</sup>
	IQ	PYTD	CPITD			
Residential EE	68,410	361,580	502,308	-	361,580	-
Residential Low-Income EE <sup>2</sup>	7,564	50,294	53,701	-	50,294	-
Commercial & Industrial EE	26,290	239,362	250,817	-	239,362	-
Government & Nonprofit EE	15,737	80,991	83,034	-	80,991	-
<b>TOTAL PORTFOLIO<sup>2</sup></b>	<b>118,001</b>	<b>732,226</b>	<b>889,859</b>	<b>-</b>	<b>732,226</b>	<b>-</b>

**NOTES**

<sup>1</sup>The Reported Gross savings indicated for each sector includes savings allocated from the CVR program. The CVR savings allocation for each sector is based on each sector's contribution to total energy consumption.

<sup>2</sup>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.

<sup>3</sup>Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.

<sup>13</sup> Note that this figure does not present savings from the CVR program, which generates demand savings throughout all sectors.

**Table 2-2. Reported Gross Demand Reduction by Sector through the End of the Reporting Period**

Market Sector	Reported Gross Impact (MW)			Projects in Progress	Total Committed	Unverified Ex Post Savings <sup>1</sup>
	IQ	PYTD	CPITD			
Residential EE	6.2	26.8	36.4	0.0	26.8	0.0
Residential Low-Income EE <sup>2</sup>	0.6	2.1	2.4	33.1	35.1	0.0
Commercial & Industrial EE	3.8	13.2	15.7	0.4	13.6	0.0
Government & Nonprofit EE	1.8	7.2	7.4	0.0	7.2	0.0
<b>TOTAL PORTFOLIO</b>	12.5	49.3	61.9	33.4	82.8	0.0

**NOTES**

<sup>1</sup>Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.

<sup>2</sup>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)(C). The legislation contains no provisions regarding targets for participation, or energy or demand savings.

**2.1 Residential EE Sector**

PECO established savings goals of 145,933 MWh and 10.7 MW for the residential sector in PY2. As demonstrated by Table 2-3 and Table 2-4, PECO reports gross savings well in excess of these goals.

**Table 2-3. Summary of Residential EE Sector Incremental Impacts by Program through the End of the Reporting Period**

Residential EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Smart Lighting Discounts Program <sup>1</sup>	1,075,859	51,316	3.0
Smart Appliance Recycling Program	3,602	943	0.1
Smart Home Rebates Program <sup>2</sup>	78,951	16,151	3.0
Allocated CVR Savings	n/a	-	0.0
<b>Sector Total</b>	<b>78,315</b>	<b>68,409.9</b>	<b>6.2</b>

NOTES:

<sup>1</sup>Participation for this program reflects number of CFL lamps rebated rather than number of program participants. Participation in this program is excluded from the Sector Total.

<sup>2</sup>Participant values exclude sales of EnergyStar lighting fixtures and LED lamps, for which upstream rebates are provided. For other measure types, participant numbers account for individual measures, regardless of how many measures were purchased by one customer.

**Table 2-4. Summary of Residential EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Residential EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh)	PYTD Reported Gross Demand Reduction (MW)
Smart Lighting Discounts Program <sup>1</sup>	3,965,086	189,248	11.2
Smart Appliance Recycling Program	16,771	25,908	5.1
Smart Home Rebates Program <sup>2</sup>	193,542	40,701	10.5
Allocated CVR Savings	n/a	105,723	0.0
<b>Sector Total</b>	<b>186,757</b>	<b>361,580</b>	<b>26.8</b>

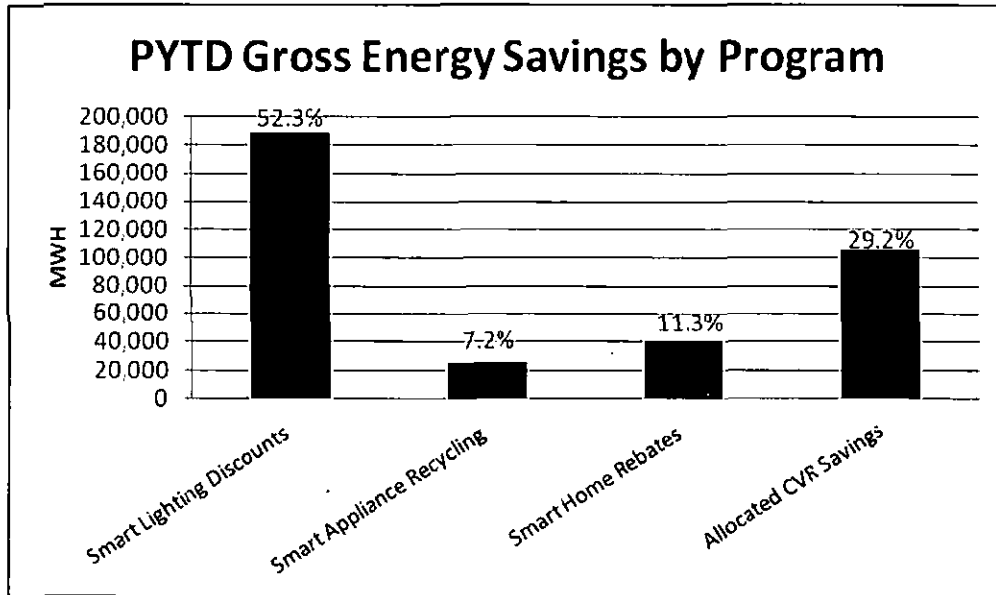
NOTES:

<sup>1</sup>Participation for this program reflects number of CFL lamps rebated rather than number of program participants. Participation in this program is excluded from the Sector Total.

<sup>2</sup>Participant values exclude sales of EnergyStar lighting fixtures and LED lamps, for which upstream rebates are provided. For other measure types, participant numbers account for individual measures, regardless of how many measures were purchased by one customer.

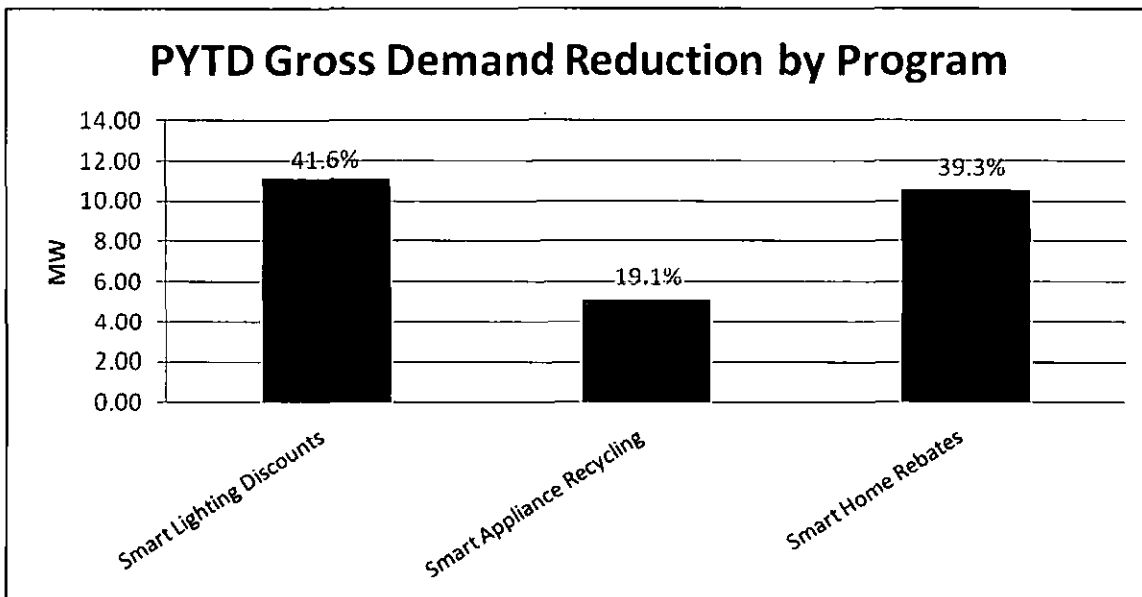
A summary of the sector energy savings by program is presented in Figure 2-3.

**Figure 2-3. Summary of Residential EE Sector PYTD Reported Gross Energy Savings by Program**



A summary of the sector demand reduction by program is presented in Figure 2-4.

**Figure 2-4. Summary of Residential EE Sector PYTD Reported Demand Reduction by Program**



## 2.2 Residential Low-Income EE Sector

PECO established savings goals of 16,143 MWh and 1.1 MW in the low-income sector for PY2. Results thus far are presented in Table 2-5 and Table 2-6.

**Table 2-5. Summary of Residential Low-Income EE Sector Incremental Impacts by Program through the End of the Reporting Period**

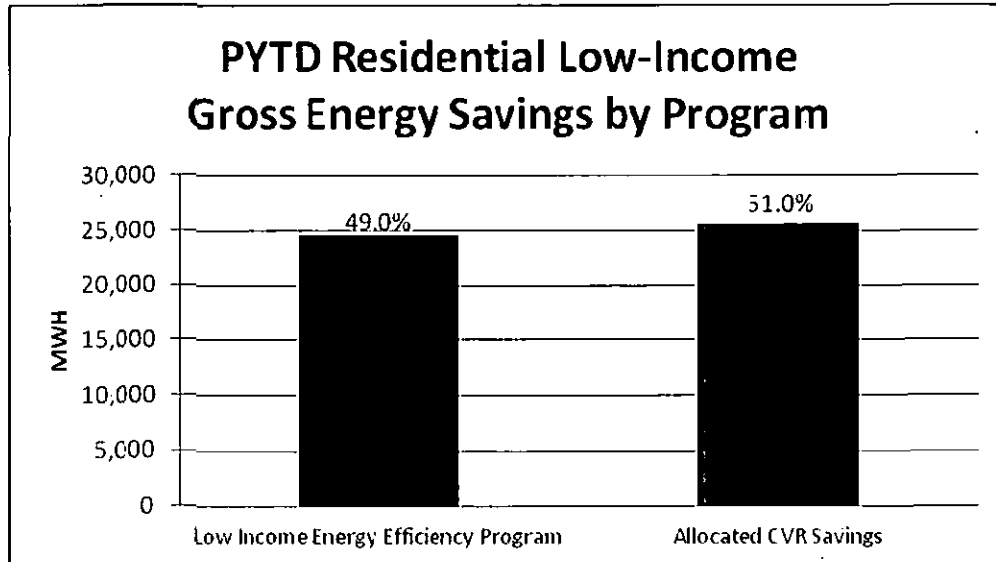
Residential Low-Income EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Residential Low-Income EE <sup>1</sup>	9,458	7,564	0.6
Allocated CVR Savings	n/a	-	0.0
<b>Sector Total</b>	<b>9,458</b>	<b>7,564</b>	<b>0.6</b>
NOTES			
<sup>1</sup> Act 129 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.			

**Table 2-6 Summary of Residential Low-Income EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Residential Low-Income EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh)	PYTD Reported Gross Demand Reduction (MW)
Residential Low-Income EE <sup>1</sup>	18,133	24,664	2.1
Allocated CVR Savings	n/a	25,630	-
<b>Sector Total</b>	<b>18,133</b>	<b>50,293.8</b>	<b>2.1</b>
NOTES			
<sup>1</sup> 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.			

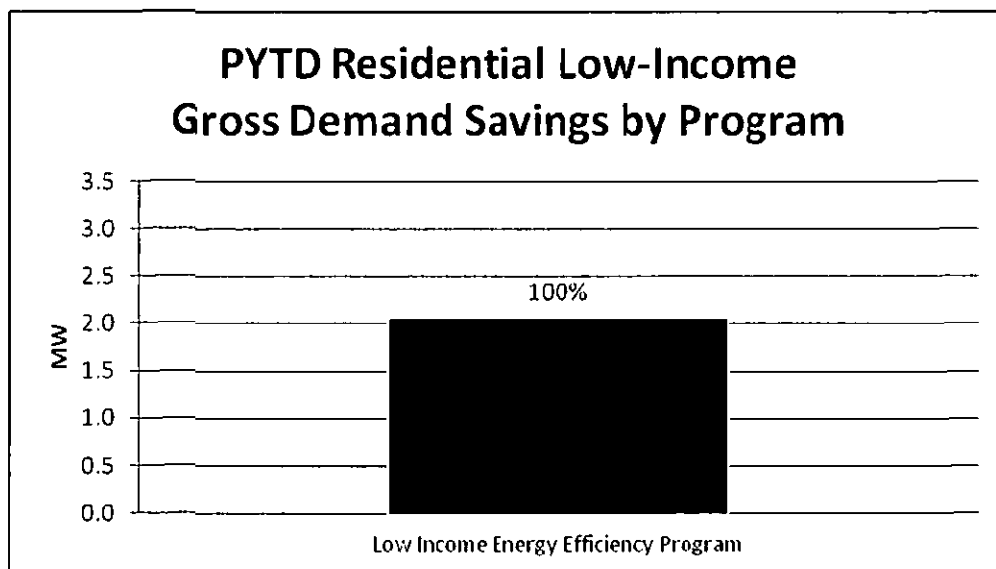
A summary of the sector energy savings by program is presented in Figure 2-5.

**Figure 2-5. Summary of Residential Low-Income EE Sector PYTD Reported Gross Energy Savings by Program**



A summary of the sector demand reduction by program is presented in Figure 2-6.

**Figure 2-6. Summary of Residential Low-Income EE Sector PYTD Reported Demand Reduction by Program**





## 2.3 Commercial and Industrial EE Sector

For PY2, PECO established a C&I sector target for annual energy savings of 100,131 MWh and demand reduction of 22.9 MW. Sector summaries of results thus far in PY2 are presented in Table 2-7 and Table 2-8.

