

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

**For the Period  
June 2009 through May 2010  
Program Year 2009**

For Pennsylvania Act 129 of 2008  
Energy Efficiency and Conservation Plan

Prepared by Navigant Consulting, Inc.

For

PECO Energy Company

September 15, 2010

## 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>22</b>
2.1	RESIDENTIAL EE SECTOR .....	24
2.2	RESIDENTIAL LOW-INCOME EE SECTOR .....	27
2.3	COMMERCIAL AND INDUSTRIAL EE SECTOR .....	29
2.4	GOVERNMENT AND NONPROFIT EE SECTOR.....	31
<b>3</b>	<b>DEMAND RESPONSE</b> .....	<b>33</b>
<b>4</b>	<b>PORTFOLIO RESULTS BY PROGRAM</b> .....	<b>34</b>
4.1	PECO SMART LIGHTING DISCOUNTS PROGRAM.....	34
4.2	LOW-INCOME ENERGY EFFICIENCY PROGRAM.....	37
4.3	RESIDENTIAL SMART APPLIANCE RECYCLING PROGRAM.....	45
4.4	SMART HOME REBATES PROGRAM.....	49
4.5	SMART EQUIPMENT INCENTIVES PROGRAM .....	54
4.6	CONSERVATION VOLTAGE REDUCTION (CVR) PROGRAM .....	64
<b>5</b>	<b>SUMMARY</b> .....	<b>71</b>

## Acronyms

CATI	Computer-Aided Telephone Interview
CPITD	Cumulative Program/Portfolio Inception to Date
EDC	Electric Distribution Company
EE&C	Energy Efficiency and Conservation
EM&V	Evaluation Measurement and Verification
IQ	Incremental Quarter
kW	Kilowatt
kWh	Kilowatt-hour
M&V	Measurement and Verification
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-Gross
PUC	Public Utility Commission
PY 2009	Program Year 2009
PYTD	Program/Portfolio Year to Date
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 annual report documents the progress and effectiveness of the EE&C accomplishments for PECO through the end of Program Year 2009 (PY 2009), defined as June 1, 2009 through May 31, 2010.

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

#### Cumulative Portfolio Energy Impacts

- The CPITD reported gross energy savings is 177,776 MWh.<sup>2</sup>
- The CPITD preliminary verified energy savings is 156,813 MWh.<sup>3</sup>
- Achieved 40 percent of the 393,850 MWh May 31<sup>st</sup>, 2011 energy savings compliance target, based on preliminary verified energy savings.
- Achieved 13 percent of the 1,181,550 MWh May 31<sup>st</sup> 2013 energy savings compliance target, based on preliminary verified energy savings.

#### Portfolio Demand Reduction<sup>4</sup>

- The Cumulative Program/Portfolio Inception to Date (CPITD) reported gross demand reduction is 11.69 megawatts (MW).<sup>5</sup>
- The CPITD preliminary verified demand reduction is 11.29 MW.<sup>6</sup>
- Achieved 3 percent of the 355 MW May 31, 2013, demand reduction compliance target, based on preliminary verified demand reduction.

#### 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

---

<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 24,346 MWh from measures for which protocol approval is pending with the Statewide Evaluator (SWE)

<sup>3</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE.

<sup>4</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>5</sup> This value includes 0.32 MW from measures for which protocol approval is pending with the SWE.

<sup>6</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE.

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>7</sup>

- The CPITD reported gross energy savings for low-income sector programs is 3,407 MWh.<sup>8</sup>
- None of the reported gross energy savings are verified, because the proposed protocol to estimate savings is currently under review by the SWE.

### **Government, Nonprofit & Institutional Sectors**

- The CPITD reported gross energy savings for government and nonprofit sector programs is 1,383 MWh.<sup>9</sup>
- The CPITD preliminary verified energy savings for government and nonprofit sector programs is 1,708 MWh.<sup>10</sup>
- Achieved 14 percent of PECO's 11,800 MWh May 31, 2010 energy reduction target for this sector based on preliminary verified savings.
- Achieved 2.1 percent of the 80,011 MWh May 31, 2011, energy reduction compliance target for this sector, based on preliminary verified energy savings.
- Achieved 0.8 percent of the 216,792-MWh May 31, 2013, energy reduction compliance target for this sector, based on preliminary verified energy savings.

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

- The PYTD reported gross energy savings is 177,776 MWh.<sup>11</sup>
- The PYTD preliminary verified energy savings is 156,813 MWh.<sup>12</sup>
- The PYTD reported gross demand reduction is 11.69 MW.<sup>13</sup>
- The PYTD preliminary verified demand reduction is 11.29 MW.<sup>14</sup>
- The PYTD reported participation is 20,696 participants.<sup>15</sup>

---

<sup>7</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>8</sup> All of these savings are from measures for which a savings protocol approval is pending with the SWE.

<sup>9</sup> This amount includes 38 MWh from measures for which protocol approval is pending with the SWE.

<sup>10</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE

<sup>11</sup> This amount includes 24,346 MWh from measures for which protocol approval is pending with the SWE.

<sup>12</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE

<sup>13</sup> This value includes 0.32 MW from measures for which protocol approval is pending with the SWE.

<sup>14</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE

<sup>15</sup> Participation excludes sales of compact fluorescent lamps (totaling 1,449,080) in the Smart Lighting Discounts program and light emitting diode lamps and Energy Star lighting fixtures (totaling 5,537) in the Smart Home Rebates program.

The savings listed above reflect results from seven programs, as shown in Table 1-1. Most of these programs started in the fourth quarter (Q4) of PY2009.

**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 – C&I	March 2010
PECO Smart Equipment Incentives – Government & Nonprofit	March 2010
Conservation Voltage Reduction	January 2010

PECO will roll out seven more programs in PY 2010, as shown in Table 1-2.

**Table 1-2. Expected PY 2010 Rollout (June 2010 – May 2011)**

<b>Program</b>	<b>Expected Launch</b>
C&I New Construction	October 2010
Residential New Construction	March 2011
Residential Direct Load Control	June 2010
C&I Direct Load Control	June 2010
Demand-Response Aggregator Contracts	March 2011
Distributed Resources	January 2011
C&I Permanent Load Reduction	October 2010

PECO expects to roll out the Residential Whole Home Performance program in PY 2011.<sup>16</sup> The PUC did not approve the Renewable Resources program.

<sup>16</sup> PECO expects to roll out a pilot of this program as described in its September 2010 filing.

## 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	111,905	8.08
Reported Gross Impact: Program Year to Date	177,776	11.69
Reported Gross Impact: Cumulative Portfolio Inception to Date	177,776	11.69
Unverified Ex Post Savings <sup>1</sup>	24,346	0.32
Estimated Impact: Projects in Progress	49,066	12.36
Estimated Impact: PYTD Total Committed	226,842	24.05
Preliminary PYTD Verified Impact <sup>2</sup>	156,813	11.29
Preliminary PYTD Net Impact <sup>3</sup>	156,813	11.29
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> 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.

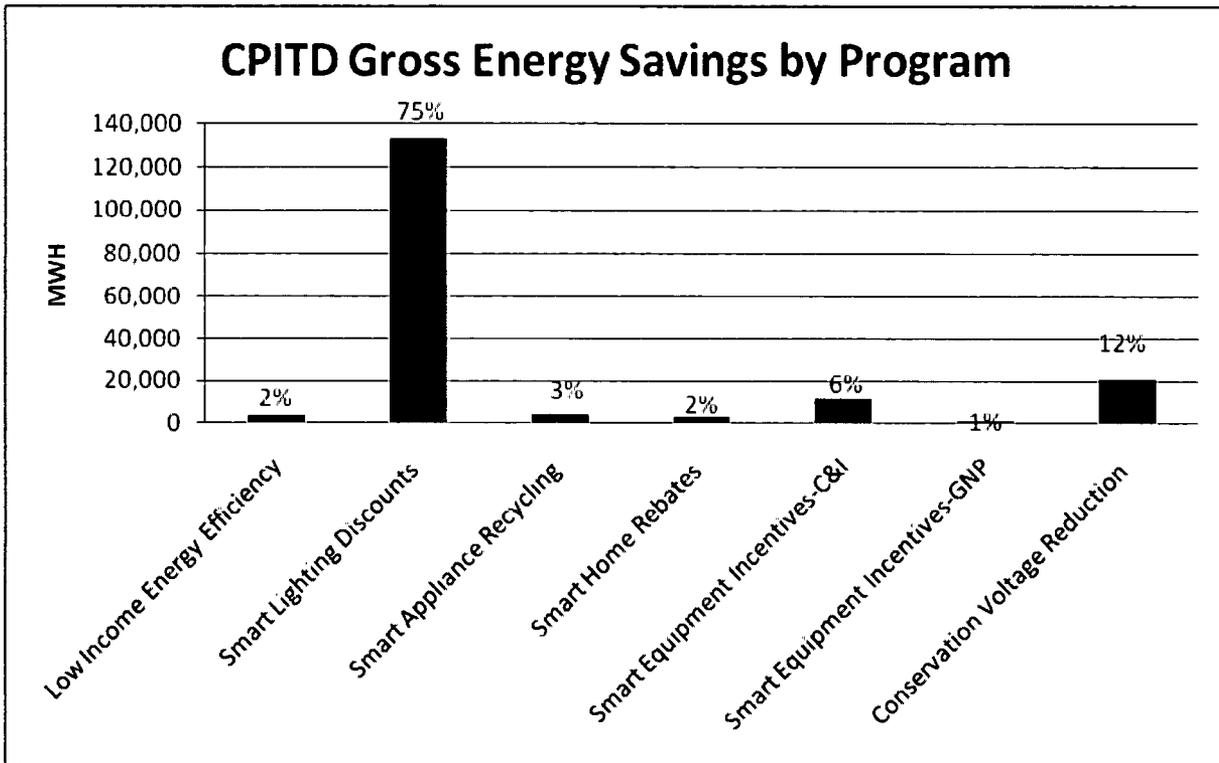
**Table 1-4. Verified Preliminary Portfolio Total Evaluation Adjusted Impacts through the End of the Reporting Period**

TRC Category	IQ	PYTD	CPITD
TRC Benefits (\$)	n/a	n/a	n/a
TRC Costs (\$)	n/a	n/a	n/a
TRC Benefit-Cost Ratio			n/a
NOTES:			
Per PUC direction, program costs, benefits, and benefit-cost ratios are not included in this report.			

## 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 PY 2009 is presented in Table 1-5 and Table 1-6.

**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</sup>	1,662	1,994	1,994	2,714	3,407	3,407
Smart Lighting Discounts Program <sup>2</sup>	1,449,080	2,878,301	2,878,301	68,220	133,212	133,212
Smart Appliance Recycling Program	3,052	3,052	3,052	4,538	4,538	4,538
Smart Home Rebates Program <sup>3</sup>	21,100	21,100	21,100	2,971	2,971	2,971
Smart Equipment Incentives-C&I	62	62	62	11,446	11,446	11,446
Smart Equipment Incentives-Government / Non-Profit	25	25	25	1,383	1,383	1,383
Conservation Voltage Reduction <sup>4</sup>	80	83	83	20,633	20,819	20,819
<b>TOTAL PORTFOLIO</b>	<b>20,364</b>	<b>20,696</b>	<b>20,696</b>	<b>111,905</b>	<b>177,776</b>	<b>177,776</b>

**NOTES:**

<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE 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>Participation numbers shown are the numbers of discounted lamps sold. These are excluded from total portfolio participation numbers

<sup>3</sup>Participation numbers for this program include 5,537 instant rebates for program qualifying LED lamps and Energy Star lighting fixtures at retail locations. These are excluded from the total portfolio participant numbers The energy savings value indicated in this table includes 8 MWh from measures for which protocol approval is pending

<sup>4</sup>Participants are reported as the number of substations treated under the CVR program, as reported by PECO, and are excluded from the total portfolio participant numbers. The savings protocol for this program is pending with the SWE

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

Program	Unverified Ex Post Savings <sup>3</sup>	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</sup>	3,407	-	3,407	6,096	56
Smart Lighting Discounts Program	-	-	133,212	73,492	181
Smart Appliance Recycling Program	-	-	4,538	7,494	61
Smart Home Rebates Program	8	-	2,971	9,810	30
Smart Equipment Incentives-C&I	73	26,716	38,162	14,321	266
Smart Equipment Incentives-Government / Non-Profit	38	22,350	23,733	11,800	201
Conservation Voltage Reduction <sup>2</sup>	20,819	-	20,819	n/a	n/a
<b>TOTAL PORTFOLIO</b>	<b>24,346</b>	<b>49,066</b>	<b>226,842</b>	<b>123,013</b>	<b>184</b>

**NOTES:**

<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE 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>The savings protocol for this program is pending with the SWE.

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

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

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

Program	PYTD Reported Gross Impact (MWh)	Preliminary Realization Rate	Preliminary PYTD Verified Impact (MWh)	Net-to-Gross Ratio	PYTD Net Impact (MWh)
Low Income Energy Efficiency Program <sup>1</sup>	3,407	0.91	n/a	1	n/a
Smart Lighting Discounts Program	133,212	1.00	133,212	1	133,212
Smart Appliance Recycling Program	4,538	0.99	4,487	1	4,487
Smart Home Rebates Program - Approved Measures	2,963	1.00	2,963	1	2,963
Smart Home Rebates Program - Pending Measures <sup>2</sup>	8	1.00	n/a	1	n/a
Smart Equipment Incentives-C&I - Approved Measures	11,373	1.27	14,444	1	14,444
Smart Equipment Incentives-C&I - Pending Measures	73	1.27	n/a	1	n/a
Smart Equipment Incentives-Government / Non-Profit - Approved Measures	1,345	1.27	1,708	1	1,708
Smart Equipment Incentives-Government / Non-Profit - Pending Measures	38	1.27	n/a	1	n/a
Conservation Voltage Reduction <sup>3</sup>	20,819	1.94	n/a	1	n/a
<b>TOTAL PORTFOLIO<sup>4</sup></b>	<b>177,776</b>	<b>1.02</b>	<b>156,813</b>	<b>1</b>	<b>156,813</b>

**NOTES:**

<sup>1</sup>The savings protocol for LEEP measures is currently under review by the SWE. Accordingly, only reported savings are presented. 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)(C). The legislation contains no provisions regarding targets for participation, or energy or demand savings.

<sup>2</sup>The savings protocols for whole-house fans, and white roofs are currently under review by the SWE. Accordingly, only reported savings are presented.

