

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

**For the period  
June 2010 to May 2011  
Program Year 2**

For Act 129 of 2008  
Energy Efficiency and Conservation Program  
of Pennsylvania Power Company

Prepared by the Pennsylvania Power Company  
November 15, 2011

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**Abbreviations (see Glossary for definitions)**

CPITD	Cumulative Program/Portfolio Inception to Date
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
PYTD	Program/Portfolio Year to Date
TRC	Total Resource Cost
VEPS	Verified Ex-Post Savings
UEPS	Unverified Ex-Post Savings

## 1 Overview of Portfolio

Act 129, signed October 15<sup>th</sup>, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDC) in Pennsylvania. Pursuant to their goals, energy efficiency and conservation (EE&C) plans were submitted by each EDC and approved by the Pennsylvania Public Utility Commission (PUC).

In accordance with the Secretarial Letter issued on May 25, 2011<sup>1</sup>, which requires the EDCs to submit a preliminary and final annual status report by July 15<sup>th</sup> and November 15<sup>th</sup>, respectively<sup>2</sup>, Pennsylvania Power Company (Penn Power) respectfully submits this final annual report documenting the progress and effectiveness of EE&C accomplishments through the end of Program Year 2, Quarter 4.

As was contemplated by the Commission's directive, the final report provides verified savings for the program year for all programs, cost-effectiveness evaluation (Total Resource Cost Test), the process evaluation, as well as items required by Act 129<sup>3</sup> and Commission Orders.

### Compliance goal progress as of the end of the reporting period<sup>4</sup>:

#### Cumulative Portfolio Energy Impacts

- The CPITD reported gross energy savings is 68,971 MWh<sup>5</sup>.
- The CPITD verified energy savings is 66,630 MWh.
- Achieved 144.5% of the 47,729 MWh May 31st, 2011 energy savings compliance target on a gross basis and 140 % on a verified basis.
- Achieved 48.2% of the 143,188 MWh May 31st, 2013 energy savings compliance target on a gross basis and 47 % on a verified basis.

#### Portfolio Demand Reduction<sup>6</sup>

- The CPITD reported gross demand reduction is 7.4 MW.
- The CPITD verified demand reduction is 7.2 MW.
- Achieved 16.7% of the 44 MW May 31st, 2013 demand reduction compliance target.

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<sup>1</sup> See Docket No. M-2008-2069887

<sup>2</sup> The first annual report, submitted on July 15, was a preliminary report.

<sup>3</sup> See 66 Pa. C.S § 2806.1(i)(1).

<sup>4</sup> Percentage of compliance target achieved calculated using both Gross and Verified Cumulative Program/Portfolio Inception to Date values divided by compliance target value.

<sup>5</sup> For purposes of this report, gross energy savings and demand reduction are considered achieved at the point at which a project is considered complete, having met the following criteria, (1) the Energy Conservation Measure (ECM) has been installed, (2) the ECM is commercially operable and (3) the EDC has accrued a liability for rebate payment or other financial incentives.

<sup>6</sup> Demand reduction to include both the demand savings from the installation of energy efficiency measures and the demand reduction associated with demand response programs. Please note that effective with this annual report, portfolio demand reductions are reported at the system level to be consistent with the target and include line losses. The factor utilized for line losses is 1.11 per Section 1.13 of the TRM, which was the factor used and approved in the Company's EE&C Plan.

### **Low Income Sector<sup>7</sup>**

- There are 39,058 measures offered to the Low-Income Sector, comprising 24.3% of the total measures offered.
- The CPITD reported gross energy savings for low-income sector programs is 18,126 MWh.
- The CPITD verified energy savings for low-income sector programs is 17,410 MWh.

### **Government and Non-Profit Sector**

- The CPITD reported gross energy savings for government and non-profit sector programs is 8,848 MWh.
- The CPITD verified energy savings for government and non-profit sector programs is 7,484 MWh.

### **Program Year portfolio highlights as of the end of the reporting period:**

- The PYTD reported gross energy savings is 62,780 MWh.
- The PYTD verified energy savings is 61,036 MWh.
- The PYTD reported gross demand reduction is 6.91 MW.
- The PYTD verified demand reduction is 6.81 MW.
- The PYTD reported participation is 139,852 participants.<sup>8</sup>

Consistent with the PUC's Opinions and Orders in Docket Nos. M-2009-2092222, M-2009-2112952 and M-2009-2112956, FirstEnergy Corp.'s Pennsylvania EDCs, Pennsylvania Power Company, Pennsylvania Power Company and Pennsylvania Power Company (collectively, the Companies) launched all of the programs with the exception of the Commercial/Industrial Demand Response program<sup>9</sup>. CSPs selected by the Companies have been approved by the PUC and placed on its CSP Registry, and the Companies' contracts with the selected CSPs have been approved or are pending approval by the PUC's staff.

The Companies have selected SAIC, Inc. (SAIC) to serve as program manager for commercial/industrial/government programs. The Companies' contract with SAIC to manage the following programs was approved by the PUC's staff on December 18, 2009:

1. lighting;
2. equipment rebates;
3. custom programs;
4. motors and VSD; and,
5. energy audit/technology assessment

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<sup>7</sup> Results reported here are the sum of the impacts of the dedicated low-income programs and the impacts of low-income customers' participation in the general residential programs.

<sup>8</sup> CFL participants comprise 113,729 of the listed participant numbers. CFL participants are defined by the number of CFL packages purchased through Penn Power's Energy Efficient Products Program.

<sup>9</sup> Contracts supporting launch of the 2011 Commercial/Industrial Demand Response program are pending award and approval as of the end of Plan Year 2.

The Companies have selected Honeywell International, Inc. (Honeywell) to serve as program manager for certain residential programs. The Companies' contract with Honeywell to manage the following programs was approved by the PUC's staff on January 7, 2010:

1. on-site home energy audits;
2. energy efficient HVAC;
3. energy efficient products; and,
4. whole building comprehensive.

The Companies have selected JACO Environmental, Inc. (JACO) to manage the residential appliance turn-in program. The PUC's staff approved the Companies' contract with JACO on December 18, 2009.

The Companies have selected Aclara Software, Inc. (Aclara) as the vendor to support the on-line energy audits for both residential and small commercial/industrial/government customers. The PUC's staff approved the Companies' contract with Aclara on February 12, 2010.

The Companies have selected Performance Systems Development of New York, LLC (PSD) to manage the Residential New Home Construction program. The PUC's staff approved the Companies' contract with PSD on September 15, 2010.

The Companies have selected PowerDirect Marketing, LLC. (PD) to manage the Residential Multi-Family program. The PUC's staff approved the Companies' contract with PD on September 29, 2010.

Penn Power has selected BPL Global LTD (BPL) to manage the Residential Direct Load Control program. The PUC's staff approved Penn Power's contract with BPL on August 30, 2010.

In addition, the Companies are using the services of Building Performance Institute (BPI) certified contractors to perform measure installation for the low income WARM programs (i.e., WARM Plus, WARM extra measures). Program services are delivered by existing Low Income Usage Reduction Program non-profit agencies, private contractors and subcontractors. Additional private contractors were hired to increase capacity to meet the Companies' EE&C Plans. The Companies' internal staff manages the WARM programs. Agencies and private contractors perform comprehensive whole house energy audits and direct installation of all cost-effective electricity-saving measures. In addition, low income customers are eligible to participate in the Companies' other residential programs.

#### **Other Observations and Risks That May Affect Portfolio Success**

Based on reported gross and verified energy savings, Penn Power has met its 2011 energy savings targets.

While the Companies have succeeded in meeting its 2011 energy savings target, the Companies did not receive final approval to implement their respective EE&C portfolios of programs and measures, designed to achieve the 2011 and 2013 Act 129 energy efficiency and peak demand reduction targets, until February 25, 2010. After receiving such approval, the Companies immediately began full implementation of these programs and measures – which was over three months later than anticipated. This shortened implementation period, coupled with other factors, including changes and uncertainties associated with Technical Reference Manual (TRM) protocols and measurement & evaluations processes, and a lack of flexibility to shift funds among programs within customer classes without

Commission approval, may adversely affect the Companies' ability to achieve future Act 129 savings targets.

The Companies have already learned much during the first two years of implementation. For example, participation in certain sectors, such as the Small C/I and Government/Non-profit sectors, are lagging expectations, while participation from the Large C/I sector has far exceeded the Companies' initial projections. Additionally, in the Large C/I sector, customers have been especially receptive to the Companies' lighting incentives, but not the Motors and Drives program incentives.

Based on this acquired knowledge, on February 18, 2011, the Companies submitted an expedited petition for approval of certain changes, which the Commission approved on March 17, 2011<sup>10</sup>, and also a First Amended EE&C Plan, which is still pending approval before the Commission. A hearing was held on this First Amended EE&C Plan on June 28, 2011. Given that the proposed First Amended EE&C Plan has several critical programmatic and funding changes, the Companies anxiously await Commission approval to move forward as these changes are critical to achievement of the May 2013 Act 129 demand and energy savings targets.

Recently, the Commission recognized the need to establish an expedited review process to approve minor EE&C Plan changes which allow EDCs to: i) eliminate a measure that is underperforming; ii) transfer funds from one measure or program within the same customer class; and iii) add or change the conditions of a measure (e.g. eligibility requirements; rebate structure or amount)<sup>11</sup>. Although the Companies appreciate the Commission's efforts to shorten the approval process for changes to EE&C Plans, the Companies still believe that the lack of implementation flexibility to shift funds in a timely manner from under- to over-subscribed, cost-effective programs is adversely impacting the Companies' EE&C strategies for compliance. For example, funds for the Large C/I Equipment program are entirely committed, while funds for the Large C/I Motors and Drives program are largely unsubscribed. Shifting funds during Program Year 2 from the Motors and Drives program to the Large C/I Equipment program would have allowed the Companies to commit further funds to its customers and create energy savings for the Companies' compliance with Act 129 2013 savings targets. However, because the Companies were required to seek formal approval to do so, a number of otherwise eligible applications for incentives were suspended, pending Commission approval of additional funding. With more flexibility, the Companies would have been able to shift funds among programs within the Large C/I sector, thus allowing otherwise eligible projects to be processed in an expeditious manner to contribute to Penn Power's energy savings targets.

Additionally, given current economic conditions and their impact on government and institutional budgets, continuing to achieve 10% of Act 129 target savings from Federal/State/local/municipal governments, school districts, institutions of higher education, and nonprofit entities may prove challenging.

Finally, the Companies have growing concerns about the ability to achieve the 4½ percent demand reduction target based on both the magnitude of the MW level, and its ability to enroll enough customers willing to curtail load specific to the top 100 hours.

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<sup>10</sup> See Opinion and Order, Docket No. M-2009-2092222, et al.

<sup>11</sup> See Final Order, Docket No. M-2008-2069887, June 9, 2011.

Despite these difficulties, the Companies are diligently working with their implementation and evaluation CSPs to evaluate current programs and identify the best approach for achieving future, aggressive Act 129 targets. The empirically-based results from these evaluations form the basis for program design decisions with a goal to cost effectively improve the delivery of energy efficiency and conservation measures to customers.

#### **Portfolio Measurement and Valuation (M&V) Status**

The Companies have selected ADM Associates, Inc. (ADM) as the M&V contractor. ADM concluded the impact evaluation for all programs that were implemented by August 31, 2010. ADM's methods of evaluation include physical inspection, on-site data gathering, and monitoring. The M&V efforts for the various measures in Penn Power's portfolio are described below.

#### **Deemed Measures:**

Deemed Measures (measures that have deemed savings in the PA TRM or interim TRM) are subject to the following verifications in order to be included in Penn Power's energy savings and demand reduction calculations:

1. Verification that the energy savings are being claimed correctly, using the appropriate protocols in the TRM; and
2. On-site, physical verification that the measures are actually installed and commercially operable, except for the following acceptable alternatives:
  - a. For upstream CFLs, review of invoices and verification of shipment to participating retailers
  - b. For recycled refrigerators and room ACs, verification of pick-up through customer interviews.
  - c. For the low-income weatherization program, statistical analysis of customer billing data. The on-site verification is conducted for quality assurance purposes rather than for impact evaluation.

Deemed measures implemented by Penn Power include refrigerator retirement, low-income weatherization, electric water heaters, and upstream rebates on CFLs.

#### **Partially Deemed Measures:**

Partially Deemed Measures (measures that have partially deemed savings in the PA TRM or interim TRM) are subject to the following verifications in order to be included in Penn Power's energy savings and demand reduction calculations:

1. Verification that the energy savings are being claimed correctly, using the appropriate protocols in the TRM;
2. Verification that the measures are actually installed and commercially operable;
3. Data gathering to support the values of variable parameters, such as "in-service rates" for items that are not directly installed, or nameplate capacities and efficiencies of appliances; and
4. Verification of baseline equipment or conditions, either by a pre-retrofit inspection or by review of documentation of pre-retrofit conditions.

Partially deemed measures implemented by Penn Power include rebated dehumidifiers, room air conditioners, heat pumps, and refrigerators; conservation kits sent to participants of online audits; and commercial lighting upgrades.



**Custom Measures:**

Custom measures are subject to the following verifications in order to be included in Penn Power's energy savings and demand reduction calculations:

1. Drafting and receiving the PA Statewide Evaluator's approval on a custom measure protocol used to estimate ex-ante and ex-post energy impacts<sup>12</sup>.
2. Verification that the parameters and data used to design the protocol are accurate and well-founded. Some protocols will require both pre-installation and post-installation monitoring.
3. Verification that the data derived from monitoring or on-site inspections is being used appropriately in the protocols.

**1.1 Summary of Portfolio Impacts**

Cumulative energy savings in this report for each program represent verified customer savings reflecting realization rates from an evaluation of a sample of applications for each program year. Cumulative demand reductions for each program (see Section 1.3) represent verified customer demand savings. Please note that effective with this annual report, portfolio demand reductions are reported at the system level to be consistent with the target and include line losses. The factor utilized for line losses is 1.11 per Section 1.13 of the TRM, which was the factor used and approved in the Company's EE&C Plan.

A summary of the portfolio reported impacts is presented in the following table:

**Table 1-1: 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	n/a	n/a
Reported Gross Impact: Program Year to Date	62,780	6.91
Reported Gross Impact: Cumulative Portfolio Inception to Date	68,971	7.35
Unverified Ex-Post Savings <sup>[a]</sup>	95	0.04
Estimated Impact: Projects in Progress	9,183	1.22
Estimated Impact: PYTD Total Committed	71,963	8.14
PYTD Verified Impact <sup>[b]</sup>	61,036	6.82
PYTD Net Impact <sup>[c]</sup>	61,036	6.82
PYTD Verified Impact Including Line Losses for MW Only <sup>[d]</sup>	61,036	7.67
<b>NOTES:</b>		
[a] "Unverified Ex Post Savings" are the total weighted savings that are being evaluated by bill impacts analysis (IPMVP Option C) that require more time to elapse since measure installation to achieve adequate signal to noise ratios. The verified savings do not include these unverified ex post savings.		
[b] 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.		
[c] 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.		
[d] Portfolio Demand Reductions are reported at the system level		

<sup>12</sup> Appropriate pre-existing protocols may be used if they have already been approved by the Statewide Evaluator.

A summary of total evaluation adjusted impacts for the portfolio is presented in the following table<sup>13</sup>:

**Table 1-2: Verified Portfolio Total Evaluation Adjusted Impacts through the End of the Reporting Period**

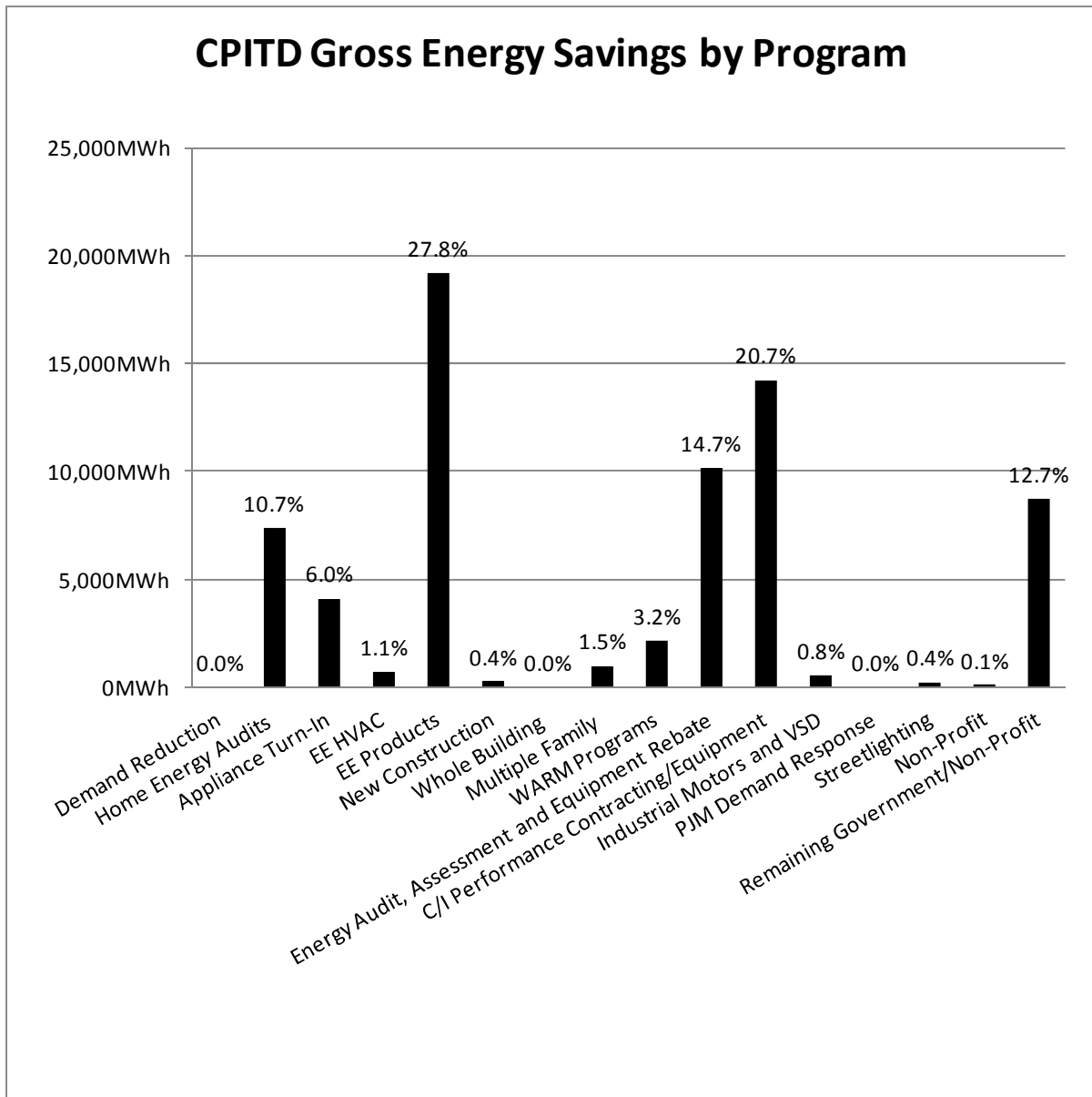
TRC Category	IQ <sup>[a]</sup>	PYTD <sup>[b]</sup>	CPITD
TRC Benefits (\$)	n/a	\$51,254,658	\$54,774,652
TRC Costs (\$)	n/a	\$14,033,845	\$15,769,723
TRC Benefit-Cost Ratio			<b>3.47</b>
<b>NOTES:</b>			
[a] Based on gross verified savings. [b] Based on gross verified savings.			