**Table 2-7. Summary of Commercial & Industrial EE Sector Incremental Impacts by Program through the End of the Reporting Period**

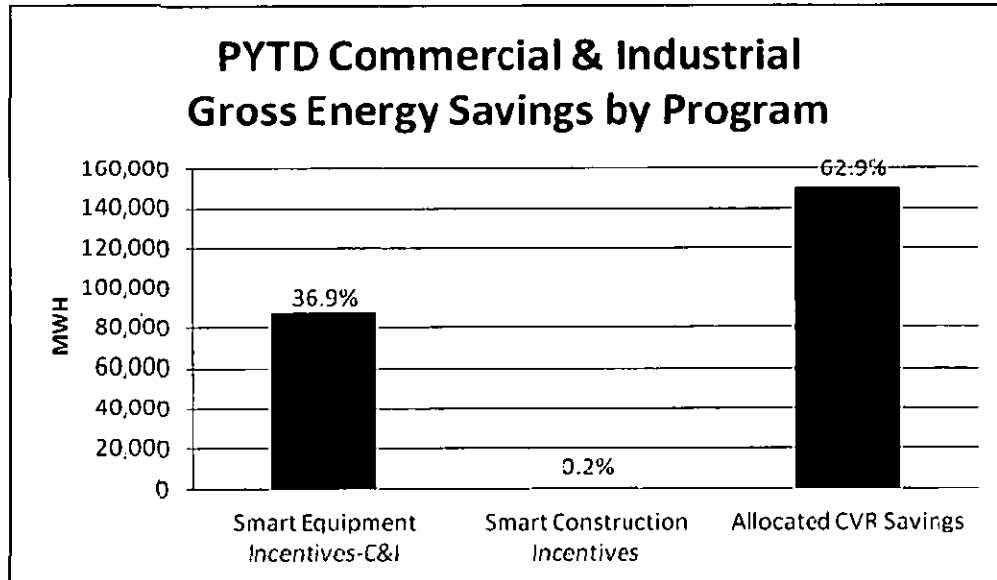
Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-C&I	572	25,747	3.8
Smart Construction Incentives	2	543	0.0
Allocated CVR Savings	n/a	-	-
<b>Sector Total</b>	<b>574</b>	<b>26,290</b>	<b>3.8</b>

**Table 2-8. Summary of Commercial and Industrial EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Commercial & Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh)	PYTD Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-C&I	2,078	88,244	13.2
Smart Construction Incentives	2	543	0.0
Allocated CVR Savings	n/a	150,575	-
<b>Sector Total</b>	<b>2,080</b>	<b>239,362</b>	<b>13.2</b>

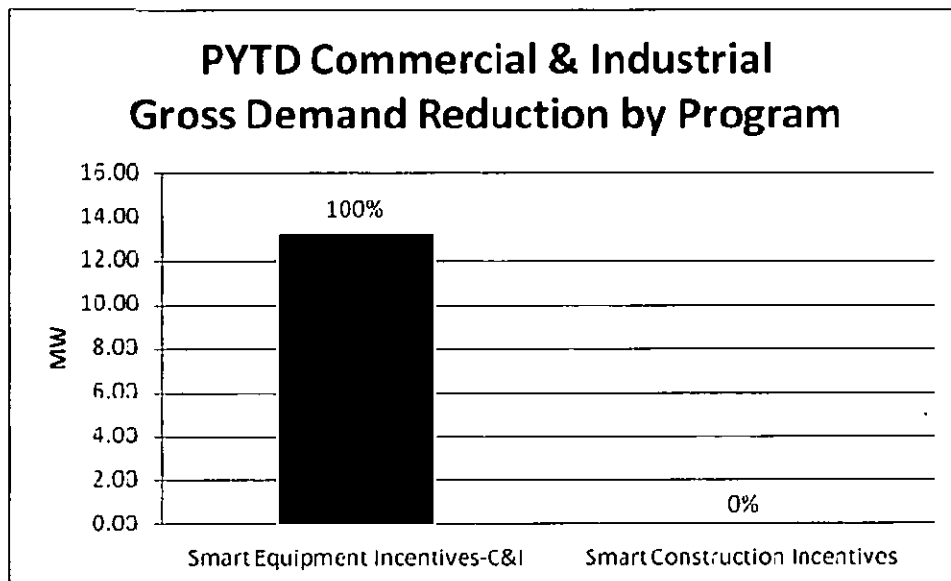
A summary of the sector energy savings by program is presented in Figure 2-7.

**Figure 2-7. Summary of Commercial & Industrial EE Sector PYTD Reported Gross Energy Savings by Program**



A summary of the sector demand reduction by program is presented in Figure 2-8.

**Figure 2-8. Summary of Commercial & Industrial EE Sector PYTD Reported Demand Reduction by Program**



## 2.4 Government and Nonprofit EE Sector

For PY2, PECO’s internal targets for this sector are 58,823 MWh (vs. a compliance target of 39,385 MWh) and 13.4 MW (there is no compliance target for demand reduction in this sector in PY2). After four quarters of operation in PY2, the Equipment Incentives program for the Government and Nonprofit sectors had accumulated reported energy savings of 80,991 MWh<sup>14</sup> and peak demand reduction of 7.2 MW.

Sector summaries of results are presented in Table 2-9 and Table 2-10.

**Table 2-9 Summary of Government & Nonprofit EE Sector Incremental Impacts by Program through the End of the Reporting Period**

Government & Non-Profit EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-Government / Nonprofit	131	15,249	1.8
Smart Construction Incentives	2	488	0.1
Allocated CVR Savings	n/a	-	-
<b>Sector Total</b>	133	15,737	1.8

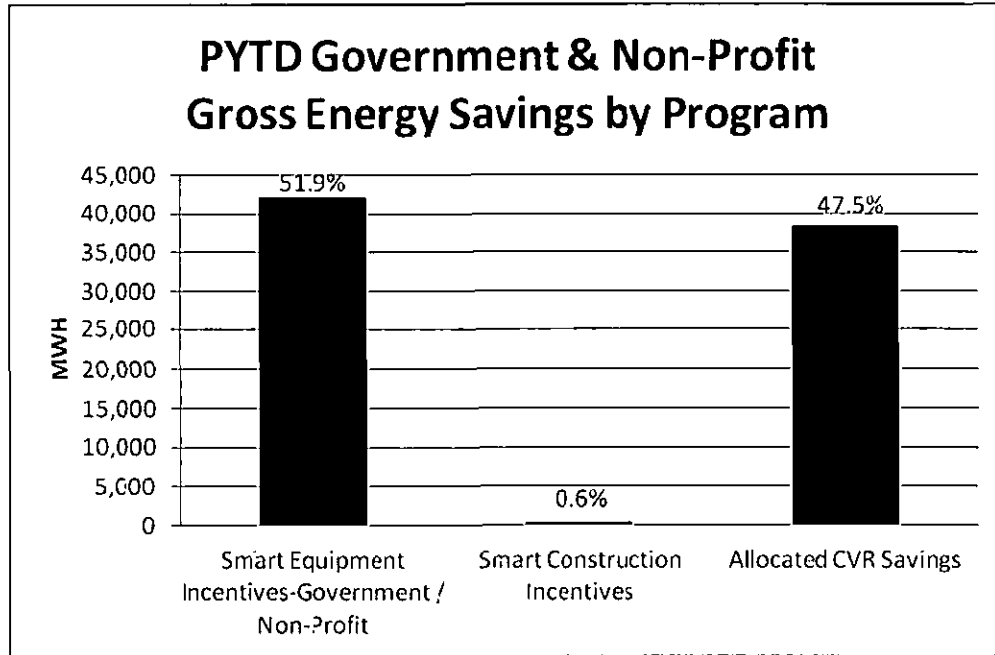
**Table 2-10. Summary of Government & Nonprofit EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Government & Non-Profit EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh)	PYTD Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-Government / Nonprofit	402	42,058	7.1
Smart Construction Incentives	2	488	0.1
Allocated CVR Savings	n/a	38,445	-
<b>Sector Total</b>	404	80,991	7.2

<sup>14</sup> This value includes 38,445 MWh allocated to this sector from the CVR program.

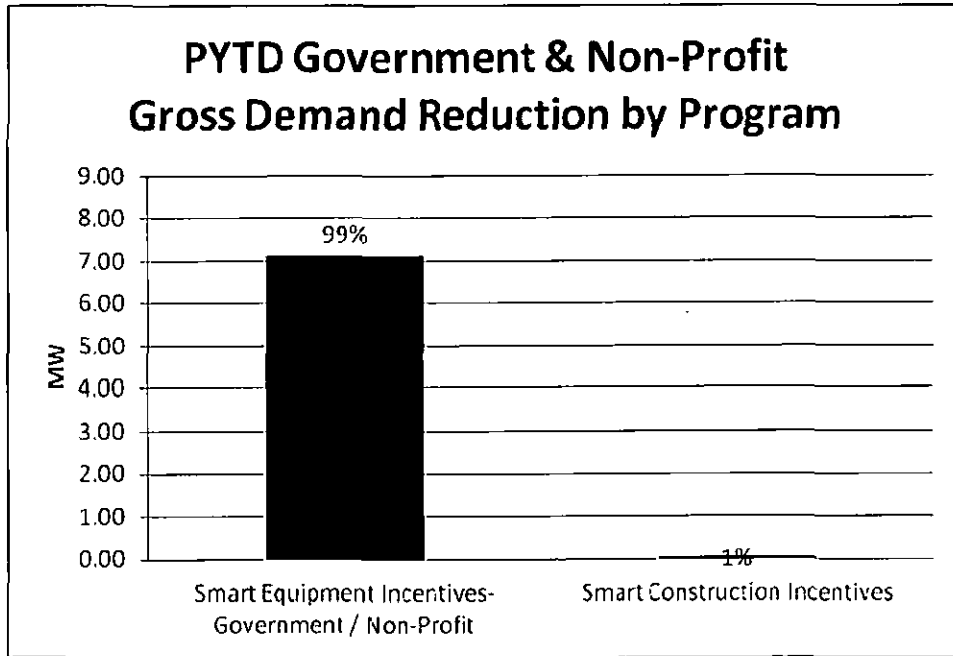
A summary of the sector energy savings by program is presented in Figure 2-9.

**Figure 2-9. Summary of Government & Nonprofit EE Sector PYTD Reported Gross Energy Savings by Program**



A summary of the sector demand reduction by program is presented in Figure 2-10.

**Figure 2-10. Summary of Government & Nonprofit EE Sector PYTD Reported Demand Reduction by Program**



### 3 Demand Reduction

Demand-response programs specifically target the reduction of peak demand through various demand-side management strategies. Three PECO demand-response programs were operated in PY2: the CVR program, the Residential Direct Load Control (DLC) program, and the Commercial DLC program. No load control events were called by PECO during the summer of 2010, so no demand savings can yet be attributed to the load control switches these programs installed in PY2.

Table 3-1 and Table 3-2 summarize fourth quarter and program year-to-date results for the Demand Response programs respectively.

**Table 3-1. Summary of Demand Response Program Quarterly Impacts through the End of the Reporting Period**

	<b>IQ Participants</b>	<b>IQ Reported Gross Energy Savings (MWh)</b>	<b>IQ Reported Gross Demand Reduction (MW)</b>
Conservation Voltage Reduction	0	0	0
Residential Direct Load Control	15,206	0	0
Commercial Direct Load Control	0	0	0
<b>Sector Total</b>	15,206	0	0

**Table 3-2: Summary of Demand Response Program PYTD Impacts through the End of the Reporting Period**

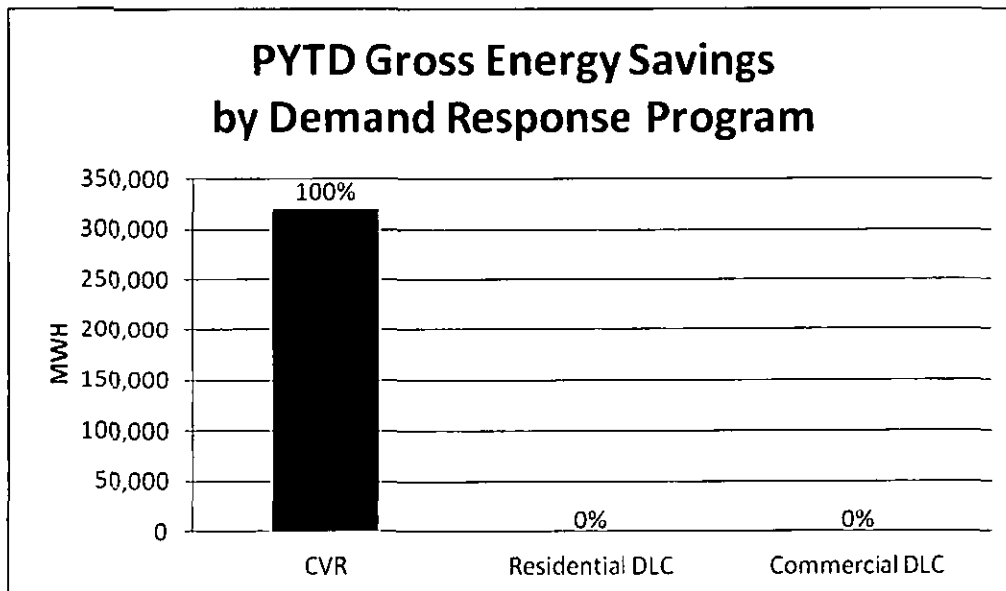
	<b>PYTD Participants</b>	<b>PYTD Reported Gross Energy Savings (MWh)</b>	<b>PYTD Reported Gross Demand Reduction (MW)</b>
Conservation Voltage Reduction <sup>1</sup>	83	320,372	89
Residential Direct Load Control	41,079	0	0
Commercial Direct Load Control	90	0	0
<b>Sector Total</b>	41,169	320,372	89

**NOTES:**

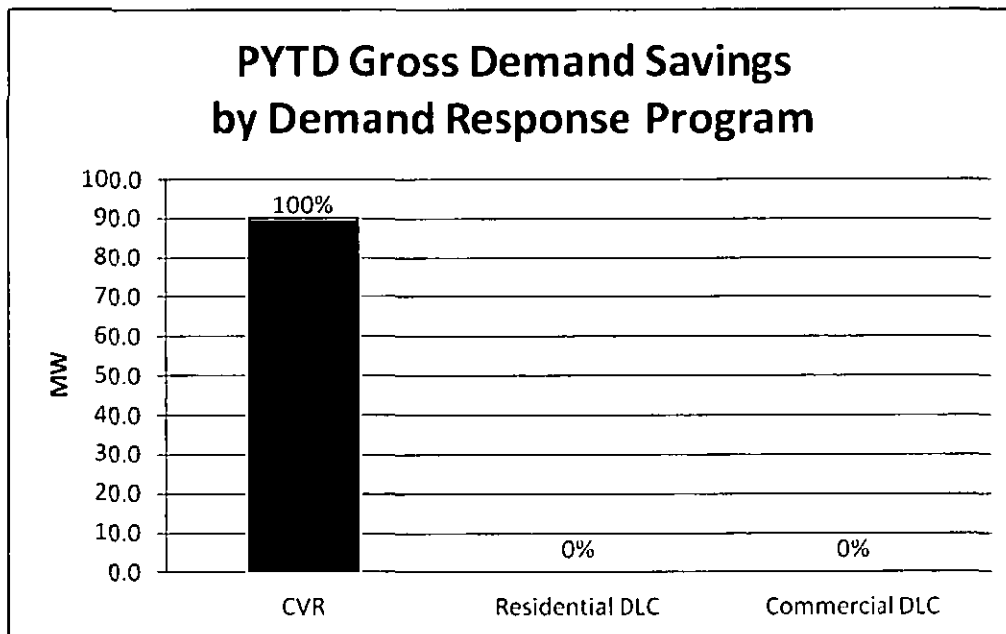
<sup>1</sup>The participation value reported for CVR reflects the number of substations involved in the program, and has been excluded from the Sector Total PYTD participation number.