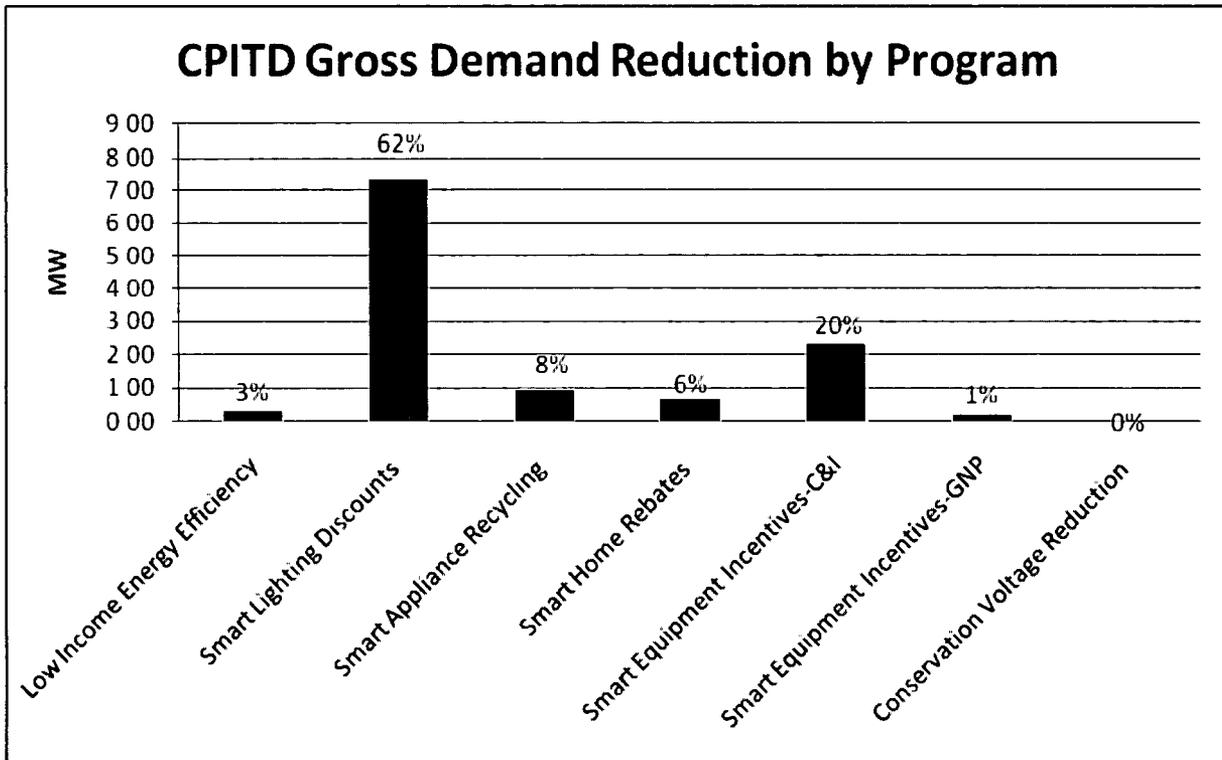
<sup>3</sup>The savings protocol for this program is pending with the SWE. Savings reported are for the period February through May 2010--they do not represent annual savings for the program.

<sup>4</sup>The total portfolio realization rate is based exclusively on energy savings from measures with deemed savings or approved protocols (PYTD Reported Gross Impact for measures with deemed savings or approved protocols =153,431 MWh).

### 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 PY 2009 is presented in Table 1-8 and Table 1-9.

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

Program	Participants			Reported Gross Impact (MW)		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Low Income Energy Efficiency Program <sup>1</sup>	1,662	1,994	1,994	0.238	0.293	0.293
Smart Lighting Discounts Program <sup>2</sup>	1,449,080	2,878,301	2,878,301	3.75	7.30	7.30
Smart Appliance Recycling Program	3,052	3,052	3,052	0.94	0.94	0.94
Smart Home Rebates Program <sup>3</sup>	21,100	21,100	21,100	0.68	0.68	0.68
Smart Equipment Incentives-C&I	62	62	62	2.31	2.31	2.31
Smart Equipment Incentives-Government / Non-Profit	25	25	25	0.17	0.17	0.17
Conservation Voltage Reduction <sup>4</sup>	80	83	83	0.00	0.00	0.00
<b>TOTAL PORTFOLIO</b>	<b>20,364</b>	<b>20,696</b>	<b>20,696</b>	<b>8.08</b>	<b>11.69</b>	<b>11.69</b>

**NOTES:**

<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE 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>Participation numbers shown are the numbers of discounted lamps sold. These are excluded from total portfolio participation numbers

<sup>3</sup>Participation numbers for this program include 5,537 instant rebates for program qualifying LED lamps and Energy Star lighting fixtures at retail locations. These are excluded from the total portfolio participant numbers

<sup>4</sup>Participants are reported as the number of substations treated under the CVR program, as reported by PECO, and are excluded from the total portfolio participant numbers. There were no peak demand MW savings for CVR in PY-2009 because CVR was implemented following peak load months. However, there will be demand reductions in future years due to program activities in PY09

**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>	0.29	0.00	0.29	0.40	73
Smart Lighting Discounts Program	0.00	0.00	7.30	4.00	183
Smart Appliance Recycling Program	0.00	0.00	0.94	1.40	67
Smart Home Rebates Program	0.00	0.00	0.68	0.40	169
Smart Equipment Incentives-C&I	0.02	4.96	7.27	3.31	220
Smart Equipment Incentives-Government / Non-Profit	0.01	7.40	7.57	2.35	322
Conservation Voltage Reduction	0.00	0.00	0.00	n/a	n/a
<b>TOTAL PORTFOLIO</b>	<b>0.32</b>	<b>12.36</b>	<b>24.05</b>	<b>11.86</b>	<b>203</b>

NOTES

<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE. 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>Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.

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)	Preliminary Realization Rate	Preliminary PYTD Verified Impact (MW)	Net-to-Gross Ratio	PYTD Net Impact (MW)
Low Income Energy Efficiency Program <sup>1</sup>	0.29	0.93	n/a	1.00	n/a
Smart Lighting Discounts Program	7.30	1.00	7.30	1.00	7.30
Smart Appliance Recycling Program	0.94	0.99	0.93	1.00	0.93
Smart Home Rebates Program - Approved Measures	0.68	1.00	0.68	1.00	0.68
Smart Home Rebates Program - Pending Measures <sup>2</sup>	0.00	1.00	n/a	1.00	n/a
Smart Equipment Incentives-C&I - Approved Measures	2.30	0.97	2.23	1.00	2.23
Smart Equipment Incentives-C&I - Pending Measures	0.02	0.97	n/a	1.00	n/a
Smart Equipment Incentives-Government / Non-Profit - Approved Measures	0.16	0.97	0.15	1.00	0.15
Smart Equipment Incentives-Government / Non-Profit - Pending Measures	0.01	0.97	n/a	1.00	n/a
Conservation Voltage Reduction <sup>3</sup>	0.00	n/a	n/a	1.00	n/a
<b>TOTAL PORTFOLIO<sup>4</sup></b>	<b>11.69</b>	<b>0.97</b>	<b>11.29</b>	<b>1.00</b>	<b>11.29</b>

**NOTES**

<sup>1</sup>The demand reduction protocol for LEEP measures is currently under review by the SWE. Accordingly, only reported savings are presented. 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>The demand reduction protocols for whole-house fans and white roofs are currently under review by the SWE. Accordingly, only reported savings are presented.

<sup>3</sup>The demand reduction protocol for this program is currently under review by the SWE. There were no peak demand MW savings for CVR in PY-2009 because CVR was implemented following peak load months. However, there will be demand reductions in future years due to program activities in PY09.

<sup>4</sup>The total portfolio realization rate is based exclusively on demand savings from measures with deemed savings or approved protocols (PYTD Reported Gross Impact =11.38 MW)

## 1.4 Summary of Evaluation

The Navigant Consulting team calculated realization rates to adjust reported savings based on statistically significant verified savings measured. 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 measure types, as defined in the Statewide Evaluator's *Audit Plan*.<sup>17</sup> Deemed measures have energy and demand savings and in some cases installation rates specified in the *Technical Reference Manual* (TRM). For deemed measures, realization rates are driven by differences in the number of installed measures, or are 1.0 if installation rates are specified. Partially deemed measure<sup>18</sup> realization rates are driven by (1) differences in the installation rate and (2) differences in the variables. Custom measure realization rates are driven by installation rate and differences in the energy savings determined by approved protocols. The measure type determines the data type that is sampled.

### 1.4.1 Impact Evaluation

Impact evaluations have been completed for PY 2009 for each of the seven implemented programs. Sample sizes and realization rates for each program are presented in Table 1-11.

---

<sup>17</sup> "Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs, Prepared by The Statewide Evaluation Team: GDS Associates, Inc., Nexant, & Mondre Energy Contracted Under the Pennsylvania Public Utility Commission's RFP 2009-1 for the Statewide Evaluator, December 1, 2009.

<sup>18</sup> TRM measures with stipulated values and variables.

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

Program	PYTD Sample Participants	Program Year Sample Participant Target	Preliminary Realization Rate for kWh	Confidence and Precision for kWh	Preliminary Realization Rate for kW	Confidence and Precision for kW
Low Income Energy Efficiency Program <sup>1</sup>	142	142	0.91	90%/± 6%	0.93	90%/± 6%
Smart Lighting Discounts Program	2,292,969	N/A	1.00	90%/±0.03%	1.00	90%/±0.03%
Smart Appliance Recycling Program	88	66	0.99	90%/±3%	0.99	90%/±3%
Smart Home Rebates Program	200	84	1.00	90%/± 1.5%	1.00	90%/± 1.5%
Smart Equipment Incentives <sup>2</sup>	23	21	1.27	90%/±5.9%	0.97	90%/±23%
Conservation Voltage Reduction <sup>3</sup>	83	83	1.94	90%/±0.5%	n/a	n/a
<b>TOTAL PORTFOLIO<sup>4</sup></b>	453	313	1.02	90%/±0.55%	0.97	90%/±4.78%

**NOTES:**

<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE 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>Monitoring and verification was conducted jointly for the C&I and Government/Non-Profit segments of this program

<sup>3</sup>There were no peak demand MW savings for CVR in PY-2009 because CVR was implemented following peak load months However, there will be demand reductions in future years due to program activities in PY09

<sup>4</sup> Sample Participants and Sample Participant Targets for the Smart Lighting Discounts and CVR programs are excluded from the total portfolio numbers, as these reflect numbers of CFL lamps and substations respectively.

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

- **Smart Lighting Discounts.** For the Smart Lighting Discounts Program, the impact evaluation consisted of a detailed review of program-tracking data and verifying the data against manufacturer invoices the implementer packaged and sent to PECO for payment. Energy and demand savings were calculated by applying the deemed per-unit savings assumptions presented in the TRM to the quantities of each type of CFL rebated through the program. There was no sampling involved, as the entire census of CFLs rebated was verified.
- **Low-Income Energy Efficiency Program.** Surveys of participants provided information on installation rates, which was used to adjust savings. These surveys were conducted for each quarter with a random sample of participants in each program component. The program had an audit component and two CFL bulb components. The Navigant Consulting team used deemed savings for the CFL components. For the audit component, the Navigant Consulting team used proposed deemed savings; however, these have been recorded as "reported" and not "verified" savings.
- **Smart Appliance Recycling.** The impact evaluation completed for the Smart Appliance Recycling Program consisted of reviewing tracking data and applying the deemed per-

unit savings assumptions in the TRM for each measure to obtain gross energy and demand savings. A telephone survey of a statistically valid sample of program participants was used to verify that the appliances were picked up as reported in the program-tracking database.

- **Smart Home Rebates Program.** Program impacts are based on gross program savings, adjusted on the basis of measure verification. Verification for non-lighting measures was based on customer confirmation via a telephone survey of installation and performance of rebated measures. Verification of savings for lighting measures was based on a review of tracking data and invoices to confirm the number and type of measures rebated. Two measures rebated by this program—white roofs, and whole-house fans—do not have savings values approved by the Statewide Evaluator. Savings from these measures have been recorded as “reported” but not “verified” savings in this report.
- **Smart Equipment Incentives.** The impact evaluation started in June 2010 for installed and paid PY 2009 projects, with tracking system review, *ex ante* savings analysis, and sample design. The population of 87 projects was grouped into those with custom measures versus prescriptive-TRM measures, was stratified by *ex ante* project-level energy savings, and sampling was then conducted. The resulting sample selection of 21 projects for on-site M&V was designed to achieve a 90/10 confidence interval for gross impact verification for the overall Smart Equipment Incentives program, although impacts are reported separately for C&I businesses and Government/Non-profit participants. Complete documentation files on selected projects were requested and received from the program implementation contractor in late July 2010. Sampled project engineering review and on-site M&V visits were conducted throughout August. *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 Smart Equipment Incentives program.

A participating customer phone survey was conducted in August 2010 that targeted the 59 unique contacts within the 87 participating projects, achieving 33 completed interviews. 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 PY1 free-ridership levels. Additional data was collected to support the process evaluation (such as program design and implementation, program marketing and awareness, customer satisfaction), a qualitative assessment of spillover, and business demographics for the process component of the evaluation.

- **Conservation Voltage Reduction** The M&V completed for CVR during PY 2009 included a detailed review of planning estimates of CVR program savings; a detailed review of information on substations/circuits/lines impacted by the program; and 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. As a custom EE/DR program concept, CVR required the development of a custom EM&V 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 Consulting team was formed, joined later by staff from the SWE.

#### 1.4.2 Process Evaluation

Process evaluations were conducted for all programs. As the Smart Equipment Incentives programs for C&I and government/nonprofits were jointly implemented, a single process evaluation was conducted for both programs.

- **Smart Lighting Discounts.** Process evaluation activities included reviewing program plans, conducting telephone surveys with participants and non-participants, and in-depth interviews with PECO program staff and program implementers. Key results include findings that most participants are unaware of the PECO program due to the upstream nature of the delivery mechanism, that some non-participants avoid CFLs because of misinformation about high cost and health concerns, and that a majority of participants have been satisfied with their CFL purchases.
- **Low-Income Energy Efficiency Program.** Process evaluation activities were primarily in-depth interviews with utility and implementation contractor staff, and telephone surveys with 142 program participants. Key interview findings are that the contractor has good quality assurance and data-tracking/reporting procedures in place, as well as long-term committed staff, and a good working relationship with PECO staff. Key survey findings are that most participants are very satisfied with the program, 84 percent of audit participants are very satisfied with educational materials, and 96 percent found the materials clear and informative.
- **Smart Appliance Recycling.** The process evaluation is based on a telephone survey of a random sample of program participants as described above. The survey was conducted in August 2010. Ultimately, a total of 76 participants responded to the process battery of questions in the survey. Survey results include findings that program participants are highly satisfied and that bill inserts and word of mouth are the most common ways of learning about the program.
- **Smart Home Rebates.** Process evaluation efforts included review of program documentation, interviews with program staff and implementers, market actor survey interviews, and a participant survey. Survey responses indicate that all stakeholders are very satisfied with program operation, that program marketing is effective, and that the program is increasing the market share of efficient equipment.
- **Smart Equipment Incentives.** All of the process evaluation data collection activities have been completed, including staff and implementer in-depth interviews, participating trade ally in-depth interviews, and a participating customer phone survey. Preliminary review of the tracking system and program QA/QC procedures has been conducted, and will be finalized after additional findings are gleaned from the impact

verification and site M&V process. Staff and implementation contractor interviews suggest that, although the implementation timeline was very tight and the program was ramping up rapidly, resources were very effectively directed at critical key functions including training of PECO account managers, outreach and training of trade allies, effective process design and implementation, including a full range of customer interfaces, and an effective application tracking system. Initial program marketing to and training of trade allies was generally very effective in spite of the short notification time before initial trade ally introductory programs. Communication between the numerous partners and with trade allies appears to have been handled very effectively.