<sup>13</sup> Consistent with the 2011 Total Resource Cost Test Order dated July 28, 2011, Docket No. M-2009-2108601 (“TRC Order”), TRC Benefit-to-Cost Ratios are included in this Annual Report for the first time. TRC tests are performed for each program reflecting verified program costs as shown in each program financial summary excluding allocated costs associated with the Statewide Evaluator, verified savings for each program, estimated incremental measure costs, and a net-to-gross ratio of 1.

## 1.2 Summary of Energy Impacts by Program

A summary of the reported energy savings by program is presented in the following figure:

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 end of the reporting period is presented in the following tables:

**Table 1-3: 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
Demand Reduction	n/a	0	0	n/a	0	0
Home Energy Audits	n/a	11,357	14,262	n/a	5,912	7,379
Appliance Turn-In	n/a	2,045	2,236	n/a	3,762	4,121
EE HVAC	n/a	591	591	n/a	743	743
EE Products	n/a	116,993	135,474	n/a	15,555	19,187
New Construction	n/a	126	126	n/a	264	264
Whole Building	n/a	8	8	n/a	11	11
Multiple Family	n/a	3,464	3,464	n/a	1,010	1,010
WARM Programs	n/a	4,412	4,547	n/a	2,168	2,188
Energy Audit, Assessment and Equipment Rebate	n/a	146	146	n/a	10,156	10,156
C/I Performance Contracting/Equipment	n/a	33	44	n/a	13,538	14,251
Industrial Motors and VSD	n/a	3	3	n/a	566	566
PJM Demand Response	n/a	0	0	n/a	0	0
Streetlighting	n/a	127	127	n/a	247	247
Non-Profit	n/a	4	4	n/a	90	90
Remaining Government/Non-Profit	n/a	543	543	n/a	8,758	8,758
<b>TOTAL PORTFOLIO</b>	n/a	139,852	161,575	n/a	62,780	68,971
<b>NOTES:</b>						
(a) Participation in the EE Products Program attributable to CFL Participation is 36,498 for IQ, 113,729 for PYTD, and 132,184 CPITD periods						

**Table 1-4: EDC Reported Gross Energy Savings by Program through the End of the Reporting Period**

<b>Program</b>	<b>Unverified Ex Post Savings (MWh)</b>	<b>Projects In Progress (MWh)</b>	<b>PYTD Total Committed (MWh)</b>	<b>EE&amp;C Plan Estimate for Program Year (MWh)</b>	<b>Percent of Estimate Committed (%)</b>
Demand Reduction	0	0	0	75	0%
Home Energy Audits	0	0	5,912	6,084	97%
Appliance Turn-In	0	301	4,063	4,140	98%
EE HVAC	0	74	817	1,198	68%
EE Products	0	2,540	18,095	7,902	229%
New Construction	0	0	264	1,892	14%
Whole Building	0	0	11	207	5%
Multiple Family	0	0	1,010	122	831%
WARM Programs	0	0	2,168	416	521%
Energy Audit, Assessment and Equipment Rebate	95	3,699	13,855	14,332	97%
C/I Performance Contracting/Equipment	0	761	14,299	3,155	453%
Industrial Motors and VSD	0	203	769	829	93%
PJM Demand Response	0	0	0	0	n/a
Streetlighting	0	0	247	212	117%
Non-Profit	0	0	90	60	150%
Remaining Government/Non-Profit	0	1,605	10,363	6,428	161%
<b>TOTAL PORTFOLIO</b>	95	9,183	71,963	47,052	153%
<b>NOTES:</b>					
“Unverified Ex Post Savings” are the total weighted savings that are being evaluated by bill impacts analysis (IPMVP Option C) that require more time to elapse since measure installation to achieve adequate signal to noise ratios.					

A summary of evaluation verified energy impacts by program is presented in the following table:

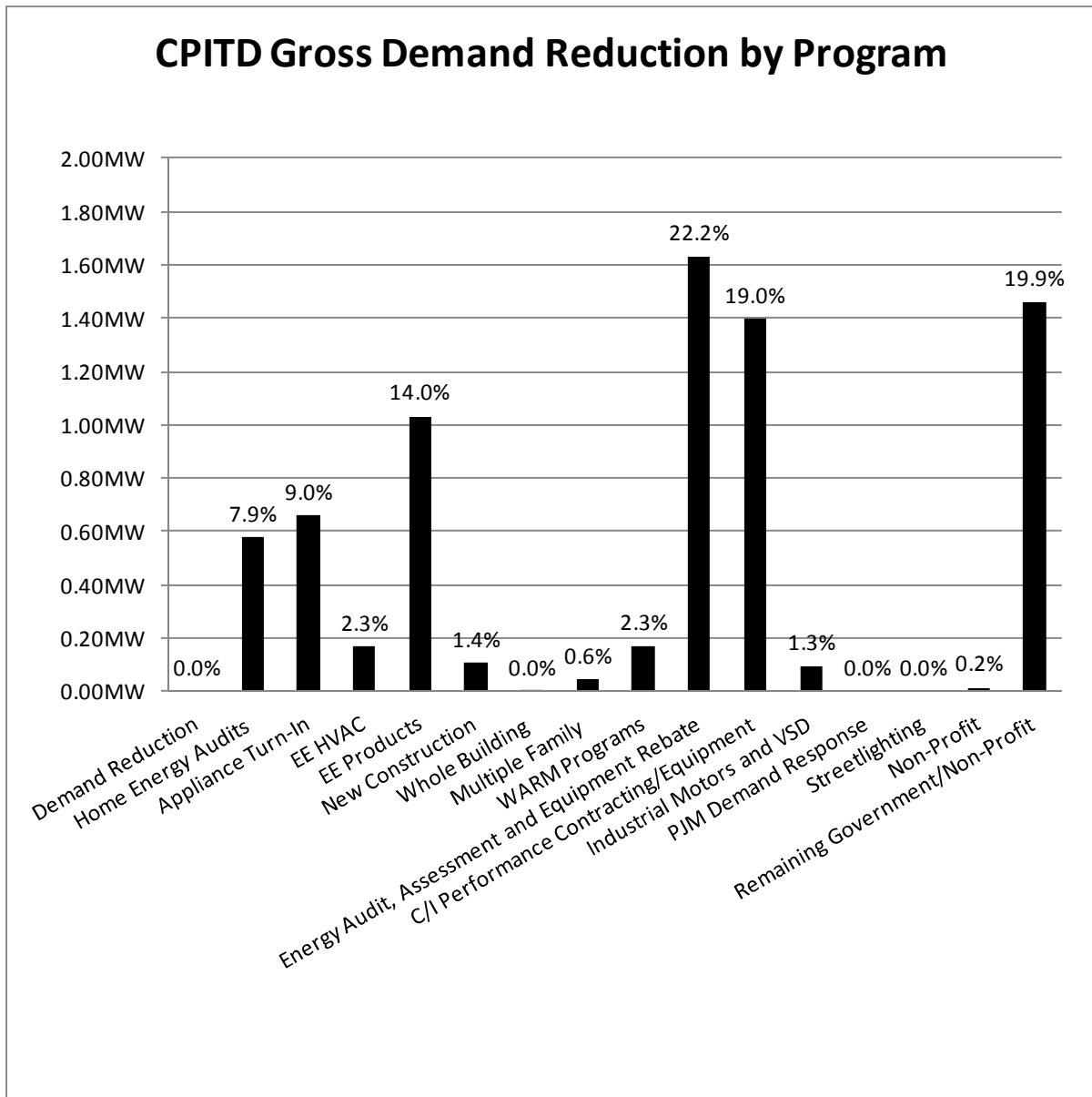
**Table 1-5: Energy Savings by Program through the End of the Reporting Period**

<b>Program</b>	<b>PYTD Reported Gross Impact (MWh)</b>	<b>Realization Rate</b>	<b>PYTD Verified Impact (MWh)</b>	<b>Net-to-Gross Ratio</b>	<b>PYTD Net Impact (MWh)</b>
Demand Reduction	0	n/a	0	100.0%	0
Home Energy Audits	5,912	98.8%	5,839	100.0%	5,839
Appliance Turn-In	3,762	100.0%	3,760	100.0%	3,760
EE HVAC	743	120.0%	892	100.0%	892
EE Products	15,555	100.3%	15,596	100.0%	15,596
New Construction	264	82.9%	219	100.0%	219
Whole Building	11	100.0%	11	100.0%	11
Multiple Family	1,010	101.0%	1,021	100.0%	1,021
WARM Programs	2,168	96.2%	2,086	100.0%	2,086
Energy Audit, Assessment and Equipment Rebate	10,156	107.0%	10,862	100.0%	10,862
C/I Performance Contracting/Equipment	13,538	91.4%	12,377	100.0%	12,377
Industrial Motors and VSD	566	113.7%	643	100.0%	643
PJM Demand Response	0	N/A	0	100.0%	0
Streetlighting	247	99.8%	246	100.0%	246
Non-Profit	90	40.5%	37	100.0%	37
Remaining Government/Non-Profit	8,758	85.0%	7,448	100.0%	7,448
<b>TOTAL PORTFOLIO</b>	<b>62,780</b>	<b>n/a</b>	<b>61,036</b>	<b>100.0%</b>	<b>61,036</b>

### 1.3 Summary of Demand Impacts by Program

A summary of the reported demand reduction by program is presented in the following figure:

Figure 1-2: Reported Customer Demand Reduction by Program through the End of the Reporting Period



A summary of demand reduction impacts by program through the end of the reporting period is presented in the following tables:

**Table 1-6: 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
Demand Reduction	n/a	0	0	n/a	0.00	0.00
Home Energy Audits	n/a	11,357	14,262	n/a	0.48	0.58
Appliance Turn-In	n/a	2,045	2,236	n/a	0.60	0.66
EE HVAC	n/a	591	591	n/a	0.17	0.17
EE Products	n/a	116,993	135,474	n/a	0.83	1.03
New Construction	n/a	126	126	n/a	0.11	0.11
Whole Building	n/a	8	8	n/a	0.00	0.00
Multiple Family	n/a	3,464	3,464	n/a	0.04	0.04
WARM Programs	n/a	4,412	4,547	n/a	0.17	0.17
Energy Audit, Assessment and Equipment Rebate	n/a	146	146	n/a	1.63	1.63
C/I Performance Contracting/Equipment	n/a	33	44	n/a	1.30	1.40
Industrial Motors and VSD	n/a	3	3	n/a	0.09	0.09
PJM Demand Response	n/a	0	0	n/a	0.00	0.00
Streetlighting	n/a	127	127	n/a	0.00	0.00
Non-Profit	n/a	4	4	n/a	0.02	0.02
Remaining Government/Non-Profit	n/a	543	543	n/a	1.46	1.46
<b>TOTAL PORTFOLIO</b>	n/a	139,852	161,575	n/a	6.91	7.35
<b>TOTAL PORTFOLIO INCLUDING LINE LOSSES</b>	n/a	n/a	n/a	n/a	7.76	8.26
<b>NOTES:</b>						
(a) Participation in the EE Products Program attributable to CFL Participation is 36,498 for IQ, 113,729 for PYTD, and 132,184 CPITD periods						
(b) Demand Reductions for each program represent verified customer demand savings. Effective with this annual report, Total Portfolio Demand Reductions are reported at the system level.						



**Table 1-7: Reported Gross Demand Reduction by Program through the End of the Reporting Period**

<b>Program</b>	<b>Unverified Ex-Post Savings (MW)</b>	<b>Projects In Progress (MW)</b>	<b>PYTD Total Committed (MW)</b>	<b>EE&amp;C Plan Estimate for Program Year (MW)</b>	<b>Percent of Estimate Committed (%)</b>
Demand Reduction	0.00	0.00	0.00	1.60	0%
Home Energy Audits	0.00	0.00	0.48	0.46	105%
Appliance Turn-In	0.00	0.05	0.65	0.58	112%
EE HVAC	0.00	0.05	0.22	1.17	18%
EE Products	0.00	0.13	0.97	0.79	123%
New Construction	0.00	0.01	0.12	1.43	8%
Whole Building	0.00	0.00	0.00	0.05	1%
Multiple Family	0.00	0.00	0.04	0.01	436%
WARM Programs	0.00	0.00	0.17	0.04	452%
Energy Audit, Assessment and Equipment Rebate	0.04	0.69	2.32	5.19	45%
C/I Performance Contracting/Equipment	0.00	0.12	1.42	1.27	112%
Industrial Motors and VSD	0.00	0.03	0.12	0.02	534%
PJM Demand Response	0.00	0.00	0.00	0.00	0.00
Streetlighting	0.00	0.00	0.00	0.00	0.00
Non-Profit	0.00	0.00	0.02	0.02	97%
Remaining Government/Non-Profit	0.00	0.14	1.60	1.70	95%
<b>TOTAL PORTFOLIO</b>	0.04	1.22	8.14	14.33	57%
<b>TOTAL PORTFOLIO INCLUDING LINE LOSSES</b>	0.04	1.38	9.14	16.10	57%
<b>NOTES:</b>					
(a) "Unverified Ex Post Savings" are the total weighted savings that are being evaluated by bill impacts analysis (IPMVP Option C) that require more time to elapse since measure installation to achieve adequate signal to noise ratios. The verified savings do not include these unverified ex post savings.					
(b) Demand Reductions for each program represent verified customer demand savings. Effective with this annual report, Total Portfolio Demand Reductions are reported at the system level.					

A summary of evaluation adjusted demand impacts by program is presented in the following table:

**Table 1-8: Verified Customer Demand Reduction by Program through the End of the Reporting Period**

<b>Program</b>	<b>PYTD Reported Gross Impact (MW)</b>	<b>Realization Rate</b>	<b>PYTD Verified Impact (MW)</b>	<b>Net-to-Gross Ratio</b>	<b>PYTD Net Impact (MW)</b>
Demand Reduction	0.00	N/A	0.00	100.0%	
Home Energy Audits	0.48	56.4%	0.27	100.0%	0.27
Appliance Turn-In	0.60	100.0%	0.60	100.0%	0.60
EE HVAC	0.17	156.2%	0.26	100.0%	0.26
EE Products	0.83	104.6%	0.87	100.0%	0.87
New Construction	0.11	83.8%	0.09	100.0%	0.09
Whole Building	0.00	100.0%	0.00	100.0%	0.00
Multiple Family	0.04	100.0%	0.04	100.0%	0.04
WARM Programs	0.17	89.2%	0.15	100.0%	0.15
Energy Audit, Assessment and Equipment Rebate	1.63	106.4%	1.74	100.0%	1.74
C/I Performance Contracting/Equipment	1.30	112.5%	1.46	100.0%	1.46
Industrial Motors and VSD	0.09	85.9%	0.08	100.0%	0.08
PJM Demand Response	0.00	N/A		100.0%	
Streetlighting	0.00	N/A	0.00	100.0%	0.00
Non-Profit	0.02	63.0%	0.01	100.0%	0.01
Remaining Government/Non-Profit	1.46	84.8%	1.24	100.0%	1.24
<b>TOTAL PORTFOLIO</b>	<b>6.91</b>	<b>100.6%</b>	<b>6.82</b>	<b>100.0%</b>	<b>6.82</b>
<b>TOTAL PORTFOLIO INCLUDING LINE LOSSES</b>	<b>7.76</b>	<b>100.6%</b>	<b>7.67</b>	<b>100.0%</b>	<b>7.67</b>
<b>NOTES:</b>					
Demand Reductions for each program represent verified customer demand savings. Effective with this annual report, Total Portfolio Demand Reductions are reported at the system level.					

## 1.4 Summary of Evaluation

Realization rates are calculated to adjust reported savings based on statistically significant verified savings measured by independent evaluators. The realization rate is defined as the percentage of reported savings that is achieved, as determined through the independent evaluation review. A realization rate of 1 or 100% indicates no difference between the reported and achieved savings. Realization rates are determined by certain attributes relative to one of three protocol types. Fully deemed TRM measure realization rates are driven by differences in the number of installed measures. Partially deemed TRM measure<sup>14</sup> realization rates are driven by: (1) differences in the number of installed measures; and (2) differences in the variables. Custom measure realization rates are driven by differences in the energy savings determined by approved protocols. The protocol type determines the data type that is sampled.

### **PY2 Evaluation activities completed include:**

- Finalized PY2 Evaluation Plan.
- Generated impact evaluation samples in accordance with the Statewide Evaluator's sampling guidelines.
- Conducted on-site verification inspections and on-site energy metering as required by M&V best practices, guidelines in the PA TRM, and custom measure protocols.
- Developed and administered telephone and online surveys for verification of certain low-cost measures.
- Participated in Technical Working Group sessions, biweekly SWE calls, and on-site visits.
- Reviewed and generated tables supporting quarterly and annual reports for verified savings.
- Performed TRC analysis.
- Determined Final Realization Rates and Verified Savings for all PY2 programs.
- Conducted periodic program design and delivery staff interviews. The interviews updated the EM&V team's understanding of how programs are operating, discussed future possible changes to the programs, and collected information to inform research with participants and market actors.
- Updated Program Logic Models to reflect current program designs.
- Developed C&I EM&V process flow maps detailing information flows and responsibilities among the third-party implementation M&V contractor, the EM&V contractor, the SWE, and the customer.
- Completed participant surveys for all programs.

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<sup>14</sup> TRM measures with stipulated values and variables.

### 1.4.1 Impact Evaluation

ADM is conducting the impact evaluation for all programs that were implemented by August 31, 2010. ADM is employing batch-wise stratified sampling for the C/I Equipment and Government/Non-Profit programs, stratified sampling for the residential “Warm Extra Measures” program, and simple random sampling for all other programs. In accordance with the PA Statewide Evaluator’s recent updates to the Audit Plan, the sample sizes will be sufficient to report verified savings with  $\pm 15\%$  relative precision at the 85% confidence level for all programs. Verified savings will be reported with  $\pm 10\%$  precision at the 90% confidence level for the residential and non-residential sectors respectively, and the government/non-profit sectors will be treated as independent programs with 85/15 confidence/precision if their savings comprise at least 20% of the sector-level savings.

In order to conduct the impact evaluation for Penn Power’s energy efficiency and conservation programs, ADM employs the following measures:

- Review of ex-ante calculations, assumptions and evaluation protocols in the TRM;
- Participation in technical working groups regarding the addition of new evaluation protocols to the TRM;
- Drafting, peer-review, and submittal of evaluation protocols for the interim TRM;
- Review of the Statewide Evaluator’s Audit Plan;
- Drafting of impact evaluation plans for all programs;
- Review of rebate forms and data collection requirements for programs;
- Review of energy efficiency program tracking protocols and systems;
- Review of ex-ante calculations associated with rebates, and pertinent feedback to the Companies;
- Drawing of samples for impact evaluation;
- Site visits, monitoring, and other data gathering;
- Analysis of data collected on-site;
- Determination of verified energy savings and demand reductions; and
- Determination of the verified energy savings and demand reductions attributable to the low-income residential sector.