Figure 3-1 and Figure 3-2 present the gross energy and demand savings reported for these programs through the fourth quarter of PY2.

**Figure 3-1 PYTD Reported Gross Energy Savings by Demand Response Program**



**Figure 3-2 PYTD Reported Gross Demand Savings by Demand Response Program**



As the 2012 performance period for DR approaches, PECO has completed the analyses and implementation strategy to determine the optimum method to implement the approved DR plan to deliver its 4.5% peak load reduction (355 MW) over the top 100 hours for the performance period. Attention has been given to resource cost, and performance probability

under multiple seasonal weather patterns. The approved DR plan under the optimized implementation strategy is predicted to make approximately 465 MW of demand resources available. This is accomplished when combining soon to be contracted for dispatchable MW resources with the deemed MW base resources from installed energy efficiency measures.

The 465 MW is required to achieve the 355 MW reductions over the top 100 hours. Given the uncertainty of weather and load conditions PECO may face in 2012, it is impossible to assure a 100% certainty of performance. Nonetheless, PECO is committed to meeting Act 129's DR requirement, and continues to study ways to improve the probability of the success of its DR programs.



## **4 Portfolio Results by Program**

### **4.1 PECO 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.

#### **4.1.1 Program Logic**

The primary activities that had to be developed before launching the PECO Smart Lighting Discounts Program included establishing manufacturer and retailer partnerships, creating program marketing materials, and training the implementer's (Ecos) field representatives. These activities resulted in the creation of point-of-purchase materials, in-store events, and retailer partners that were educated about the PECO program and the benefits of high-efficiency lighting products. These actions enabled PECO customers to learn about the benefits of CFLs and the related discounts being offered from PECO to encourage them to purchase and install CFLs in their homes (including both program and non-program bulbs), all of which leads to PECO energy savings.

#### **4.1.2 Program M&V Methodology**

The PY2 impact evaluation continued and extended the methodology from PY1 and incorporated qualitatively new elements. Similar to PY1, the evaluation included verification of the quantity of bulbs sold based on the PECO tracking database, a general population survey, and in-depth interviews with program implementers and staff. In addition, the evaluation included in-store intercepts, shelf stocking surveys, and in-depth interviews with lighting manufacturers and high-level retail buyers.

The M&V completed for this report consisted of reviewing the tracking database provided to the evaluation team by PECO personnel lighting staff and verifying it against the manufacturer invoices Ecos packaged and sent to PECO for payment. The tracking data was used to estimate the annual program savings for this report. All gross and net savings parameters, other than

quantity of bulbs sold, are deemed for PY2.<sup>15</sup> The estimated gross energy savings (kWh) were estimated as follows:

$$\text{Total kWh Savings} = \# \text{ bulbs sold} * ((\text{CFL}_{\text{watts}} \times (\text{CFL}_{\text{hours}} \times 365))/1,000 \times \text{ISR}_{\text{CFL}})$$

Where:

- The deemed installation rate is 84 percent ( $\text{ISR}_{\text{CFL}}$ )
- The deemed hours of use-per-day is three hours ( $\text{CFL}_{\text{hours}}$ )
- The deemed displaced watts is bulb-specific based on the program bulb wattage and equivalent incandescent wattage ( $\text{CFL}_{\text{watts}}$ )

The estimated gross demand savings (kW) were estimated as follows:

$$\text{Total kW Savings} = \# \text{ bulbs sold} * (\text{CFL}_{\text{watts}}) \times \text{Light CF} \times \text{ISR}_{\text{CFL}}$$

Where:

- The deemed peak coincidence factor is 5 percent (Light CF) and all other savings parameter estimates are the same as for the gross energy savings (kWh).

The net and gross savings for the residential lighting program are equal, as the deemed net-to-gross (NTG) ratio is 1.

#### 4.1.3 Program Sampling

For impact evaluation, no sampling was necessary for this report. All available tracking data was summarized for this report. For process evaluation, the evaluation team utilized a 503-point general population phone survey in PY2, which identified 167 self-reported upstream program participants. This survey was also stratified across other customer dispositions: those unaware of CFLs, aware non-purchasers, and CFL user non-program purchasers. The sample for this phone survey was a random sample of PECO customers. The survey sample sizes were based on an assumption that one-third of the PECO residential customers surveyed would have bought program bulbs (based on the PY1 and PY2 evaluations). We used overlapping samples for the gross, process, and NTG analysis.

Navigant conducted four interviews with key lighting program staff at PECO and Ecos. Navigant interviewed all key PECO and Ecos staff that have been instrumental in the rollout of this lighting program, as well as lighting manufacturers and participating program retailers.

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<sup>15</sup> Pennsylvania Public Utility Commission. "Technical Reference Manual (TRM) for Pennsylvania Act 129 Energy Efficiency and Conservation Program and Act 213 Alternative Energy Portfolio Standards", 2009.

#### **4.1.4 Process Evaluation**

As with the impact evaluation, the PY2 process evaluation continued and extended the methodology from PY1 and incorporated qualitatively new elements. The PY2 process methodology added new data sources in the form of the in-store intercepts, shelf-stocking surveys, and in-depth interviews with lighting manufacturers and high-level retail buyers.

#### **4.1.5 Program Partners and Trade Allies**

The PECO Smart Lighting Discounts Program is delivered upstream using a markdown/buy-down approach, which allows for customers to purchase discounted products. Program partners include CFL manufacturers and retailers and currently there are approximately eight manufacturers and 700 retail stores (representing approximately 20 unique retailers) participating in the program.<sup>16</sup>

#### **4.1.6 Program Finances**

A summary of the project finances is presented in Table 4-1.

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<sup>16</sup> This data is based on interviews with Ecos implementation staff.

**Table 4-1: Summary of Program Finances: TRC Test<sup>17</sup>**

	Quarter 4 (\$000)	PYTD (\$000)
EDC Incentives to Participants	\$0	\$0
EDC Incentives to Trade Allies	\$1,120	\$4,102
<b>Subtotal EDC Incentive Costs</b>	<b>\$1,120</b>	<b>\$4,102</b>
Design & Development	n/a	n/a
Administration <sup>[1]</sup>	\$226	\$899
Management <sup>[2]</sup>	\$74	\$286
Marketing	\$505	\$1,456
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$804</b>	<b>\$2,641</b>
EDC Evaluation Costs	\$30	\$248
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	\$9,636
<b>Total Costs</b>	<b>n/a</b>	<b>\$16,627</b>
Annualized Avoided Supply Costs	n/a	\$26,051
Lifetime Avoided Supply Costs	n/a	\$137,692
<b>Total TRC Costs</b>		<b>\$12,526</b>
<b>Total Lifetime Economic Benefits<sup>[3]</sup></b>	<b>n/a</b>	<b>\$150,552</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>12.02</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Total Lifetime Economic Benefits include Lifetime Avoided Supply Costs plus any avoided participant costs associated with participating in the program.		

## 4.2 Low-Income Energy Efficiency Program

LEEP is intended to educate and assist eligible residential customers with making their homes more energy efficient. The program builds upon the objective of the Low-Income Usage Reduction Program (LIURP) to make low-income customers' energy bills more affordable by

<sup>17</sup> Definitions for terms in the table are subject to the TRC Order.

helping to reduce energy usage. LEEP also builds on the existing LIURP infrastructure for outreach and delivery of services, using the same contractor (CMC Energy Services) to deliver audit services for both LIURP and LEEP. PECO launched the program on January 4, 2010.

#### 4.2.1 Program Logic

LEEP allows PECO to offer energy savings assistance to more low-income customers; LIURP participation is limited by available funding. A goal of LEEP is to double the number of participants over the 2008 LIURP level by 2013. The eligible customer population consists of low-income residents in existing residential units that are provided with electricity by PECO and who are financially responsible for the electric bill payment.

There are several program components:

1. In-home audits, education, and direct installation of measures for customers with household incomes below 200 percent of the federal poverty level (with a focus on those below 150 percent of the poverty level), and energy consumption of 500 kWh or more monthly for non-electric heating customers and 1,400 kWh monthly for electric heating customers.
2. Increase by the maximum possible level, the number of CFLs installed for LIURP participants.
3. Include up to ten additional CFLs, with weatherization improvements provided through weatherization programs other than LIURP.
4. Replace refrigerators in homes weatherized by DCED<sup>18</sup>.
5. In addition, as opportunity allows, LEEP will provide funding for the implementation of other measures using other contractors or agencies.

Customers must meet usage and income eligibility criteria for program participation. These vary a bit by program component, as described in Table 4-2, which also shows measures associated with each component.

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<sup>18</sup> As part of the DSP settlement agreement, PECO was required to spend \$1M in usage reduction/weatherization efforts in calendar year 2010. Although the budget for DSP falls under the LIURP program, the energy usage savings will be counted towards Act 129 LEEP.

**Table 4-2 LEEP Target Markets and Measures**

Component	Target Market	Measures
1	PECO residential customers with a household income at or below 200% of the federal poverty level with a focus on customers at or below 150%, plus household usage levels exceeding 600 kWh per month for electric baseload (500 kWh for Customer Assistance Program rate customers) for non-electric heating customers, and 1,400 kWh per month for electric heating customers.	Audits conducted. Extra CFL bulbs installed
2	PECO customers who will participate in LIURP during PY1- PY4.	Extra CFL bulbs installed
3	PECO residential electric customers eligible to participate in other weatherization programs for low-income residents.	Extra CFL bulbs installed.
4	PECO residential customers eligible to participate in other energy efficiency programs.	Refrigerator replacements*
5	Opportunities with other agencies such as Project H.O.M.E.	Custom*

\*Funded by the Default Service Plan (DSP) settlement.

#### 4.2.2 Program M&V Methodology

The M&V methodology applied to the LEEP results assesses participation in the program and calculates savings using distinct approaches depending on the measures implemented (LEEP audits, additional CFL bulbs installed, refrigerator replacements, or custom projects).

The team conducted surveys of participants which obtained information on measure installation and rates, which were used to determine the realization rate. Field research on a sample to assess installation and retention of installed measures was also used to establish installation rates.

#### 4.2.3 Program Sampling

Site visits were conducted during September 2011 for a sample of 25 LEEP participants who received major measures associated with Component 1. The information from these site visits was used to confirm installation rates, spillover, and correct measure assignment in the database. The confidence level for the information gleaned from the site visits is 90 +/- 10 percent with a coefficient of variance of 0.2. All ex ante savings for Component 1 were based on the PY1 deemed savings value. The evaluation found no adjustments were necessary based on the site visit findings, but did update all measures in the database using the PY2 deemed savings values versus the PY1 savings. Further, a few projects were reassigned measure type

and some measure quantities adjusted based on a detailed review of the database. Although all projects were reviewed and corrected in the database, this was justified by the findings of the site visits. Therefore the overall confidence and precision is driven primarily by the site visits and is 90 percent +/- 10 percent.

#### **4.2.4 Process Evaluation**

The process evaluation activities for PY2 consisted of developing a program logic model based on the PY1 in-depth interviews with utility and implementation contractor staff, and the review of program materials and process flow. Navigant also conducted a total of 106 customer interviews which assessed overall customer satisfaction with the program operations and the effectiveness of customer education. In-depth interviews with program implementers and staff will be conducted during PY3.

#### **4.2.5 Program Partners and Trade Allies**

PECO works with several partners and trade allies to deliver LEEP savings.

CMC Energy Services (CMC) implements Components 1 and 2. CMC conducts the LEEP audit and develops a work order for additional measures to be installed on subsequent visit(s) by the program subcontractors. CMC also does a follow-up inspection for a sample of the audits and all of the subcontractor installations. CMC also tracks and reports results to PECO. CMC implements Component 2 by installing additional CFL bulbs as part of LIURP audits.

For Component 3, PECO works through other weatherization agencies such as the Philadelphia Housing Authority (PHA) and the Bucks County Opportunity Council to install CFL bulbs as part of their weatherization services. Also, PECO mails CFL bulbs to CAP rate customers and distributes them at low-income community events.

Component 4 is delivered through a partnership with the PHA and the Pennsylvania Department of Community and Economic Development (DCED), a state weatherization provider, to replace older, inefficient refrigerators as part of their weatherization services in Philadelphia and the surrounding counties in PECO's service territory.

Component 5 is delivered through Project H.O.M.E., a non-profit organization that provides housing to enable chronically homeless and low-income persons to break the cycle of homelessness and poverty. The project included the replacement of boilers, water heaters, central air conditioning systems and refrigerators at two multi-family dwellings.

#### **4.2.6 Program Finances**

A summary of the project costs by quarter and year is presented in Table 4-3.

Table 4-3 Summary of LEEP Program Finances

	Quarter 4 (\$000)	PYTD (\$000)
EDC Incentives to Participants	\$0	\$0
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$0</b>	<b>\$0</b>
Design & Development	\$0	\$0
Administration <sup>[1]</sup>	\$199	\$830
Management <sup>[2]</sup>	\$99	\$326
Marketing	\$12	\$31
Technical Assistance	\$1,321	\$4,719
<b>Subtotal EDC Implementation Costs</b>	<b>\$1,646</b>	<b>\$5,906</b>
EDC Evaluation Costs	\$16	\$162
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	n/a
<b>Total Costs</b>	<b>n/a</b>	<b>\$6,068</b>
Annualized Avoided Supply Costs	n/a	\$1,785
Lifetime Avoided Supply Costs	n/a	\$18,904
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$6,068</b>
<b>Total Lifetime Economic Benefits<sup>[3]</sup></b>	<b>n/a</b>	<b>\$20,062</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>3.31</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Total Lifetime Economic Benefits include Lifetime Avoided Supply Costs plus any avoided participant costs associated with participating in the program.		