- **Conservation Voltage Reduction Program.** The process evaluation of the CVR program is centered on whether there were significant customer complaints during the program year that could possibly be attributed to the program. There were a total of four customer complaints on circuits affected by CVR during the program year that were potentially relevant. However, following investigation, none were attributable to the program, but turned out to be customer equipment issues.

### 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>19</sup> A breakdown of the portfolio finances is presented in Table 1-12. Per PUC direction, TRC inputs and calculations have not been presented in this report.

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

	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	PYTD
EDC Incentives to Participants	-	\$2,497,000	\$2,497,000
EDC Incentives to Trade Allies (manufacturers)	\$1,190,896	\$1,447,000	\$3,329,122
<b>Subtotal EDC Incentive Costs</b>	<b>\$1,190,896</b>	<b>\$3,944,000</b>	<b>\$5,826,122</b>
Design & Development	n/a	n/a	n/a
Administration <sup>[2]</sup>	\$426,000	\$2,802,000	\$3,228,000
Management <sup>[3]</sup>	\$406,000	\$929,000	\$2,108,681
Marketing	\$2,000	\$1,209,000	\$1,227,000
Technical Assistance	\$109,677	\$1,612,019	\$1,721,696
<b>Subtotal EDC Implementation Costs<sup>[4]</sup></b>	<b>\$943,667</b>	<b>\$6,508,019</b>	<b>\$8,285,377</b>
EDC Evaluation Costs <sup>[5]</sup>	In above	In above	\$333,391
SWE Audit Costs <sup>[6]</sup>	n/a	n/a	\$193,885
Participant Costs	n/a	n/a	n/a
<b>Total Costs<sup>[7]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Annualized Avoided Supply Costs<sup>[8]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Lifetime Supply Costs<sup>[9]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Total Lifetime Economic Benefits<sup>[10]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>

NOTES TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report  
<sup>1</sup>All program benefits and costs except CVR reflect verified savings or *reported* savings for measures where verification protocols have not yet been approved. Only CVR costs have been included in this draft. Portfolio benefits and TRC do not reflect CVR in this draft  
<sup>2</sup>Implementation contractor costs  
<sup>3</sup>EDC costs other than those identified explicitly  
<sup>4</sup>EDC implementation costs were not tracked by all the sub-categories listed through Q4  
<sup>5</sup>Reflects only costs of active programs  
<sup>6</sup>Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost spread  
<sup>7</sup>Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation  
<sup>8</sup>Cumulative annual supply costs divided by program maximum measure life  
<sup>9</sup>Present value of avoided supply costs  
<sup>10</sup>Present value of avoided supply costs plus present value of avoided incandescent bulb costs for relevant programs

<sup>19</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."

The TRC benefit-cost ratio for each program is presented in Table 1-13. Per PUC direction, TRC inputs and calculations have not been provided in this report.

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

<b>Program</b>	<b>TRC Benefits (\$)</b>	<b>TRC Costs (\$)</b>	<b>TRC Benefit-Cost Ratio</b>
Low Income Energy Efficiency Program	n/a	n/a	n/a
Smart Lighting Discounts Program	n/a	n/a	n/a
Smart Appliance Recycling Program	n/a	n/a	n/a
Smart Home Rebates Program	n/a	n/a	n/a
Smart Equipment Incentives-C&I	n/a	n/a	n/a
Smart Equipment Incentives-Government / Non-Profit	n/a	n/a	n/a
Conservation Voltage Reduction	n/a	n/a	n/a
<b>Portfolio</b>	n/a	n/a	n/a
NOTE: TRC benefit-cost ratios are not required to be reported for the PY 2009 Annual Report.			

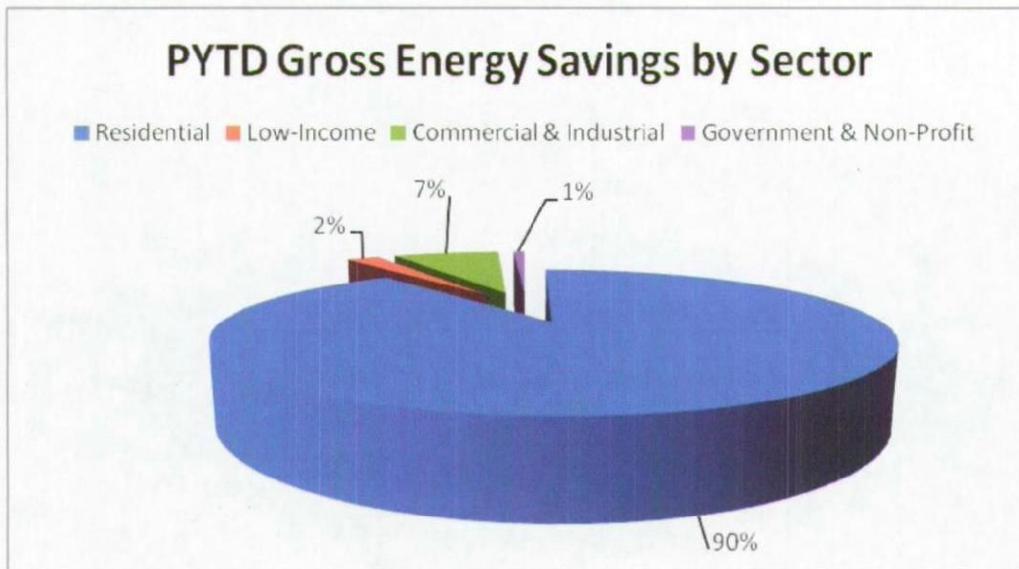
## 2 Portfolio Results by Sector

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.

**Figure 2-1. PYTD Reported Gross Energy Savings by Sector<sup>20</sup>**



---

<sup>20</sup> Note that this figure does not present savings from the CVR program, which generates energy savings throughout all sectors.

Figure 2-2. PYTD Reported Gross Demand Reduction by Sector<sup>21</sup>

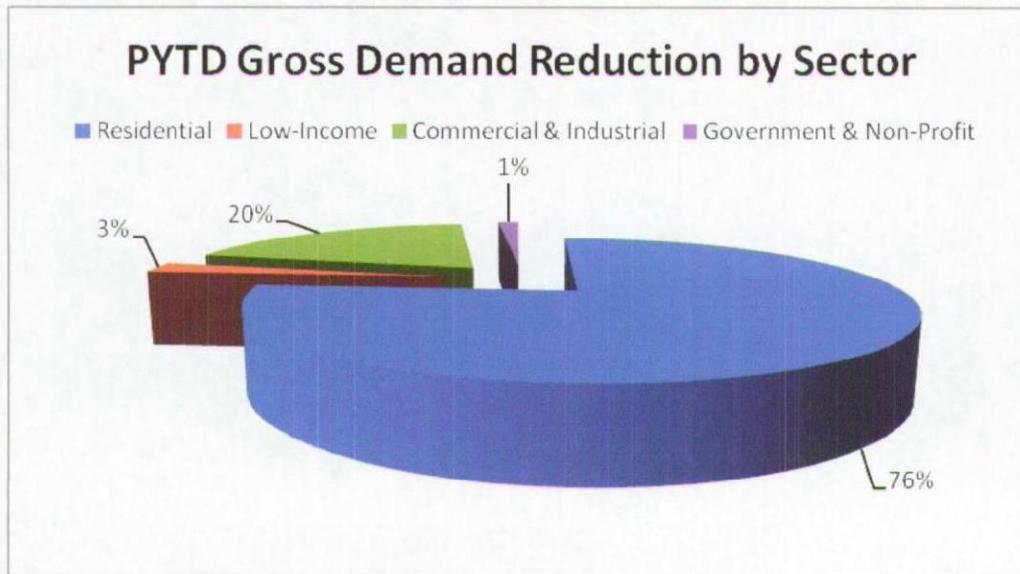


Table 2-1. Reported Gross Energy Savings by Sector through the End of the Reporting Period

Market Sector	Reported Gross Impact (MWh)			Projects in Progress	Total Committed	Unverified Ex Post Savings <sup>3</sup>
	IQ	PYTD	CPITD			
Residential EE	75,729	140,721	140,721	-	140,721	8
Residential Low-Income EE <sup>1</sup>	2,714	3,407	3,407	-	3,407	3,407
Commercial & Industrial EE	11,446	11,446	11,446	26,716	38,162	73
Government & Non-Profit EE	1,383	1,383	1,383	22,350	23,733	38
<b>TOTAL PORTFOLIO<sup>2</sup></b>	91,272	156,957	156,957	49,066	206,023	3,527

NOTES

<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE. 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>Because the CVR program is classified as a demand reduction program, its energy savings are reported in Section 3.1. Nevertheless, CVR does provide energy savings in all sectors that are not reflected in this table.

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

<sup>21</sup> Although the CVR program did not contribute demand savings during PY 2009, activities conducted under this program in PY 2009 will produce demand savings in future years.

**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>2</sup>
	IQ	PYTD	CPITD			
Residential EE	5.36	8.92	8.92	0.00	8.92	0.00
Residential Low-Income EE <sup>1</sup>	0.24	0.29	0.29	0.00	0.29	0.29
Commercial & Industrial EE	2.31	2.31	2.31	4.96	7.27	0.02
Government & Non-Profit EE	0.17	0.17	0.17	7.40	7.57	0.01
<b>TOTAL PORTFOLIO</b>	<b>8.08</b>	<b>11.69</b>	<b>11.69</b>	<b>12.36</b>	<b>24.05</b>	<b>0.32</b>
<p>NOTES</p> <p><sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE 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</p> <p><sup>2</sup>Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission</p>						

## 2.1 Residential EE Sector

PECO established savings goals of 90,796 MWh and 5.8 MW for program year 2009. As demonstrated by Table 2-3 and Table 2-4, PECO's reported savings exceeded the reported energy savings goal by nearly 50,000 MWh and the demand goal by over 3 MW.

**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>	1,449,080	68,220	3.75
Smart Appliance Recycling Program	3,052	4,538	0.94
Smart Home Rebates Program <sup>2</sup>	21,100	2,971	0.68
<b>Sector Total<sup>3</sup></b>	<b>18,615</b>	<b>75,729</b>	<b>5.36</b>
<p>NOTES:</p> <p><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</p> <p><sup>2</sup>Participation number includes 5,537 LED lamps and Energy Star lighting fixtures for which instant rebates were provided</p> <p><sup>3</sup>Participation excludes CFL and LED lamps and Energy Star fixtures rebated through the Smart Lighting Discounts and Smart Home Rebates programs.</p>			

**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>	2,878,301	133,212	7.30
Smart Appliance Recycling Program	3,052	4,538	0.94
Smart Home Rebates Program <sup>2</sup>	21,100	2,971	0.68
<b>Sector Total<sup>3</sup></b>	<b>18,615</b>	<b>140,721</b>	<b>8.92</b>

**NOTES:**

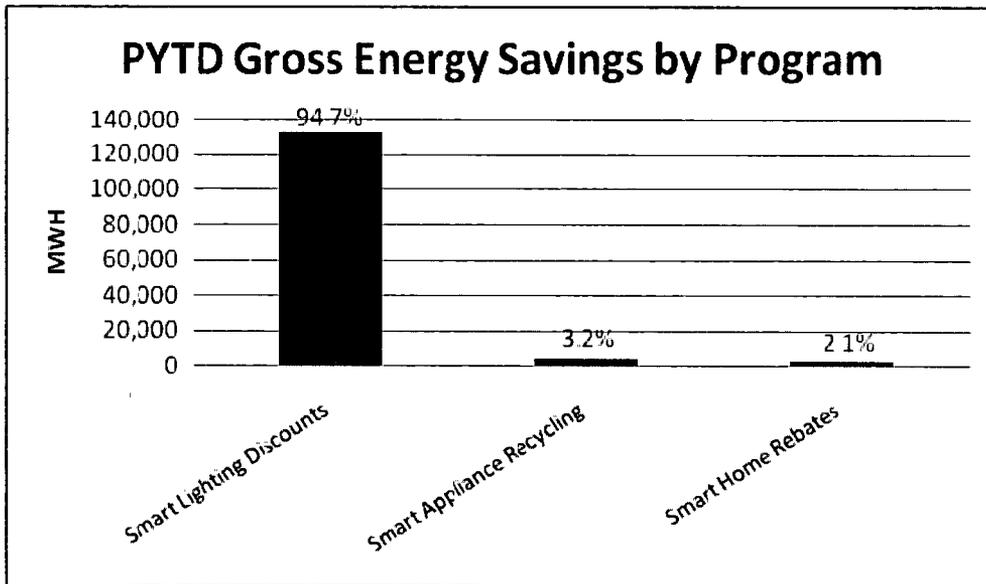
<sup>1</sup>Participation for this program reflects number of CFL lamps rebated rather than number of program participants. Participation in this program is excluded from the Sector Total.

<sup>2</sup>Participation number includes 5,537 LED lamps and Energy Star lighting fixtures for which instant rebates were provided

<sup>3</sup>Participation excludes CFL and LED lamps and Energy Star fixtures rebated through the Smart Lighting Discounts and Smart Home Rebates programs

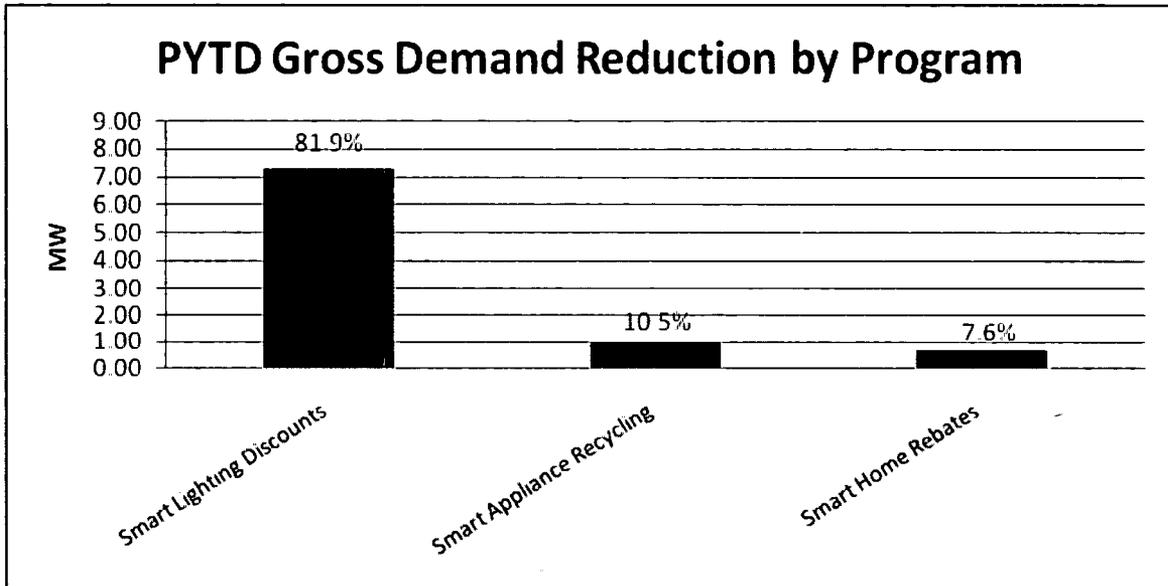
A summary of the sector energy savings by program is presented in Figure 2-3.