The current program year (Year 2), beginning June 1, 2010, will be the first year of full-scale portfolio implementation. ADM has drafted revised evaluation plans for Penn Power’s portfolio for the current program year. The main changes to the evaluation plans include:

1. Consolidation of certain non-residential programs that share the same management, CSPs, and rebated measures; and,
2. The separation of the categories of rebates or measures into homogeneous subgroups.

The realization rates for each program are presented in the following table:

**Table 1-9: Summary of Realization Rates and Confidence Intervals (CI) for kWh**

<b>Program</b>	<b>PYTD Sample Participants</b>	<b>Program Year Sample Participant Target</b>	<b>Realization Rate for kWh</b>	<b>Confidence and Precision for kWh</b>	<b>Realization Rate for kW</b>	<b>Confidence and Precision for kW</b>
Demand Reduction	N/A	75	N/A	N/A	N/A	N/A
Home Energy Audits	211	200 online surveys, 11 on-sites	98.8%	5%	56.4%	5%
Appliance Turn-In	70	70	100.0%	9%	100.0%	9%
EE HVAC	47	128 Desk/Invoice Review, 24 On-Site, 23 Survey	120.0%	10%	156.2%	10%
EE Products	127	CFL: Census invoice/calculation. Appliances, 127 desk review, 40 On-site visits	100.3%	0%	104.6%	0%
New Construction	19	19	82.9%	15%	83.8%	15%
Whole Building	2	4	100.0%	43%	100.0%	43%
Multiple Family	29	29 on-site, census invoice review	101.0%	1%	100.0%	1%
WARM Programs	146	146	96.2%	6%	89.2%	6%
Energy Audit, Assessment and Equipment Rebate	30	30	107.0%	12%	106.4%	12%
C/I Performance Contracting/Equipment	16	16	91.4%	9%	112.5%	9%
Industrial Motors and VSD	3	3	113.7%	0%	85.9%	0%
PJM Demand Response	N/A	N/A	N/A	N/A	N/A	N/A
Streetlighting	18	18	99.8%	15%	N/A	15%
Non-Profit	2	2	40.5%	0%	63.0%	0%
Remaining Government/Non-Profit	71	15 on-site and 56 survey (for CFL kits)	85.0%	9%	84.8%	9%
<b>PORTFOLIO</b>	<b>791</b>	<b>N/A</b>	<b>97%</b>	<b>3.1%</b>	<b>99%</b>	<b>4.1%</b>

### **1.4.2 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, ADM, the Companies' internal staff and contractors drafted, for each program, a process evaluation plan and a program logic model which will serve as a visual representation for the program processes.

The process evaluation effort includes the following initiatives:

- Review of the measures and program delivery mechanisms in the Companies' plan portfolios;
- Interviews with the Companies' internal staff and CSP staff;
- Drafting of process evaluation plans for all programs;
- Creation of logic models for each program; and,
- Identification of researchable issues for each program.

The process evaluation has also resulted in immediate feedback to the Companies' regarding the following items:

- Review of rebate forms to ensure that proper data fields are collected and documented;
- Review of various program tracking systems;
- Review of program evaluability, with specific suggestions to Penn Power and each Company that will increase the evaluability of certain programs; and,
- Projections of energy savings achievements by May 31 2011 for key programs, and projections of potential energy savings under alternate scenarios that involve program modifications.

As of this writing, all programs in Penn Power's portfolio are online and actively adding participants. ADM is prepared to begin interviews with program participants and non-participants to evaluate the process.

## 1.5 Summary of Finances

The Total Resource Cost Test (TRC) demonstrates the cost-effectiveness of a program by comparing the total economic benefits to the total costs. TRCs were calculated for each program and each program year. The benefits and costs of PY1 and PY2 are added to come up with a CPITD TRC score for each program. For each program, the TRC benefits are based on the avoided costs of the Company's approved EE&C Plan. These avoided costs are calculated with gross verified impacts (Energy and Demand, scaled up for T&D losses as directed by the TRC order) and the discount rates, generation rates, and distribution rates from the original plan filing for all programs. For residential energy-efficiency programs that rely on point-of-sale or mail-in rebates, the per-unit incremental costs from the original plan filing were assigned to each individual measure and aggregated to the program level. The incremental costs for most other measures are also taken from the original filing with several exceptions noted below.

For certain programs that rely wholly on direct installation or direct delivery (e.g. Low-Income or Multifamily programs), the full incremental costs are tracked in the program finances. These costs, being more accurate than planning estimates, were used for the incremental costs.

For project-based programs such as C/I lighting, motors and drives, and custom, this methodology is not possible because the program implementer's tracking systems is based on projects, or rebates at the elemental level. The TRC, therefore, is also calculated based on projects and not individual measures.

To characterize the incremental costs for such projects, ADM reviewed the project documentation, including estimated costs and invoices for approximately 20 custom projects. ADM also reviewed the fixture types and counts for 150 sampled lighting projects. For lighting projects, the (weighted) average types and quantities of fixtures were characterized for each category of rebate application, rate class, and project scope (as defined by project energy savings). Similarly, custom projects of different technologies (e.g. motors, HVAC) tended to have different and characteristic incremental costs per unit of energy savings. This process of developing incremental costs at the rebate level based on a statistical characterization is nearly identical to the process used to generate verified impacts<sup>15</sup>.

It should be noted that it may be premature to assess the long-term performance potential of programs based on TRC results to date. This is due to the fact that many of the programs have only been in operation for approximately one year and contain start-up costs that should be spread over a longer term period.

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<sup>15</sup> The exception is that invoices are *exact* – that is, the typical measurement or calculation uncertainty inherent in gross impact evaluation are absent from this process.

A breakdown of the portfolio finances is presented in the following table:

**Table 1-10: Summary of Portfolio Finances: TRC Test<sup>16</sup>**

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$2,922,458	\$5,234,998	\$5,567,088
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$2,922,458</b>	<b>\$5,234,998</b>	<b>\$5,567,088</b>
B.1	Design & Development <sup>1</sup>	\$5,115	\$12,208	\$78,544
B.2	Administration <sup>2</sup>	\$469,467	\$1,341,087	\$1,797,643
B.3	Management <sup>3</sup>	\$70,273	\$232,719	\$292,689
B.4	Marketing <sup>4</sup>	\$39,741	\$126,909	\$129,013
B.5	Technical Assistance <sup>5</sup>	\$12,457	\$49,259	\$55,462
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$597,052</b>	<b>\$1,762,181</b>	<b>\$2,353,350</b>
C	<b>EDC Evaluation Costs</b>	\$37,910	\$131,661	\$159,094
D	<b>SWE Audit Costs</b>	\$0	\$38,804	\$61,350
E	<b>Participant Costs</b>	\$0	\$13,493,395	\$13,493,395
	<b>Total Costs</b>	<b>\$3,557,420</b>	<b>\$20,661,038</b>	<b>\$21,634,277</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$14,033,845	\$15,769,723
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$5,841,431	\$6,419,447
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$51,254,658	\$54,774,652
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$51,254,658</b>	<b>\$54,774,652</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>3.65</b>	<b>3.47</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System			
	<sup>6</sup> In this table and in the financial tables in Section 4, the total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

<sup>16</sup> Consistent with the 2011 Total Resource Cost Test Order dated July 28, 2011, Docket No. M-2009-2108601 ("TRC Order"), TRC Benefit-to-Cost Ratios are included in this Annual Report for the first time. TRC tests are performed for each program reflecting verified program costs as shown in each program financial summary excluding allocated costs associated with the Statewide Evaluator, verified savings for each program, estimated incremental measure costs, and a net-to-gross ratio of 1.



## 2 Portfolio Results by Sector

Page 11 of the EE&C Implementation Order issued on January 15, 2009 provides requirements for specific sectors. 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. Small Commercial & Industrial EE
4. Large Commercial & Industrial EE
5. Government & Non-Profit EE

A summary of portfolio gross energy savings and gross demand reduction by sector is presented in the following figures:

**Figure 2-1: PYTD Reported Gross Energy Savings by Sector**

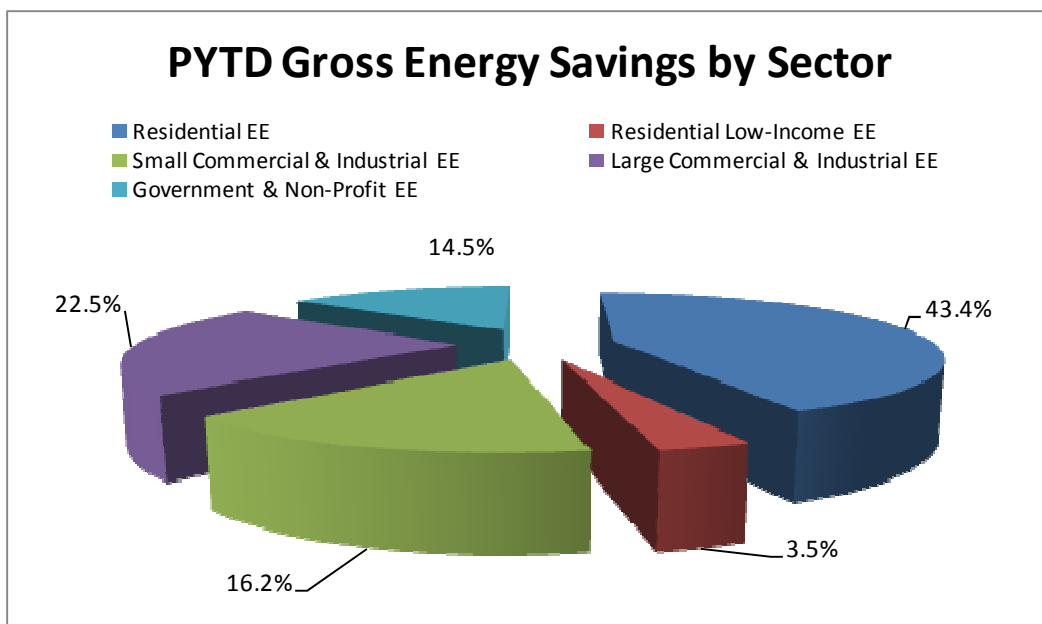


Figure 2-2: PYTD Reported Gross Demand Reduction by Sector

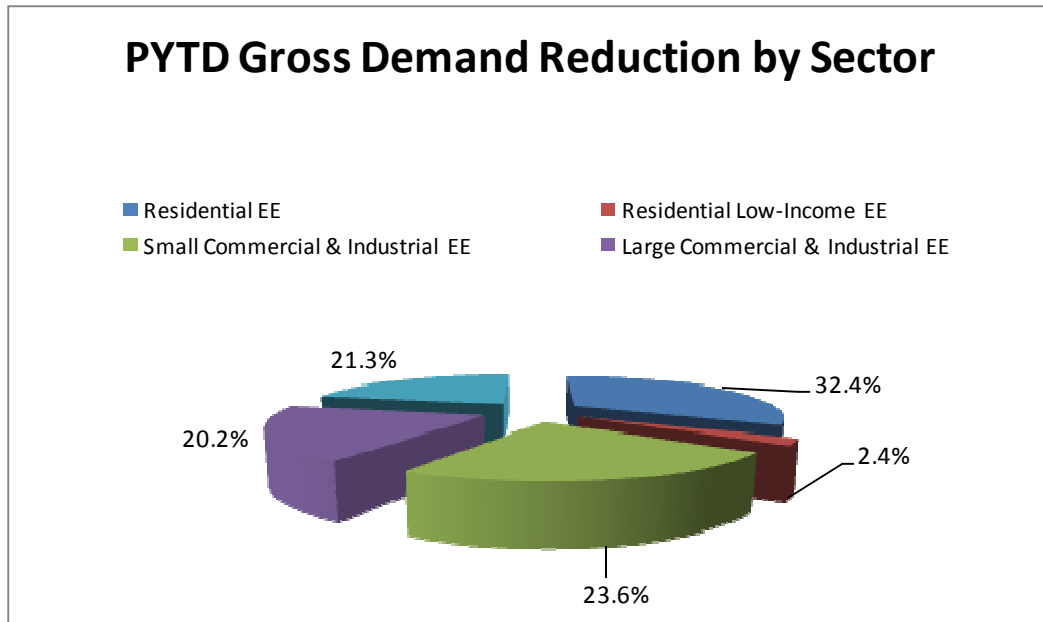


Table 2-1: Reported Gross Energy Savings by Sector through the End of the Reporting Period

Market Sector	Reported Gross Impact (MWh)			Projects in Progress	Total Committed	Unverified Ex Post Savings
	IQ	PYTD	CPITD			
Residential EE	n/a	27,258	32,716	2,916	30,173	0
Residential Low-Income EE	n/a	2,168	2,188	0	2,168	0
Small Commercial & Industrial EE	n/a	10,156	10,156	3,699	13,855	95
Large Commercial & Industrial EE	n/a	14,104	14,817	964	15,068	0
Government & Non-Profit EE	n/a	9,095	9,095	1,605	10,699	0
<b>TOTAL PORTFOLIO</b>	n/a	62,780	68,971	9,183	71,963	95

Notes:

“Unverified Ex Post Savings” are the total weighted savings that are being evaluated by bill impacts analysis (IPMVP Option C) that require more time to elapse since measure installation to achieve adequate signal to noise ratios. The verified savings do not include these unverified ex post savings.

**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
	IQ	PYTD	CPITD			
Residential EE	n/a	2.24	2.58	0.24	2.48	0.00
Residential Low-Income EE	n/a	0.17	0.17	0.00	0.17	0.00
Small Commercial & Industrial EE	n/a	1.63	1.63	0.69	2.32	0.04
Large Commercial & Industrial EE	n/a	1.39	1.49	0.15	1.55	0.00
Government & Non-Profit EE	n/a	1.48	1.48	0.14	1.62	0.00
<b>TOTAL PORTFOLIO</b>	n/a	6.91	7.35	1.22	8.14	0.04
<b>TOTAL PORTFOLIO INCLUDING LINE LOSSES</b>	n/a	7.76	8.26	1.38	9.14	0.04

Notes:  
 "Unverified Ex Post Savings" are the total weighted savings that are being evaluated by bill impacts analysis (IPMVP Option C) that require more time to elapse since measure installation to achieve adequate signal to noise ratios. The verified savings do not include these unverified ex post savings.  
 Demand Reductions for each program represent verified customer demand savings. Effective with this annual report, Total Portfolio Demand Reductions are reported at the system level.

## 2.1 Residential EE Sector

The sector target for annual energy savings is 21,621 MWh and the sector target for annual peak demand reduction is 26.12 MW.

A sector summary of results by program is presented in the following tables:

**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)
Demand Reduction	n/a	n/a	n/a
Home Energy Audits	n/a	n/a	n/a
Appliance Turn-In	n/a	n/a	n/a
EE HVAC	n/a	n/a	n/a
EE Products	n/a	n/a	n/a
New Construction	n/a	n/a	n/a
Whole Building	n/a	n/a	n/a
Multiple Family	n/a	n/a	n/a
<b>Sector Total</b>	n/a	n/a	n/a

**NOTES:**

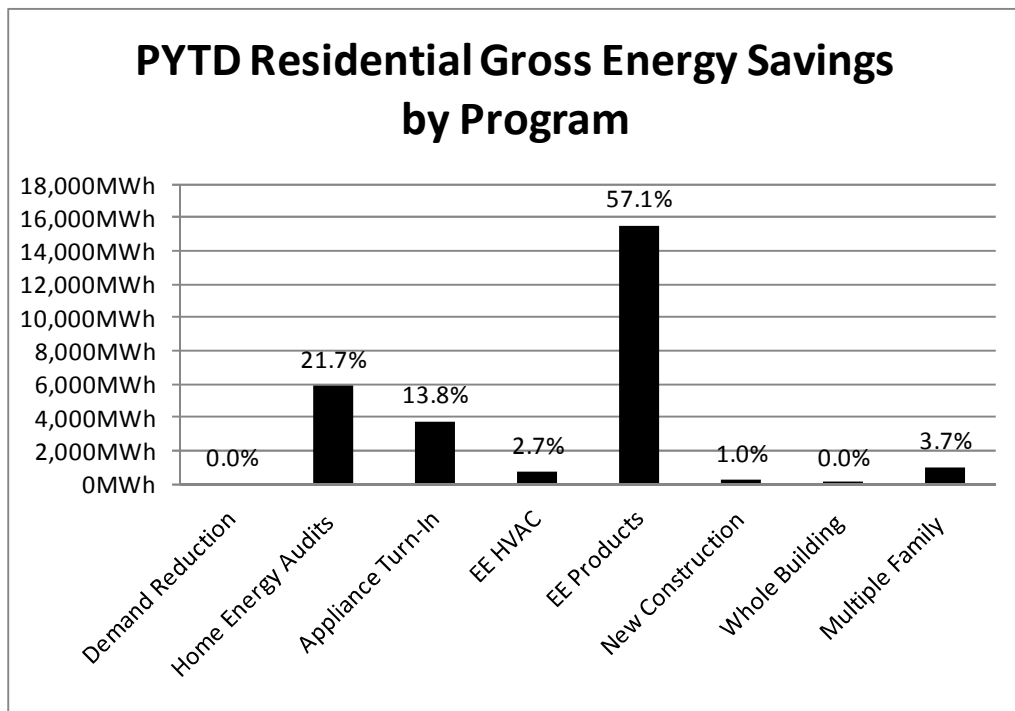
(a) Participation in the EE Products Program attributable to CFL Participation is 36,498 for IQ, 113,729 for PYTD, and 132,184 CPITD periods.

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

<b>Residential EE Sector</b>	<b>PYTD Participants</b>	<b>PYTD Reported Gross Energy Savings (MWH)</b>	<b>PYTD Reported Gross Demand Reduction (MW)</b>
Demand Reduction	0	0	0.00
Home Energy Audits	11,357	5,912	0.48
Appliance Turn-In	2,045	3,762	0.60
EE HVAC	591	743	0.17
EE Products	116,993	15,555	0.83
New Construction	126	264	0.11
Whole Building	8	11	0.00
Multiple Family	3,464	1,010	0.04
<b>Sector Total</b>	<b>134,584</b>	<b>27,258</b>	<b>2.24</b>
<b>NOTES:</b>			
(a) Participation in the EE Products Program attributable to CFL Participation is 36,498 for IQ, 113,729 for PYTD, and 132,184 CPITD periods.			