### 4.3 Residential Smart Appliance Recycling Program

The PECO Residential Smart Appliance Recycling program removes old, inefficient refrigerators, freezers, and room air conditioners from operation as secondary units in homes. It prevents existing 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 to a collection facility and disassembled for environmentally responsible disposal and recycling. PECO rolled out the program on March 1, 2010 (Q4 of PY1).



### 4.3.1 Program Logic

The primary activities put in place prior to launching the PECO Smart Appliance Recycling Program included creating program marketing materials and building a recycling facility. The marketing materials include content for PECO bill stuffers and program brochures. These serve to build customer awareness of PECO's program and participation procedures and requirements, and to educate them on the program benefits, namely the availability of the recycling and pickup service, and the associated program rebate for turning in a program-qualifying, unwanted appliance. These, in turn, lead program-aware customers with such an appliance(s) to contact the program and to schedule an appliance pick-up. Once picked up, the units are taken to the recycling facility, where they are dismantled and component parts and chemicals are recycled and/or resold.

In the first program year, the program relied entirely on 'curbside pickup', only recycling units that were located in residential customers homes. In this second program year, the program added a retailer strategy in November 2010. The program is currently partnering with Sears to promote the program to customers that purchase new replacement appliances at their retail stores. When the new unit is delivered to the home, the old appliances are then removed and taken to a central location where they are aggregated and picked up by JACO. The presumption is that these units would otherwise become secondary units in the home, or be transferred or sold to another user and remain grid-connected.

### 4.3.2 Program M&V Methodology

The impact evaluation of the Appliance Recycling program was based on an in-depth review and analysis of ANB 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 the telephone survey described below.

The M&V procedure included reviewing the program year tracking data provided to the evaluation team by PECO staff based on a comprehensive data extract from the ANB tracking database. This served to append information on unit characteristics, location, various project milestone dates, and other detail onto the official quarterly data tables.

Once this review was completed, the Navigant team then had a count of the units collected for each measure type. The Navigant team then applied the deemed per-unit savings assumptions in the TRM for each measure to obtain gross energy and demand savings for the measures.

The TRM procedure was complicated this program year, by an update in October 2010, which was made retroactive back to June 1, 2010. This new procedure provides for two separate savings calculations, one for units that were replaced subsequent to being recycled, and a second for units that were not replaced. The aim of this is to avoid double counting of savings by so-called replacers of their newly obtained units, since such savings are already being claimed through the Home Energy Incentives program.

The TRM-approved gross savings per unit for each measure type are shown below:

- Refrigerators and Freezers:
  - Replaced Units: Energy -1,274 kWh/unit and Demand - 0.158 kW/unit
  - Non-replaced Units: Energy - 1,728 kWh/unit and Demand - 0.2376 kW/unit
- Room Air Conditioner: Energy - 353 kWh/unit and Demand - 0.6395 kW/unit

To calculate savings impacts under the new TRM procedure, data is required regarding the proportion of units that were replaced versus not replaced. This data was not included in the program tracking data for PY2. (Note: this has been corrected in PY3.) However, the telephone survey of program participants conducted in July 2011 did provide this information. Therefore, it was not possible to perform calculations using the new TRM procedure until after the close of Q4 PY2, after the phone survey data had been analyzed.

Because the data required to implement the new procedure were not available earlier in the program year, PECO's filed quarterly reports for Q1-Q3 reflected the application of the old TRM procedure (which did not distinguish between replaced and non-replaced units in the savings calculation). Thus, savings for Q1-Q3 were computed by applying the old procedure reflecting per unit savings of 1,728 kWh and 0.2376 kW. The effect of the new TRM procedure has been reflected in Q4 unit savings as described below.

Savings impacts for Q4 savings have been reduced to account for the effect of this change for all units collected in PY2. From the telephone survey, we relied on responses to a question regarding whether or not the unit had been replaced. Fully 71% of participants are replacers according to these results. The calculation for Q4 units was differentiated by Replaced vs. Nonreplaced Units. The True up for Q1-Q3 Replaced Units results in negative savings of -4,471 MWh.

In addition Q1 participant and savings values have also been corrected in this report. Previously, there was a problem in Q1 data with duplicate records. At the time the Q1 report was prepared, PECO provided what they thought was the correct participant and unit count and kWh savings. PECO's numbers were 4,867 units and 9,244 MWh savings. These were reported in Q1 and carried forward all year in cumulative numbers. However, PECO has since provided corrected data which reveals more than 1,001 additional units for Refrigerators. (Freezers and Room AC are correct as previously reported.) In addition, the corrected kWh savings for Q1 is 9,255 MWh (based on 1728 kWh/unit). This figure exceeds the previously reported savings by 11 MWh.

Combining the effect of the TRM true-up and the Q1 corrections in Q4 reported MWh savings results in a negative adjustment to savings of -4,481 MWh for the year. Demand savings are also lower due to the TRM revision, the True up for Q1-Q3 Replaced Units results in negative savings of -0.784 MW.

With these changes, the revised quarterly and annual participant count, reported MWh savings and MW savings for the program are summarized in the table below.

**Table 4-4. Smart Appliance Recycling Participants and Reported Savings**

	Q1	Q2	Q3	Q4	PY2 Total
Participants	4,884	4,966	3,319	3,602	16,771
MWh	9,255	9,443	6,266	943.22	25,908
MW	1.73	1.79	1.14	0.10	4.77

A telephone survey of a statistically valid sample of program participants was used to verify the appliances were picked up as reported in the program tracking database. In total, there were 208 participants that responded to the verification question. Of those queried, all participants confirmed that the program did pick up their unit and confirmed the unit types and pickup as were recorded in the database. The resulting verification rate is 100 percent.

With respect to actual confidence and precision achieved based on survey results for overall verification of appliance pickup, the 208 responses yielded a confidence and precision level of more than 90/10.

#### 4.3.3 Program Sampling

As previously noted, all available tracking data were analyzed and summarized for this report. In addition, a telephone survey was conducted of a statistically valid random sample of PY 2010 participants. The sample was drawn to achieve 90/10 confidence/precision levels. The sample of Appliance Recycling participants was randomly selected from the program tracking database provided by PECO. Basic data-cleaning steps were undertaken before the sample was pulled from the database so that, for example, records with missing or invalid phone numbers were removed. These records could not be included in the surveying efforts but were included in the final impact results. The sample was stratified by appliance type and nature of use (Primary versus Secondary). Quotas were then set based on the proportion of each appliance in the general population. Therefore, no weights are necessary for the data analysis. In total, 10,438 sample points were sent to Itron's CATI Center in order to complete the survey. The CATI Center was then instructed to randomly select and dial participants until they had reached the quotas shown in Table 4-5.

**Table 4-5 Composition of Smart Appliance Recycling Program Survey Sample**

Group	Strata	Strata Description	Refrigerator Primary	Refrigerator Secondary	Freezer	Room A/C	QUOTAS
1	1	Refrigerator Primary	1				22
2	2	Refrigerator Secondary		1			70
3	3	Refrigerator Primary + Room A/C	1			1	12
4	4	Refrigerator Secondary + Room A/C		1		1	36
5	5	Freezer			1		32
6	6	Freezer + Room A/C			1	1	12
7	1	Refrigerator Primary + Freezer	1		1		4
8	2	Refrigerator Secondary + Freezer		1	1		10
9	3	Refrigerator Primary + Freezer + Room A/C	1		1	1	0
10	4	Refrigerator Secondary + Freezer + Room A/C		1	1	1	2
		<i>Total QUOTAS</i>					200

#### 4.3.4 Process Evaluation

The process evaluation of the Appliance Recycling program is based on the same telephone survey of a random sample of program participants as described above. The survey was conducted in August 2011. Ultimately, a total of 196 participants responded to the process battery of questions in the survey.

Key process findings include the following:

- Participants are highly satisfied with the program, as well as its different elements. A mean score of 9.44 out of 10 was provided for overall program satisfaction. Program elements received the following mean satisfaction scores:
  - Time it took to pick up appliance after appointment was made – 8.7
  - Collection team who picked up the appliances –8.8
  - Size of the incentive payment 8.9
  - Amount of time it took to receive the incentive payment – 8.9

- Participants are highly likely to recommend the program to others based on their experiences. The mean likelihood of recommending the program is 9.7 on a 10-point scale.
- The most commonly cited ways of learning about the program were bill inserts, marketing by participating retailers, and word of mouth.
- The primary motivations for participating in the program are the \$35 incentive, the convenience of the home pick-up and the opportunity to dispose of unwanted appliances in an environmentally safe manner.
- Nearly two-thirds of participants feel more favorable toward PECO after participating in the program.

#### **4.3.5 Program Partners and Trade Allies**

One important partner is the implementation contractor, JACO. The program is also partnering with one retailer, Sears.

#### **4.3.6 Program Finances**

A summary of the project finances is presented in Table 4-6 below.

**Table 4-6 Smart Appliance Recycling Program Finances<sup>(1)</sup>**

	Quarter 4 (\$000)	PYTD (\$000)
EDC Incentives to Participants	\$137	\$679
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$137</b>	<b>\$679</b>
Design & Development	\$0	\$0
Administration <sup>(1)</sup>	\$332	\$1,584
Management <sup>(2)</sup>	\$81	\$299
Marketing	\$54	\$387
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$467</b>	<b>\$2,271</b>
EDC Evaluation Costs	\$9	\$73
SWE Audit Costs	n/a	n/a
Participant Costs <sup>(3)</sup>	n/a	n/a
<b>Total Costs</b>	<b>n/a</b>	<b>\$3,023</b>
Annualized Avoided Supply Costs	n/a	\$2,042
Lifetime Avoided Supply Costs	n/a	\$23,965
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$3,023</b>
<b>Total Lifetime Economic Benefits</b>	<b>n/a</b>	<b>\$23,965</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>7.93</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> As per the July 2011 TRC Total Resource Costs Test Order, incentive costs for this program were used as a proxy for participant costs in the benefit cost analysis.		

#### 4.4 Smart Home Rebates 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; lighting fixtures and LED lamps; whole-house fans; white roofs; ground-source heat pumps; ENERGY STAR windows and 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). Consumer electronics, including televisions, monitors, desktop computers and advanced plug strips, were added in Q3.

#### **4.4.1 Program Logic**

The Smart Home Rebates Program is a retrofit and renovation program designed to upgrade existing equipment to higher levels of efficiency. It is designed to encourage and assist residential customers in improving the energy efficiency of their homes through a broad range of energy efficiency options that address all major end uses. This program offers cash rebates to residential customers who install high-efficiency electric equipment and engages equipment suppliers and contractors to promote the rebate-eligible equipment. The program also encourages customers to make energy-efficient choices when purchasing new products. Unlike an appliance-recycling program, the Smart Home Rebates Program does not focus on persuading customers to get rid of inefficient equipment with significant useful life remaining.

A conservation service provider, Ecos, implements the program on PECO's behalf, providing assistance with PECO's direct marketing, working with upstream and mid-stream suppliers to stock qualifying measures, promoting the program, assisting with rebate applications, providing fulfillment services, and tracking and reporting program activities and achievements toward goals.

#### **4.4.2 M&V Methodology**

The three major objectives of the evaluation are to: (1) quantify gross savings impacts from the program; (2) determine key process-related program strengths and weaknesses and identify ways in which the program can be improved; and (3) assess the program's effectiveness in demonstrating PECO's commitment to and confidence in the measures' performance and their ability to reduce home energy use.

The M&V completed on a quarterly basis includes reviewing program data and documentation to track and verify savings. In addition the M&V also includes 1) conducting participant surveys to obtain customer experience and insight information and to confirm measure installation; and 2) interviewing staff and market actors for insights into program structure and implementation.

For non-lighting measures, gross savings impacts are based on program-reported activity by measure and deemed savings values from the TRM. Savings are adjusted based on results of a participant survey, in which participants are asked to verify the installation and performance of rebated measures.

For lighting measures, M&V consists of reviewing the tracking database and verifying it against the manufacturer invoices sent to PECO for payment. The tracking data is used to estimate the annual program savings. In addition, an engineering analysis was performed in which the savings were verified for conformance to existing TRM and approved TRM protocols.

#### **4.4.3 Program Sampling**

The sampling plan was modified this year to reflect the changes in program operations and also to streamline the overall program evaluation. Instead of quarterly surveys, there were two rounds of surveys of program participants, with the summary of the first round completed in Q4. A total of 103 customer surveys were fielded to PY2 Q1 and PY2 Q2 participants in March 2011. A second round of 101 customer surveys was fielded in August 2011 to program participants in the PY2 Q3 and Q4. These 204 completed surveys resulted in an installation rate of 1.0 and a free ridership rate of 15 percent, both at a 90/10 confidence level.

#### **4.4.4 Process Evaluation**

Process evaluation activities include reviewing program plans and documentation, and conducting CATI 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 Ecos program implementers. In addition, the program databases were reviewed as part of the verification and due diligence completed during the fourth quarter of PY2.

#### **4.4.5 Program Partners and Trade Allies**

Under the Smart Home Rebates Program, customers purchase and install qualified products from retailers and/or contractors. The customers or their contractors submit the rebate form to Ecos with information that documents the qualifying sale or installation, with the form allowing customers to see the exact rebate they can receive. Ecos mails the rebate checks to the customer.

Under the implementation strategy, the program is delivered mainly through direct contact between PECO and its customers but offers opportunities for working with trade allies and other upstream suppliers. Retailers and equipment contractors and installers are engaged to promote awareness and use rebate offers to help sell qualifying equipment and may also provide or pre-fill rebate forms to help customers obtain rebates. These allies include residential air-conditioning and heating equipment dealers and installers, high-efficiency clothes washer and dishwasher dealers, and electrical equipment dealers.

#### **4.4.6 Program Finances**

A summary of the project finances is presented in Table 4-7.



**Table 4-7 Summary of PECO Smart Home Rebates Program Finances: TRC Test<sup>1</sup>**

	Quarter 4 (\$000)	PYTD (\$000)
EDC Incentives to Participants	\$2,529	\$14,161
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$2,529</b>	<b>\$14,161</b>
Design & Development	\$0	\$0
Administration <sup>[1]</sup>	\$735	\$3,425
Management <sup>[2]</sup>	\$212	\$860
Marketing	\$419	\$1,310
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$1,365</b>	<b>\$5,594</b>
EDC Evaluation Costs	\$34	\$288
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	\$56,409
<b>Total Costs</b>	<b>n/a</b>	<b>\$76,452</b>
Annualized Avoided Supply Costs	n/a	\$5,690
Lifetime Avoided Supply Costs	n/a	\$55,716
<b>Total TRC Costs</b>		<b>\$62,291</b>
<b>Total Lifetime Economic Benefits<sup>[3]</sup></b>	<b>n/a</b>	<b>\$55,730</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>0.89</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Total Lifetime Economic Benefits include Lifetime Avoided Supply Costs plus any avoided participant costs associated with participating in the program.		