**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 6,096 MWh and 0.4 MW for Program Year 2009. In five months of operation in PY 2009, the Low-Income program achieved reported savings of 3,407 MWh and 0.3 MW. Sector summaries of results by program 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**

<b>Residential Low-Income EE Sector</b>	<b>IQ Participants</b>	<b>IQ Reported Gross Energy Savings (MWh)</b>	<b>IQ Reported Gross Demand Reduction (MW)</b>
Residential Low-Income EE <sup>1</sup>	1,662	2,714	0.24
<b>Sector Total</b>	1,662	2,714	0.24

NOTES  
<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE. 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.

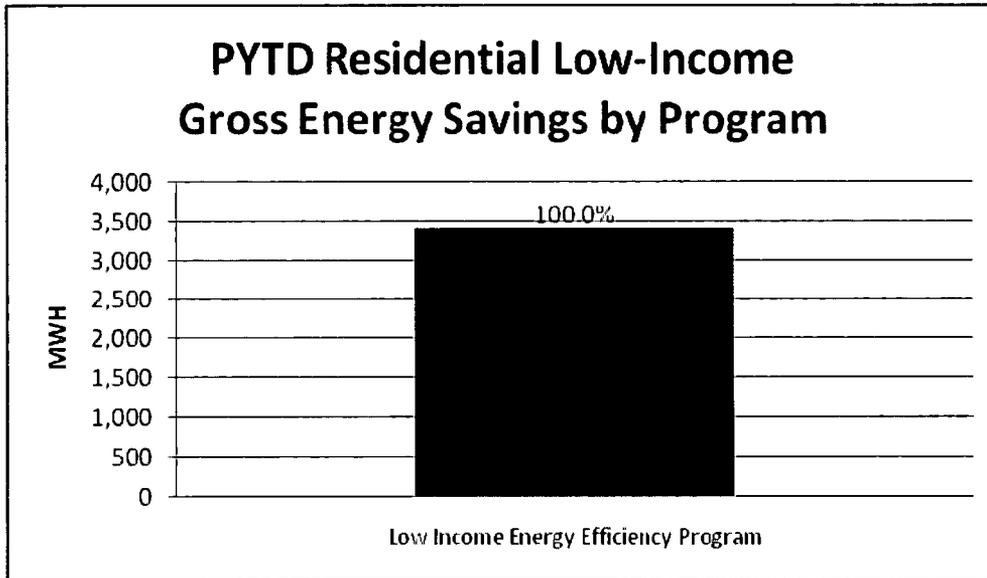
**Table 2-6. Summary of Residential Low-Income EE Sector PYTD Impacts by Program through the End of the Reporting Period**

<b>Residential Low-Income EE Sector</b>	<b>PYTD Participants</b>	<b>PYTD Reported Gross Energy Savings (MWh)</b>	<b>PYTD Reported Gross Demand Reduction (MW)</b>
Residential Low-Income EE <sup>1</sup>	1,994	3,407	0.29
<b>Sector Total</b>	1,994	3,407	0.29

NOTES  
<sup>1</sup>The savings reported for this program are based on a proposed protocol, which is currently under review by the SWE. 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.

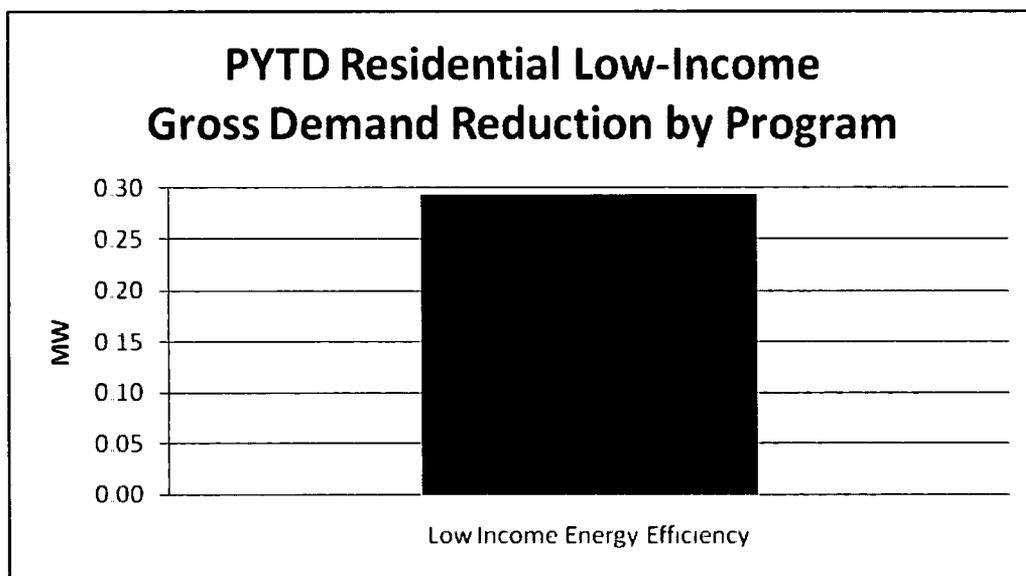
A summary of the sector energy savings by program is presented in Figure 2-5.

**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 PY 2009, PECO established a C&I sector target for annual energy savings of 14,772 MWh and demand reduction of 3.3 MW. After just one quarter of operation, the total reported energy savings due to the C&I Smart Equipment Incentives program was 11,446 MWh and the total peak demand reduction was 2.31 MW.

Sector summaries of results by program 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**

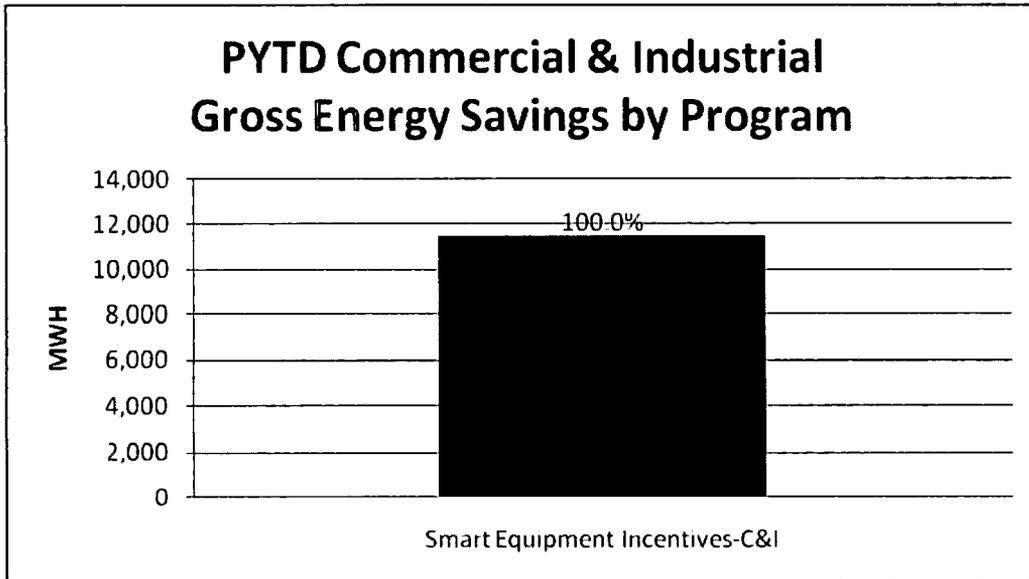
Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-C&I	62	11,446	2.31
<b>Sector Total</b>	62	11,446	2.31

**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	62	11,446	2.31
<b>Sector Total</b>	62	11,446	2.31

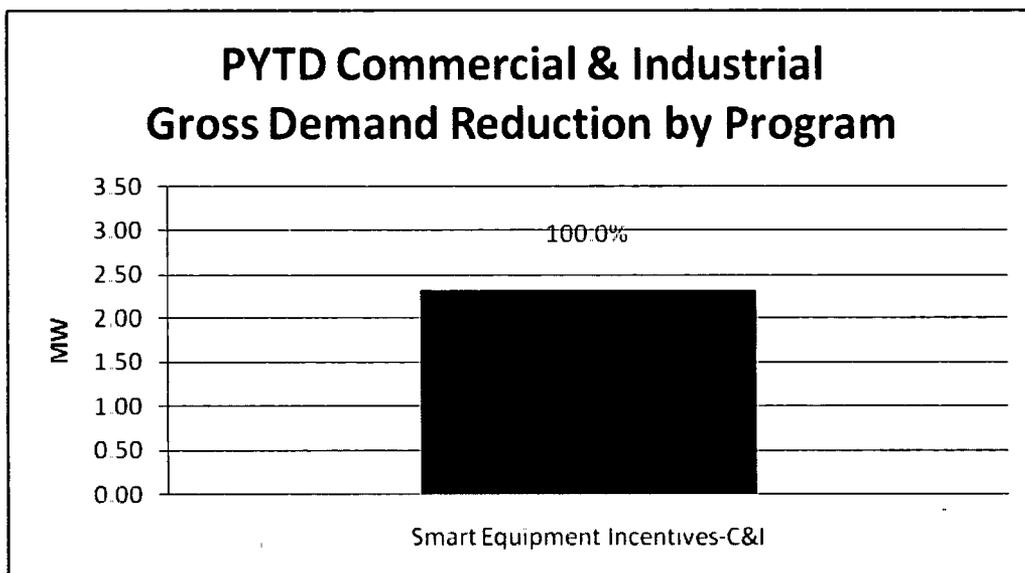
A summary of the sector energy savings by program is presented in Figure 2-7.

**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 PY 2009, the sector target for annual energy savings is 11,800 MWh and the sector target for annual peak demand reduction is 2.353 MW. After one quarter of operation, the Equipment Incentives program for the Government and Non-Profit sectors had accumulated reported energy savings of 1,383 MWh and peak demand reduction of 0.17 MW.

Sector summaries of results by program 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**

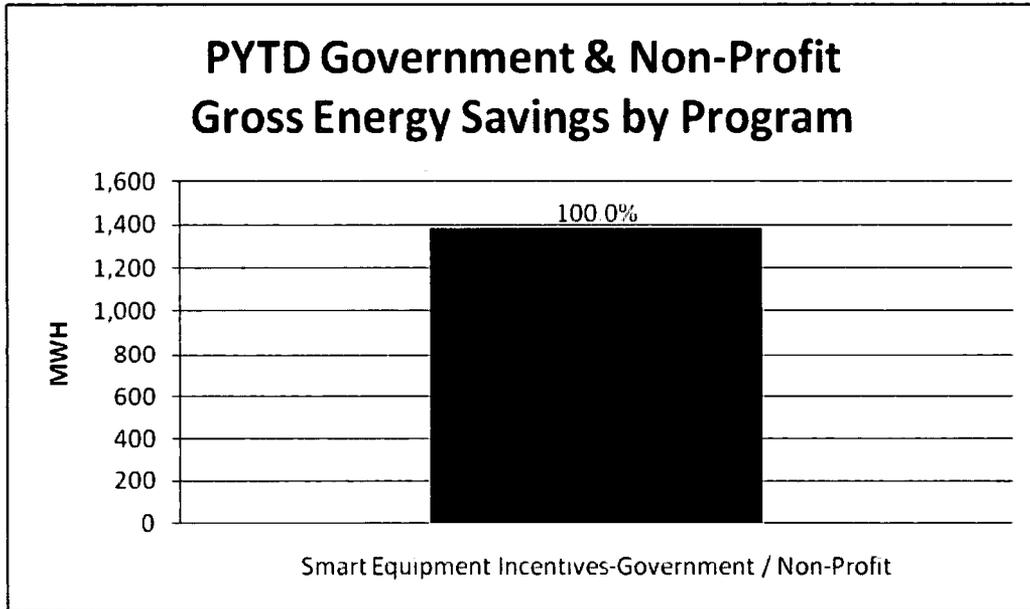
Government & Non-Profit EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-Government / Non-Profit	25	1,383	0.17
<b>Sector Total</b>	25	1,383	0.17

**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	IQ Participants	IQ Reported Gross Energy Savings (MWh)	IQ Reported Gross Demand Reduction (MW)
Smart Equipment Incentives-Government / Non-Profit	25	1,383	0.17
<b>Sector Total</b>	25	1,383	0.17

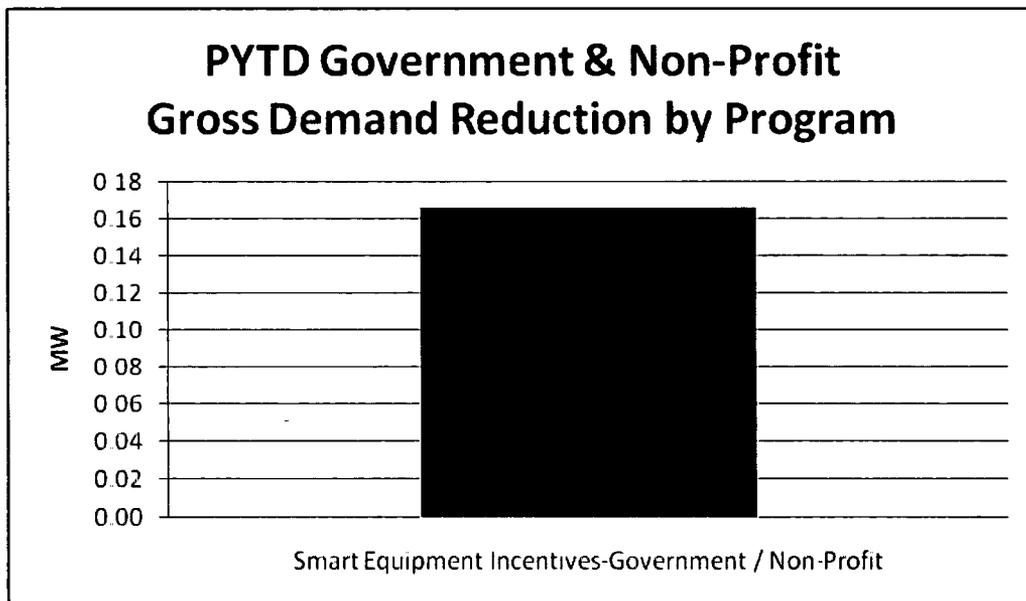
A summary of the sector energy savings by program is presented in Figure 2-9.