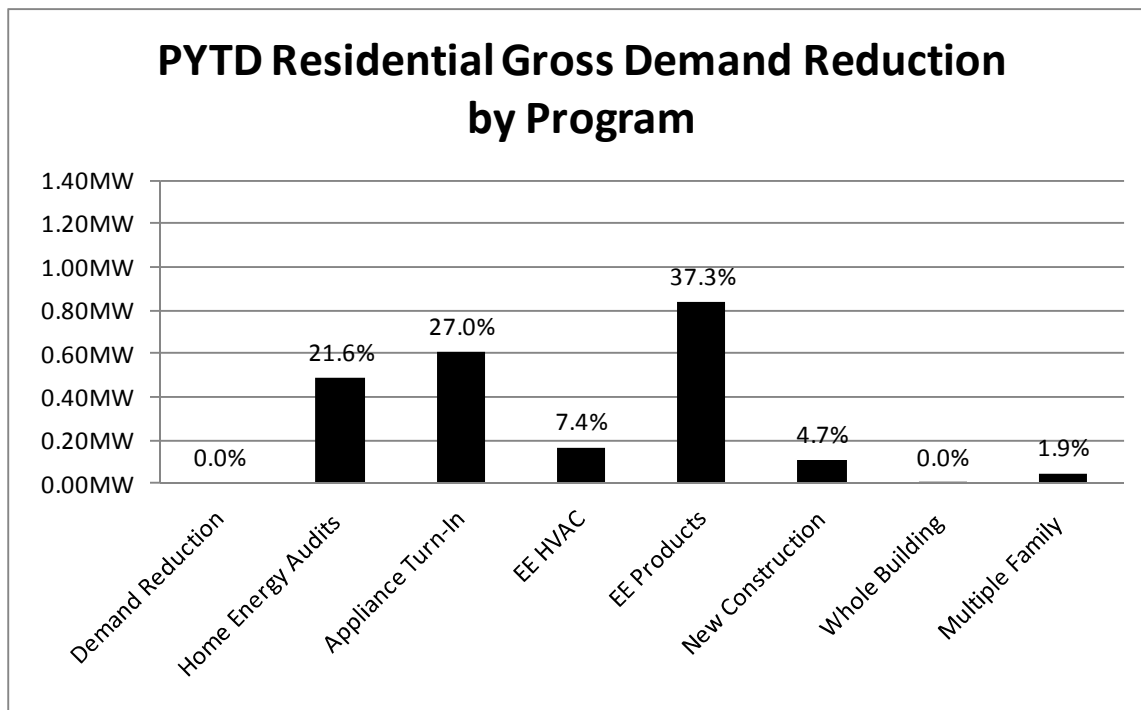
A summary of the sector energy savings by program is presented in the following figure:

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 the following figure:

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



## 2.2 Residential Low-Income EE Sector

The sector target for annual energy savings is 416 MWh and the sector target for annual peak demand reduction is 0.04 MW.

A sector summary of results by program is presented in the following tables:

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

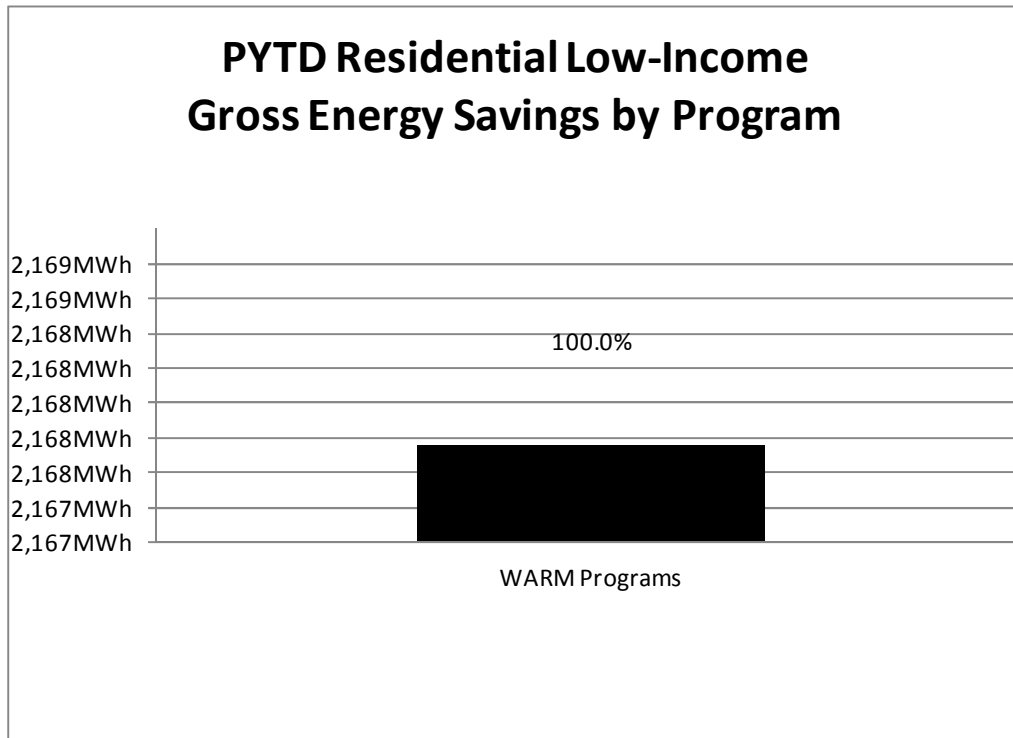
Residential Low-Income EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWH)	IQ Reported Gross Demand Reduction (MW)
WARM Programs	n/a	n/a	n/a
<b>Sector Total</b>	n/a	n/a	n/a
NOTES:			

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

Residential Low-Income EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWH)	PYTD Reported Gross Demand Reduction (MW)
WARM Programs	4,412	2,168	0.17
<b>Sector Total</b>	4,412	2,168	0.17
NOTES:			

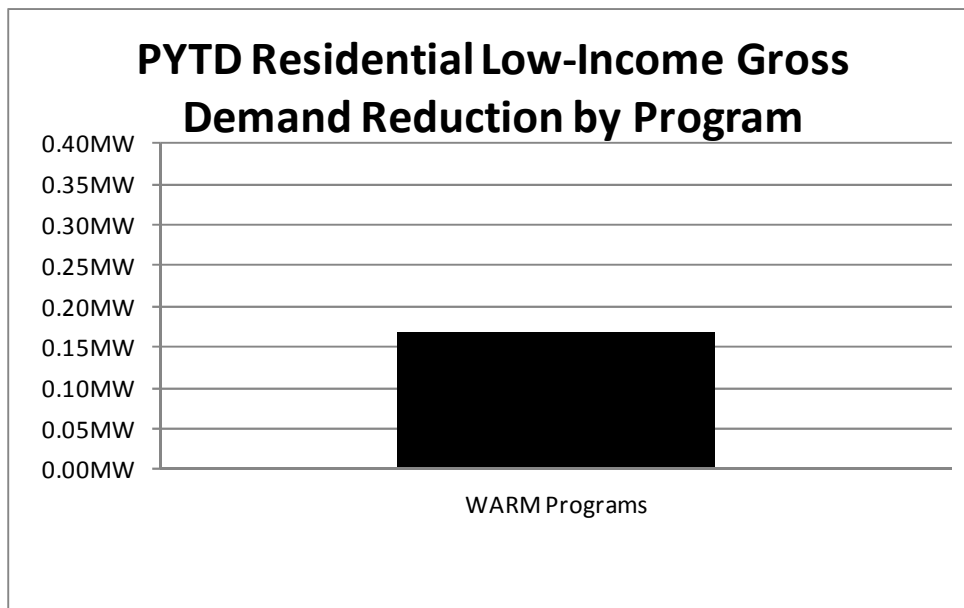
A summary of the sector energy savings by program is presented in the following figure:

**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 the following figure:

**Figure 2.6: Summary of Residential Low-Income EE Sector PYTD Reported Demand Reduction by Program**



### 2.3 Small Commercial & Industrial EE Sector

The sector target for annual energy savings is 14,332 MWh and the sector target for annual peak demand reduction is 5.19 MW.

A sector summary of results by program is presented in the following tables. As noted in Section 4.10, energy efficiency and peak demand reduction savings for the Small Commercial and Industrial Sector Energy Audit & Assessment, and Equipment Rebate Programs have been combined for purposes of this report.

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

Small Commercial/Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWH)	IQ Reported Gross Demand Reduction (MW)
Energy Audit, Assessment and Equipment Rebate	n/a	n/a	n/a
<b>Sector Total</b>	n/a	n/a	n/a
<b>NOTES:</b>			

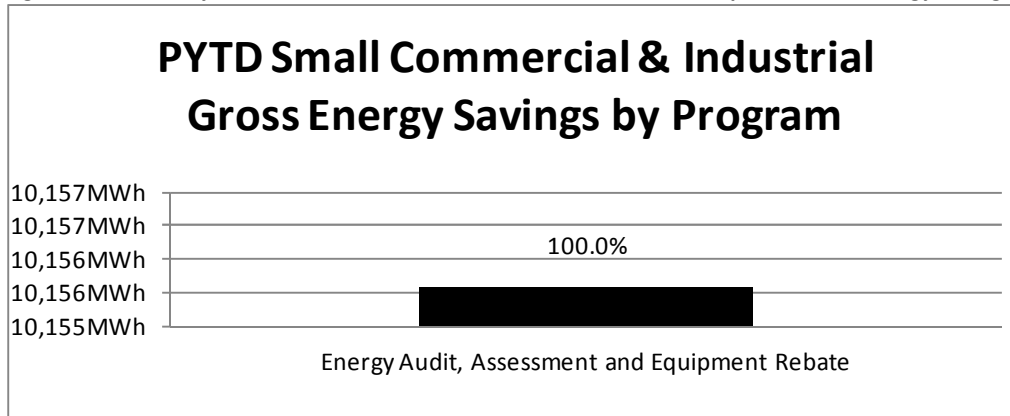
**Table 2-8: Summary of Small Commercial/Industrial EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Small Commercial/Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWH)	PYTD Reported Gross Demand Reduction (MW)
Energy Audit, Assessment and Equipment Rebate	146	10,156	1.63
<b>Sector Total</b>	146	10,156	1.63
<b>NOTES:</b>			



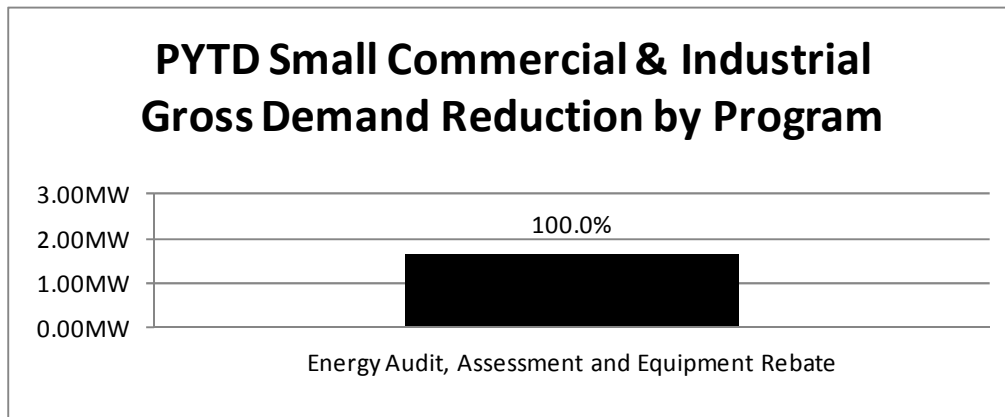
A summary of the sector energy savings by program is presented in the following figure:

**Figure 2.7: Summary of Small Commercial & Industrial EE Sector PYTD Reported Gross Energy Savings by Program**



A summary of the sector demand reduction by program is presented in the following figure:

**Figure 2.8: Summary of Small Commercial & Industrial EE Sector PYTD Reported Demand Reduction by Program**



## 2.4 Large Commercial & Industrial EE Sector

The sector target for annual energy savings is 3,984 MWh and the sector target for annual peak demand reduction is 1.3 MW.

A sector summary of results by program is presented in the following tables:

**Table 2-9: Summary of Large Commercial/Industrial EE Sector Incremental Impacts by Program through the End of the Reporting Period**

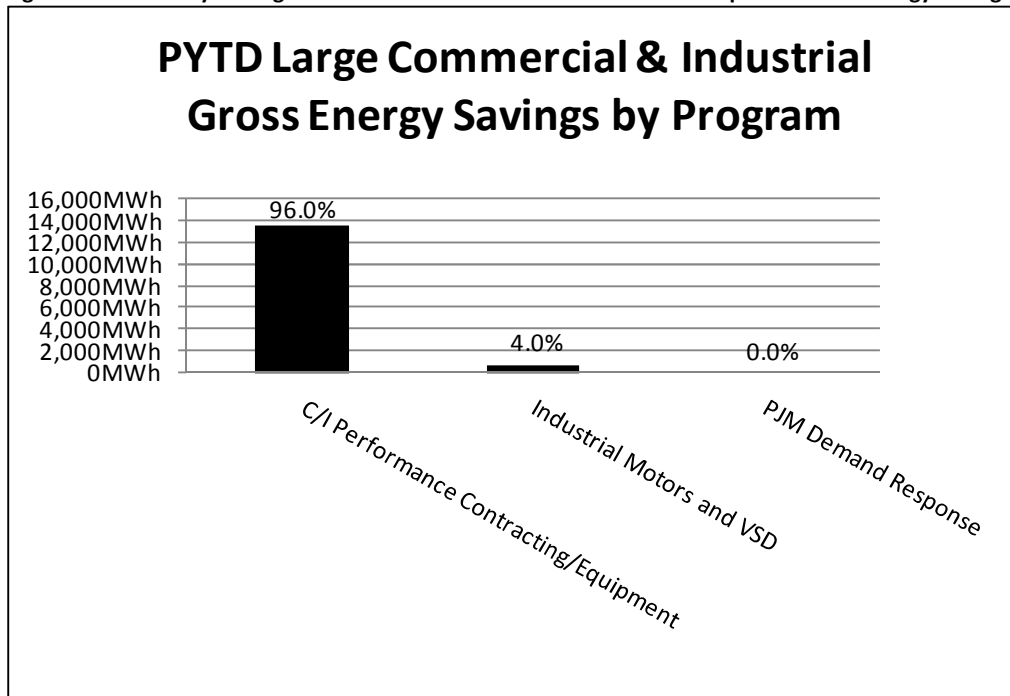
Large Commercial/Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWH)	IQ Reported Gross Demand Reduction (MW)
C/I Performance Contracting/Equipment	n/a	n/a	n/a
Industrial Motors and VSD	n/a	n/a	n/a
PJM Demand Response	n/a	n/a	n/a
<b>Sector Total</b>	n/a	n/a	n/a
<b>NOTES:</b>			

**Table 2-10: Summary of Large Commercial/Industrial EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Large Commercial/Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWH)	PYTD Reported Gross Demand Reduction (MW)
C/I Performance Contracting/Equipment	33	13,538	1.30
Industrial Motors and VSD	3	566	0.09
PJM Demand Response	0	0	0.00
<b>Sector Total</b>	36	14,104	1.39
<b>NOTES:</b>			

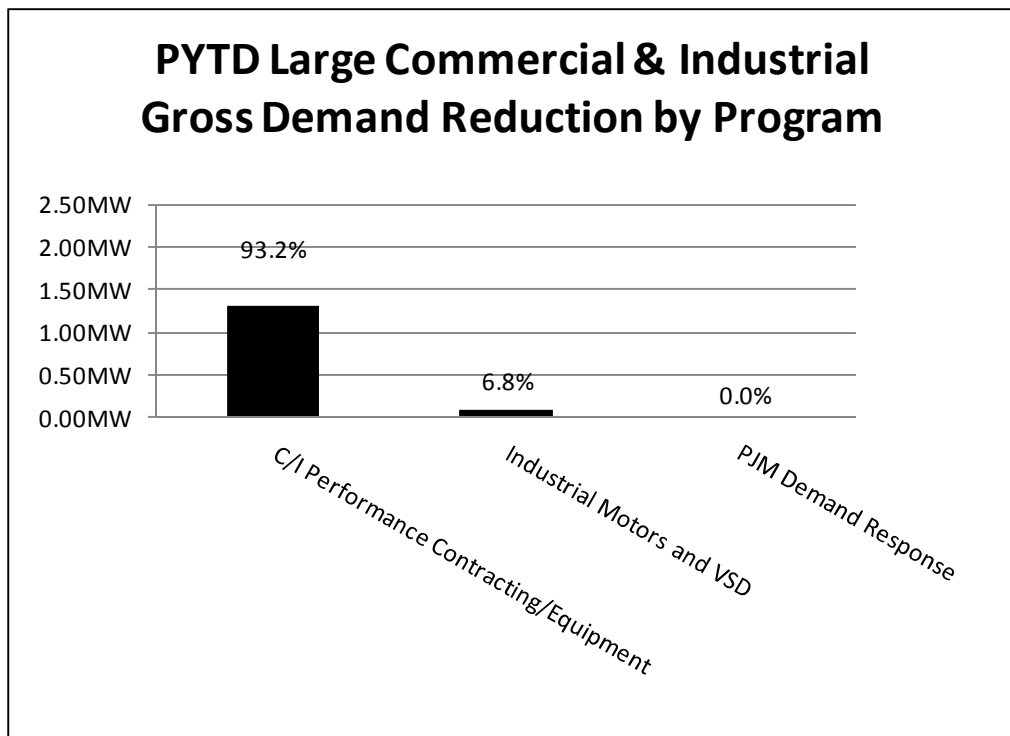
A summary of the sector energy savings by program is presented in the following figure:

Figure 2.9: Summary of Large Commercial & Industrial EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in the following figure:

Figure 2.10: Summary of Large Commercial & Industrial EE Sector PYTD Reported Demand Reduction by Program



## 2.5 Government & Non-Profit EE Sector

The sector target for annual energy savings is 6,700 MWh and the sector target for annual peak demand reduction is 1.71 MW.