#### 4.5 Smart Equipment Incentives Program for Commercial and Industrial Customers

The purpose of the C&I Smart Equipment Incentives 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 launched March 1, 2010, although incentives were also offered for projects completed between July 1, 2009, and February 28, 2010.

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. The PY2 C&I and government programs are sufficiently differentiated that the two programs are now being evaluated separately. Although PECO recently initiated a wait list for customers applying for incentives on or after October 1, 2011, PY2 was a complete program year and the evaluation was unaffected by this change.

#### **4.5.1 Program Logic**

The Smart Equipment Incentives program is designed to make it as easy for C&I customers and their contractors to obtain rebates for prescriptive measures, while also providing flexibility in accommodating custom energy-savings measures. The program leverages the involvement of trade allies to promote the program and identify energy-savings opportunities. Measure incentives are expected to cover part of the installation costs and drive the market. PECO administers the Smart Equipment Incentives program through an implementation contractor, KEMA. The implementation contractor works with trade allies and contractors, and directly with customers, to achieve program participation. Information flows from customers and contractors to KEMA, is aggregated for PECO, and then flows as needed to the SWE and to the program evaluators.

#### **4.5.2 Program M&V Methodology**

The impact evaluation plan for PY2 was modified from the PY1 approach, due to the larger and more diverse population of projects. The primary plan modification was that the Government and Nonprofit Smart Equipment Incentives program was evaluated separately from the C&I Smart Equipment Incentives program, due to the greater differentiation in program marketing and delivery for PY2 and the larger population of projects from which to sample.

The sample plan for PY2 used stratified ratio estimation as in PY1; there continued to be three tiers stratified by size of energy savings. In PY2, dynamic sampling was employed to incorporate sample points from each quarter or period. Q1 and Q2 were combined for one sample due to the light participation in Q1 and some uncertainty during Q1 regarding sampling rules that the SWE since resolved. Sample points were allocated to sample groups to reflect higher participation in non-lighting measures and custom measures. Measurement and verification in PY2 included data collection and on-site M&V for most sampled sites.

For sample design purposes, multi-tenant projects at the individual living unit were aggregated to one project based on the common site utility account ID. Due to the low level of uncertainty with the fully deemed multi-tenant measures, the sampled multi-tenant aggregated projects

received a file review only to verify invoices and ensure the TRM protocols were correctly applied.

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 TRM<sup>19</sup> 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 (IMP). 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 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<sup>20</sup>. Evaluation of all partially deemed projects included an application and file review and development of a site-specific M&V plan (SSMVP). Site visits were performed following the activities laid out in the SSMVP and verified savings calculated using the variables determined through the site visit 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 should have been reported as custom instead) 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 PY2 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. The focus of the site 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

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<sup>19</sup> 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 2010.

<sup>20</sup> 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*, December 1, 2009.

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.

#### **4.5.3 Program Sampling**

The sample plan for PY2 used stratified ratio estimation similar to the method used in PY1. Based on a combined paid annual population of 1085 non-multi-tenant projects and 490 multi-tenant projects (per sampling count as described above, not reporting counts), the final verified sample size is 39 projects for the program year, with samples allocated by participation from each quarter and by strata.

A maximum of up to 48 sample points was planned for, while the final sample design included 40 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 one of the sampled projects was not able to be verified due to the customer's lack of cooperation. This project was a strata 2 project and was not 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 sample was not differentiated between lighting and non-lighting projects, but an effort was made to ensure a high percentage of custom projects were verified through the sample without inappropriately skewing the sample design. Due to the distribution of projects among strata with Custom projects making up a majority of strata 1, the overall sampled projects had 19 percent ex ante kWh savings from TRM Lighting measures, 32 percent from TRM non-lighting measures and 49 percent from Custom measures.

#### **4.5.4 Process Evaluation**

Process evaluation activities for the Smart Equipment Incentives program in PY2 included in-depth interviews with program staff and program implementers, CATI phone interviews with program participants and trade allies, and a detailed review of the tracking system and other program materials. Although results are developed separately for the C&I and Government, Institutional, and Nonprofit (GIN) programs, many of the process evaluation activities were done simultaneously as one effort due to the substantial overlap in program implementation efforts.

All of the process evaluation data collection activities and interviews have been completed for PY2, including staff and implementer in-depth interviews, participating and non-participating trade ally surveys, and a participating customer phone surveys. The evaluation team also reviewed program materials to inform the process evaluation.

Review of the tracking system and program quality assurance/quality control (QA/QC) procedures was conducted throughout the program year.

Analysis of the data collection activities and interviews is underway but not yet complete. Findings from the impact verification and site M&V process will be compiled to inform PECO as to any follow up recommendations for revisions or changes. Reporting on process evaluation findings is also in progress. These activities and status are summarized in Table 4-8 .

**Table 4-8 PY2 Smart Equipment Incentives Process Evaluation Activities**

<b>PY 2 Process Evaluation Activity</b>	<b>Data Collection</b>	<b>Reporting Status</b>	<b>Comment</b>
In-depth interviews with PECO staff and program implementer	Completed	In progress	6 completed interviews
Telephone interviews with trade allies	Completed	In progress	12 participating trade allies; 6 non-participating trade allies
Participating customer phone survey including impact, NTG, and process questions	Completed	In progress	104 completed interviews (C&I Lighting = 31, C&I Non-Lighting = 28, GIN Lighting = 27, GIN Non-Lighting = 18)
Tracking system review	Completed	In progress (Partially complete in reports to PECO)	Independent review of PECO's tracking system and tracking system inputs
QA/QC procedures review	Completed	In progress	As part of the impact evaluation and tracking system reviews

A participating customer telephone survey was conducted for the PY2 Smart Equipment Incentives program resulting in 104 completed interviews. These surveys are split between four individual samples, two each for the C&I and GIN programs covering lighting project participants and non-lighting project participants. The surveys were designed to achieve 85/15 confidence/precision each. The survey focused on questions to estimate the gross and net program impacts and to support the process evaluation. All CATI surveys were completed by Itron by October 2011.

The CATI survey was directed toward unique customer contact names drawn from the tracking system for PY2 paid projects. The survey assessed all of the parameters necessary to calculate free ridership, and supported gross savings analysis by collecting self-reported data for end-use hours of operation and characterization of removed and installed equipment. 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.

Trade ally surveys were also completed during the PY2 evaluation. The sample population was chosen using a simple random sample of participating and non-participating trade allies. PECO contracts with a Conservation Service Provider (CSP) to deliver the SEI Business program. The CSP conducts outreach through trade allies, architects, engineers, energy consultants, energy service companies, equipment providers, and contractors. Customers may also implement measures on their own. PECO contracts with KEMA to provide these services.

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 team from KEMA in September 2011. The interviews were designed to obtain information about the program's administration and delivery during program year (PY2) and 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 program application.

The evaluation team conducted telephone interviews with twelve (12) participating trade allies and six (6) non-participating trade allies for the PY2 SEI program evaluation. These surveys provided insight into program marketing and outreach to the trade community and explored the influence of the program on equipment stocking and installation practices.

The evaluation team found that the program has been most successful recruiting trade allies to participate in the lighting component of the SEI program. The majority of participating trade allies are lighting consultants. The program has been less successful in recruiting HVAC contractors to participate as trade allies.

#### **4.5.5 Program Partners and Trade Allies**

PECO and PECO's program managers use the contracted program conservation service provider (CSP) to deliver the program. Outreach through trade allies, architects, engineers, energy consultants, energy service companies, equipment providers, and contractors continued throughout PY2. Customers may also implement measures on their own. In brief, the duties of the program partners are as follows:

- PECO program staff and account managers– Compile results and provide support to the CSP.
- Program CSP – KEMA, as CSP, oversees and administers the program, ensuring that measures are implemented as intended, required forms are completed, and collecting information on measures installed.

- Participating trade allies – These entities ensure measures are implemented and functional, measures are eligible, and that cost and energy-savings data are accurate and available.
- Evaluation contractor – Navigant seeks to verify the actual program results and optimize the delivery of services under this program.

#### 4.5.6 Program Finances

Summaries of program finances are presented in Table 4-9.

**Table 4-9 Summary of PECO Smart Equipment Incentives – C&I Program Finances:**

	Quarter 4 (\$000)	PYTD <sup>(4)</sup> (\$000)
EDC Incentives to Participants	\$1,716	\$5,795
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$1,716</b>	<b>\$5,795</b>
Design & Development	\$0	\$0
Administration <sup>[1]</sup>	\$581	\$3,129
Management <sup>[2]</sup>	\$192	\$573
Marketing	\$334	\$430
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$1,107</b>	<b>\$4,132</b>
EDC Evaluation Costs	\$76	\$586
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	\$30,256
<b>Total Costs</b>	<b>n/a</b>	<b>\$40,769</b>
Annualized Avoided Supply Costs	n/a	\$6,230
Lifetime Avoided Supply Costs	n/a	\$62,474
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$34,974</b>
<b>Total Lifetime Economic Benefits<sup>[3]</sup></b>	<b>n/a</b>	<b>\$62,518</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>1.79</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Total Lifetime Economic Benefits include Lifetime Avoided Supply Costs plus any avoided participant costs associated with participating in the program.		
<sup>4</sup> An administrative cost discrepancy for PY1 startup costs was found during an internal review. This cost is not included on this table or explicitly reported in this PY2 report. The discrepancy added \$373k to Smart Equipment Incentives – C&I; \$206k to Smart Equipment Incentives – Government and Nonprofit; \$31k to Smart Construction; and \$30k to Permanent Load Reduction for a total administrative cost increase of \$640k across these 4 programs		

## **4.6 Smart Equipment Incentives Program for Government and Nonprofit Customers**

The purpose of the Smart Equipment Incentives program is to increase awareness of energy savings opportunities and assist customers in acting on those opportunities to decrease energy usage in government, nonprofit, and institutional facilities. 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 launched March 1, 2010, although incentives were also offered for projects completed between July 1, 2009, and February 28, 2010.

PECO's three-year 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. The PY2 C&I and government programs are now sufficiently differentiated that the two programs are now being evaluated separately.

### **4.6.1 Program Logic**

The Smart Equipment Incentives program is designed to make it as easy as possible for government, nonprofit, and institutional customers and their contractors to obtain rebates for prescriptive measures, while also providing flexibility in accommodating custom energy savings measures. The program leverages the involvement of trade allies to promote the program and identify energy savings opportunities. Measure incentives are expected to cover part of the installation costs and drive the market. PECO administers the Smart Equipment Incentives program through an implementation contractor, KEMA. The implementation contractor works with trade allies and contractors, and directly with customers, to achieve program participation. Information flows from customers and contractors to KEMA, is aggregated for PECO, and then flows as needed to the SWE and to the program evaluators.

### **4.6.2 Program M&V Methodology**

The impact evaluation plan for PY2 was modified from the PY1 approach, due to the larger and more diverse population of projects. The primary plan modification is that the Government /Nonprofit energy savings program is being evaluated separately from the C&I Smart Equipment Incentives program, due to the greater differentiation in program marketing and delivery for PY2 and the larger population of projects from which to sample. The sample plan for PY2 used stratified ratio estimation as in PY1; there continued to be three tiers stratified by size of energy savings. In PY2, dynamic sampling was employed to incorporate sample points from each quarter or period. Q1 and Q2 were combined for one sample due to the light participation in Q1 and some uncertainty during Q1 regarding sampling rules that the SWE has now resolved. Sample points were allocated to different measures, reflecting higher



participation in non-lighting measures. Measurement and verification included data collection and on-site M&V. A total of 16 sample points for full M&V was used; this was selected to be sufficient to meet precision and confidence targets of 85/15 at the program level and 90/10 at the (non-residential) sector level.

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 TRM 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 (IMP). The evaluation approach for deemed measures is to verify both quantity and that the measure installed matches TRM-required specifications. The only fully deemed measures are the LED traffic light installations and appliances /equipment in the multi-tenant programs. 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 through an approved protocol (Basic or Enhanced level of rigor) that includes application review and site-specific M&V. Projects that included custom measures as defined by the TRM were evaluated through application review and implementing site-specific M&V plans. Multi-tenant projects were aggregated to one project based on the common site utility account ID. The sampled multi-tenant and traffic light projects received a file review only to verify invoices and proper application of the deemed savings.

#### **4.6.3 Program Sampling**

The sample plan for PY2 used stratified ratio estimation as in PY1. Based on a combined paid annual population of 288 non-multi-tenant projects and 101 multi-tenant projects (per sampling count for multi-tenant projects as described above, not reporting counts), along with relaxed sampling requirements for the evaluation, the sample size for the larger non-multi-tenant projects, the traffic light projects, and the multi-tenant projects was 24 M&V sites for the program year, with sample allocated by participation from Q1 and Q2 combined, Q3 and Q4. (Note that 101 projects of the completed total number of projects are for small multi-tenant projects, generally consisting of a single appliance and contributing less than 1 percent of the ex ante savings). The on-site sample size of 24 was chosen to meet the confidence and precision targets for the portfolio. The sample was not specifically allocated to larger projects or projects in underrepresented (primarily non-lighting) measures. The sample included six projects pulled from the fully deemed traffic lights projects for file review of invoices and checks for proper application of deemed savings only. As these are fully deemed measures, a lower level of rigor is justified. Also, two multi-tenant projects were sampled and verified.

#### **4.6.4 Process Evaluation**

As in PY1, the process evaluation in PY2 included in-depth interviews with program staff and trade allies, and 45 participant CATI phone interviews, 18 of which involved non-lighting measures. The participant CATI interviews assessed standard process topics, focusing on satisfaction and program delivery issues. Trade ally interviews were also conducted with vendors and contractors, involving 12 participating and 6 non-participating trade allies. Except for the CATI interviews, the process evaluation activities were conducted jointly with the SEI C&I evaluation. As mentioned above, analysis for the process evaluation is continuing although all data collection and interviews are complete.

#### **4.6.5 Program Partners and Trade Allies**

PECO and PECO's program managers use a contracted program conservation service provider to deliver the program. The CSP conducts outreach through trade allies, architects, engineers, energy consultants, energy service companies, equipment providers, and contractors. Customers may also implement measures on their own.