**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 Response

Demand-response programs specifically target the reduction of peak demand through various demand-side management strategies. The only PECO program categorized as a demand-response program in PY 2009 was the Conservation Voltage Reduction program. As this program is implemented by adjusting supply voltages at substations, this program generates energy and demand savings across all affected customers in all sectors. While program operation during PY 2009 will result in demand savings in future years, the program was not operational during the summer months in PY 2009, so no demand savings are ascribed to the program for that year.

Table 3-1 and Table 3-2 summarize fourth quarter and year-to-date results for the CVR program.

**Table 3-1. Summary of CVR 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 <sup>1</sup>	80	20,633	0
<b>Sector Total</b>	80	20,633	0
NOTES			
<sup>1</sup> The savings protocol for this program is pending with the SWE. Savings reported are for the period February through May 2010-- they do not represent annual savings for the program.			

**Table 3-2: Summary of CVR 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	20,819	0
<b>Sector Total</b>	83	20,819	0
NOTES			
<sup>1</sup> The savings protocol for this program is pending with the SWE. Savings reported are for the period February through May 2010-- they do not represent annual savings for the program.			

## 4 Portfolio Results by Program

### 4.1 PECO Smart Lighting Discounts Program

The PECO Smart Lighting Discounts Program helps PECO residential customers become consumers who are 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 Measurement and Verification (M&V) Methodology

The M&V completed for this annual report consisted of reviewing the Atlas NetworkBuilder™(ANB) tracking database provided to the evaluation team by PECO personnel lighting staff and verifying it against a sample of the manufacturer invoices Ecos packaged and sent to PECO for payment. The ANB tracking data was used to estimate the annual program savings for this annual report. All gross and net savings parameters, other than quantity of bulbs sold, are deemed for PY 2009.<sup>22</sup> The estimated gross energy savings (kWh) were estimated as follows.

$$\text{Total kWh Savings} = \# \text{ bulbs sold} * ((\text{CFL}_{\text{watts}} * (\text{CFL}_{\text{hours}} * 365))/1000 * \text{ISRCFL})$$

---

<sup>22</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.

Where:

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

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

Total kW Savings = # bulbs sold \* ( $CFL_{watts}$ ) X Light CF X  $ISR_{CFL}$

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**

There was no sampling necessary for this annual report. All available tracking data was summarized for this report.

#### **4.1.4 Process Evaluation**

Process evaluation activities included reviewing program plans, conducting Computer-Aided Telephone Interview (CATI) telephone surveys with Smart Lighting Discount Program participants and nonparticipants, and in-depth interviews with PECO program staff and Ecos program implementers. Key process findings include the following:

1. The main marketing efforts of the program included bill inserts and mailings, in-store lighting demonstrations, signage and displays at retail locations, giveaway events, and advertisements in newspapers and on the radio. A majority of program participants first learned of the program through mailings and bill inserts, which was consistent with this approach. However, most program participants were unaware of the PECO program due to the upstream nature of the delivery mechanism.
2. Awareness of CFLs is not a barrier to participation in the program or to greater CFL use. Eighty-one percent of PECO customers have heard of CFLs without being offered a description of the bulbs. Another 14 percent say they have heard of CFLs once they have been described. This knowledge of CFLs among PECO's customers shows that campaigns designed to inform consumers of the availability of discounted CFLs would be received by consumers who know what CFLs are.

3. Though PECO customers have heard of CFLs, knowledge of the benefits of CFLs is a barrier to greater CFL use. Some of those who have not purchased CFLs give reasons that suggest a lack of information about high cost and concerns regarding health risks from being too close to CFLs. Many also are waiting for their incandescent bulbs to burn out rather than replace the still functioning bulbs with CFLs.
4. Purchasers of CFLs, regardless of whether they are program participants or non-program purchasers, state that using less energy is a motivation for buying these bulbs. This stems from an interest in both saving money on utility bills and concerns about the environment.
5. A majority of PECO customers who have purchased CFLs have been satisfied with their purchase.
6. Concern about mercury and CFL disposal is not widespread and does not pose a significant barrier to CFL adoption. However, the flip side to this lack of concern is use of improper disposal methods. More than half of those customers surveyed were not aware that CFLs need to be recycled rather than placed in the trash.

#### **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 15-20 unique retailers) participating in the program.<sup>23</sup>

#### **4.1.6 Program Finances**

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

---

<sup>23</sup> This data is based on interviews with Ecos implementation staff

**Table 4-1: Summary of Program Finances: TRC Test<sup>24</sup>**

	Quarter 3	Quarter 4	PYTD
EDC Incentives to Participants	-	-	-
EDC Incentives to Trade Allies (manufacturers)	\$1,190,896	\$1,447,000	\$3,392,122
<b>Subtotal EDC Incentive Costs</b>	<b>\$1,190,896</b>	<b>\$1,447,000</b>	<b>\$3,392,122</b>
Design & Development	n/a	n/a	n/a
Administration <sup>[2]</sup>	\$400,000	\$239,000	\$639,000
Management <sup>[3]</sup>	\$145,000	\$219,000	\$211,933
Marketing	\$2,000	\$998,000	\$1,000,000
Technical Assistance	n/a	n/a	n/a
<b>Subtotal EDC Implementation Costs<sup>[4]</sup></b>	<b>\$547,000</b>	<b>\$1,456,000</b>	<b>\$1,850,933</b>
<b>EDC Evaluation Costs</b>	In above	In above	\$152,067
<b>SWE Audit Costs<sup>[5]</sup></b>	n/a	n/a	\$88,454
<b>Participant Costs</b>	n/a	n/a	n/a
<b>Total Costs<sup>[6]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Annualized Avoided Supply Costs<sup>[7]</sup></b>	n/a	n/a	n/a
<b>Lifetime Supply Costs<sup>[8]</sup></b>	n/a	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>[9]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>

NOTES: TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report

<sup>1</sup>All program benefits and costs reflect verified savings or *reported* savings for measures where verification protocols have not yet been approved.

<sup>2</sup>Implementation contractor costs

<sup>3</sup>EDC costs other than those identified explicitly

<sup>4</sup>EDC implementation costs were not tracked by all the sub-categories listed through Q4.

<sup>5</sup>Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost spread

<sup>6</sup>Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation.

<sup>7</sup>Cumulative annual supply costs divided by program maximum measure life.

<sup>8</sup>Present value of avoided supply costs.

<sup>9</sup>Present value of avoided supply costs plus present value of avoided costs for incandescent bulbs.

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

<sup>24</sup> Definitions for terms in the table are subject to the TRC Order

#### 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 three 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 (FPL), 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.

The first step in service delivery is the program audit, which is performed by CMC staff. The auditor verifies the previously reported household characteristics, including the number of household occupants, age of home, and years of occupancy. The auditor also calculates the average household energy use per day, the energy use for each household appliance, temperature settings, and water temperature. Based on this information, the auditor may wrap the water heater and pipes, and install aerators, smoke detectors, showerheads, and CFLs during this initial audit visit. The auditor schedules the appropriate subcontractors to complete any necessary major measures, such as insulation, heating system repair or replacement, or new appliances. A work order is sent to the subcontractor to communicate the work that is needed. CMC requires that major measures be installed within 30 days after the initial audit.

The auditor provides the primary LEEP energy education session during the initial audit visit. This session lasts at least 30 minutes. Further education is often provided by subcontractors when major measures are installed and by other CMC staff during quality control inspections and follow-up telephone calls. During the initial education session, the educator reviews the customer's audit results and identifies ways that the customer can modify the behaviors of household members to save energy and money. The auditor and the customer set a monthly usage and bill reduction goal for the household. The educator also provides the customer with an education package.

The educator reviews these educational materials with the customer, and compares the household's energy cost estimate form to the household's actual energy bill. Additionally, the educator refers the customer to programs and agencies that might help him or her meet household needs, and answers any questions the customer may have about the program or the education session. The educator reviews the measures that have been installed and those that

will be installed by subcontractors. In addition, the educator reviews the LEEP follow-up procedures that the customer can expect.

#### 4.2.2 Program M&V Methodology

The M&V methodology applied to the LEEP results assessed participation in the program and calculated savings using two distinct approaches, one for audit savings and one for savings from extra CFL bulbs installed for LEEP and LIURP audit participants. Surveys of participants provided information on installation rates, which was used to adjust savings.

The rest of this section presents participation for PY 2009, results of installation surveys, calculations of savings from extra CFLs, and effective useful life for audit measures and CFLs.

#### Participation

As shown in Table 4-2 and Table 4-3, CMC Energy Services provided the number of audits by month for each job category and number of extra CFL bulbs (by wattage) installed for both LEEP and LIURP audit participants.

**Table 4-2. Number of Audit Participants in PY 2009 by Audit Type and Month (Component 1)**

Component 1: Audit Types	JAN 2010	FEB 2010	MAR 2010	APR 2010	MAY 2010	PY2009
Electric Baseload Basic Measures	109	158	525	364	1,345	1,612
Electric Baseload Major Measures	16	40	85	61	253	309
Electric Heat Basic Measures	0	1	9	4	23	24
Electric Heat Major Measures	5	3	7	17	41	49
<b>Total Audits</b>	<b>130</b>	<b>202</b>	<b>590</b>	<b>626</b>	<b>446</b>	<b>1,994</b>

**Table 4-3. Number of Extra CFL Bulbs Installed for LEEP and LIURP Audit Participants (Components 2 & 3)**

Type of Replacement Bulb	Component 1	Component 2	TOTAL
13-Watt Bulb	5,718	9,245	14,963
19-Watt Bulb	2,282	6,010	8,292
20-Watt Bulb	963	4,837	5,800
<b>Total Bulbs</b>	<b>8,963</b>	<b>20,092</b>	<b>29,055</b>

## Installation Rates

Participant telephone surveys provided information on installation rates of measures in Components 1 & 2 of the program (Component 3 was not implemented in PY 2009). These surveys were conducted for each quarter, with a random sample of participants in each component. The realization rate for Component 1 was 96 percent, and that for Component 2 was 85 percent.

## Calculation of Audit Savings

Reported energy and peak demand savings values for Component 1 (shown in Table 4-4) are based on the savings reported by PECO, as the proposed custom protocol was under review by the SWE as of the date of this report.

**Table 4-4. LEEP Component 1 Audit Energy Savings from Proposed Protocol**

Measures	Annual Energy Savings (kWh per unit)	Peak Demand Reduction (kW per unit)
Electric Baseload - Basic	775	0.095
Electric Baseload - Major	1,504	0.183
Electric Heat – Basic	382	0.047
Electric Heat – Major	1,374	0.168

Source: PECO Energy Efficiency & Conservation Plan PY 2009-2012, submitted July 1, 2009

- *Energy savings per unit* are based on the LIURP average program savings for 2005 through 2008 and vary based on the heating fuel type and the extent of the measures provided.

Annual Energy Savings = Installation Rate \*  $\sum$  (# of audits\*kWh savings per unit) by job type

- *Demand savings per unit* were calculated by multiplying the stipulated energy savings from Table 4-4 by a coincident peak demand savings conversion factor of 0.000122 kW/kWh. This factor was derived from Global Energy Partner's BEST model results for PECO's approved Energy Efficiency and Conservation Plan.<sup>25</sup> BEST is an internally developed user interface for the U.S. Department of Energy (DOE) 2.2 simulation engine.<sup>26</sup>

Peak Demand Reduction =  $\sum$  (# of audits\*kW savings per unit) for each job type

<sup>25</sup> PECO Energy Efficiency and Conservation Plan (Program Years 2009-2012). Prepared July 1, 2009.

<sup>26</sup> The model was developed using a prototypical North East residential building and Philadelphia weather data. A representative sample of measures within the LEEP Component 1 program was applied to the baseline model and the simulation results were used to derive the LEEP Component 1 kW to kWh conversion factor.

## Calculation of CFL Savings

A modification of the TRM protocol was used to calculate energy and demand savings for CFL bulbs, including those installed during audits beyond the maximum of four bulbs used for LIURP. Energy savings from installation of screw-in CFLs are based on an algorithm from the TRM<sup>27</sup> that calculates the difference between existing and new wattage and the average daily hours of usage for the lighting unit being replaced, which is identical to that used for the Smart Lighting Discounts program. The modification for the LEEP program is that instead of the 84 percent in-service rate that is assumed by the TRM, this analysis assumed an ISR of 100 percent, since these lamps are directly installed by the contractor. This modification is incorporated in the savings calculation protocol for the LEEP program that is currently under review by the SWE.

$$\text{Total kWh Savings} = \# \text{ bulbs sold} * ((\text{CFL}_{\text{watts}} \times (\text{CFL}_{\text{hours}} \times 365))/1000 \times \text{ISR}_{\text{CFL}})$$

Where:

- The deemed installation rate is 100 percent ( $\text{ISR}_{\text{CFL}}$ ), the deemed hours of use per day is three hours ( $\text{CFL}_{\text{hours}}$ ), and
- 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 all-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 NTC ratio is 1.

LEEP installed 13-W CFL bulbs, which were assumed to replace 60-W incandescent bulbs, and 19-W or 20-W CFL bulbs, which were assumed to replace 75-W incandescent bulbs. The assumed baseline wattages for replaced bulbs are based on ENERGY STAR'S online bulb replacement guide, as shown in Table 4-5.<sup>28</sup>

---

<sup>27</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.

<sup>28</sup> ENERGY STAR bulb replacement guide:

[http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std\\_adp.php?p\\_faqid=2563](http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std_adp.php?p_faqid=2563)

**Table 4-5 ENERGY STAR Bulb Replacement Guide**

Incandescent Light Bulbs (Watts)	Minimum Light Output (Lumens)	ENERGY STAR qualified CFLs (Watts)
25	250	4 to 9
40	450	9 to 13
60	800	13 to 15
75	1,100	18 to 25
100	1,600	23 to 30
125	2,000	28 to 40
150	2,600	30 to 52

Source: Energy Star bulb replacement guide:  
[http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std\\_adp.php?p\\_faqid=2563](http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std_adp.php?p_faqid=2563)

**Effective Use Life (EUL)**

Audits

- For basic measures, an EUL of 6.4 years per the TRM for CFLs is used. Most of the savings are primarily measures with five to seven years, as noted in the LIURP evaluations.
- For major measures, an EUL of 13 years applies per the TRM value for refrigerator replacement. Major measures include measures such as heat pumps and weatherization measures which last from 15 to 20 years, but based on LIURP results, refrigerator replacements (along with basic measures) were the most common measures installed.

CFLs

The TRM assumes an EUL of 6.4 years for CFL bulbs.

**4.2.3 Program Sampling**

Telephone surveys to assess installation in each quarter were conducted per the evaluation plan.

**Table 4-6. Sample Sizes for Quarterly Surveys of Measure Implementation**

LEEP Components	Sample Size (Q3)	Sample Size (Q4)	Total Sample Size	Precision at 90% Confidence Level
Component 1	35	36	71	4%
Component 2	36	35	71	8%
<b>Total</b>	<b>71</b>	<b>71</b>	<b>142</b>	<b>6%</b>

#### **4.2.4 Process Evaluation**

The process evaluation activities for PY 2009 consisted of in-depth interviews with utility and implementation contractor staff, telephone surveys with program participants, and review of program materials and process flow. This section describes the interviews, surveys, and findings.