A sector summary of results by program is presented in the following tables:

**Table 2-11: Summary of Governmental EE Sector Incremental Impacts by Program through the End of the Reporting Period**

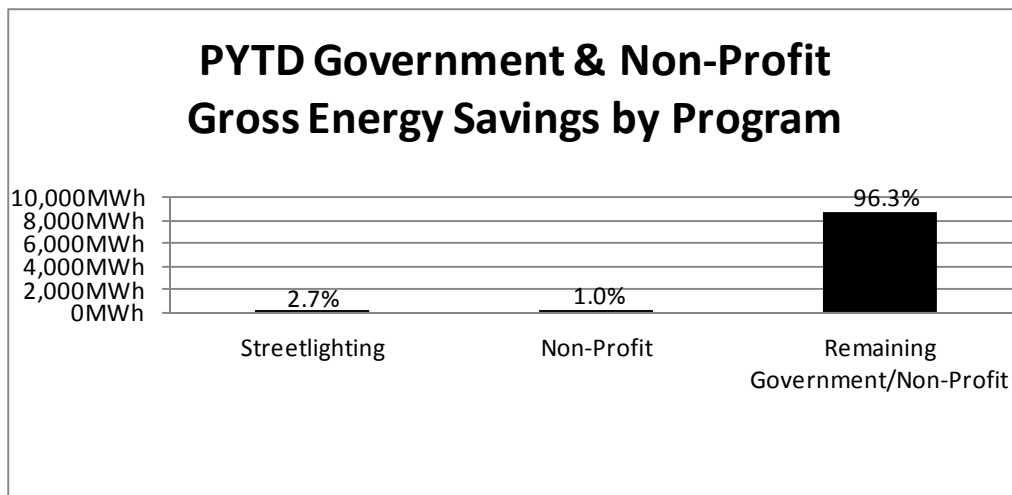
Governmental EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWH)	IQ Reported Gross Demand Reduction (MW)
Streetlighting	n/a	n/a	n/a
Non-Profit	n/a	n/a	n/a
Remaining Government/Non-Profit	n/a	n/a	n/a
<b>Sector Total</b>	n/a	n/a	n/a
NOTES:			

**Table 2-12: Summary of Governmental EE Sector PYTD Impacts by Program through the End of the Reporting Period**

Governmental EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWH)	PYTD Reported Gross Demand Reduction (MW)
Streetlighting	127	247	0.00
Non-Profit	4	90	0.02
Remaining Government/Non-Profit	543	8,758	1.46
<b>Sector Total</b>	674	9,095	1.48
NOTES:			

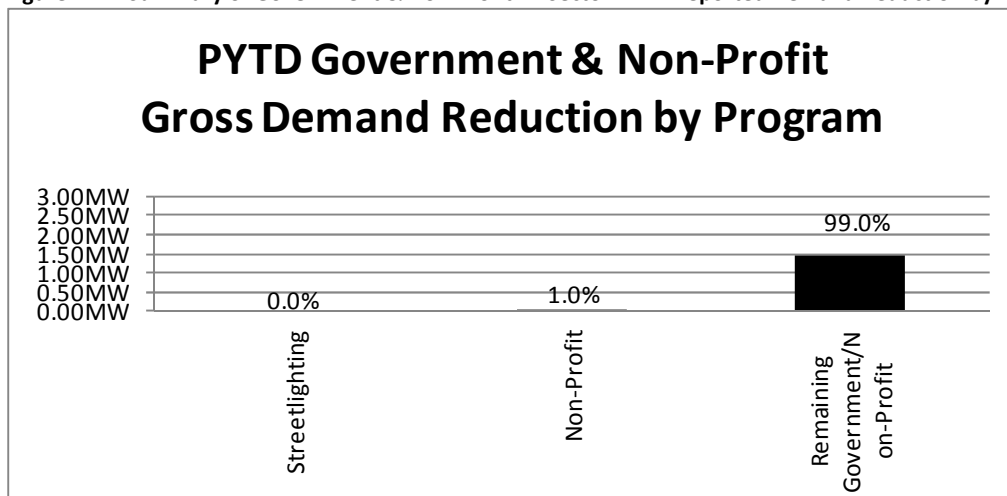
A summary of the sector energy savings by program is presented in the following figure:

**Figure 2.11: Summary of Government & Non-Profit EE Sector PYTD Reported Gross Energy Savings by Program**



A summary of the sector demand reduction by program is presented in the following figure:

Figure 2.12: Summary of Government & Non-Profit 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. Penn Power currently does not have any Demand Reduction savings to report in its 100 peak hours as interpreted by the PUC under Act 129<sup>17</sup>.

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<sup>17</sup> The Commission's Implementation Order in Docket No. M-2008-2069887 sets forth that by May 31, 2013, peak demand is to be reduced by a minimum of four-and-a-half percent (4.5%) of the EDC's annual system peak demand in the 100 hours of highest demand, measured against the EDC's peak demand during the period of June 1, 2007 through May 31, 2008. The Commission defined the summer months of June through September 2012 as the appropriate time to reduce annual system peak demand in the 100 hours of highest demand.

## **4 Portfolio Results by Program**

### **4.1 Residential Demand Reduction Program**

This program will pay an incentive to participants who agree to have controls installed on their Central Air Conditioning (CAC) systems that enable Penn Power to limit CAC operation during peak load periods. Once such devices are installed, the utility will have the ability to cycle air conditioning compressors or reset temperatures for the duration of the load control event. It is anticipated that this program will be activated over Penn Power's top 100 load hours, typically from noon – 7 pm on selected weekdays.

#### **4.1.1 Program Logic**

Initially, the program will target customers located in major load areas with higher customer density to minimize risks associated with communications coverage. Customers will receive a one time cash payment of up to \$75 in the first year as an enrollment incentive. In each following year, customers will receive up to \$15 per summer month for participation (as will be determined in consultation with the CSP).

In order to gain more robust, longer term program participation, direct load control switches will be chosen that will have the capability to utilize multiple communication protocols to facilitate the eventual migration of this program and leverage the communication investment from an Advanced Metering Infrastructure (AMI) solution.

Opportunities for expansion will be examined as technology options improve over time. The Companies will bid its Residential Direct Load Control programs into the PJM Reliability Pricing Model (RPM). The revenues received by the Companies, if any, from bidding and clearing residential Direct Load Control programs into the applicable RPM auctions, will be netted against the program costs, including but not limited to: administration, contracted services, credits provided to customers, and PJM penalties for underperformance.

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

Penn Power will verify that demand reduction targets are being achieved consistent with requirements defined in PJM Manual 19, Attachment B. Penn Power has selected technology using two-way communications that supports robust measurement and verification, and is currently in the process of working with the selected CSP to develop an M&V methodology specific to that technology for review by PJM and the SWE.

#### **4.1.3 Program Sampling**

The sampling will be sufficient to determine this program's gross impact with 10% relative precision at the 90% confidence level<sup>18</sup>. Sampling methodology is currently under development.

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<sup>18</sup> The confidence/precision requirements for this program exceed the 85/15 minimum requirement because this program is expected to comprise the majority of the demand reduction in the residential sector.

#### **4.1.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the ADM, internal staff and contractors drafted a program logic model which will serve as a visual representation for the program processes. As the programs near launch, additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Once the program is launched, participant surveys, non-participant surveys, and drop-out surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. If the goals are appropriate, the process evaluation will identify specific best practices that may help the Companies reach the program goals.

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

Penn Power selected Honeywell for the management of the Direct Load Control program.



#### 4.1.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-1: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$32,000	\$32,000	\$32,000
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$32,000</b>	<b>\$32,000</b>	<b>\$32,000</b>
B.1	Design & Development <sup>1</sup>	\$391	\$934	\$4,285
B.2	Administration <sup>2</sup>	\$192,446	\$207,446	\$207,446
B.3	Management <sup>3</sup>	\$4,597	\$14,288	\$17,228
B.4	Marketing <sup>4</sup>	\$1,446	\$3,577	\$3,738
B.5	Technical Assistance <sup>5</sup>	\$378	\$2,222	\$2,429
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$199,259</b>	<b>\$228,468</b>	<b>\$235,126</b>
C	<b>EDC Evaluation Costs</b>	\$1,934	\$3,206	\$3,590
D	<b>SWE Audit Costs</b>	\$0	\$2,970	\$4,109
E	<b>Participant Costs</b>	\$0	\$0	\$0
	<b>Total Costs</b>	<b>\$233,193</b>	<b>\$266,644</b>	<b>\$274,825</b>
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$0	\$0
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$0	\$0
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
				\$0
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Notes				
:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System			

## **4.2 Residential Home Energy Audit Program**

Households will be able to identify energy saving opportunities through two levels of home energy audits: 1) a self-administered on-line audit that analyzes historic energy use, and calculates energy savings based on customer responses to a series of questions (customers without internet access can complete the audit over the phone with a Company representative); and, 2) a walk-through on-site audit administered by a trained professional auditor. The purpose of the audits is to: 1) identify energy savings opportunities; 2) install basic low-cost measures; and 3) make customers aware of other programs offered by Penn Power. Customers who complete the on-line audit are eligible to receive an energy conservation kit. Customers who participate in the walk-through on-site audit will benefit from direct-installed low-cost energy savings measures selected by the trained auditor based on the needs of the home.

### **4.2.1 Program Logic**

This program involves consumer education through generic energy savings recommendations combined with information customized to a specific dwelling based on either self-reported information or input by a trained auditor. This program serves as a portal to other programs by informing customers about additional energy-saving solutions.

Estimates of low-income participation by county and census are included in Penn Power's annual report to the PUC.

There is no additional charge to complete the on-line audit. Customers are eligible to receive an energy conservation kit valued at up to \$104 once the audit is complete and uploaded.

Customers pay a fee of \$50 for the on-site audit and will receive customized energy efficiency recommendations and direct installed energy savings measures of an equal value.

### **4.2.2 Program M&V Methodology**

This program has two components: online audits and walk-through audits. While the online audits component began in the fourth quarter of the first program year (PY1Q4), the walk-through component of the program began implementation in the PY2Q1. The evaluation process used a combination of on-site visits, an online survey data collection system and telephone interviews.

### **Gross Impact Analysis for the Energy Conservation Kit Contents**

In Q1 and part of PY2Q2, customers who completed the self administered online audit (or completed the audit via telephone with a Company representative) received the "original" energy conservation kit comprised of CFLs, LED night lights, faucet aerators and aerator adapters, and "smart" power strips. Beginning in the middle of PY2Q2 (October), two separate energy conservation kits were sent to customers depending on their hot water fuel source. The kit provided to customers with electric water heating consists of CFLs, LED night lights, aerators and aerator adapters, a furnace whistle, "smart" power strips, and a low flow showerhead. The kit provided to customers with non-electric water heating consists of CFLs, specialty dimmable CFLs, LED night lights, a furnace whistle, and "smart" power strips. Finally, in Q4 two additional "Opt-In" kits were sent to customers who had received the "original" kit and indicated they would like to receive additional energy efficiency measures specific to their hot

water fuel source. The Opt-In kit provided to customers with electric water heating includes CFLs, a low-flow showerhead, and a furnace whistle. The Opt-In kit provided to customers with non-electric water heating consists of CFLs, specialty dimmable CFLs, and a furnace whistle. The newer, “second generation” kits contain only one smart power strip per kit while the original PY1 and PY2Q1 kits had two smart power strips.

In evaluating the gross impact analysis for the energy conservation kits in PY2, four items must be determined:

1. The average energy savings and demand reduction for the kit elements that are installed; and,
2. The number and type of kits mailed to customers during PY2,
3. The installation rate for the various kit elements
4. The percentage of kits claimed to be sent to customers that were not received by customers, either because of shipping problems, customer moving, or other such scenarios.

The first item has been determined through participation in technical working groups held by the PA Statewide Evaluator. The expected energy savings and demand reduction for each kit element has been established through a combination of engineering calculations and literature review. The partially deemed savings protocols for the kit contents are incorporated into the 2010 PA TRM or the Interim Protocols for the 2010 PA TRM.

The second item, the total number and type of kits mailed to customers in PY2, is determined by reviewing the program tracking system, shipment tracking logs, and invoices from the implementation contractor. Specifically, the tracking system is checked to assure that: (1) duplicate shipments to the same account number are not counted, (2) all kits being claimed for PY2 are eligible based on shipment dates; and (3) the ex-ante kWh savings and kW reduction claims are reasonable. The energy conservation kits are mailed to the Pennsylvania address on record for those ratepayers who complete the online energy audit questionnaire (or complete the questionnaire via telephone). Shipment tracking logs including FedEx tracking numbers are reviewed to further verify the quantity of kits shipped. This includes verifying that returns due to wrong addresses that are sent back to the warehouse are not counted.

The third item, installation rates, are determined through a combination of online surveys and on-site visits, except for CFLs and furnace whistles which are given “deemed” installation rates of 0.84 and 0.474 respectively consistent with the TRM or interim protocols for those measures. While initial survey findings for CFL ISRs are approximately 70%, there is evidence that it may take one year or more for the ISR to reach 84%. For the online home energy audit program, ADM has been conducting online surveys for over one year. Most surveys occur within two or three months of conservation kit receipt and also show ISRs of around 70% for CFLs. However, ADM has also surveyed a sample of PY2Q1 participants in October 2011 to investigate if the ISR has climbed over time. The ISR for CFLs for customers that received kits during PY2Q1 were 67% during the initial survey conducted in October 2010, but the ISRs climbed to 82% in an October 2011 survey for the PY2Q1 participants. Both surveys had 7% relative precision at the 90% confidence level, so this represents a statistically significant rise in the ISR over time. While the furnace whistle installation rate is deemed at 47.4%, recent preliminary results from online surveys indicate that the percentage is likely lower, somewhere around 15%. The Company plans to review and share these findings to support future updates to the TRM to reflect evaluation results.

For a particular site in a sample, the installation rate for each kit element takes on a binary value of 1, if the element is installed in accordance to the principles that define that element as an energy efficiency

measure, and 0 otherwise. In particular, faucet aerators and low flow showerheads are only counted as “installed” if they are installed in a home that has electric water heating. Smart power strips are counted as “installed” if: (1) there are appliances plugged into the “controlled” sockets that are turned on and off by the smart strip; and (2) an appliance that is not uniformly on is installed in the “master” socket. . Similarly, LED night lights are only counted as “installed” if they replace an incandescent night light.

The final item, the percentage of kits that are claimed to be sent to customers but for whatever reason do not arrive, is determined through the online survey instrument and through follow up telephone interviews. Online survey respondents are asked to indicate whether they received the conservation kit that was mailed to them. For the small percentage of respondents who indicated that they did not receive the kits, a follow up telephone interview was conducted at a later date to determine if the kit was received late, or if the customer had misunderstood the question in the online survey.

The online survey instrument that was used to verify that the shipped energy conservation kits were actually installed asks a series of questions that determine how many of each item was installed and where each item was installed. The accuracy of the online survey instrument was verified through on-site data collection activities of a nested sample of the online survey respondents. The results of this analysis indicate that the vast majority of the variance in savings attributable to this program is a result of installation rates. This variance is best captured in the online survey instrument, as it allows for a large sample size not easily obtained through on-site data collection. Furthermore, the online survey seems particularly appropriate because the majority of program participants completed the audit process online (as opposed to the telephone and walk-through methods). The more anonymous nature of online survey method is also arguably less likely to introduce bias in the estimates of installation rates. The on-site visits did find, on average, slightly higher apparent ISRs than the online survey instrument. One possible reason is that some time had elapsed between the online surveys and on-site visits, so that participants may have had opportunities to install more measures. The more likely scenario, however, is that the field technicians may have counted pre-existing or otherwise installed CFLs as being attributable to the program. Lastly, if the installation rates had been determined by on-site data collection alone, it is reasonable to assume they may have been overstated, as customers may be inclined to install additional items upon scheduling the on-site visit. For these reasons, the on-site visit results were not used to bolster ISRs, but were rather used to generally confirm the validity of the data gathered by the online survey instrument.

### **Gross Impact Analysis for the Walk-Through Audits**

The items that are installed during the walk-through visits include a variable quantity of conservation kit items, and other low-cost measures to be determined or judged as appropriate by the auditor. All of the energy efficiency measures distributed in the walk-through audits have energy savings protocols that are in the 2010 PA TRM, or the Interim Protocols for the 2010 PA TRM. The energy savings are determined by counting the number of each item installed by each contractor. These counts are checked for those measures which only have savings in homes with electric water heating.

Savings claims were further verified through a telephone survey effort focusing on the installation rates. While this is a direct install program, the telephone survey recognizes that some of the items may have been uninstalled by participating home owners. The installation rates determined through the telephone survey were applied to each measure to determine verified savings, except for CFLs which have a “deemed” installation rate of 0.84. A small sample of program participants was also selected for

on-site data collection activities to supplement the telephone survey. As was the case with the energy conservation kit component of the program, most of the variance in savings values comes as a result of installation rates. This variance is best captured in the telephone survey, which again allowed for larger sample sizes and potentially less bias than on-site data collection.

### **4.2.3 Program Sampling**

The two program components - online and walk-through audits - are treated as separate programs, each with distinct populations, samples, and realization rates. A sample point in the context of this program is “a program participant.” For the online/telephone audits component, this is equivalent to “one energy conservation kit.” For the walk-through audit component, it is equivalent to saying “one home.”

#### *Online Audits*

The sampling approach for the online audit program component is batch-wise random sampling on a quarterly basis, stratified by kit type. Stratification by kit type was done to ensure that the sample had adequate representation of each individual kit type. While many of the measures are mutually included in the various kits, there are some measures that are unique to certain kits and as such the kits can be viewed as heterogeneous subsets with homogeneous sample points. In other words, it would not be appropriate to impute the installation rates of kits for electric water heater homes on non-electric water heater kits.

Overall, there are three tiers of sampling involved.

1. A census of the energy and demand savings calculations in the program tracking data are reviewed to ensure that the energy savings and demand reductions are claimed according to the protocols in the PA TRM, with reasonable assumptions for installation rates.
2. The sample size for online surveys was sufficiently large to determine gross impact with  $\pm 5\%$  relative precision at the 85% confidence level. This large sample size (see Table 1-9) is motivated by the fact that installation rates for some items in the kit are sufficiently low that only a large sample can accurately capture a true estimate of the installation rate. This is the main advantage of an online survey instrument as compared to on-site data collection for this program.
3. A much smaller, nested sample of survey respondents was randomly selected for on-site verification.

#### *Walk-Through Audits*

There were very few walk-through audits completed in the second program year. The sampling approach for the walk-through audit program component is simple random sampling. Three tiers of sampling involved.

1. A census of the energy and demand savings calculations in the program tracking data are reviewed to ensure that the energy savings and demand reductions are claimed according to the protocols in the PA TRM.
2. The sample size for telephone surveys was sufficient to determine gross impact with  $\pm 15\%$  relative precision at the 85% confidence level.
3. A much smaller sample of participants were randomly selected for on-site verification.

The sample size<sup>19</sup> for on-site visits is small because (a) this program component accounts for an insignificant fraction of overall program savings.

#### **4.2.4 Process Evaluation**

Tetra Tech has conducted interviews with the Companies' internal program managers and implementation staff across the multi-year evaluation period. The first set of interviews was completed prior to developing the process evaluation plan. Tetra Tech will continue to discuss issues with the program staff throughout the evaluation process.

In addition to program staff interviews, surveys of participants and non-participants will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. The first round of surveys has been administered online, and the results have been reported to the Company.

A second aspect of the process evaluation is to determine the relationship between the walk-through and online audit programs and the other energy efficiency programs offered by the Companies. The audits are intended to provide customers with "a customized comprehensive understanding of the opportunities available for saving energy." In theory, this understanding may induce customers to partake in appropriate energy efficiency programs offered by the Companies. Quantitatively, one can track the number of audit participants that also participated in other programs.

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

##### *Home Energy Analyzer:*

The Aclara Software Company owns the tool customers use to complete the Home Energy Audit. Households can identify energy saving opportunities through an audit completed on-line at [www.firstenergycorp.com](http://www.firstenergycorp.com) or over the phone with customer service (for customers without access to a computer). This provides customers with information on how their energy bill is impacted by each of the appliances in the home. After an online audit is completed, an Energy Conservation Kit consistent with the home's water heating source is sent to the customer.

##### *Walk Through Home Energy Audit:*

For a fee of \$50, residential customers can receive an in-home energy audit with specific energy efficiency recommendations as well as receiving \$50 worth of installed low-cost electric reduction measures (high efficiency lighting and electric water heating saving measures, etc.). Honeywell Utility Solutions is Penn Power's CSP who will conduct Walk Through Home Energy Audits and complete the installation of energy saving measures. Honeywell may recruit and develop qualified contractors if the participation rate warrants additional auditors.

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<sup>19</sup> See Table 1-9.