#### **4.6.6 Program Finances**

Summaries of program finances are presented in Table 4-10.

**Table 4-10 Summary of PECO Smart Equipment Incentives – Government and Nonprofit Program Finances: TRC Test<sup>1</sup>**

	Quarter 4 (\$000)	PYTD <sup>(4)</sup> (\$000)
EDC Incentives to Participants	\$1,486	\$4,530
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$1,486</b>	<b>\$4,530</b>
<b>Design &amp; Development</b>	<b>\$0</b>	<b>\$0</b>
Administration <sup>[1]</sup>	\$617	\$1,641
Management <sup>[2]</sup>	\$100	\$370
Marketing	\$34	\$34
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$751</b>	<b>\$2,045</b>
<b>EDC Evaluation Costs</b>	<b>\$36</b>	<b>\$313</b>
<b>SWE Audit Costs</b>	<b>n/a</b>	<b>n/a</b>
<b>Participant Costs</b>	<b>n/a</b>	<b>\$15,349</b>
<b>Total Costs</b>	<b>n/a</b>	<b>\$22,236</b>
<b>Annualized Avoided Supply Costs</b>	<b>n/a</b>	<b>\$3,988</b>
<b>Lifetime Avoided Supply Costs</b>	<b>n/a</b>	<b>\$36,809</b>
<b>Total TRC Costs</b>		<b>\$17,707</b>
<b>Total Lifetime Economic Benefits<sup>[3]</sup></b>	<b>n/a</b>	<b>\$36,836</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>2.08</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Total Lifetime Economic Benefits include Lifetime Avoided Supply Costs plus any avoided participant costs associated with participating in the program.		
<sup>4</sup> An administrative cost discrepancy for PY1 startup costs was found during an internal review. This cost is not included on this table or explicitly reported in this PY2 report. The discrepancy added \$373k to Smart Equipment Incentives – C&I; \$206k to Smart Equipment Incentives – Government and Nonprofit; \$31k to Smart Construction; and \$30k to Permanent Load Reduction for a total administrative cost increase of \$640k across these 4 programs		

#### 4.7 Conservation Voltage Reduction (CVR) Program

The Conservation Voltage Reduction 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.

#### 4.7.1 Program Logic

Changes in voltage translate into demand and energy savings through the basic physical relationships governing power. The change in voltage targeted by this program is a 1 percent change in voltage within the tolerance bandwidths required to insure power quality and equipment performance by end-use customers. In most instances, customers will not notice, nor experience, any changes in equipment performance(s) (e.g., air-conditioning, electric space heating, and motor performance and use), resulting from the change in voltage.

However, there is a small possibility that power quality and equipment performance could be impacted under the program, requiring adjustments consisting of equipment changes or enhancements (e.g., adding capacitors to feeders), and/or dialing voltage settings back to their pretreatment level(s).

Part of the role of the EM&V protocol for the CVR program will be to assess these potential impacts, and how effective PECO is in the following areas:

- 1) Identifying adverse outcomes resulting from the program vs. common voltage complaints
- 2) Implementing a remediation plan to restore electric service and power quality to prior levels

#### 4.7.2 Program M&V Methodology

M&V activities relating to the CVR program for PY2 focused on completing the review of the custom protocol developed by the PECO/NCI evaluation team, and approved by the SWE in December 2010. The demand savings model was subsequently approved in September 2011 by the SWE, subject to an agreement by all parties that additional primary data collection would be undertaken in 2012, and used to update the CVR factor (CVRf) .

A summary of M&V tasks completed for CVR during PY2 presented in this annual report includes the following:

- o Statistical analyses of metered hourly MW and kV data for each circuit collected approximately one week before, and one week following, the voltage change(s) date.

- A statistical analysis of peak demand impacts using hourly voltage and energy data collected at 4 substations during a controlled, data collection experiment conducted in mid-July through early August 2010.

As a custom EE/DR program concept, CVR required the development of a custom measurement protocol to calculate verified program energy and demand savings. Toward this objective, a CVR Working Group consisting of PECO staff and members of the Navigant team was formed, joined later by staff from the SWE. The M&V protocol for CVR includes the following steps:

- 1) Gather hourly metered data (MW, voltage readings) for substations included in the program, for seven days before the cut-over date, and seven days immediately following the voltage cut-over date.
- 2) Estimate the CVR factor(s) (*CVR<sub>f</sub>*) defined in the following equation as:

$$\text{CVR}_f = \frac{[\% \text{ change in measured energy}]}{[\% \text{ change in measured voltage}]}$$

Where each percentage change is calculated statistically, as the measured change in average hourly metered MW divided by the change in voltage (set at 1 percent in program):

$$= \frac{[\text{Avg Hrly MW post-cut-over} - \text{Avg Hrly MW pre-cut-over}]}{[\text{Avg Hrly MW pre-cut-over}]}$$

- 3) Verify the average measured voltage change (in percentage) using the following equation:

$$= \frac{[\text{Avg Hrly kV post-cut-over} - \text{Avg Hrly kV pre-cut-over}]}{[\text{Avg Hrly kV pre-cut-over}]}$$

This calculation was performed separately for the 13kV and 34 kV substation/feeder locations. A weighted average was calculated, to derive the measured change in voltage across all substations/feeders treated under the program.

The *CVR<sub>f</sub>* represented in equation 2 (above) is the *elasticity* of the percentage average change in metered hourly MW (i.e., MWh), resulting from a 1 percent reduction in voltage. *CVR<sub>f</sub>*, was estimated over the same cleaned sample of substations/feeders used in the calculation of the average voltage change (above). Table 4-12 (below) includes the parameter estimates used in the energy savings calculation.

- 4) Once estimated, CVRf is then used to calculate energy (and demand) savings, using the following savings equation:

$$\text{Saved Energy} = (\text{Energy}_{\text{Base Period}}) \times [\text{Delta Voltage} \times \text{CVRf} \times (1\text{-line loss})]$$

The line loss factor in equation 4 reflects a parameter value assumption representing an estimate of average losses from the substation location to end-use customers over all hours of the year. CVRf can (and will) vary by time period, particularly during peak system hours, including the top 100 hours of the load duration curve, versus the average (CVRf) value over all 8,760 hours of the year, owing to line loadings, which vary by weather conditions and day-of-week and system conditions.<sup>21</sup> CVRf was statistically estimated using the following two methods:

- A) The delta calculation using pre- and post-hourly metered MW for all impacted substation/feeder locations
- B) A regression model specification that includes hourly weather (degree-day) variables similar to the following:

$$\text{Log}(\text{Hourly MWs}) = B0 + B1 * [\text{Hourly HDD}_{65}] + B2 * [\text{Hourly CDD}_{65}] + B3 * \text{Log}[\text{Metered Voltage}]$$

Estimated in this (log-linear) form, B3 reveals the CVR factor (elasticity) estimate, measured as the (%) change in average hourly MW, in response to a 1% change in voltage. The weather variable(s) are included to control for weather-related influences that could confound the direct measurement of program-induced impacts from the voltage change.

**Table 4-11. Parameter Estimation Results**

CVR Measurement Method:	CVR Factor (Point Estimate)	Measured voltage change:	Loss Factor Adjustment
CVRf (elasticity) of Energy:	<b>1.0828</b>	<b>0.76%</b>	<b>4.9%</b>

In the summer of 2010, PECO conducted a controlled experiment aimed at collecting data at a representative sample of substations, for use in estimating an hourly peak (MW) demand model for CVR:

<sup>21</sup> This was the primary reason for commissioning a controlled data collection experiment during the 2010 summer period for use in calculating CVR factors that would more accurately reflect energy and demand savings accrued during peak hours, including those most likely to fall within the top 100 hours on the annual load duration curve.

The regression to calculate  $CVR_f$ , which allowed this factor to display sensitivity to changes in extreme weather during peak periods, was the following<sup>22</sup>:

$$Eq1) \text{Log}(\text{Hourly MW}) = B0 + B1*\{\text{Hourly HDD}_{65}\} + B2*\text{Log}\{\text{Metered Voltage}*\} + B3*\{\text{Log}\{\text{Metered Voltage}*\} * \{\text{Hourly CDD}_{65}\}\}$$

*\*Net of Dead Band Data*

$CVR_f$  now varies with summer weather (average hourly cooling degree days) according to the following:

$$Eq2: CVR_f = B2 + B3* \{\text{Hourly CDD}_{65}\} = B2 + B3*\{(\text{Avg Temp over Top 100 Peak Hours} - 65)\}$$

Using this equation, the  $CVR_f$  for the top 100 peak hours can be estimated by calculation the average hourly cooling degree days observed over the top 100 peak hours and plugging that into Eq2. Table 4-14 includes the parameter estimates for the peak demand savings model.

**Table 4-12. Deemed Parameters &  $CVR_f$  Equation Used for Peak Demand Reductions**

<b>Energy Factors:</b>	<b>Deemed Value:</b>	<b>Source:</b>	<b>Discussion:</b>
$CVR_f$ Equation for Summer Hours:	1.081 + 0.01347*(Hourly CDD65)	Regression Study using summer load substation sample.	Estimated from summer test results from summer experimental study
Delta Volts (in %):	.76%	Analysis of System Impacts	Measured changes in peak demand hours.
Avg Peak Line Losses % (Losses as a % of Avg. Load During Top 100hrs):	8.2%	Calculated using Avg. Line Losses of 4.9% (Losses as % of Avg. Load)	Assumption: load factor squared = loss factor

PECO will use its data/model based on the 2010 study, including the  $CVR$  factor of 1.48 for verifying savings in the PY4 DR period (June 1-September 30, 2012). PECO will also conduct a study, based on feedback from the SWE, in the summer of 2012 to determine a more applicable  $CVR$  factor. That factor will not be used for compliance for the 2012 DR period, but will be used prospectively for future DR programs.

<sup>22</sup> The proceeding equations will be used as a first estimate for 2010 summer impact however PECO will conduct a more detailed study in the summer of 2011 to refine the Peak  $CVR_f$  regression model.

#### 4.7.3 Program Sampling

The energy model was estimated using census-level data encompassing all substation/feeder locations treated in the program, for which data was available. The DB was cleaned of missing data, lines/circuits with sign reversal problems, and outliers before conducting the statistical analysis of energy savings. The following data was collected, cleaned, and used in the impact calculations:

- Hourly metered MW, voltages, and amps collected during a seven-day period, immediately preceding the day/hour(s) on which the voltage change was completed
- A date stamp for the day on which voltages were dialed back, at each substation/feeder location
- Hourly metered MW, voltages, and amps collected during a seven-day period, immediately following the day/hour(s) on which the voltage change was completed

Estimation of the peak demand impact model for CVR used experimental data collected at the following substations:

- Lenepe
- Grays Ferry
- Jenkintown
- Warrington

This dataset included on/off readings of voltages and energy allowing for the estimation of a  $CVR_f$  during more extreme weather during which the top 100 peak hours are most often found.

#### 4.7.4 Process Evaluation<sup>23</sup>

A process evaluation of PY2 will be performed in the late Fall/Winter of 2011 and will consist of the following:

- A review of internal company documents and records relating to voltage complaints received during the summer of 2011, to determine if CVR could have been a factor in the voltage problem(s).
- A power quality survey of a statistically representative sample of end-use customers to determine voltage performance and whether CVR could have impacted power quality.

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<sup>23</sup> A process study of PY 2010 will commence shortly, and the results of that study will be reported in 2012/Q1.



Lastly, a verification analysis of energy savings persistence is scheduled for 2011/2012 to verify that there were no system-level changes that could have materially impacted energy and demand savings from the CVR program.<sup>24</sup>

#### **4.7.5 Program Partners and Trade Allies**

The CVR program involves no program partners or trade allies.

#### **4.7.6 Program Finances**

A summary of the project finances is presented in Table 4-13.

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<sup>24</sup> In the final set of negotiations with the SWE during the summer, 2011, PECO also agreed to perform additional primary data collection during summer, 2012 as part of a broader plan to update CVR program performance parameters.

**Table 4-13 Summary of CVR Program Finances**

	Quarter 4 (\$000)	PYTD (\$000)
EDC Incentives to Participants	\$0	\$0
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$0</b>	<b>\$0</b>
Design & Development	\$0	\$0
Administration <sup>[1]</sup>	\$31	\$1,391
Management <sup>[2]</sup>	\$24	\$78
Marketing	\$1	\$1
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$56</b>	<b>\$1,470</b>
EDC Evaluation Costs	\$7	\$52
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	n/a
<b>Total Costs</b>	<b>n/a</b>	<b>\$1,523</b>
Annualized Avoided Supply Costs	n/a	\$43,378
Lifetime Avoided Supply Costs	n/a	\$399,384
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$1,522</b>
<b>Total Lifetime Economic Benefits</b>	<b>n/a</b>	<b>\$399,384</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>262</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		

## 4.8 Residential Direct Load Control

The Smart A/C Saver Program is a direct load control program for residential customers. 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, but no control events were called during the summer of 2010.

### 4.8.1 Program Logic

The Smart A/C Saver Program is based on the installation of digital control units (switches) on qualified residential air conditioners. Participants are incented at the rate of \$120/year (\$30 in each of the four summer months per installed device). These switches will initially be controlled via public VHF paging networks, but as AMI is implemented, these units may

migrate to a ZigBee control protocol (switches are dual mode, i.e., both VHF paging and ZigBee).

#### 4.8.2 Program M&V Methodology

The two major objectives of the PY2 evaluation are to:

- (1) Verify installations
- (2) Determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.

In PY3 and PY4, the additional objective of quantifying gross energy and demand savings impacts will be added.

Installations were verified by on-site visits to a sample of participant homes in February and March 2011. Another round of installation verification will be completed in fall 2011. The first process evaluation was completed in PY2 Q3 and relied on stakeholder interviews and phone surveys with a sample of participants. The process evaluation will be repeated in summer and fall 2011. Impacts will be estimated from a metered data sample after the completion of control events for summer 2011 and again after the summer 2012.

#### 4.8.3 Program Sampling

**Installation Verification:** Each year a sample of sites will be randomly selected for on-site inspection. They will be selected from all installations completed over the previous year. Quotas will be set to ensure there is coverage across geographic areas and different installers. The quotas will minimize potential sampling bias related to these parameters.