##### **In-Depth Interviews**

As per the evaluation plan for PY 2009, in-depth interviews were conducted in Q4 with two PECO Energy program staff and three staff of CMC Energy Services, the program implementer. Interview guides for staff and contractors were created with topics for PECO staff addressing program design such as program history, implementation, and administration. Topics for the implementer included communications and coordination, program participation, tracking systems, quality control, customer satisfaction, and program effectiveness. Results from the interviews were used to inform a report on verification and due diligence.

Interview findings are as follows:

- CMC Energy Services has good quality control procedures in place; surveying of customer satisfaction is ongoing and comprehensive.
- CMC Energy Services staff is long term and experienced.
- PECO and CMC have a strong working relationship.
- Adequate vendor data tracking and control systems are in place.

##### **Participant Surveys**

A sample of 71 participants in Q3 was surveyed by telephone in the fourth quarter of PY 2009. The survey included process-related questions such as satisfaction and value of educational materials. A similar study was conducted for a sample of 71 Q4 participants.

Survey findings are as follows:

- 82 percent of audit participants and 89 percent of Component 2 participants were extremely satisfied with the program (8-10 on a scale of 0-10).
- 96 percent of audit participants said educational material was clear and informative and 84 percent were extremely satisfied with the materials.
- 77 percent of audit participants reporting taking other energy efficiency actions as a result of the program, mainly turning off lights and other appliances/equipment

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

CMC staff conducts the LEEP audit and develops a work order for additional measures to be installed on subsequent visit(s) by the program subcontractors. Five subcontractors assist in the

implementation of LIURP. CMC also does a follow-up inspection for a sample of the audits and all of the subcontractor installations.

#### 4.2.6 Program Finances

A summary of the project costs by quarter and year are presented in Table 4-7

**Table 4-7 Summary of LEEP Program Finances**

	Quarter 3	Quarter 4	PYTD
EDC Incentives to Participants	-	-	-
EDC Incentives to Trade Allies	-	-	-
<b>Subtotal EDC Incentive Costs</b>	-	-	-
Design & Development	n/a	n/a	n/a
Administration <sup>[1]</sup>	\$26,000	\$156,000	\$182,000
Management <sup>[2]</sup>	\$261,000	\$105,000	\$331,186
Marketing	-	-	-
Technical Assistance <sup>[3]</sup>	\$109,677	\$530,540	\$640,217
<b>Subtotal EDC Implementation Costs<sup>[4]</sup></b>	<b>\$396,667</b>	<b>\$791,540</b>	<b>\$1,153,403</b>
EDC Evaluation Costs	In above	In above	\$34,814
SWE Audit Costs <sup>[5]</sup>	n/a	n/a	\$20,250
Participant Costs	n/a	n/a	n/a
<b>Total Costs<sup>[6]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
Annualized Avoided Supply Costs <sup>[7]</sup>	n/a	n/a	n/a
Lifetime Supply Costs <sup>[8]</sup>	n/a	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>[9]</sup></b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>

NOTES TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report

<sup>1</sup>Implementation contractor costs.

<sup>2</sup>EDC costs other than those identified explicitly.

<sup>3</sup>EDC payments for measures.

<sup>4</sup>EDC implementation costs were not tracked by all the sub-categories listed through Q4.

<sup>5</sup>Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost distribution.

<sup>6</sup>Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation.

<sup>7</sup>Cumulative annual supply costs divided by program maximum measure life.

<sup>8</sup>Present value of avoided supply costs.

<sup>9</sup>Present value of avoided supply costs plus present value of avoided costs for incandescent bulbs. All program benefits and costs reflect verified savings or *reported* savings for measures where verification protocols have not yet been approved.

### **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 in Q4 of PY 2009 (specifically, on March 1, 2010).

#### **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.

#### **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 above.

The M&V included reviewing the fourth quarter 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 Q4 data tables.

Once this review was completed, the Navigant Consulting team then had a count of the units collected for each measure type. The Navigant Consulting 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-approved gross savings per unit for each measure type are shown below:

- Refrigerators and Freezers: Energy – 1,728 kWh/unit and Demand – 0.2376 kW/unit
- Room Air Conditioner: Energy – 353 kWh/unit and Demand – 0.6395 kW/unit

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 88 participants that responded to the verification question. Of those queried, only one participant claimed they did not participate and the program did not pick up their unit. Two others corrected the types of units that were recorded in the tracking database, but otherwise corroborated the units were picked up. And the vast majority (85 of 88) confirmed the unit types and pickup as were recorded in the database. The resulting verification rate (0.99) is close to one.

With respect to actual confidence and precision achieved based on survey results for overall verification of appliance pickup, the 88 responses yielded a confidence and precision level of 90/3. By appliance, the confidence/precision levels are: Refrigerators – 90/3, Freezers – 90/7, and Room –Air Conditioners – 90/6. These parameters are well within the required 90/10 confidence and precision ranges.

#### **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 2009 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, 2,028 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 4-8.

**Table 4-8 Composition of Smart Appliance Recycling Program Survey Sample**

Group	Strata	Strata Description	Refrigerator Primary	Refrigerator Secondary	Freezer	Room A/C	QUOTAS	In Sample
1	1	Refrigerator Primary	1				4	278
2	2	Refrigerator Secondary		1			13	1,118
3	3	Refrigerator Primary + Room A/C	1			1	3	32
4	4	Refrigerator Secondary + Room A/C		1		1	15	187
5	5	Freezer			1		14	290
6	6	Freezer + Room A/C			1	1	11	55
7	1	Refrigerator Primary + Freezer	1		1		0	9
8	2	Refrigerator Secondary + Freezer		1	1		4	52
9	3	Refrigerator Primary + Freezer + Room A/C	1		1	1	0	2
10	4	Refrigerator Secondary + Freezer + Room A/C		1	1	1	2	15
		<b>Total QUOTAS</b>	7	34	31	31	66	
		<b>Total IN SAMPLE</b>	321	1372	423	291		2,038

**4.3.4 Process Evaluation**

The process evaluation of the Appliance Recycling program is based on a telephone survey of a random sample of program participants as described above. The survey was conducted in August 2010. Ultimately, a total of 76 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 9.2 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 – 6.6
  - Collection team who picked up the appliances – 9.4
  - 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 9.8 on a 10-point scale.
- The most commonly cited ways of learning about the program were bill inserts and word of mouth.
- The primary motivations for participating in the program are the \$35 incentive, and the opportunity to dispose of unwanted appliances in an environmentally safe manner.
- More than two-thirds of participants feel more favorable toward PECO after participating in the program.

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

The only partner at this point is the implementation contractor, JACO. The program may eventually partner with big-box retailers that sell new units and can collect the old units when they are being turned over.

#### **4.3.6 Program Finances**

A summary of the project finances is presented in Table 4-9 below.

**Table 4-9 Smart Appliance Recycling Program Finances<sup>[1]</sup>**

	Quarter 4	PYTD
EDC Incentives to Participants <sup>[2]</sup>	\$102,000	\$102,000
EDC Incentives to Trade Allies	-	-
<b>Subtotal EDC Incentive Costs</b>	<b>\$102,000</b>	<b>\$102,000</b>
Design & Development	n/a	n/a
Administration <sup>[3]</sup>	\$280,000	\$280,000
Management <sup>[4]</sup>	\$108,000	\$184,971
Marketing	\$18,000	\$19,000
Technical Assistance	-	-
<b>Subtotal EDC Implementation Costs<sup>[5]</sup></b>	<b>\$406,000</b>	<b>\$483,971</b>
EDC Evaluation Costs	In above	\$17,029
<b>SWE Audit Costs<sup>[6]</sup></b>	<b>n/a</b>	<b>\$9,906</b>
<b>Participant Costs</b>	<b>n/a</b>	<b>n/a</b>
<b>Total Costs<sup>[7]</sup></b>	<b>n/a</b>	<b>n/a</b>
Annualized Avoided Supply Costs <sup>[8]</sup>	n/a	n/a
Lifetime Supply Costs <sup>[9]</sup>	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>[10]</sup></b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>

NOTES TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report  
<sup>1</sup>All program benefits and costs reflect verified savings or *reported* savings for measures where verification protocols have not yet been approved  
<sup>2</sup>Incentives paid to participants are not included in the TRC calculation  
<sup>3</sup>Implementation contractor costs.  
<sup>4</sup>EDC costs other than those identified explicitly.  
<sup>5</sup>EDC implementation costs were not tracked by all the sub-categories listed through Q4  
<sup>6</sup>Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost spread.  
<sup>7</sup>Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation.  
<sup>8</sup>Cumulative annual supply costs divided by program maximum measure life  
<sup>9</sup>Present value of avoided supply costs  
<sup>10</sup>Present value of avoided supply costs

#### 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; LED lamps; whole-house fans; white roofs; ground-source heat pumps; and ENERGY STAR windows, room air conditioners; dehumidifiers; central air conditioning (14.5, 15, and 16 seasonal energy efficiency ratio [SEER]); refrigerators; freezers; clothes washers; dishwashers; lighting fixtures; heat pump water heaters; high-efficiency gas water heaters (fuel switching); and high-efficiency gas furnaces (fuel switching from baseboard or heat pump).

#### **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 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 for this annual report consisted of 1) reviewing program data and documentation to track and verify savings; 2) conducting participant surveys to obtain customer experience and insight information and to confirm measure installation; and 3) interviewing staff and market actors for insights into program structure and implementation.

For non-lighting measures, gross savings impacts for PY 2009 are based on program-reported activity by measure and deemed savings values from the TRM. Savings were adjusted based on results of a participant survey, in which participants were asked to verify the installation and performance of rebated measures.

For lighting measures, the M&V completed for this report consisted of reviewing the ANB tracking database and verifying it against the manufacturer invoices Ecos packaged and sent to PECO for payment. The ANB tracking data was used to estimate the annual program savings. Because the gross and net savings parameters for lighting are to be based on deemed values for PY 2009, the gross energy savings for LED measures are based on the proposed LED protocols under consideration by the SWE, and are subject to adjustment.

Key process-related program strengths and weaknesses and opportunities for improvement were identified through customer surveys and survey interviews with program staff, implementers, retailers, and contractors.

An assessment of PECO's commitment to energy efficiency was addressed using the participant survey battery, which included questions to elicit information on customer perceptions of PECO

#### **4.4.3 Program Sampling**

The Smart Home Rebates Program participant survey uses a sampling approach targeting participation in the overall program. Although the survey captured information on both program impact (verification of installation and performance) and program processes (customer experience of the program and suggestions for improvement), the sampling approach was designed primarily for the purpose of verification of savings from non-lighting measures, with participants asked to confirm the installation and performance of rebated measures. A sample size of 84 is sufficient to estimate the proportion of all measures installed with a 90 percent confidence interval of plus or minus 10 percent; the number of participants sampled for verification purposes was 200. The sample was allocated among measures in relation to the number of program participants that purchase each measure, with a target of at least two participants per measure

Verification of lighting measures was based on a census of all lighting measures invoiced and tracked in PY 2009.

For the process evaluation, in addition to the participant interviews, the Navigant Consulting team also conducted seven interview surveys for each of the following groups for their opinions and insights on the program:

- Participant vendors
- Limited-participation vendors
- Participant contractors
- Non-participant contractors

#### 4.4.4 Process Evaluation

Process evaluation activities included reviewing program plans and documentation, and conducting CATI telephone surveys with Smart Home Rebate Program participants, survey interviews with participant and nonparticipant retailers and contractors, and in-depth interviews with PECO program staff and Ecos program implementers. Key process findings include the following:

- Marketing to retailers and contractors has been effective. Fifty-one percent of customers learned about the program from store staff or in-store displays, and 15 percent learned about the program directly from contractors. Additionally, contractors and retailers place a high value on the marketing support as a method for building customer awareness and interest.
- Customer-focused marketing has built awareness, with 34 percent of participants learning about the program through PECO bill inserts or other PECO mailings. Thirteen percent learned about the program from the PECO website; 13 percent also learned about the program through PECO radio, TV, newspaper, or outdoor advertisements.
- Participant satisfaction with the Smart Home Rebates Program is high, with 96 percent of respondents rating their satisfaction with PECO at 7 or higher on a 0 to 10 scale. This includes 67 percent reporting complete satisfaction with the program. Overall participant satisfaction with PECO is also high, with 91 percent of respondents rating their satisfaction with PECO at 7 or higher, including 30 percent reporting complete satisfaction with PECO.
- Although participating contractors and retailers have not changed the type of equipment they carry, more customers are purchasing qualifying equipment. Some contractors noted that the program is countering a recent customer trend to repair inefficient equipment rather than replace it.
- Participating contractors and retailers rated the program highly for its effectiveness in increasing sales of qualifying energy-efficient products. However, participating contractors and retailers tend to promote the Smart Home Rebate in combination with other incentives, including manufacturer rebates, the Pennsylvania Home Heating Equipment Rebate, and the Federal Energy Tax Credit. Forty-one percent of all participants report using an additional financial incentive in addition to the Smart Home Rebate.
- First cost still limits participation. Although contractors report the program attracts the purchase of new, efficient equipment, they note that people with limited finances may not participate due to first cost and will have older, inefficient systems repaired rather than purchase more efficient models.

#### 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 will be 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 4-10. Factors affecting Program Year 1 include:

- While the program exceeded the overall rebate goal of 15,197 by achieving 21,100 rebates, this reflects higher than expected sales of relatively low savings measures, such as dishwashers and refrigerators.
- Lack of any activity in the fuel switching area, which had been expected to produce significant kW and kWh savings in Program Year 1. Gas furnace fuel switching had a goal of achieving 1,725 MWh; gas water heater fuel switching had goals of 3,258 MWh and 345 kW.
- No installation of programmable thermostats, which had been expected to provide 581 MWh in savings.<sup>29</sup>
- Differences between initial and revised kWh and kW estimates for some measures; resulting in lower per-unit kWh savings.
- Initial start up costs for marketing, and advertising, retailer and contractor recruitment, and program tracking systems involved in launching this program, which would be expected to be amortized over the life of the program.

The program is taking steps to increase participation, particularly in higher kWh measures. A recent company update on program performance reports that in June 2010, there was a bill insert focused on HVAC and Hot Water Heaters to help drive rebates, and additional targeted mailings to customers on HVAC rebates.