## 4.2.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-2: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$215,862	\$606,681	\$798,481
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$215,862</b>	<b>\$606,681</b>	<b>\$798,481</b>
B.1	Design & Development <sup>1</sup>	\$444	\$1,059	\$8,751
B.2	Administration <sup>2</sup>	\$2,192	-\$111,916	\$20,181
B.3	Management <sup>3</sup>	\$5,209	\$16,285	\$24,767
B.4	Marketing <sup>4</sup>	\$1,796	\$22,541	\$22,794
B.5	Technical Assistance <sup>5</sup>	\$7,113	\$16,781	\$17,257
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$16,754</b>	<b>-\$55,250</b>	<b>\$93,750</b>
C	<b>EDC Evaluation Costs</b>	\$2,664	\$14,411	\$15,600
D	<b>SWE Audit Costs</b>	\$0	\$3,365	\$5,980
E	<b>Participant Costs</b>	\$0	\$606,681	\$798,481
	<b>Total Costs</b>	<b>\$235,279</b>	<b>\$1,175,887</b>	<b>\$1,520,492</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$524,315	\$866,305
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$641,100	\$724,269
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$4,383,109	\$4,951,725
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$4,383,109</b>	<b>\$4,951,725</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>8.4</b>	<b>5.7</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

### **4.3 Residential Appliance Turn-In Program**

Residential customers are eligible for a cash incentive and disposal of up to two large older inefficient appliances (refrigerators or freezers); and two room air conditioners (RAC) per household per calendar year. All units must be working and meet established size requirements.

#### **4.3.1 Program Logic**

JACO is the program CSP hired by the Companies to deliver this program. JACO is also the CSP chosen across PA utilities to run this program. JACO's selection provides Penn Power's residential customers a collaborative approach to appliance collections.

JACO tests and confirms an appliance's eligibility for collection at the customer's residence prior to removing the appliance and issuing the incentive. Pre-testing of appliances may result in lower participation as a result of refusing non-working appliances, but will provide better quality control.

Marketing to residential customers is conducted through various media and marketing channels to facilitate a targeted roll-out of the program and efficient collection in targeted areas. The marketing campaign includes a mix of digital media, direct mail, radio, web banners, television and newspaper advertising. In addition Penn Power uses monthly bill inserts to market this program to encourage residential customers to recycle targeted appliances.

Participation by low-income customers will be tracked or estimated to support assessment of equitable treatment of low-income customers. Direct participation by low-income customers will be included in Penn Power's annual report to the PUC.

#### **4.3.2 Program M&V Methodology**

The M&V values for this program are based on the energy savings resulting from a customer taking a refrigerator, freezer or RAC out of service. The savings from refrigerator recycling are stipulated in the TRM. The savings from RAC recycling are stipulated in an interim TRM protocol. While RAC energy savings are dependent on location and are mapped using the participant's zip code, RAC demand savings are not location dependent.

Verifying the savings from this program requires telephone verification, with the final sample encompassing a range of participants entering the program at various times throughout the year.

#### **4.3.3 Program Sampling**

The sampling approach for this program is a simple random sample. Sample sizes will target 90% confidence level and 10% precision<sup>20</sup>.

#### **4.3.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team has drafted a program logic model which will serve

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<sup>20</sup> See Table 1-9.



as a visual representation for the program processes. Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys, non-participant surveys, and drop-out surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a document review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance. Tetra Tech has completed 70 participant surveys and is preparing a report expected to be delivered to the Company in the fall of 2011.

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

JACO is the CSP for Penn Power's PA EDC Appliance Turn-In Program supporting residential customers. Subcontractors supporting the CSP are Appliance Distribution, Inc., Runyon Saltzman & Einhorn and ITSoft, Inc.

### 4.3.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-3: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$33,770	\$103,060	\$109,289
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$33,770</b>	<b>\$103,060</b>	<b>\$109,289</b>
B.1	Design & Development <sup>1</sup>	\$249	\$594	\$5,409
B.2	Administration <sup>2</sup>	\$61,133	\$244,055	\$269,430
B.3	Management <sup>3</sup>	\$3,014	\$9,172	\$13,198
B.4	Marketing <sup>4</sup>	\$919	\$2,273	\$3,466
B.5	Technical Assistance <sup>5</sup>	\$240	\$1,412	\$1,709
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$65,555</b>	<b>\$257,505</b>	<b>\$293,213</b>
C	<b>EDC Evaluation Costs</b>	\$1,984	\$8,651	\$9,842
D	<b>SWE Audit Costs</b>	\$0	\$1,887	\$3,524
E	<b>Participant Costs</b>	\$0	\$103,060	\$103,060
	<b>Total Costs</b>	<b>\$101,309</b>	<b>\$474,163</b>	<b>\$518,928</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$342,120	\$382,083
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$438,192	\$479,672
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$2,790,780	\$3,054,956
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$2,790,780</b>	<b>\$3,054,956</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>8.2</b>	<b>8.0</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.4 Residential Energy Efficiency HVAC Program**

This program provides incentives supporting implementation of contractor-installed HVAC or other eligible systems in existing or new residential buildings. The program involves promoting the sale of high-efficiency, ENERGYSTAR® compliant equipment through installation contractors selling to residential customers who are replacing existing home HVAC equipment. The program provides incentives to customers who replace existing or standard HVAC equipment in residential applications with qualifying energy efficient heating and cooling systems.

The program also provides incentives for maintenance (tune-ups) of existing central air conditioners or heat pump equipment and offers an additional incentive toward replacement of furnace fans meeting ENERGYSTAR® efficiency guidelines.

Within the Residential Energy Efficiency HVAC program, there were a total of 591 HVAC equipment rebates through the end of PY2. Of the HVAC equipment rebates, a total of 302 customers indicated that natural gas was available.

### **4.4.1 Program Logic**

Program services will be delivered to customers by qualified local contractors identified by an implementation vendor or manufacturer of such equipment. Contractors will certify the proper sizing and installation of high efficiency equipment.

Qualifying equipment must meet or exceed ENERGYSTAR® standards. Qualified HVAC equipment will include:

- High-efficiency central air conditioning units (CAC)
- High-efficiency air source heat pumps (ASHP)
- High-efficiency ground source heat pumps (GSHP)
- Central air conditioning maintenance and furnace fan motor replacement meeting Energy Star guidelines.

Customers will receive rebates for the high efficiency HVAC equipment that is installed or serviced by a participating, qualified contractor.

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

#### **Gross Impact Analysis**

The evaluation effort will be conducted using separate methodologies for rebated HVAC equipment such as heat pumps, CACs and solar water heaters, and for HVAC maintenance. Details of the methodologies are described in the subsections below. A calculation review is part of all methodologies ensuring that the energy savings and demand reductions for each measure are calculated according to the appropriate protocols in the PA TRM.

### Gross Impact for CACs and Heat Pumps

Savings associated with these HVAC equipment types are estimated using a partially deemed approach, with the kWh reduction determined using deemed hours of operation of the equipment determined by which reference city the installed location is closest to and nameplate information from the equipment regarding unit capacities and efficiencies.

For all new HVAC systems, the baseline efficiencies are stipulated in the PA TRM and are in accordance with Federal codes and standards.

The 'nameplate' data (e.g. capacity, SEER, EER, COP, HSPF) that provides the basis for deemed savings calculation will be verified through a combination of three activities:

1. A review of the DSM tracking system to identify claimed nameplate data,
2. On-site verification visits, and;
3. A review of program application materials including contractor and retailer invoices, rebate applications, and AHRI certificates.

The first activity, reviewing the DSM tracking system, consists of several elements. First the tracking data is checked for duplicate entries, program eligibility based on date, and proper use of PA TRM protocols for calculating savings. Upon reviewing the tracking system data it was identified that the claimed savings values were computed using "average" capacity and efficiency assumptions rather than characteristics specific to each unit/application. Additionally, all units were assumed to have operational hours consistent with the reference city of Harrisburg, rather than the closest and most appropriate reference city. In the context of this program, proper use of PA TRM protocols for calculating savings requires data fields listing the 'nameplate' data for each unit. These data, as well as the AHRI certificate number for new equipment applications, are captured and stored in the tracking system. However, these may not be reported for the census of sites in an efficient manner until after this writing. As such, a sufficiently large sample of program applications was checked on a one-by one basis in the online database to determine actual capacities and efficiencies. The AHRI database was then cross-checked to ensure that the capacities and efficiencies listed in the online database were accurate. Finally, a zip-code "lookup" was used to identify the closest reference city and therefore the most appropriate deemed hours of operation<sup>21</sup>. The proper PA TRM protocols for savings calculations were then applied to this sample of program participants, and the results were compared with the claimed savings from the DSM tracking system to develop a "preliminary desk review realization rate."

The second activity, on-site verification visits, was conducted to verify installation and operation of a sample of program participants. During these on-site visits, field staff documented important unit characteristics and took pictures of the installed equipment. The product of these visits is two important verification items:

1. An "installation verification rate," and;
2. Installed capacity and efficiency characteristics that were used to check the accuracy of the online program database.

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<sup>21</sup> This zip code lookup was generated by ADM and modified slightly by the SWE team. The version used in this EM&V effort included any modifications proposed by the SWE as it was taken from the Appendix of the draft 2012 PA TRM

The third activity, reviewing program application materials, was completed for equipment selected for on-site verification. This final check is performed in an effort to verify that program application materials, on-site data, AHRI database specifications, and information found in the online program database are all in agreement.

Final verified savings are a product of the “preliminary desk review realization rate,” and the “installation verification rate,” adjusted for any discrepancies found through review of the online database, application materials, and on-site data collection activities. The vast majority of variance between claimed and verified savings comes as a result of using proper capacities, efficiencies, and deemed hours of operation rather than assumed averages. The variance attributable to discrepancies found on-site or through review of program application materials are negligible in comparison.

### **Gross Impact for AC Tune Ups**

The verification for AC tune-ups includes two components. First, it must be verified that a tune-up actually occurred as claimed in the DSM tracking system.

This was accomplished by surveying program participants via telephone to confirm that they had received a tune-up during PY02. Additionally, several informal phone interviews with participating contractors were conducted to confirm that they were actively providing HVAC maintenance services and submitting rebate applications. Program application materials were also reviewed for a sample of tune-up participants.

Secondly, to properly utilize the PA TRM protocols for savings calculations, the capacities and efficiencies of the units being serviced needs to be known. The capacities of the units in question are inferred through the model numbers. This information is not always available, however – the model numbers may have been illegible or omitted from the applications, for example. As such, the average capacity and efficiencies found during the desk review of new equipment were used as proxy values. Cross-checking program application materials for a sample of tune-up participants verified that these proxy values, on average, were reasonable. Proper deemed hours of operation were also determined using the zip-code “lookup” mentioned above.

The PA TRM deemed savings calculations were applied using the capacities, efficiencies, and deemed hours of operation as described above. The resulting savings estimates were then compared to the claimed savings values from the DSM tracking system to develop a “preliminary desk review realization rate.” Final verified savings are a product of this preliminary realization rate and the verification rate determined through the participant telephone interviews.

### **Evaluation Findings**

The program had an essentially perfect verification rate. All of the variance between the gross reported and gross verified savings was attributable to the application of PA TRM protocols to gross reported savings that were estimated with ‘typical’ capacities, efficiencies, and heating, cooling hours.

#### **4.4.3 Program Sampling**

The two program components – new equipment rebates and AC tune-ups - are treated as separate programs, each with distinct populations, samples, and realization rates. A sample point in the context of this program is “a participating unit.” For new equipment, this is equivalent to “one CAC, ASHP, or GSHP.” For the AC tune-up component, it is equivalent to “one serviced CAC or ASHP.”

##### *New Equipment: CAC’s and Heat Pumps*

There are two sampling activities associated with this component of the program. The first is sampling from the DSM tracking system to identify unit characteristics from the online program database, while the second is sampling for on-site verification visits. The gross impact confidence and precision is based upon the sample size for on-site verification visits<sup>22</sup>.

The first sampling activity was to randomly select new equipment participants from the DSM tracking system to identify relevant unit capacities and efficiencies from the online program database. The characteristics of these sample points were also verified using the AHRI database. To ensure accuracy at the measure level, each measure was treated as a separate population, from which a simple random sample was drawn. Thus a unique sample was drawn for each of the following measures: CACs, ASHPs and GSHPs. The sample size was then determined such that the results would exceed  $\pm 10\%$  relative precision at the 90% confidence level at the measure level.

The second sampling activity was for on-site verification visits. The sampling approach for these on-site visits is batch-wise stratified random sampling on a quarterly basis. Due to the relatively small number of participating ground source heat pumps, just two strata – heat pumps and CACs – were sufficient to determine this component’s gross impact with  $\pm 15\%$  relative precision at the 85% confidence level.

##### *AC Tune-Ups*

A simple random sample of AC tune-up participants was used such the  $\pm 20\%$  relative precision at the 85% confidence level was achieved for gross impacts attributable to the tune-up measure. The less stringent criteria were chosen because tune-ups make up a relatively small percentage of the total program savings as compared to new equipment installations (the relative precision for the overall program is better than the required 15%).

#### **4.4.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies’ EE&C program staff. Following the interviews, the evaluation team drafted a program logic model which will serve as a visual representation for the program processes. Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys, non-participant surveys, and drop-out surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals

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<sup>22</sup> See Table 1-9.

were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance. The participant surveys have recently been completed and results will be reported to Penn Power in the fall of 2011.

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

Residential customers may complete an incentive form for contractor-installed qualified high-efficiency heating, ventilation, and air-conditioning equipment and for solar hot water systems in existing or new residential buildings. HVAC Tune-up incentives are also available for customers through a network of participating trade allies. Honeywell is Penn Power's program CSP who will recruit and develop trade allies, provide program marketing support, process customer rebate applications, validate applications meet all program requirements, and approve or deny rebate payment.

#### 4.4.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-4: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$49,695	\$175,159	\$176,281
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
<b>A</b>	<b>Subtotal EDC Incentive Costs</b>	<b>\$49,695</b>	<b>\$175,159</b>	<b>\$176,281</b>
B.1	Design & Development <sup>1</sup>	\$269	\$642	\$3,266
B.2	Administration <sup>2</sup>	\$13,750	\$84,176	\$121,071
B.3	Management <sup>3</sup>	\$7,747	\$17,237	\$19,060
B.4	Marketing <sup>4</sup>	\$4,951	\$24,754	\$24,804
B.5	Technical Assistance <sup>5</sup>	\$260	\$1,525	\$1,688
<b>B</b>	<b>Subtotal EDC Implementation Costs</b>	<b>\$26,976</b>	<b>\$128,334</b>	<b>\$169,888</b>
<b>C</b>	<b>EDC Evaluation Costs</b>	<b>\$1,373</b>	<b>\$3,617</b>	<b>\$6,045</b>
<b>D</b>	<b>SWE Audit Costs</b>	<b>\$0</b>	<b>\$2,039</b>	<b>\$2,931</b>
<b>E</b>	<b>Participant Costs</b>	<b>\$0</b>	<b>\$483,225</b>	<b>\$483,225</b>
	<b>Total Costs</b>	<b>\$78,044</b>	<b>\$792,374</b>	<b>\$838,370</b>
	<b>Total Costs for TRC<sup>6</sup></b>		<b>\$570,030</b>	<b>\$595,753</b>
<b>F</b>	<b>Annualized Avoided Supply Costs</b>	<b>\$0</b>	<b>\$111,146</b>	<b>\$111,146</b>
<b>G</b>	<b>Lifetime Avoided Supply Costs</b>	<b>\$0</b>	<b>\$1,043,321</b>	<b>\$1,043,321</b>
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$1,043,321</b>	<b>\$1,043,321</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>1.8</b>	<b>1.8</b>
Notes				
:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			



## **4.5 Residential Energy Efficient Products Program**

The Energy Efficient Products Program provides financial incentives to customers and support to retailers that sell energy efficient products such as ENERGYSTAR® qualified appliances or compact fluorescent light bulbs. The program includes promotional support, point-of-sale materials, training, promotional events and “up-stream product buy-down” rebates to retailers, distributors or manufacturers for select appliances. The program also includes existing catalog sales channel, and support for community-based initiatives, or other distribution channels that can reliably document effective distribution of energy efficient products.

Within the Residential Energy Efficient Products Program, there were a total of 3,239 Appliance rebates and 53 Water Heater rebates through the end of PY2. Of the appliances rebated, a total of 1,605 customers indicated that natural gas was available. Of the water heaters rebated, a total of 6 customers indicated that natural gas was available.

### **4.5.1 Program Logic**

The program will encourage community-based initiatives that support documented distribution of energy efficient products and energy saving results. Such community-based initiatives include outreach through in-school training, college students, faith-based organizations, and municipal initiatives. The CSP will develop educational materials on the proper use and selection of high efficiency light bulbs, along with product discounts, coupons and price buy-downs to incentivize customers to purchase CFLs, LEDs and other qualifying EE products.

Estimates of low-income participation by county and census will be included in Penn Power’s annual report to the PUC.

For the program, the minimum qualifying efficiency ratings are based on current ENERGY STAR® qualified appliances published by the US EPA. Customer incentives can be in many forms and all are paid by the utility. Incentives can range from \$1 to the full purchase price of a light bulb. One incentive will be a mark-down or buy-down program which is a shelf tag, display sticker or end cap sign recognizing the incentive coming through the utility’s program. The discount is paid by the utility to the CFL manufacturer based off point-of-sale purchase data. A second incentive may include coupons through print media, bill inserts, or directly at the point of sale such as shelf coupon pads redeemable at the register. These incentives would be paid by the utility and redeemable at participating retailers. A third method may include rebate forms that are mailed to a clearing house with rebate checks sent directly to customers. A fourth method may include discounts prepaid at the utility’s on-line store which allows customers to shop using the internet.

Dealer incentives and special promotional “events” will be used to encourage sales of high efficiency products, and/or retirement of less efficient equipment (e.g. Torchiere lamps) through “buy down” first cost and/or promotion of eligible equipment to customers. Customer rebates will be available for selected appliances. Exchange program events for lighting and room air conditioners may also be employed at periodic events.

The message delivered to customers can be accomplished by using a variety of mass marketing tools including utility bill inserts, local newspaper circulars, direct mail, point-of-sale displays at retailers and the utility web site and on-line store. Retailers and manufacturers will also be involved cross-promoting

product offers in conjunction with national campaigns like Earth Day and Change a Light, Change the World programs.

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

##### **Gross Impact Analysis**

The evaluation effort is conducted using separate methodologies for CFLs and for other appliances, with the details of the methodologies described in the subsections below.

##### **Gross Impact for CFLs**

Savings associated with the CFL component are estimated using a deemed approach, with the energy savings and demand reductions taken as deemed in accordance with the TRM.

There were two separate activities within the CFL component of this program in PY2: upstream discounts and giveaway events. The impact evaluation for both activities within the CFL program component includes the following verification elements:

- Review of shipment invoices, including types and quantities of CFLs distributed to participating retailers. These shipment invoices are carefully matched to the DSM tracking system to confirm proper counts and bulbs types claimed.
- Review of the DSM tracking system to assure there are no duplicate entries and that all bulbs were eligible for being counted in PY2 based on invoice dates.
- Review of CSP energy savings and demand reduction calculations.
  - A review of the assumptions regarding the wattages of the baseline incandescent bulbs presumed to be supplanted by CFLs is particularly important.
- For CFL giveaway events, a review of the event documentation including photographs and post-event reports.

##### **Gross Impact for Appliances**

Gross kWh savings for appliances sold through the Residential Energy Efficient Products program are estimated using a deemed approach for measures included in the statewide TRM.