**Summary of On-site Visits:** The Navigant team covered over 400 miles and 26 sites in an effort to verify the installation practices of as many different technicians as possible. At 100 percent of the sites, Navigant observed no missing, damaged or incorrectly installed equipment. At 100 percent of the sites visited, the installed DCUs and thermostats indicated they were receiving a paging signal.

**Participant Survey:** Similarly, a sample of participants is randomly selected each summer or fall for telephone interviews. They are selected from all participants at the time of the survey. In program years when control events will be called, the survey is designed to be delivered immediately after the events to get reliable customer recall of conditions in their home while their air-conditioning was being controlled. In PY3 participants who have opted out of the program will also be surveyed to better understand their decision to leave the program.

**Metered Data:** A random sample of 79 participants, representing 100 switches was selected in the early months of 2011 to have interval recording meters installed. This sample will be used

to measure impacts from events over all program years due to the high cost of installing interval meters and data communication equipment. Annual monitoring will be done to verify that the selected sample remains representative of the participant customer base, particularly related to average customer size, geography, and number of air-conditioners per home. Corrections will be made to the selected metered sample if needed to keep it representative over time.

#### **4.8.4 Process Evaluation**

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

Participant surveys were used to understand customer demographics, how customers learned of the program, satisfaction with the installation process, and how customers handle their air conditioner on a typical summer day and during heat waves. In future process evaluations, after customers have experienced control events, they will also be asked if they noticed load control events, and how they and their homes or businesses responded to these events.

#### **4.8.5 Program Partners and Trade Allies**

Comverge is the third-party implementer for this program.

#### 4.8.6 Program Finances

A summary of the project finances is presented in Table 4-14. Note that PECO did not call any load control events during the summer of PY2. Accordingly, no benefits are shown in the following table, and the program benefit-to-cost ratio is not calculated.

**Table 4-14 Summary of Residential DLC Program Finances**

	Quarter 4 (\$000)	PYTD <sup>[3]</sup> (\$000)
EDC Incentives to Participants	\$0	\$825
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$0</b>	<b>\$825</b>
Design & Development	\$0	\$0
Administration <sup>[1]</sup>	\$1,145	\$3,186
Management <sup>[2]</sup>	\$2,473	\$7,117
Marketing	\$164	\$164
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$3,782</b>	<b>\$10,468</b>
EDC Evaluation Costs	\$19	\$242
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	n/a
<b>Total Costs</b>	<b>n/a</b>	<b>\$11,536</b>
Annualized Avoided Supply Costs	n/a	n/a
Lifetime Avoided Supply Costs	n/a	n/a
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$10,710</b>
<b>Total Lifetime Economic Benefits</b>	<b>n/a</b>	<b>n/a</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Implementation and Evaluation costs for PY1 were not reported for the direct load control programs. The total of these non-reported costs are \$1,491k for residential DLC and \$377k for commercial DLC. These costs pertain to PY1 only and do not change the values reflected in the PY2 report.		

#### 4.9 Commercial Direct Load Control

The Smart A/C Saver Program is a direct load control program available to small commercial customers. 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, but no control events were called during the summer of 2010.

#### 4.9.1 Program Logic

The Smart A/C Saver Program is based on the installation of programmable thermostats on qualified small commercial air conditioners. Participants are incented at the rate of \$120/year (\$30 per four summer months per installed device). These thermostats are controlled via a public VHF paging network.

#### 4.9.2 Program M&V Methodology

The two major objectives of the PY2 evaluation are to:

- (1) Verify installations
- (2) Determine key process-related program strengths and weaknesses and identify ways in which the program can be improved

Installations were verified by on-site visits to a sample of participant businesses in February and March 2011. Another round of installation verification will be completed in fall 2011. The first process evaluation was completed in the third quarter of PY2 and relied on stakeholder interviews and phone surveys with a sample of participants. The process evaluation will be repeated in summer and fall 2011. Impacts will be estimated from a metered data sample after the completion of control events for summer 2012.

#### 4.9.3 Program Sampling

**Installation Verification:** Each fall a sample of sites will be randomly selected for on-site inspection. They will be selected from all installations completed over the previous year. Quotas will be set to ensure there is coverage across geographic areas and different installers. The quotas will minimize potential sampling bias related to these parameters.

**Summary of On-site Visits:** The Navigant team covered over 400 miles and 26 sites in an effort to verify the installation practices of as many different technicians as possible. At 100 percent of the sites, Navigant observed no missing, damaged or incorrectly installed equipment. At 100 percent of the sites visited, the installed DCUs and thermostats indicated they were receiving a paging signal.

**Participant Survey:** Similarly, a sample of participants will be randomly selected each summer or fall for telephone interviews. They will be selected from all participants at the time of the survey. In program years when control events are called, the survey will be designed to be delivered immediately after the events to get reliable customer recall of conditions in their business while their air-conditioning was being controlled.

**Metered Data:** A random sample of participants representing 100 thermostats will be selected in the early months of 2012 to have interval recording meters installed. This sample will be used to measure impacts from events over all program years due to the high cost of installing interval meters and data communication equipment. Annual monitoring will be done to verify that the selected sample remains representative of the participant customer base, particularly related to average customer size, geography, and number of air conditioners per business. Corrections will be made to the selected metered sample if needed to keep it representative over time.

#### **4.9.4 Process Evaluation**

Participant surveys and stakeholder interviews were been conducted during the third quarter. They focused on marketing and installation processes because no control events have been called yet.

#### **4.9.5 Program Partners and Trade Allies**

Comverge is the third-party implementer for this program.

#### **4.9.6 Program Finances**

A summary of the project finances is presented in Table 4-15. Note that PECO did not call any load control events during the summer of PY2. Accordingly, no benefits are shown in the following table, and the program benefit-to-cost ratio is not calculated.

**Table 4-15 Summary of Commercial DLC Program Finances**

	<b>Quarter 4 (\$000)</b>	<b>PYTD<sup>(3)</sup> (\$000)</b>
EDC Incentives to Participants	\$0	\$12
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$0</b>	<b>\$12</b>
Design & Development	\$0	\$0
Administration <sup>(1)</sup>	\$274	\$855
Management <sup>(2)</sup>	\$37	\$315
Marketing	\$5	\$5
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$316</b>	<b>\$1,175</b>
EDC Evaluation Costs	\$6	\$84
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	n/a
<b>Total Costs</b>	<b>n/a</b>	<b>\$1,271</b>
Annualized Avoided Supply Costs	n/a	n/a
Lifetime Avoided Supply Costs	n/a	n/a
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$1,259</b>
<b>Total Lifetime Economic Benefits</b>	<b>n/a</b>	<b>n/a</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> Implementation and Evaluation costs for PY1 were not reported for the direct load control programs. The total of these non-reported costs are \$1,491k for residential DLC and \$377k for commercial DLC. These costs pertain to PY1 only and do not change the values reflected in the PY2 report.		

#### 4.10 Smart Construction Incentives Program

The purpose of the Smart Construction Incentives program is to greatly improve the energy efficiency of all newly constructed facilities and facilities that are completely renovated or reconstructed in the PECO service territory. Customers can participate through a custom, whole building performance approach and a prescriptive equipment efficiency approach. The Smart Construction Incentives program provides facility designers and builders with training, design assistance and custom incentives (based on kWh saved) to incorporate energy efficient systems and construction practices in facilities.



The program launched officially in February 2011 with some pipeline participants who were in the Smart Ideas tracking system anticipating the launch of this new construction program.

#### **4.10.1 Program Logic**

The Smart Construction Incentives program is designed to make it as easy as possible for C&I and government/nonprofit customers and their contractors to obtain rebates for energy efficiency in new construction that exceeds the minimum standard required by state and local building codes. The program leverages the involvement of the design and engineering community to promote the program and identify energy-savings opportunities.

PECO administers the Smart Construction Incentives program through an implementation contractor, KEMA. The implementation contractor works with design professionals and contractors, and directly with customers, to achieve program participation. Information flows from customers and contractors to KEMA, is aggregated for PECO, and then flows as needed to the SWE and to the program evaluators.

#### **4.10.2 Program M&V Methodology**

Due to limited participation in PY2, Navigant did not conduct an impact evaluation for the Smart Construction Incentives Program. Only four new construction projects (two in the C&I sector and two in the government/institutional/nonprofit sector) were completed in PY2. Savings from these projects will be verified along with those of additional projects completed in PY3.

#### **4.10.3 Program Impact Sampling**

Due to limited participation in PY2, Navigant did not conduct an impact evaluation for the Smart Construction Incentives Program.

#### **4.10.4 Process Evaluation**

The process evaluation included a review of marketing materials and the program operations manual as well as interviews with the program manager and implementation contractor. No participants were contacted because implementation was just beginning and there were few participants. Navigant focused on the following key areas:

- Effectiveness of Program Implementation and Processes
- Roles and Responsibilities
- Overall Goals and Objectives
- Effectiveness of Program Design
- Marketing and Outreach
- Barriers and Benefits to Participation
- Quality Assurance and Quality Control

### ***Effectiveness of Program Implementation and Processes***

PECO has implemented the Smart Construction Incentives program smoothly by leveraging processes and lessons learned from the other, more mature C&I programs. Many trade allies have been recruited from these other programs, and the project verification and incentive payment processes are virtually identical for all C&I programs. However, Navigant has identified two areas of potential improvement.

PECO did not completely match the needs of the Smart Construction Incentives program with its trade ally recruiting activities. The current contractor-heavy group of trade allies is not ideally positioned to support the program as the window of opportunity to design energy efficient buildings may have already closed by the time a contractor is chosen. PECO is making efforts to involve more architects and designers in the program. Navigant recommends reinforcing these efforts with appropriate recruiting events to ensure that trade allies can steer customers towards energy efficiency at the most appropriate project stage.

Navigant also recommends finalizing the program's operations manual and keeping it updated to have a documented set of program rules that serves as reference material. A formal program operations manual has been drafted but not yet released.

### ***Roles and Responsibilities***

It is clear from the evaluation that roles and responsibilities are well established, and that communications between the various actors have been handled effectively. Program roles are defined as follows:

- PECO assumes the role of program designer and high level administrator
- PECO's Smart Construction Incentives program manager acts as the liaison between internal and external stakeholders.
- KEMA assumes the role of program administrator and runs day to day operations.

Regular meetings between PECO's departments, KEMA, and contractors are held to coordinate activities. Program staff is well educated across PECO's platform of C&I programs and leverages best practices across programs.

### ***Overall Goals and Objectives***

Navigant has confirmed that overall goals and objectives are on track at this early stage of the program.

### ***Effectiveness of Program Design***

The initial pipeline of four projects indicates that PECO and KEMA have done an excellent job of leveraging PECO's infrastructure for its other C&I programs. However, it is too early to draw any firm conclusions about program design. The program will need to branch out from the traditional C&I trade allies and recruit more architects and designers to reach its full potential.

### ***Marketing and Outreach***

Marketing and outreach activity for the Smart Construction Incentives program in PY2 was bundled with similar activities for PECO's other C&I programs. This was an efficient way to

market the C&I platform, however, in those cases, as for Smart Construction Incentives, where a program would benefit from more targeted outreach, this approach would not be optimal over the long term. PECO is developing program specific training presentations to complement the broader C&I marketing activities. More program specific activities such as outreach to architects and designers will be critical in moving the program forward effectively.

#### ***Barriers and Benefits to Participation***

With the Smart Construction Incentives program in its early stages, barriers and benefits to participation have not fully emerged. PECO customers are generally interested in the program, and despite the slow economy, program participation was better than anticipated in PY2. The program initially had trouble processing applications and incentive payments in a timely fashion due to insufficient TRM detail on savings calculations. These issues were resolved in July 2011, eliminating this barrier to participation.

#### ***Quality Assurance and Quality Control***

Navigant's review found that KEMA's procedural rules for quality assurance and quality control are well developed and detailed, having been based on a successful model developed by KEMA for other programs. Necessary procedures and checks prevent fraud, ensure that energy savings are realized, enable fair and timely processing of applications, and generate appropriate rebate payments. In combination with PECO's review process, these procedures are reasonable. As the program develops, these procedures should be reviewed to ensure that they are still applicable to new construction projects.

#### **4.10.5 Program Partners and Trade Allies**

PECO and PECO's program managers use a contracted program conservation service provider (CSP) to deliver the program. The CSP is expected to conduct outreach through architects, engineers, energy service companies, equipment providers, and contractors. Customers may also implement measures on their own.

#### **4.10.6 Program Finances**

A summary of the project finances is presented in Table 4-16.

**Table 4-16. Summary of Smart Construction Incentives Program Finances**

	Quarter 4 (\$000)	PYTD <sup>(3)</sup> (\$000)
EDC Incentives to Participants	\$109	\$109
EDC Incentives to Trade Allies	\$0	\$0
<b>Subtotal EDC Incentive Costs</b>	<b>\$109</b>	<b>\$109</b>
Design & Development	\$0	\$0
Administration <sup>(1)</sup>	\$50	\$152
Management <sup>(2)</sup>	\$8	\$43
Marketing	\$5	\$5
Technical Assistance	\$0	\$0
<b>Subtotal EDC Implementation Costs</b>	<b>\$64</b>	<b>\$200</b>
EDC Evaluation Costs	\$0	\$12
SWE Audit Costs	n/a	n/a
Participant Costs	n/a	n/a
<b>Total Costs</b>	<b>n/a</b>	<b>\$322</b>
Annualized Avoided Supply Costs	n/a	n/a
Lifetime Avoided Supply Costs	n/a	n/a
<b>Total TRC Costs</b>	<b>n/a</b>	<b>\$213</b>
<b>Total Lifetime Economic Benefits</b>	<b>n/a</b>	<b>n/a</b>
<b>Program Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>
<b>NOTES</b>		
<sup>1</sup> Implementation contractor costs.		
<sup>2</sup> EDC costs other than those identified explicitly.		
<sup>3</sup> An administrative cost discrepancy for PY1 startup costs was found during an internal review. This cost is not included on this table or explicitly reported in this PY2 report. The discrepancy added \$373k to Smart Equipment Incentives – C&I; \$206k to Smart Equipment Incentives—Government and Nonprofit; \$31k to Smart Construction; and \$30k to Permanent Load Reduction for a total administrative cost increase of \$640k across these 4 programs		

## Summary

PECO's progress toward its Pennsylvania Act 129 goals continued to accelerate in the fourth quarter of PY2. Compliance goal progress as of the end of the reporting period<sup>25</sup> is as follows:

### Cumulative Portfolio Energy Impacts

- The Cumulative Program/Portfolio Inception to Date (CPITD) reported gross energy savings is 889,859 megawatt-hours (MWh).
- The CPITD verified energy savings is 873,192 MWh.<sup>26</sup>
- PECO achieved 222 percent of the 393,850 MWh May 31, 2011 energy savings compliance target, based on verified energy savings.
- PECO achieved 74 percent of the 1,181,550 MWh May 31, 2013, energy savings compliance target, based on verified energy savings.