---

<sup>29</sup> Due to the outcome of the SWE review, which resulted in significantly reduced kWh as well as its limited application, PECO elected to eliminate this measure from its Plan

**Table 4-10 Summary of PECO Smart Home Rebates Program Finances: TRC Test<sup>1</sup>**

	<b>Quarter 4</b>	<b>PYTD</b>
EDC Incentives to Participants <sup>2</sup>	\$1,561,000	\$1,561,000
EDC Incentives to Trade Allies	-	-
<b>Subtotal EDC Incentive Costs</b>	<b>\$1,561,000</b>	<b>\$1,561,000</b>
Design & Development	n/a	n/a
Administration <sup>3</sup>	\$1,285,000	\$1,285,000
Management <sup>4</sup>	\$247,000	\$499,795
Marketing	\$184,000	\$188,000
Technical Assistance	-	-
<b>Subtotal EDC Implementation Costs<sup>5</sup></b>	<b>\$1,716,000</b>	<b>\$1,972,795</b>
EDC Evaluation Costs	In above	\$60,205
SWE Audit Costs <sup>6</sup>	n/a	\$35,020
Participant Costs	n/a	
<b>Total Costs<sup>7</sup></b>	<b>n/a</b>	<b>\$7,120,798</b>
Annualized Avoided Supply Costs <sup>8</sup>	n/a	n/a
Lifetime Supply Costs <sup>9</sup>	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>10</sup></b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>

NOTES: TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report.

<sup>1</sup> Definitions for terms in following table are subject to TRC Order. All program benefits and costs reflect verified savings or *reported* savings for measures where verification protocols have not yet been approved.

<sup>2</sup> Incentives paid to participants are not included in the TRC calculation

<sup>3</sup> Implementation contractor costs

<sup>4</sup> EDC costs other than those identified explicitly

<sup>5</sup> EDC implementation costs were not tracked by all the sub-categories listed through Q4

<sup>6</sup> Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost spread

<sup>7</sup> Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation

<sup>8</sup> Cumulative annual supply costs divided by program maximum measure life

<sup>9</sup> Present value of avoided supply costs

<sup>10</sup> Present value of avoided supply costs plus present value of avoided costs for incandescent bulbs

## 4.5 Smart Equipment Incentives Program

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 commercial, industrial, government, institutional, and nonprofit 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 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 PY 2009, 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. Furthermore, a significant number of participating projects were initiated during the retroactive period when neither program was being marketed or implemented. Government had one difference in PY 2009 in allowing traffic signal measures; however, these are fully deemed in the TRM. Although the evaluation of the government/non-profit program was included with the evaluation of the C&I Smart Equipment Incentives program as a single program evaluation effort in PY 2009, impact evaluation reporting differentiates savings between C&I and government/non-Profit sectors for compliance with Act 129 requirements. Certain other descriptive material is presented separately. The PY 2010 C&I and government programs may be sufficiently differentiated that separate evaluations will be conducted in the future.

#### **4.5.1 Program Logic**

The Smart Equipment 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 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 identifies 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**

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. For the PY 2009 impact evaluation, the measures in these categories are defined by the TRM in effect for the PY 2009 program evaluation, which is an update of the May 2009 TRM version,<sup>30</sup> plus interim protocols approved by the PA PUC through the Statewide Evaluator.

If a measure is deemed, the impacts for the measure are provided in the TRM or in an approved Interim TRM Measure protocol. The evaluation approach for deemed measures is to verify both quantity and that the measure installed matches TRM required specifications. If a measure is partially deemed, the TRM or approved work paper provides the algorithms and default

---

<sup>30</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*, May 2009. Updated version released June 2010

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 contain custom measures as defined by the TRM were evaluated through application review and implementing site-specific M&V plans.

The evaluation included *ex-post* engineering-based estimates of gross annual energy and summer peak demand impact for each sampled measure. Evaluation of PY 2009 measures 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 current operation differs from planned operation, taking into account daily, weekly, and seasonal variations. The site evaluation may involve performing on-site measurement and/or obtaining customer-stored data to support downstream M&V calculations. Measurement may include spot measurements, run-time hour data logging, and post-installation interval metering. Customer-supplied data from energy management systems or supervisory control and data acquisition systems may be used when available.

### 4.5.3 Program Sampling

The Navigant Consulting team's program sampling for PY 2009 reflects the unique characteristics of the participation profile. As noted previously, 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. Instead, the 25 government and 62 C&I projects were combined into a single population of 87 projects for sampling.

For PY 2009, 93.9 percent of *ex ante* program impacts by kWh for the 87 C&I and government projects are for lighting measures within the current TRM, 5.5 percent are non-lighting measures in the current TRM, and 0.6 percent are custom or interim TRM measures. Our sample design for gross impact verification created two sampling groups: Prescriptive-TRM measures in one group, and Custom measures in the second group. This resulted in a population of 86 projects in the prescriptive-TRM group and only 1 project in the custom group. This skewed participation is unique to PY 2009; custom measure projects tend to take longer to develop and with only three months post-launch in PY 2009, only one relatively simple custom measure was able to reach paid status.

The participating population for PY 2009 was defined as those projects with a payment mailed date of June 7, 2010 or earlier. Although the program year ended May 31, 2010, it is common practice and reasonable to include projects undergoing administrative processing in the period immediately after the end of the program year.

The decision to split prescriptive TRM measures from custom measures in the population reflected the nature of these measures in the context of program verification and evaluation M&V requirements of Act 129. TRM-approved measures share an extensive level of completed research and analysis on their savings; they use deemed and partially deemed variables and simplified algorithms, and have common implementation, program administrative review, and evaluation M&V requirements. This commonality results in a sample population with common characteristics that can be expected to have gross realization rates that are consistent across measure types. On the other hand, custom measures by nature combine unique baselines, operating characteristics, and energy-saving techniques and merit individual administration, impact analysis, and evaluation approaches. Custom measures are not expected to have gross realization rates that are consistent with prescriptive measures.

For PY 2009, four measures with interim protocols awaiting approval for inclusion in the TRM were grouped with the prescriptive-TRM population. These measures are beverage machine controls (1,202 annual kWh saved for PY 2009 *ex ante*), ice makers (1,551 annual kWh saved *ex ante*), LED refrigerated case lighting (63,353 annual kWh *ex ante*), and LED lamp/fixture (77,811 annual kWh *ex ante*). The minimal savings for these four measures will be included as reported but not verified (total pending approval is 143,918 annual kWh *ex ante*, 1.2% of total *ex ante* annual kWh savings).

The population of prescriptive TRM projects had an energy-savings distribution that was heavily skewed toward a few large projects. Approximately one-third of overall program savings occurred in three very large projects, while another third of overall savings occurred in eight additional projects. The largest project saved 1,538,676 *ex ante* kWh, while the smallest saved 403 *ex ante* kWh. For this reason, a sample design was chosen that stratified the population by project size. The sample design is based on a stratified ratio estimate approach, described in detail in the California Evaluation framework.<sup>31</sup>

The Navigant Consulting team's stratified ratio estimate sample design is consistent with a 90/10 result at the program level for prescriptive projects. The required sample for 86 prescriptive projects with an assumed error ratio of 0.5, with finite population correction factor rounded up to a whole number, is 39 projects. The Navigant Consulting team stratified into three kWh-size strata and allocated 13 sample points to each stratum. However, there were only three projects in the population that fell into the "large-project" stratum, and eight projects in the "medium" stratum. The sample design selected a census of these 11 projects, targeting complete verification of roughly 66 percent of prescriptive savings in the Smart Equipment Incentives program.

---

<sup>31</sup> Techmarket Works Framework Team, *The California Evaluation Framework*, June 2004, California Public Utilities Commission, pages 361 to 384.

Given that the Navigant Consulting team conducted a census in the medium- and large-project strata, an overall 90/10 result was achievable with a random sample of 9 (rather than 13) of the 75 projects selected from the small-project stratum. Although there are allowances to sample at the 90/30 level for certain HVAC measures, for PY 2009 we found this did not alter the samples sizes, because of our census in strata 1 and 2 and the small number of participating HVAC projects in stratum 3. In addition to the nine primary sites selected for our M&V site visits, we selected additional sites from stratum 3 to serve as backup sites in the event the primary selection was not able to allow site M&V within our time frame.

Sampling was not required for the participant phone survey. For the 87 projects there were only 59 contacts to interview, and each was called until an interview was completed or the contact disposed (interview refused, terminated midway, or not reachable after multiple attempts). Ultimately 33 of the 50 contacts completed surveys, reflecting a 56% response rate which was better-than-anticipated.

Sampling for the engineering analysis of the Smart Equipment Incentives program is summarized in Table 4-11. Our completed sample is included in the table below, reflecting some on-site refusal in prescriptive stratum 2. The table also provides the relative precision at the 90 percent level of confidence for annual kWh saved.

**Table 4-11 Smart Equipment Incentives Sample Design and Results**

PECO PY 2009	Smart Equipment Incentives Program C&I plus Government				
	Population	Initial Sample Design	Target Sample with Stratification	Completed Sample	
Site M & V				Relative Precision at 90% Confidence	
Custom Measures	1	1	1	1	± 0%
<b>Prescriptive, TRM Approved Measures</b>					
Large Projects Stratum	3	13	3	3	± 0%
Medium Projects Stratum	8	13	8	8	± 0%
Small Projects Stratum	75	13	9	11	± 18%
<b>Total, Prescriptive TRM</b>	86	39	20	22	± 5.9%
<b>Total PY 2009</b>	87	40	21	23	± 5.9%

**4.5.4 Process Evaluation**

For the Smart Equipment Incentives program, all of the process evaluation data collection activities have been completed, including staff and implementer in-depth interviews, participating trade ally in-depth interviews, and a participating customer phone survey. Preliminary review of the tracking system and program Quality Assurance/Quality Control

(QA/QC) procedures has been conducted, and will be finalized after additional findings are gleaned from the impact verification and site M&V process. Reporting on process evaluation findings is in progress. These activities and status are summarized in Table 4-12.

**Table 4-12 PY 2009 Smart Equipment Process Evaluation Activities**

PY 2009 Process Evaluation Activity	Data Collection	Reporting Status	Comment
In-depth interviews with PECO staff and implementers	Completed	In progress	4 completed interviews
In-depth interviews with participating trade allies	Completed	In progress	6 trade allies interviewed
Participating customer phone survey including impact, NTG, and process questions	Completed	In progress	33 completed interviews
Tracking system review	Completed	In progress	2 completed interviews
QA/QC procedures review	Completed	In progress	2 completed interviews

**In-Depth Interviews with Staff and Implementation Contractors**

The in-depth interviews with staff and implementation contractors took place in March through June 2010. The primary purpose of the interviews was to gather information on program design, administration, delivery, and marketing to inform upcoming evaluation activities. This task included a review of program marketing collateral and customer materials, the marketing plan, and other internal documents. The interviews also inquired about areas of improvement and future plans.

Staff and implementation contractor interviews suggest that, although the implementation timeline was very tight and the program was ramping up rapidly, resources were very effectively directed at critical key functions including training of PECO account managers, outreach and training of trade allies, effective process design and implementation, including a full range of customer interfaces, and an effective application tracking system. The tight timeline required that certain activities be delayed, including drafting of an official Operations Manual and Marketing Plan. However, the lack of these documents does not appear to have harmed the program execution in the least during its initial program year.

Initial program marketing to and training of trade allies was generally very effective in spite of the short notification time before initial trade ally introductory programs. A list of trade allies is easily accessible on the PECO website and is very well designed for ease of use. A number of market materials are available and well designed for the program’s purposes. In year two of the program when time allows marketing results will be assessed to determine if there are any under-represented customer segments and ally types and if the outreach needs to be modified to bring them into the program.

Communication between the numerous partners and with trade allies appears to have been handled very effectively. Regular meetings between CSP, its contractors and PECO were held to coordinate activities and the team was very responsive to trade ally requests to support their marketing efforts. The application tracking system has been well designed to provide the required information to the CSP to enable effective and timely performance through system flags and checks at critical process points. Call volume has been relatively limited, presumably due to either a simple and clear application process and or other knowledgeable information sources.

Most identified issues and opportunities for potential improvement were recognized and being managed. These included the need to ramp up for additional application volume, uncertainty and challenges around SWE information requirements, and the complexity of the technical study incentive.

### **In-Depth Interviews with Participating Trade Allies**

In-depth interviews were conducted with participating trade allies to gather early feedback on their participation experience. The interviews took place May through August 2010. Topics included background on the firm and their level of involvement, marketing and promotion, end-user customer participation experience, incentives, call center experience, and recommendations for program enhancements.

Trade ally feedback was strongly positive. Interviewees indicated that the program was very smoothly run, staff was helpful and pleasant, applications and payments were handled in a timely manner, and applications were easy to complete. All interviewees indicated that the program was central to their making additional sales. They typically handled the application process for their customers and were clearly integral to the success of the program.

Few participants had any suggestions for improvements. One LED supplier suggested that in re-evaluating the LED rebates PECO should consider requiring that eligible products be either ETL or UL certified to ensure quality installations.

### **Participating Customer Phone Survey**

A CATI telephone survey was conducted with an attempted census of 59 unique participants in the PY 2009 Smart Equipment Incentives program, resulting in 33 completed interviews. This 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 in August 2010.

The CATI survey was directed toward unique customer contact names drawn from the tracking system for PY 2009 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.

An important difference between the phone survey and gross impact M&V is that the phone survey must target unique contact names to avoid a burden on the respondent of discussing multiple projects. Many businesses submitted projects for multiple locations (e.g., chain stores) and listed a single contact person for all projects. These duplicates had to be removed from the sample.

Below are some key indicators of satisfaction:

- Do you plan to participate in the program again in the future? (94% yes)
- How would you rate your satisfaction (7 or higher, where 10 is very satisfied).
  - with PECO? (78%)
  - the incentive amount? (69%)
  - communication with program staff? (75%)
  - the call center's ability to answer your questions? (100%)
  - the measures offered by the program? (91%)
  - the Smart Equipment Incentives program overall? (81%)

### **Tracking System Review**

Under this task, the Navigant Consulting team performed a verification of the program-tracking database to determine the level of input, outliers, missing values, and potentially missing variables. The purpose of the tracking system review is to ensure these systems gather the data required to document program savings, support future evaluation, allow program managers to monitor key aspects of program performance at regular intervals, and enable the SWE to perform their required audit. The Navigant Consulting team performed an engineering review of the inputs and outputs of the energy and demand impacts of a sample of projects within the tracking database to verify that the database is providing correct information and is consistent with the TRM. Although the PECO tracking system was under-development during the PY 2009 evaluation process, all tracking system data necessary to conduct the evaluation was provided by KEMA, including measure-level and project-level data. KEMA improved the data quality and consistency with the TRM in extracts provided to evaluators in May, June, July, and September 2010.

### **QA/QC Procedures Review**

Under this task, the Navigant Consulting team explored the quality assurance and verification activities currently carried out by program and implementation staff. The Navigant Consulting

team compared these activities to industry best practices<sup>32</sup> for similar business programs to determine:

1. If any key quality assurance and verification activities that should take place are currently not being implemented.
2. If any of the current quality assurance and verification activities are biased (i.e., incorrect sampling that may inadvertently skew results, and purposeful sampling that is not defensible).
3. If any of the current quality assurance and verification activities are overly time consuming and might be simplified or dropped.

This assessment primarily relied on in-depth interviews with program and implementation staff, documentation of current program processes, where available, and our experience conducting the impact evaluation file review and site M&V.