The impact evaluation for the appliance program component will include the following components:

- Verification of proper installation through on-site visits; and
- Review of CSP energy savings and demand reduction calculations
  - Calculations are reviewed to ensure that they are done according to the PA TRM or PA Interim TRM.
  - For three particular measures – room air conditioners, dehumidifiers, and clothes washers – the PA TRM requires a partially deemed approach. That is, certain characteristics of the appliance or the household in which the appliance is used affect the calculations.

Upon review of the DSM tracking system, it was found that the CSP energy savings and demand calculations for room air conditioners used Harrisburg as the reference city in all cases. This was corrected by using a zip-code “lookup” to identify the closest reference city to the household in which the unit was used for each case. Additionally, the savings for dehumidifiers assumed that all of the rebated units had a capacity between 25 and 35 pint per day. This resulted in an understatement of energy savings attributable to dehumidifiers, as many of the units had capacities greater than that range

(and accordingly greater deemed savings). The default export of the DSM tracking system for the program did not have a data field listing the capacities of each dehumidifier rebated. Fortunately, these parameters *are* captured and recorded in the tracking database, though in a format that precludes determination of these parameters for the census of the population<sup>23</sup>. Accordingly, ADM sampled a sufficiently large number of rebated dehumidifiers to check the distribution of capacities. Deemed energy savings and demand reductions from the PA TRM were applied to this sample of dehumidifiers and compared to the claimed savings in the DSM tracking system. The resulting realization rate was applied to the population of dehumidifiers rebated through the program. Finally, the DSM tracking system energy savings calculations for clothes washers assumed that all units were operating in households with electric water heating. However, on-site data collection activities revealed that this was not necessarily the case. For the sample of clothes washers verified on-site, information regarding the households' water heating fuel source was documented and used to properly assign energy savings according to the PA TRM. These energy savings were compared to the DSM tracking system's claims and used to develop a realization rate that was applied to the population of clothes washers rebated through the program.

For LED holiday lighting, the DSM tracking system had a systematic error of over estimating energy savings by a factor of six. This was corrected by applying the proper deemed energy savings and demand reductions in accordance with the PA TRM for all LED holiday lights. For the rest of the appliances rebated through the program, the claimed energy savings and demand reductions were appropriately calculated in the DSM tracking system. As a result, a realization rate for these appliances was calculated based on the results of the field verification activities.

The preceding discussion illustrates the fact that the majority of the variance between claimed savings and verified savings was the result of miscalculations in the DSM tracking system, which were corrected during the "desk review" phase of verification. The only exception, which was revealed during field verification, was the prevalence of non-electric water heating and its effect on verified savings for clothes washers.

### **4.5.3 Program Sampling**

The M&V of the upstream CFL program component does not require field work or customer surveys. A census of shipment invoices along with the calculations in the DSM tracking system were reviewed to ensure that the energy savings and demand reductions are claimed according to the protocols in the PA TRM. Minor discrepancies were found regarding baseline wattage assumptions and there were some rounding errors but overall there was very little variance between claimed and verified savings.

The sampling approach for the appliance rebate program component is batch- stratified random sampling on a quarterly basis (for on-site verification)<sup>24</sup>. A sample point in the context of the appliance rebate component of this program is defined as "one appliance." A census of the energy and demand savings calculations in the program tracking data are reviewed to ensure that the energy savings and demand reductions are claimed according to the protocols in the PA TRM, as described in the previous section.

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<sup>23</sup> This is technically possible, and future exports may indeed include these essential fields. For the PY2 report, ADM staff needed to access these data on a rebate by rebate basis using the online "Vision DSM" database tool.

<sup>24</sup> See Table 1-9.

Two sampling activities were required for the appliance component of the program:

1. A sample of rebated dehumidifiers from the DSM tracking system was examined in the online program database to identify each unit's capacity in pints per day. This was a simple random sample that achieved  $\pm 6\%$  precision at the 90% confidence level. The sample size for on-site physical verifications will be sufficient to determine gross impact with  $\pm 30\%$  relative precision at the 90% confidence level. The sampling technique was stratified random sampling with clothes washers comprising one stratum, and all other appliances composing a separate stratum. This stratification was chosen because of the variance in savings unique to clothes washers resulting from different water heating fuel sources.

Although the program realization rate reported herein is for the combined Efficient Products program, the realization rate for each program component is reported separately to Penn Power.

#### **4.5.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team drafted a program logic model which will serve as a visual representation for the program processes. Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The participant surveys have recently been completed and results will be reported to Penn Power in the fall of 2011.

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

Residential customers may complete an application form for rebate incentives for purchases of qualified ENERGYSTAR® labeled appliances and other energy efficient household products. Honeywell is Penn Power's program CSP who will provide marketing support and training to retailers throughout PA service territory, will process customers' rebate applications, validate that applications meet all program requirements, and approve or deny rebate payment.

#### 4.5.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-5: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$177,669	\$514,208	\$598,050
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$177,669</b>	<b>\$514,208</b>	<b>\$598,050</b>
B.1	Design & Development <sup>1</sup>	\$378	\$902	\$4,374
B.2	Administration <sup>2</sup>	\$53,088	\$315,869	\$376,805
B.3	Management <sup>3</sup>	\$4,436	\$13,787	\$16,842
B.4	Marketing <sup>4</sup>	\$27,549	\$48,005	\$48,173
B.5	Technical Assistance <sup>5</sup>	\$365	\$2,144	\$2,358
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$85,815</b>	<b>\$380,707</b>	<b>\$448,553</b>
C	<b>EDC Evaluation Costs</b>	\$2,262	\$9,238	\$11,461
D	<b>SWE Audit Costs</b>	\$0	\$2,866	\$4,046
E	<b>Participant Costs</b>	\$0	\$931,288	\$1,070,087
	<b>Total Costs</b>	<b>\$265,746</b>	<b>\$1,838,307</b>	<b>\$1,993,398</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$1,224,272	\$1,433,139
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$1,721,243	\$2,120,615
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$8,534,835	\$10,515,133
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$8,534,835</b>	<b>\$10,515,133</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>7.0</b>	<b>7.3</b>
Notes: <sup>1</sup> Includes cost of EE Expert				
<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.				
<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.				
<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.				
<sup>5</sup> Includes costs for Tracking and Reporting System.				
<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.				

## 4.6 Residential New Construction Program

This program provides incentives to builders for achieving ENERGY STAR® Homes status, or the Home Energy Rating System Program (HERS) associated with a highly energy efficient home. The program supports implementation of contractor-installed HVAC, solar, or other eligible systems in existing or new residential buildings, as well as measures addressing building shell, appliances and other energy consuming features. This program involves promoting the sale of high-efficiency, ENERGY STAR® compliant equipment through local builders. Participants can receive a rebate based on calculation of the energy savings related to the home's construction over standard practice.

### 4.6.1 Program Logic

This program supports the construction of homes exceeding code requirements, and implementation of contractor-installed HVAC, solar, or other eligible systems, as well as high or energy efficient appliances in new or rehab homes.

To qualify for this program, the home must exceed the PA Energy Code (International Energy Conservation Code IECC 2006) requirements by at least 15% and 30%. Program services will be delivered to customers by qualified local builders and contractors who demonstrate (through HERS, REM/Rate or other rating tool recognized in the TRM) that the house meets minimum performance energy savings criteria consistent with that of a highly energy efficient home. Participating contractors or builders receive rebates for achieving high efficiency standards.

Equipment offered to existing residential customers under the other programs are eligible for installation in new homes under this program. The rebate is determined by a formula, based on savings, estimated at 70% of incremental costs.

### 4.6.2 Program M&V Methodology

This program started up late in PY2, and contributes an insignificant amount of the portfolio level savings for PY2. As such, some of the more costly evaluation activities for this program are reserved for the PY3 evaluation. The evaluation methodology described herein did result in significant findings that (1) resulted in adjustments to the gross reported impacts and (2) were quickly communicated to the Company and its implementer, Performance Systems Development (PSD).

For the PY2 evaluation, ADM focused on conducting engineering reviews of a sample of projects<sup>25</sup>. The engineering review involved inspection of the REM/Rate models associated with the rebated buildings. For each sampled home, ADM analysts ran the REM/Rate input files and made the following considerations:

1. Are the baseline specifications in accordance to those in the 2010 PA TRM?
2. Are the claimed impacts attributable to improved construction practices and premium efficiency HVAC systems and appliances, or do they result from modifications that are not supportable by the PA TRM<sup>26</sup>

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<sup>25</sup> ADM did conduct a handful of on-site inspections during the Spring and Summer of 2011. However, all of the inspected homes were technically part of the PY3 population.

<sup>26</sup> For example, it would not be appropriate to claim energy savings based on differences in the 'reference' and 'as built' models' thermostat settings, or by virtue of using different heating or cooling degree days in the two models.

3. Is the REM/Rate modeling performed correctly and does it provide accurate results?

If any irregularities or inconsistencies are discovered in the above checks, ADM recalculated the energy savings and determined the realization rate for the particular sampled project.

### **Evaluation Findings**

The engineering review in large validated that the reference homes were modeled in accordance with the PA 2010 TRM requirements. In rare cases, the REM/Rate models miscalculated the energy usage of ground source heat pumps. ADM's corrections to these miscalculations/modeling issues accounted for the variance between gross reported and gross verified energy savings and demand reductions for this project.

#### **4.6.3 Program Sampling**

The sampling approach for this program is batch-wise stratified random sampling on a quarterly basis. The sample size is sufficient to determine this program's gross impact with  $\pm 15\%$  relative precision at the 85% confidence level<sup>27</sup>. The sample employs four strata due to the skewed distribution of energy savings. The stratification is along claimed energy savings, and the strata are determined such that all strata have approximately the same amount of cumulative gross reported energy savings. Homes with electric space heating and electric water heating tend to have much higher claimed savings than homes with gas heating. Homes with ground source heat pumps tend to have the highest claimed savings in the population.

#### **4.6.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team drafted a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?
- Which measures are implemented most frequently and what is the incremental cost?
- Which measures are potentially cost effective but not implemented very frequently?
- What are the non-monetary barriers for greater implementation of energy efficiency measures?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

In real-time evaluations, there is also a strong component of "Process Feedback" that may result from impact evaluation activities. For example, ADM has communicated the nature of the discrepancy related

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<sup>27</sup> See Table 1-9.

to the modeling of ground source heat pumps to PSD. After a web-based meeting of ADM and PSD staff, PSD has developed a three-fold effort to remedy this potential issue. First, PSD is engaging Architectural Energy Corporation regarding modifications to REM/Rate that may prevent or minimize this occurrence, even if the nature of the problem lies with the modeler and not the REM/Rate software itself. Secondly, PSD plans on educating the participating HERS raters regarding modeling of homes with ground source heat pumps. Lastly, PSD is increasing the frequency and depth of quality control checks on models that utilize ground source heat pumps.

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

The Companies selected Performance Systems Development to manage the New Construction Program. The program was launched on October 11, 2010.



#### 4.6.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-6: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$140,394	\$177,600	\$177,600
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$140,394</b>	<b>\$177,600</b>	<b>\$177,600</b>
B.1	Design & Development <sup>1</sup>	\$518	\$1,236	\$5,601
B.2	Administration <sup>2</sup>	\$32,511	\$120,093	\$120,093
B.3	Management <sup>3</sup>	\$6,081	\$18,900	\$22,262
B.4	Marketing <sup>4</sup>	\$1,913	\$4,732	\$4,866
B.5	Technical Assistance <sup>5</sup>	\$500	\$2,938	\$3,208
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$41,523</b>	<b>\$147,899</b>	<b>\$156,031</b>
C	<b>EDC Evaluation Costs</b>	\$1,955	\$4,924	\$5,564
D	<b>SWE Audit Costs</b>	\$0	\$3,929	\$5,412
E	<b>Participant Costs</b>	\$0	\$186,480	\$186,480
	<b>Total Costs</b>	<b>\$183,872</b>	<b>\$520,832</b>	<b>\$531,087</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$314,402	\$323,173
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$28,594	\$28,594
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$303,810	\$303,810
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$303,810</b>	<b>\$303,810</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>0.97</b>	<b>0.94</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.7 Residential Whole Building Comprehensive**

This program provides comprehensive diagnostic assessments of households followed by direct installation of selected low-cost measures plus incentives for implementation of measures addressing building shell, appliances and other energy-consuming features. Customers are eligible to receive up to \$300 in rebates for participating in a two part (test in/test out) comprehensive energy audit and up to \$900 in rebates calculated on performance-based kWh savings achieved by installing energy-saving improvements.

### **4.7.1 Program Logic**

This program provides comprehensive EE diagnostic assessments followed by direct installation of selected low cost measures plus incentives to households for implementation of associated measures. Customers pay open market rates for the comprehensive audit while being eligible to receive incentives to offset the audit cost. Performance-based rebates up to \$900 will be paid based on calculated energy savings from major measures installed.

This is a full service program similar to the EPA's Home Performance with ENERGY STAR program that involves test-in/test-out blower door procedures, identification and installation of energy savings opportunities and, at the contractor's discretion, relevant health and safety measures.

### **4.7.2 Program M&V Methodology**

This program started up very late in PY2, and contributed much less than one percent of the portfolio level savings for PY2.

The gross impact analysis for the program has three components:

1. Verify the rate of participant homes to install and continue to use the program induced low- and medium-cost upgrades,
2. Verify that the energy and demand impact claims associated with the low- and medium-cost upgrades are calculated according to the PA 2010 TRM.
3. Verify the installation of capital cost measures (typically envelope improvements) and that the energy savings claims associated with these upgrades are consistent with simple engineering estimations of the energy savings.

In PY3 it is anticipated that this program will have a much higher contribution to the portfolio level savings, and in response both the sample sizes and the rigor of the process in step 3 above will be increased accordingly. For example, the baseline and as-built performance of each sample participant home will be determined by obtaining the original electronic data file from the energy auditor's simulation software and updating it to match the pre-existing and as-built conditions observed during the on-site data collection and monitoring visit. If necessary, the simulation software can be calibrated to monthly usage data obtained from customer bills.

The PY3 evaluation relied on a combined telephone and field survey of the sample to verify installation rates of energy efficiency measures, if the home is occupied or not, and to verify heating fuel type, as the energy savings for envelope sealing measures are highly dependent on heating fuel source and system type. Sampled homes that received significant envelope improvements such as insulation, infiltration reduction, duct sealing, or new windows were subject to on-site visits, while telephone

surveys were used to verify the installation rates of low-cost measures such as CFLs and smart power strips.

#### **4.7.3 Program Sampling**

The sampling approach for this program is batch-wise stratified random sampling on a quarterly basis. The projects were categorized into two strata based on gross reported savings. Projects with extensive envelope improvements, typically resulting in decreased usage of electric space heating equipment, dominated the higher savings stratum, while the lower savings stratum was dominated with homes that received CFLs, smart power strips, and other low-cost measures during an initial audit. For Penn Power, the sample size was sufficient to determine this program's gross impact with  $\pm 15\%$  relative precision at the 85% confidence level<sup>28</sup>.

#### **4.7.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team drafted a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

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

Honeywell is Penn Power's program CSP who will recruit and develop qualified contractors who will use diagnostic equipment to evaluate and ensure that the home is operating at peak efficiency. Honeywell has subcontracted this program to Performance Systems Development (PSD) to benefit from their established network of BPI contractors.

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<sup>28</sup> See Table 1-9.

#### 4.7.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-7: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$1,669	\$2,959	\$2,959
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$1,669</b>	<b>\$2,959</b>	<b>\$2,959</b>
B.1	Design & Development <sup>1</sup>	\$91	\$218	\$2,498
B.2	Administration <sup>2</sup>	\$11,252	\$77,119	\$91,783
B.3	Management <sup>3</sup>	\$1,072	\$6,202	\$8,345
B.4	Marketing <sup>4</sup>	\$1,089	\$19,918	\$20,050
B.5	Technical Assistance <sup>5</sup>	\$88	\$518	\$659
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$13,592</b>	<b>\$103,975</b>	<b>\$123,335</b>
C	<b>EDC Evaluation Costs</b>	\$960	\$3,311	\$3,594
D	<b>SWE Audit Costs</b>	\$0	\$693	\$1,467
E	<b>Participant Costs</b>	\$0	\$5,526	\$5,526
	<b>Total Costs</b>	<b>\$16,222</b>	<b>\$116,463</b>	<b>\$136,881</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$104,533	\$124,176
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$1,229	\$1,229
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$9,474	\$9,474
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$9,474</b>	<b>\$9,474</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>0.09</b>	<b>0.08</b>
150	Notes:			
	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## 4.8 Residential Multi-Family Program

This program leverages audit services already being provided by the Pennsylvania Housing Finance Agency (PHFA) by marketing the program to property managers and owners who have participated and completed the PHFA audits. By leveraging other resources available through PHFA, the program targets other property managers and owners who have not participated in the PHFA audits. The program also targets tenants in these multifamily buildings by directly providing an energy conservation kit at no cost to tenants. For purposes of this report, and consistent with the Companies' February 5, 2010 EE&C filing, all energy savings and demand reduction results for this program are reported in the Residential sector.

### 4.8.1 Program Logic

The objective of this program is to capture electric energy savings available in common lighting areas (hallways, exit signs, laundry facilities, exterior lighting, etc.). Building upon the PHFA audit findings, this program provides common area interior and exterior lighting measures for multifamily buildings, plus installation of CFLs and LED Exit Signs in common areas. These retrofit services will be provided by electrical contractors, hired directly by the property owners/managers, as the program is being marketed to these trade allies.

In addition to providing lighting measures for common areas, this program also targets tenant areas. Tenants who pay for utilities as part of their rent in multifamily buildings often have little motivation to save electricity since they do not benefit directly, unless landlords pass on the energy savings through reduced rent. Tenants who pay electricity directly have more motivation since they are likely to experience lower electric bills. Regardless of whether a tenant is master metered or a customer of record, they will be offered a conservation kit consisting of CFLs plus two (2) LED night lights at no cost to the tenant.

Tenants that qualify as low-income customers receiving energy conservation kits will be estimated and tracked to support assessment of equitable treatment of low-income customers. This estimate will be based on the information provided by the property manager/owner as to what percentage of tenants in a given building qualify as low-income tenants.

### 4.8.2 Program M&V Methodology

The program has a unique delivery mechanism: conservation kits are sent to apartment managers to be either directly installed in dwellings, or to be distributed to tenants for self installation. The managers collect contact information for the tenants when possible, so it is possible to contact the tenants directly for verification purposes. Although customer telephone surveys are usually the most cost effective method for verification simple, prescriptive measures such as CFLs and LED night lights, the unique delivery mechanism prompted ADM to conduct on-site verification visits for impact evaluation. The impact evaluation conducts the following investigations and makes adjustments accordingly.

- Tracking System Review:
  - Are there duplicate records?
  - Are there invoices that match the counts of conservation kits in the tracking data?
  - Do all records correspond to the 6/1/2010 to 5/31/2011 delivery period?
  - Are the per-unit savings calculated in accordance to the TRM?

- On site visit:
  - Is there evidence that a conservation kit has been received by tenant?
  - How many CFLs are installed as of the site visit?
  - How many LED night lights are installed as of the site visit?