### Portfolio Demand Reduction<sup>27</sup>

- The Total Committed demand reduction for PY2 is 172.1 megawatts (MW).
- The CPITD reported gross demand reduction is 151.2 MW.
- The CPITD verified demand reduction is 149.2 MW.<sup>28</sup>
- PECO achieved 42 percent of the 355 MW May 31, 2013 demand reduction compliance target, based on verified demand reduction.
- PECO achieved 51.4 percent of the 355 MW May 31, 2013 demand reduction compliance target based on CPITD verified plus unverified, committed savings.<sup>29</sup>

The progress reported here reflects results of the ten programs in operation in PY2. Additional programs have or will be launched in PY3. PECO is making excellent progress toward meeting its savings targets, particularly given the fact the CVR program is the only DR program that has contributed verified demand savings toward PECO's demand reduction goal.

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<sup>25</sup> Percentage of the compliance target achieved, which is calculated using verified Cumulative Program/Portfolio Inception to Date values (or preliminary verified value, if not available) divided by the compliance target value.

<sup>26</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE. As of the date of publication, this includes 713,313 MWh for PY2 and 159,879 MWh for PY1.

<sup>27</sup> Demand reduction includes both the demand savings from the installation of energy efficiency measures and the demand reduction associated with demand-response programs.

<sup>28</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE. As of the date of publication, this includes 136.7 MW for PY2 and 12.5 MW for PY1 (the latter value is higher than reported in the PY1 Annual Report due to the subsequent approval of the savings protocol for the LEEP program and corrections to tracking system errors in the Smart Equipment Incentives program).

<sup>29</sup> Unverified, Reported Gross MW from PY2 program activity is 33.4 MW. This committed capacity is from the Residential and Commercial Direct Load Control programs, which has not yet been verified.

## Appendix A: Adjustments to the PY1 Smart Equipment Incentive Program Gross and Verified Savings

The purpose of this appendix is to explain adjustments that were made to the previously reported PY1 savings for PECO's Smart Equipment Incentives (SEI) program for both commercial & industrial customers (C&I) and government, institutional & non-profit customers (GIN).

### **Background:**

The gross reported energy and demand savings from PECO's SEI program were originally based on PECO's Conservation Service Provider's (CSP's) internal tracking system. These savings were reported prior to the completion of PECO's own tracking system called SIDS. The CSP's tracking system was based partly on the 2009 PA TRM and partly on the CSP's internally developed savings algorithms for measures which were not found in the 2009 TRM.

The TRM Annual Update Order (Docket No. M-00051865), issued by the Commission on June 3, 2010, ordered the 2010 PA TRM update be applied retroactively to the 2009 program year. This effectively invalidated the savings originally reported in the PY1 Annual report for PECO's SEI program for C&I and GIN customers. PECO has since completed their SIDS tracking systems and has updated the PY1 SEI program savings calculations for each measure based on the 2010 PA TRM. Navigant has also performed an audit of the SIDS system to verify that it is correctly calculating the savings.

As a result of these activities, PECO and Navigant believe it is appropriate and necessary to update reported savings for the PY1 SEI program for the C&I and GIN customers. These changes also affect the verified savings for both these groups as it changes the calculations for the verified realization rates. This memo documents the adjusted gross reported and verified savings for these programs and also shows where the changes occurred.

### **PY1 SEI Program Savings Adjustments**

The update to PECO's tracking system to the 2010 PA TRM resulted in adjustments to the ex ante savings for several SEI projects. Some changes may be due to errors in the original database, updates from 2009 TRM algorithms to 2010 algorithms, or from transition from CSP algorithms to the 2010 TRM algorithms. The source of the differences for each project is not clear, but we believe the current SIDS extract most closely aligns with the 2010 TRM and thus provides the most reliable ex ante savings estimates. Table A-1 lists the project level adjustments to the originally reported ex ante savings compared to the latest SIDS extract from 7/7/2011. Table A-2 shows the measure level adjustments and highlights the total SEI program level ex ante savings adjustments.

**Table A-1: Adjusted PY1 SEI Program Gross Impacts by Project**

Project Summary				Energy Impacts			Peak Demand Impacts		
Project Number	Program Type	Strata	Performed On-Site M&V	CSP 9/2/10 Extract Reported Ex Ante Annual kWh	SIDS 7/7/2011 Extract Ex Ante ANNUAL_KWH	Adjustment to Ex Ante Energy Savings (kWh)	CSP 9/2/10 Extract Reported Ex Ante Coincident kW Saved	SIDS 7/7/2011 Extract Ex Ante ANNUAL_KW	Adjustment to Ex Ante Peak Demand Savings (kW)
PECO-10-00057	SEI C&I	3	No	6,268	14,979	8,711	0.357	0.357	-
PECO-10-00155	SEI C&I	2	Yes	608,095	608,096	1	106.842	106.842	-
PECO-10-00024	SEI GIN	2	Yes	619,772	1,138,047	518,275	29.111	26.254	(2.857)
PECO-10-00025	SEI GIN	3	No	7,181	314	(6,867)	-	-	-
PECO-10-00065	SEI GIN	3	Yes	47,026	113,472	66,446	5.491	5.491	-
PECO-10-00121	SEI GIN	3	No	50,308	132,630	82,322	6.305	6.305	-

**Table A-2: Adjusted PY1 SEI Program Gross Impacts by Measure**

Measure Summary			CSP9/2/10 Extract 300-Tab Measure Level Savings		SIDS7/7/11 Extract 300-Tab Measure Level Savings		Adjustment to PY1 Measure Level Savings	
Project Number	Program Type	Measure Type	Energy Savings (kWh)	Peak Demand Savings (kW)	Energy Savings (kWh)	Peak Demand Savings (kW)	Energy Savings (kWh)	Peak Demand Savings (kW)
PECO-10-00024	SEI GIN	20 HP Motor	1,543	0.406	1,543	0.300	(0)	(0.106)
PECO-10-00024	SEI GIN	25 HP Motor	2,431	0.640	2,431	0.473	-	(0.166)
PECO-10-00024	SEI GIN	40 HP Motor	3,208	0.844	3,208	0.625	-	(0.219)
PECO-10-00024	SEI GIN	40 HP Motor	2,138	0.563	4,075	0.416	1,937	(0.146)
PECO-10-00024	SEI GIN	60 HP Motor	6,027	1.586	6,027	1.173	-	(0.412)
PECO-10-00024	SEI GIN	VSD on HVAC Fans	49,720	6.231	130,899	4.424	81,179	(1.808)
PECO-10-00024	SEI GIN	VSD on HVAC Pumps	110,810	13.887	292,136	13.887	181,326	-
PECO-10-00024	SEI GIN	VSD on HVAC Pumps	25,511	3.197	67,255	3.197	41,745	-
PECO-10-00024	SEI GIN	VSD on HVAC Pumps	74,580	9.347	208,553	9.347	133,973	-
PECO-10-00024	SEI GIN	VSD on HVAC Pumps	47,164	5.911	124,341	5.911	77,177	-
PECO-10-00024	SEI GIN	Water Cooled Chillers, Centrifugal > 300 tons - Level 2	296,640	(13.500)	297,579	(13.500)	939	-
PECO-10-00025	SEI GIN	Exterior LED or Induction replacing 175W or Less HID	7,181	-	314	-	(6,867)	-
PECO-10-00057	SEI C&I	VSD on HVAC Fans	6,268	0.357	14,979	0.357	8,711	-
PECO-10-00065	SEI GIN	VSD on HVAC Fans	31,123	3.634	75,098	3.634	43,975	-
PECO-10-00065	SEI GIN	VSD on HVAC Fans	15,903	1.857	38,374	1.857	22,471	-
PECO-10-00121	SEI GIN	VSD on HVAC Pumps	50,308	6.305	132,630	6.305	82,322	-
PECO-10-00155	SEI C&I	Interior T8/T5 New Fluorescent Fixture w/ Electronic Ballast	608,095	106.842	608,096	106.842	0	-
<b>Sum of Adjusted Projects</b>	SEI	N/A	<b>1,338,650</b>	<b>148.105</b>	<b>2,007,538</b>	<b>145.248</b>	<b>668,888</b>	<b>(2.857)</b>



Table A-3 and Table A-4 show a summary of the adjusted gross savings impacts for energy and demand for PECO's PY1 SEI program, separated by program customer type. The number of projects has not changed since first reported in the PY1 Annual Report. The verified ex post savings by individual sampled projects has not changed. However, due to the adjustment in the program level ex ante savings estimate it was necessary to update the program level Verified Gross Realization Rates and Verified Ex Post Gross Savings. In addition to these adjustments, due to the changes in the Custom Measure Protocol process there are no longer any "Pending" verified savings. All measure level savings are included in the analysis. The PY1 SEI program verified ex post gross energy savings have changed from 15,937 MWh to 15,796 MWh. The PY1 SEI program verified ex post gross peak demand savings have changed from 2.377 MW to 2.406 MW.

**Table A-3: Summary of Adjusted PY1 SEI Program Gross Energy Impacts**

Program Type	Number of Projects (N)	Ex Ante Claimed Gross Energy Savings, kWh	Verified Gross kWh Realization Rate (RR)	Verified Ex Post Gross Energy Savings, kWh
C&I	62	11,455,069	1.17	13,404,511
GIN	25	2,043,351	1.17	2,391,092
<b>TOTAL</b>	<b>87</b>	<b>13,498,420</b>	<b>1.17</b>	<b>15,795,602</b>

**Table A-4: Summary of Adjusted PY1 SEI Program Gross Peak Demand Impacts**

Program Type	Number of Projects (N)	Ex Ante Claimed Gross Peak Demand Savings, kW	Verified Gross kWh Realization Rate (RR)	Verified Ex Post Gross Peak Demand Savings, kW
C&I	62	2,314	0.97	2,247
GIN	25	163	0.97	158
<b>TOTAL</b>	<b>87</b>	<b>2,477</b>	<b>0.97</b>	<b>2,406</b>

Table A-5 and Table A-6 summarize the sampled energy and demand savings using the adjusted PY1 SEI reported savings from the current SIDS extract. As before, one hundred percent of savings in strata 1 and strata 2 were selected in the sample design. All sampled projects received an on-site verification by the evaluation team and verified savings were calculated based on the findings of both the site visit and file review.

**Table A-5: Profile of Adjusted PY1 Gross Impact M&V Sample by Strata, kWh**

Sampling Strata	Number of Project (N)	Ex Ante Claimed Gross Savings, kWh	kWh Weights	Number of Samples (n)	Ex Ante kWh	Sampled % of Population
1	3	3,841,921	28.5%	3	3,841,921	100%
2	8	5,172,176	38.3%	8	5,172,176	100%
3	76	4,484,323	33.2%	13	868,153	19%
<b>TOTAL</b>	<b>87</b>	<b>13,498,420</b>	<b>100.0%</b>	<b>24</b>	<b>9,882,250</b>	<b>73%</b>

Table A-6: Profile of Adjusted PY1 Gross Impact M&amp;V Sample by Strata, kW

Population Summary				Sample		
Sampling Strata	Number of Project (N)	Ex Ante Claimed Gross Savings, kW	kWh Weights	Number of Samples (n)	Ex Ante kW	Sampled % of Population
1	3	803	32.4%	3	803	100%
2	8	781	31.5%	8	781	100%
3	76	893	36.0%	13	180	20%
<b>TOTAL</b>	<b>87</b>	<b>2,477</b>	<b>100.0%</b>	<b>24</b>	<b>1,764</b>	<b>71%</b>

The verified gross energy and demand realization rates were re-calculated to account for the adjustment in ex ante savings. Table A-7 and Table A-8 show the adjusted realization rates and the corresponding relative precision and level of confidence for energy and demand respectively. The realization rate for energy was adjusted downward from the originally reported 1.25 to 1.17 due to the ex ante energy savings changes. The realization rate for peak demand savings did not change significantly and remains at 0.97. The program level confidence and relative precision results are better than the required 85/15 confidence and precision.

Table A-7: Adjusted PY1 Verified Gross kWh Realization Rates and Relative Precision

Sampling Strata	Relative Precision at 85% Level of Confidence ( $\pm$ %)	Low	Mean	High
Stratum 1	0%	1.62	1.62	1.62
Stratum 2	0%	1.26	1.26	1.26
Stratum 3	34%	0.60	0.90	1.21
<b>Total kWh RR</b>	<b>9%</b>	<b>1.06</b>	<b>1.17</b>	<b>1.28</b>

Table A-8: Adjusted PY1 Verified Gross kW Realization Rates and Relative Precision

Sampling Strata	Relative Precision at 85% Level of Confidence ( $\pm$ %)	Low	Mean	High
Stratum 1	0%	1.10	1.10	1.10
Stratum 2	0%	0.99	0.99	0.99
Stratum 3	18%	0.71	0.86	1.01
<b>Total kW RR</b>	<b>6%</b>	<b>0.91</b>	<b>0.97</b>	<b>1.03</b>

Finally, Table A-9 shows the updated error ratios for energy and demand savings for the PY1 SEI program as a whole. Because the relatively small participation rate in PY1, both the C&I and GIN projects were analyzed together as one population. Therefore, the realization rates, confidence and precision levels, and error ratios are only valid at the combined program level, not the sector level. The error ratios were not originally reported and are included here for informational purposes.

**Table A-9: Adjusted PY1 Error Ratio**

Unit	Error Ratio
kWh	0.53
kW	0.24

All other PY1 analysis results for PECO's SEI program remain as originally reported. This paper summarizes the adjustments to the PY1 SEI program reported figures to better reflect PECO's efforts to comply with the requirements of the Commission pertaining to Pennsylvania's Act 129.

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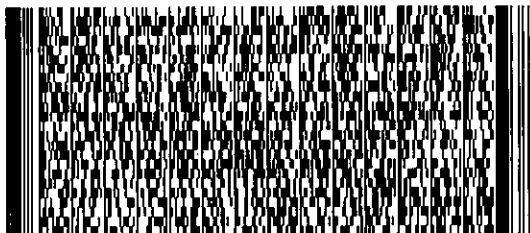
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