#### **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 was conducted. 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, will oversee and administer the program, making sure measures are implemented as intended, ensuring completion of required forms, and collecting information on measures.
- Implementation contractors
- Participating trade allies – These entities will ensure measures are implemented and functional, measures are eligible, and that cost and energy-savings data are accurate and available.
- Evaluation contractor – The program will have both an impact and process evaluation conducted that will seek to verify the actual program results and optimize the delivery of services under this program.
- The SWE will ensure that reporting across EDCs in Pennsylvania is consistent.

#### **4.5.6 Program Finances**

Summaries of the project finances for the C&I and government / non-profit segments of this program are presented in Figures Figure 4-13 and Figure 4-14 respectively.

---

<sup>32</sup> See the Best Practices Self Benchmarking Tool developed for the Energy Efficiency Best Practices Project: <http://www.eebestpractices.com/benchmarking.asp>

**Figure 4-13 Summary of PECO Smart Equipment Incentives – C&I Program Finances: TRC Test<sup>1</sup>**

	<b>Quarter 4</b>	<b>PYTD</b>
EDC Incentives to Participants <sup>[2]</sup>	\$722,000	\$722,000
EDC Incentives to Trade Allies	-	-
<b>Subtotal EDC Incentive Costs</b>	<b>\$722,000</b>	<b>\$722,000</b>
Design & Development	n/a	n/a
Administration <sup>[3]</sup>	\$326,000	\$326,000
Management <sup>[4]</sup>	\$139,000	\$528,889
Marketing	\$9,000	\$15,000
Technical Assistance	n/a	n/a
<b>Subtotal EDC Implementation Costs<sup>[5]</sup></b>	<b>\$474,000</b>	<b>\$869,889</b>
EDC Evaluation Costs	In above	\$43,111
SWE Audit Costs <sup>[6]</sup>	n/a	\$25,077
Participant Costs	n/a	n/a
<b>Total Costs<sup>[7]</sup></b>	<b>n/a</b>	<b>n/a</b>
Annualized Avoided Supply Costs <sup>[8]</sup>	n/a	n/a
Lifetime Supply Costs <sup>[9]</sup>	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>[10]</sup></b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>
<p>NOTES TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report</p> <p><sup>1</sup> Definitions for terms in this table are subject to TRC Order. All program benefits and costs reflect verified savings or <i>reported</i> savings for measures where verification protocols have not yet been approved.</p> <p><sup>2</sup>Incentives paid to participants are not included in the TRC calculation.</p> <p><sup>3</sup>Implementation contractor costs.</p> <p><sup>4</sup>EDC costs other than those identified explicitly.</p> <p><sup>5</sup>EDC implementation costs were not tracked by all the sub-categories listed through Q4.</p> <p><sup>6</sup>Not included in the program cost calculation per the PUC. Allocated to programs based on M&amp;V cost spread.</p> <p><sup>7</sup>Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation.</p> <p><sup>8</sup>Cumulative annual supply costs divided by program maximum measure life.</p> <p><sup>9</sup>Present value of avoided supply costs.</p> <p><sup>10</sup>Present value of avoided supply costs plus present value of avoided costs for incandescent bulbs.</p>		

**Figure 4-14 Summary of PECO Smart Equipment Incentives – Government and Non-Profit Program Finances: TRC Test<sup>1</sup>**

	Quarter 4	PYTD
EDC Incentives to Participants <sup>[2]</sup>	\$112,000	\$112,000
EDC Incentives to Trade Allies	-	-
<b>Subtotal EDC Incentive Costs</b>	<b>\$112,000</b>	<b>\$112,000</b>
Design & Development	n/a	n/a
Administration <sup>[3]</sup>	\$516,000	\$516,000
Management <sup>[4]</sup>	\$67,000	\$324,295
Marketing	-	\$5,000
Technical Assistance	n/a	n/a
<b>Subtotal EDC Implementation Costs<sup>[5]</sup></b>	<b>\$583,000</b>	<b>\$845,295</b>
EDC Evaluation Costs	In above	\$9,705
SWE Audit Costs <sup>[6]</sup>	n/a	\$5,645
Participant Costs	n/a	n/a
<b>Total Costs<sup>[7]</sup></b>	<b>n/a</b>	<b>n/a</b>
Annualized Avoided Supply Costs <sup>[8]</sup>	n/a	n/a
Lifetime Supply Costs <sup>[9]</sup>	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>[10]</sup></b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>
NOTES: TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report <sup>1</sup> Definitions for terms in this table are subject to TRC Order. All program benefits and costs reflect verified savings or <i>reported</i> savings for measures where verification protocols have not yet been approved. <sup>2</sup> Incentives paid to participants are not included in the TRC calculation <sup>3</sup> Implementation contractor costs <sup>4</sup> EDC costs other than those identified explicitly <sup>5</sup> EDC implementation costs were not tracked by all the sub-categories listed through Q4 <sup>6</sup> Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost spread. <sup>7</sup> Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation <sup>8</sup> Cumulative annual supply costs divided by program maximum measure life. <sup>9</sup> Present value of avoided supply costs <sup>10</sup> Present value of avoided supply costs plus present value of avoided costs for incandescent bulbs		

#### 4.6 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.

Because the CVR program was implemented in the final four months of program year 2009, program savings consist of energy (MWh) only, as no peak demand savings were realized during the summer months in PY 2009.

#### **4.6.1 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% 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

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

The M&V completed for CVR during PY 2009 and presented in this annual report included the following:

- A detailed review of planning estimates of CVR program savings including energy and peak demand impacts, furnished by the company
- A detailed review of a PECO database containing information on substations/circuits/lines impacted by the program, including the date(s) of the voltage change(s) and site information (e.g., substation names and circuit-level codes)
- 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 review of company records and discussions with PECO staff relating to voltage issues that may have been associated with the CVR program, occurring through the end of the 2009 program period (May 31, 2009).

As a custom EE/DR program concept, CVR required the development of a custom EM&V 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 Consulting team was formed, joined later by staff from the SWE.

The CVR Working Group met multiple times throughout most of 2010 and made significant progress on development of a comprehensive EM&V protocol for the CVR program. However, at the time of writing this report for PY 2009, the protocol has not received formal approval by the SWE and remains a work in progress.<sup>33</sup> The following discussion presents the steps used in the analysis of PY 2009 impacts. 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) ( $CVR_f$ ) defined in the following equation as:

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

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.

---

<sup>33</sup> At the time this report was being completed, a general agreement was reached with staff from the SWE on the EM&V methodology to be used in the evaluation and verification of savings from CVR, subject to completion of a field data collection task and the analysis of this PECO-specific metered data, for inclusion in the savings equations within the protocol.

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% 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)

- 4) Once estimated, CVR<sub>f</sub> is then used to calculate energy (and demand) savings, using the following savings equation:

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

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. CVR<sub>f</sub> 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 (CVR<sub>f</sub>) 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>34</sup> CVR<sub>f</sub> 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:

$$\text{Log}(\text{Hourly MWs}) = B_0 + B_1[\text{Hourly HDD}_{65}] + B_2[\text{Hourly CDD}_{65}] + B_3[\text{Log}(\text{Metered Voltage})]$$

Estimated in this (log-linear) form, B<sub>3</sub> 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.

Parameter Estimation Results

CVR Measurement Method:	CVR Factor (Point Estimate)	Measured voltage change:	Loss Factor Adjustment
Pre-Post (Delta) CVR <sub>f</sub> (MW) Demand Estimate	N/A	N/A	N/A
CVR <sub>f</sub> (elasticity) of Energy:	<b>1.0828</b>	<b>0.76%</b>	<b>4.9%</b>

Calculating Verified Energy Savings reported for PY 2009 consisted of the following steps:

- 1) Verify the measured change in voltage, using equation 3 above.

<sup>34</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.

- 2) Apply equation 4 above, to the set of substations/circuits with valid sample data in the analysis sample to (baseline) MWh for the months/days following cut-over period(s) remaining in PY 2009 (February through May 2010)
- 3) Verify that the energy savings reported for CVR is the sum of MWh saved over all substations circuits in PY 2009, furnished by PECO.

Reported monthly MWh energy savings are reported below<sup>35</sup>.

Period:	Reported MWh Savings
Feb-2010	186
March	2,891
April	8,156
May	9,586
<i>PYr2009/4th Quarter:</i>	<i>20,633</i>
<b>Program Totals</b>	<b>20,819</b>

Note that both reported and verified savings were calculated over the months February through May 31<sup>st</sup>, 2010 corresponding to the program implementation period. Annualized savings were not reported because they could not be verified based on available system level voltage data for the summer capability period (June 1 through September 30) for CVR. The data needed to calculate the CVR factor over this period was not available at the time of this report, and hence could not be used to estimate verified annual (MWh) energy and peak (MW) demand savings. Similarly, no peak demand savings are being claimed by CVR for PY 2009.

#### 4.6.3 Program Sampling

The analyses presented in this report were applied to census-level data encompassing all substation/feeder locations treated in the program, for which data was available. For the census of site locations treated under the program, 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

For each substation/circuit/line treated in the program, there were 359 hourly data points (15 days x 24 hours).<sup>36</sup> Because substations were cut-over according to a predetermined

<sup>35</sup> The evaluation of the CVR program resulted in a realization rate of 1.94. However, verified savings are not reported because the protocol for estimating savings is currently under review by the SWE.

<sup>36</sup> Includes changeovers from daylight savings

implementation schedule, this 15-day analysis window varied by location, with some cut-overs occurring in February, others in March, and so forth.

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 table includes the number of data observations, by cutover month, in the final model sample

<b>Program Cutover Month (PY 2009):</b>	<b>Number of Data Points in Final CVR Model Sample</b>
February	6,491
March	97,987
April	102,171
May	40,196
<b>N=</b>	<b>246,510</b>

#### 4.6.4 Process Evaluation

The process evaluation of the CVR program is centered on whether there were significant customer complaints after the CVR cut-over dates, and is based on a review of PECO’s complaint log for calendar year 2010 to date. Complaints were considered CVR related if they met all of the following criteria:

- They were filed by May 31, 2010 (the end of the current program year).
- They were classified as low voltage-related by PECO.
- They occurred on distribution feeders that were included in the CVR program.
- The complaint was registered after the CVR cut-over date.
- The nature of the complaint appeared to be related to CVR, rather than an equipment-related problem (such as a transformer replacement), or one that involved downed wires, tree branches, or a problem with the wiring inside the home

There were a total of four complaints registered from four separate customers that met the above criteria. However, following investigation, none were attributable to the program, but turned out to be customer equipment issues.

PECO has stated that they had not received any complaints during PY 2009 that were clearly attributable to the CVR program. The results of this review substantiate PECO’s claim.

Therefore, it appears there were no significant occurrences of customer complaints during PY 2009 on the affected circuits following the CVR cut-over dates.

#### 4.6.5 Program Partners and Trade Allies

The CVR program involves no program partners or trade allies.

#### 4.6.6 Program Finances

A summary of the project finances is presented in Table 4-15.

**Table 4-15 Summary of CVR Program Finances<sup>1</sup>**

	Quarter 4	PYTD
EDC Incentives to Participants	-	-
EDC Incentives to Trade Allies	-	-
<b>Subtotal EDC Incentive Costs</b>	-	-
Design & Development	n/a	n/a
Administration <sup>[2]</sup>	-	-
Management <sup>[3]</sup>	\$44,000	\$27,612
Marketing	-	-
Technical Assistance <sup>[4]</sup>	\$1,081,479	\$1,081,479
<b>Subtotal EDC Implementation Costs<sup>[5]</sup></b>	<b>\$1,129,479</b>	<b>\$1,109,091</b>
EDC Evaluation Costs	In above	\$16,388
SWE Audit Costs <sup>[6]</sup>	n/a	\$9,533
Participant Costs	n/a	n/a
<b>Total Costs<sup>[7]</sup></b>	<b>\$1,129,479</b>	<b>\$1,135,012</b>
Annualized Avoided Supply Costs <sup>[8]</sup>	n/a	n/a
Lifetime Supply Costs <sup>[9]</sup>	n/a	n/a
<b>Total Lifetime Economic Benefits<sup>[10]</sup></b>	<b>n/a</b>	<b>n/a</b>
<b>Portfolio Benefit-to-Cost Ratio</b>	<b>n/a</b>	<b>n/a</b>

NOTES TRC Benefit-Cost Ratios are not required to be reported for the PY 2009 annual report  
<sup>1</sup>CVR program benefits and TRC are pending finalized verification protocols and will be reported shortly  
<sup>2</sup>Implementation contractor costs.  
<sup>3</sup>EDC costs other than those identified explicitly.  
<sup>4</sup>EDC costs for capacitors. This cost is under review to determine if it is fully attributable to the CVR program and may actually be lower  
<sup>5</sup>EDC implementation costs were not tracked by all the sub-categories listed through Q4  
<sup>6</sup>Not included in the program cost calculation per the PUC. Allocated to programs based on M&V cost spread.  
<sup>7</sup>Does not equal TRC cost due to inclusion of SWE costs and incentives paid to participants which are not in the TRC calculation.  
<sup>8</sup>Cumulative annual supply costs divided by program maximum measure life  
<sup>9</sup>Present value of avoided supply costs  
<sup>10</sup>Present value of avoided supply costs

## 5 Summary

PECO realized significant progress toward its Pennsylvania Act 129 goals in PY 2009.

Compliance goal progress as of the end of the reporting period<sup>37</sup>:

### **Cumulative Portfolio Energy Impacts**

- The CPITD reported gross energy savings is 177,776 MWh.<sup>38</sup>
- The CPITD preliminary verified energy savings is 156,813 MWh.<sup>39</sup>
- Achieved 40 percent of the 393,850 MWh May 31<sup>st</sup>, 2011 energy savings compliance target, based on preliminary verified energy savings.
- Achieved 13 percent of the 1,181,550 MWh May 31<sup>st</sup>, 2013 energy savings compliance target, based on preliminary verified energy savings.

### **Portfolio Demand Reduction<sup>40</sup>**

- The Cumulative Program/Portfolio Inception to Date (CPITD) reported gross demand reduction is 11.69 megawatts (MW).<sup>41</sup>
- The CPITD preliminary verified demand reduction is 11.29 MW.<sup>42</sup>
- Achieved 3 percent of the 355 MW May 31, 2013, demand reduction compliance target, based on preliminary verified demand reduction.

The progress reported here reflects the results of seven programs launched in PY 2009. Four of these were only launched in Q4, and only one was launched before Q3. An additional seven programs will be launched in PY 2010. No savings from the demand response programs were realized in PY 2009. Consequently, the rate of progress toward the goal should increase significantly in PY 2010. The overall realization rate of 1.02 indicates the programs are achieving slightly better results than expected on a per unit basis. PECO appears to be on track toward meeting its targets.

---

<sup>37</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>38</sup> This amount includes 24,346 MWh from measures for which protocol approval is pending with the Statewide Evaluator (SWE).

<sup>39</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE.

<sup>40</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>41</sup> This value includes 0.32 MW from measures for which protocol approval is pending with the SWE.

<sup>42</sup> This amount includes verified savings exclusively from measures with approved deemed savings values or protocols that have been approved by the SWE