Based on the on-site visits, the ISR for CFLs is taken to be 84%. The actual observed ISRs on-site were approximately 66%, but the 84% value in the TRM is judged to be appropriate because, though there may be a considerable lag between CFL receipt and CFL installation, the observed initial ISRs were high enough such that it is likely that ISRs of 84% or higher may be achieved<sup>29</sup>. The ISR for the night lights was calculated according to on-site counts of installed night lights, but was adjusted downward by a factor of 0.53 to represent the fraction of night lights that actually replaced preexisting incandescent night lights. The factor is taken from comprehensive surveys of participants from the online home audit program, but is judged to be appropriate as the number of LED night lights delivered and the delivery mechanism are quite similar. .

### **4.8.3 Program Sampling**

The sampling unit is the conservation kit, which should have a 1-to-1 correspondence with individual residences within the participating apartment complexes. The sample size is sufficient to achieve the desired 15% relative precision at the 85% confidence level with the assumption that the coefficient of variation in the gross verified savings is 0.5<sup>30</sup>. Our initial samples were stratified by management installed kits versus tenant installed kits. This stratification was based on the expectation is that the apartment management team will install the individual measures at a higher rate than the tenants. The two sets did not have significantly different ISRs, however, and the gross verified savings for the overall program was calculated with the 84% ISR for all CFLs that were delivered to or installed in dwelling units.

### **4.8.4 Process Evaluation**

The contract for the tenant area program component has been awarded to PowerDirect. The evaluation team has reviewed the scope of work and the program delivery proposal for the tenant area program component. Interviews with the Companies' key program staff are occurred in early October 2010. Following the interviews, the evaluation team drafted a program logic model which served as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In

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<sup>29</sup> ADM's on-site verification visits occurred 16 to 22 weeks after the kits were mailed. It may take one year or more for the 'in service rate' to reach 84%. For the online home energy audit program, ADM has been conducting online surveys for over one year. Most surveys occur within two or three months of conservation kit receipt and also show ISRs of around 70% for CFLs. However, ADM has also surveyed a sample of PY2Q1 participants in October 2011 to investigate if the ISR has climbed over time. The ISR for CFLs for customers that received kits during PY2Q1 were 67% during the initial survey, but the ISRs climbed to 82% in the October 2011 survey for the PY2Q1 participants. Both surveys had 7% relative precision at the 90% confidence level, so this represents a statistically significant rise in the ISR over time.

<sup>30</sup> See Table 1-9.

addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

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

Penn Power has launched the Multifamily Program for Common Areas using SAIC to administer this program. SAIC is responsible for marketing to multifamily buildings property managers/owners by conducting direct contact with these customers, email solicitations and using Penn Power account representative leads. SAIC is also marketing this program through trade allies – e.g., electrical contractors – and by targeting different associations of property owners and managers. The Companies have hired PowerDirect (PD) to administer a Multifamily Program for Tenant Areas. PD completed necessary upfront work to identify multifamily properties in the Companies’ service territories and have contacted property managers and provided information about the program. Beginning in January through March, PD shipped energy conservation kits to properties that agreed to participate in the program. Starting in Apr through present, PD is working with property managers having received kits to gather pertinent information needed for program evaluation.

#### 4.8.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-8: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$3,496	\$57,060	\$57,060
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
<b>A</b>	<b>Subtotal EDC Incentive Costs</b>	<b>\$3,496</b>	<b>\$57,060</b>	<b>\$57,060</b>
B.1	Design & Development <sup>1</sup>	\$21	\$50	\$521
B.2	Administration <sup>2</sup>	\$8,108	\$31,245	\$44,764
B.3	Management <sup>3</sup>	\$247	\$768	\$1,114
B.4	Marketing <sup>4</sup>	\$78	\$192	\$204
B.5	Technical Assistance <sup>5</sup>	\$20	\$119	\$148
<b>B</b>	<b>Subtotal EDC Implementation Costs</b>	<b>\$8,474</b>	<b>\$32,375</b>	<b>\$46,751</b>
<b>C</b>	<b>EDC Evaluation Costs</b>	<b>\$467</b>	<b>\$2,488</b>	<b>\$3,288</b>
<b>D</b>	<b>SWE Audit Costs</b>	<b>\$0</b>	<b>\$160</b>	<b>\$320</b>
<b>E</b>	<b>Participant Costs</b>	<b>\$0</b>	<b>\$57,060</b>	<b>\$57,060</b>
	<b>Total Costs</b>	<b>\$12,437</b>	<b>\$149,142</b>	<b>\$164,478</b>
	<b>Total Costs for TRC<sup>6</sup></b>		<b>\$85,176</b>	<b>\$100,353</b>
<b>F</b>	<b>Annualized Avoided Supply Costs</b>	<b>\$0</b>	<b>\$111,850</b>	<b>\$111,850</b>
<b>G</b>	<b>Lifetime Avoided Supply Costs</b>	<b>\$0</b>	<b>\$539,691</b>	<b>\$539,691</b>
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$539,691</b>	<b>\$539,691</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>6.3</b>	<b>5.4</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			



## **4.9 Residential Low-Income Programs**

### **WARM Extra Measures Program:**

This program is an expansion of, and enhancement to the existing comprehensive Low-Income Usage Reduction Program, known as WARM, that provides additional electric energy savings measures and services to income-eligible customers. Expanded measures include an average of four (4) additional CFLs (including specialty CFLs such as candelabras, 3-way, outdoor, recessed and flood lights), LED night lights, and smart power strips.

### **WARM Plus Program:**

This program is an expansion of, and enhancement to the existing comprehensive Low-Income Usage Reduction Program, known as WARM, that will provide additional electric energy savings measures and services to income-eligible customers. The WARM Plus program will support a 25 percent increase above the existing WARM/LIURP program, in the number of income-eligible homes receiving comprehensive treatments for Penn Power.

### **Low-Income, Low-Use Program:**

This program is for low-income customers that do not meet the minimum usage of 600 kWh/month to qualify for the WARM program. These customers received CFLs, faucet aerators, LED nightlights, a furnace whistle and energy education materials.

#### **4.9.1 Program Logic**

### **WARM Extra Measures Program:**

This program offers two ways for customers to realize increased electric energy savings. The Act 129 Program opens the door for customers to reduce phantom load from electronics and entertainment equipment in their homes by allowing installation of smart power strips. It also allows for the installation of an average of four (4) CFLs in addition to the WARM/LIURP Program maximum of twelve (12) per home.

Program services are delivered by existing WARM Community Based Organizations (CBOs) and private contractors, coordinated or augmented by additional private vendors as needed to enhance the capacity of existing agencies and contractors.

The WARM/LIURP program is managed by the Companies' internal staff with outside agencies and private contractors performing comprehensive whole-house energy audits, energy education and direct installation of cost-effective electricity-saving measures.

### **WARM Plus Program:**

This program provides additional electric energy savings measures and whole-house services to an additional 25 percent of lower income households above the existing WARM/LIURP program participant goals.

Program services are delivered by existing WARM CBOs and private contractors, coordinated or augmented by additional private vendors as needed to enhance the capacity of existing agencies and contractors.

The program provides whole-house energy conservation services such as those provided by the WARM Program: air sealing, insulation, electric water heat and cooling reduction measures, appliance testing and possible replacement, replacement lighting, smart power strips, energy education, and other cost-effective custom measures. The program will also increase availability of subsidized energy efficiency services to 25 percent more customers. There is no payment required by the customer for the installation of these measures.

### **Low-Income, Low-Use Program:**

Hundreds of applications are received each year from low-income customers who use less electricity than the WARM program usage eligibility threshold of 600 kWh per month. This program will allow Penn Power to target this previously unserved group for energy savings by providing them with CFLs, faucet aerators, LED night lights, a furnace whistle and energy education materials.

## **4.9.2 Program M&V Methodology**

### **WARM Extra Measures Program:**

ADM conducted both telephone surveys and site visits to verify that the various energy efficiency measures were installed in accordance with the assumptions in the TRM.

The ISRs LED night lights and “smart” power strips are taken from field verification surveys in accordance to the principles discussed in section 4.2.2 or in the LULU discussion below. ADM used the ISRs from on-site visits only for the smart strips because, unlike the detailed online survey instrument used for the Home Energy Audit program, the telephone surveys may not capture enough details about the smart strip installation to determine if the devices are actually saving energy<sup>31</sup>.

The ISRs for CFLs and Furnace whistles are taken from the TRM. For both CFLs and Furnace Whistles, the ISRs in this program component are notably higher than the stipulated values in the TRM: The ISRs for CFLs were found to be 94% instead of 84%. The ISRs for furnace whistles were found to be 81% for this program, instead of the 47% stipulated in the TRM. These ISRs are high because this program utilizes “direct install” implementation strategy rather than the usual (and more cost effective) “direct delivery” or “point of sale” channels. To be consistent with evaluation protocols used for the rest of the

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<sup>31</sup> The on-site verification found ISRs of approximately 41%, which are consistent with the findings of the online survey. The telephone surveys found an ISR of 69%, but the results were not used in this evaluation because the telephone survey instrument was not as rigorous of a data collection instrument as the online or on-site surveys.

residential sector in Penn Power's portfolio, the stipulated TRM ISRs were used instead of the as-found ISRs for the CFLs and furnace whistles.

**WARM Plus Program:**

The ex-ante energy savings for the Warm Plus program are based on the impact evaluation of the 2008 and 2009 WARM program, by job type,<sup>32</sup> which employed a statistical billing analysis. Additionally, both ADM and the SWE team conducted on-site inspections to verify installation of energy efficiency measures. The on-site inspections did not result in adjustments to the reported energy savings, but were used, along with a review of the tracking system and program rules and procedures, to establish the general validity of the application of 2008 and 2009 WARM evaluation results to the 2010 WARM Plus program. In accordance to the custom measure protocols for such low-income weatherization programs, ADM looks forward to conducting a billing impacts analysis of the PY1 and PY2 WARM Plus participants to inform the gross verified impacts of the PY3 program.

**Low-Income, Low-Use Program:**

The gross impact analysis for the energy conservation kits has two components:

1. Determine the evaluable, or validate the stipulated TRM installation rate for the measures in the conservation kits.
2. Determine that the average energy savings and demand reductions for the measures in the kits are calculated in accordance to PA TRM protocols.

The installation rates were determined through telephone interviews.

The surveys collected information regarding the installation rates for all kit components, though the CFLs and furnace whistles have ISRs that are stipulated in the TRM. As discussed in section 4.2.2, the surveyed ISRs for CFLs can support the TRM's estimation of a long-term ISR of 84% (although initial ISRs are typically lower than 84%) while for furnace whistles delivered in kits, the ISRs tend to be lower than the 47% stipulated in the TRM.

Apart from measures with stipulated ISRs, for a particular site in a sample the installation rate for each kit element takes on a binary value of 1, if the element is installed in accordance to the principles that define that element as an energy efficiency measure, and 0 otherwise. In particular, faucet aerators are only counted as "installed" if they are installed in a home that has electric water heating. LED night lights are only counted as "installed" if they replace an incandescent night light. The rate at which LED night lights replace incandescent night lights is taken to be 53% from the results of the detailed surveys conducted for the Home Energy Audit program<sup>33</sup>.

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<sup>32</sup> The three job types are as follows: Electric heat jobs are weatherization jobs that direct at least \$250 to reduce space heating energy usage for electrically heated homes; electric water heat jobs direct at least \$25 to reduce water heating energy usage for homes that have electric water heaters, and electric baseload jobs, which may include refrigerator/freezer replacement and lighting retrofits.

<sup>33</sup> This factor, though derived from the Home Energy Audit program's evaluation, is appropriate to use for this program because the LILU kits and the Home Energy Audit kits all contain two LED night lights, sourced, packaged, and shipped by the same implementer, PD. Additionally, the 53% figure appears to have very little variation with respect to EDC service territory or with respect to the kind of kits that contained the LED night lights (there were three distinct kits sent by PD for which we have data regarding the fraction of LED night lights that replace incandescent ones).

### **4.9.3 Program Sampling**

The sampling schemes for each program component are described below. The overall statistical precision of the program was 6% at the 85% confidence level, driven by 70 surveys for each program component and six on-site visits per EDC for Warm Extra measures<sup>34</sup>. The 70 surveys for Warm Extra measures are not counted toward the statistical precision of the program because the main adjustments to the gross reported savings for this component was attributable to the smart strip ISRs, which were determined solely from the on-site surveys. Likewise, the on-site surveys for Warm Plus were not counted toward the statistical precision because they were viewed as a due diligence aspect of using the proxy billing analysis in accordance to the low income usage reduction custom measure protocol.

#### **WARM Extra Measures Program:**

The simple random sample for this program component included 70 telephone verification surveys and six on-site visits per EDC.

#### **WARM Plus Program:**

The sampling approach for this program component is batch-wise simple random sampling on a quarterly basis. The sample size will be approximately ten sites. This field work was conducted mainly to give feedback regarding program implementation to the Companies – the gross energy and demand impacts are determined through billing analysis that incorporates a census of the 2008 and 2009 LIURP participants. ADM conducts a desk review of the tracking system to verify that the energy and demand impact claims for each “job type” correspond to the appropriate energy savings in the “job type” categories of the proxy billing analyses.

#### **Low-Income, Low-Use Program:**

The simple random sample for this program component included 70 telephone verification surveys per EDC.

### **4.9.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies’ EE&C program staff. Following the interviews, the evaluation team drafted a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the efficiency of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance. The recent field work has also resulted in suggestions

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<sup>34</sup> See Table 1-9.

that will increase the evaluability of the Warm Extra Measures program. To facilitate future impact evaluations, the Companies have now directed participating contractors to mark all CFLs installed under the Warm Extra Measures program. A total of 210 participant surveys have recently been completed by Research America and Tetra Tech will report the results to Penn Power in the fall of 2011.

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

##### **WARM Extra Measures Program:**

Program services are delivered by existing Low Income Usage Reduction Program (WARM/LIURP) non-profit agencies, private contractors and subcontractors. Three (3) non-profit agencies expanded their production capacity and additional private contractors were hired to increase capacity to meet the targets in Penn Power's EE&C Plan.

The Companies' internal staff manages the program. Agencies and private contractors perform comprehensive whole house energy audits and direct installation of cost-effective electricity-saving measures.

Following is a list of program partners (Implementation Contractors):

##### **WARM Extra Measures:**

- ACTION Housing, Inc. (Quality Assurance Inspectors)
- Bill Busters, Inc.
- CMC Energy Services
- Community Action Partnership of Mercer County
- EIC/Comfort Home, Inc.
- Northwest PA Weatherization

##### **WARM Plus Program:**

Program services are delivered by existing Low Income Usage Reduction Program (WARM/LIURP) non-profit agencies, private contractors and subcontractors. Three (3) non-profit agencies expanded their production capacity and additional private contractors were hired to increase capacity to meet the targets in Penn Power's EE&C Plan.

The program is managed internally by the Companies' internal staff with outside agencies and private contractors performing comprehensive whole house energy audits and direct installation of cost-effective electricity-saving measures.

Following is a list of program partners (Implementation Contractors):

##### **WARM Plus:**

- ACTION Housing, Inc. (Quality Assurance Inspectors)
- CMC Energy Services
- EIC/Comfort Home, Inc.

**Low-Income, Low-Use Program:**

A large number of WARM applicants do not meet the minimum usage requirement of 600 kWh per month necessary to participate in certain WARM program offerings. In order to meet these customers' needs, the Low-Income Low-Use Program shipped kits of CFLs, faucet aerators, LED night lights, a furnace whistle and energy education material to select low-income Penn Power customers. The Companies' internal staff participated in pre-bid meetings with interested vendors. Internal staff also compared vendor samples, reviewed proposals and met with the top three vendors. A contract award was made August 10, 2010 to PowerDirect. The program launched in October 2010, and kits were shipped in October and November 2010 and February 2011 at no direct cost to customers.

#### 4.9.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-9: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$114,987	\$504,042	\$507,429
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$114,987</b>	<b>\$504,042</b>	<b>\$507,429</b>
B.1	Design & Development <sup>1</sup>	\$152	\$364	\$6,111
B.2	Administration <sup>2</sup>	\$3,710	\$14,773	\$18,501
B.3	Management <sup>3</sup>	\$7,890	\$32,919	\$44,120
B.4	Marketing <sup>4</sup>	\$0	\$917	\$917
B.5	Technical Assistance <sup>5</sup>	\$980	\$6,835	\$9,291
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$12,732</b>	<b>\$55,808</b>	<b>\$78,940</b>
C	<b>EDC Evaluation Costs</b>	\$2,608	\$10,634	\$11,878
D	<b>SWE Audit Costs</b>	\$0	\$1,157	\$3,110
E	<b>Participant Costs</b>	\$0	\$504,042	\$507,429
	<b>Total Costs</b>	<b>\$130,327</b>	<b>\$1,075,683</b>	<b>\$1,105,398</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$528,617	\$554,341
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$232,129	\$234,657
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$1,514,297	\$1,530,786
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$1,514,297</b>	<b>\$1,530,786</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>2.9</b>	<b>2.8</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.10 Commercial / Industrial Small Sector Energy Audit and Technical Assessment Program**

In addition to providing information and a list of auditors, this program funds all the CFL installations for this class of customers. Since all lighting is marketed via the Standard and Nonstandard lighting incentives, this program will be combined with the C&I Equipment Program for reporting purposes.

### **4.10.1 Program Logic**

A list of Auditor & Technical Assessment Providers has been posted on the website. The CFLs have been promoted through Penn Power's Standard Lighting Incentive Program.

Penn Power will support and track participation by governmental customers in a separate program.

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

#### **Gross Impact Analysis**

The CFLs are marketed and processed in the Standard Lighting Incentive Program. As such, the gross impact of the CFL installations is covered under the impact evaluation of the C/I Equipment Program.

### **4.10.3 Program Sampling**

The impact evaluation sample for this program is subsumed into the sample for the C/I Equipment program. In the second program year, the impact evaluation will classify all C/I programs and measures into two categories – custom and prescriptive. This program will fall under the prescriptive component of the C/I Equipment program.

### **4.10.4 Process Evaluation**

A primary aspect of this program's process evaluation is to determine the relationship between the Audit program and the other energy efficiency programs offered by Penn Power. The audits are intended to provide customers with "a customized comprehensive understanding of the opportunities available for saving energy." In theory, this understanding may induce customers to partake in appropriate energy efficiency programs offered by Penn Power. Quantitatively, one can track the number of audit participants that also participated in other Penn Power energy efficiency programs. Qualitatively, the evaluation effort will attempt to capture whether the appropriate energy savings opportunities are identified and described to the customers. Additionally, the evaluation team will interview the Small C/I audit vendor, the Large C/I audit contractors (trade allies), participant customers and program non-participants to address the following issues:

- Degree to which the trade ally is integrated into professional organizations;
- How the trade ally heard about the program;
- Concerns the trade ally might have had about the program;
- Motivation for participating in the program;
- Technologies and practices used by the trade ally prior to hearing about or using the program;
- Extent to which the trade ally recommends the technologies and practices to other customers;
- Extent of uptake of technologies and practices by nonparticipating customers;
- Degree to which participants promote the program with customers;
- How the trade ally "sells" the program;



- Factors that make it difficult to sell or implement the program;
- Customer reactions to the technologies and practices, and to the program;
- Effectiveness of program promotional activities and program operations;
- Quality of interactions with the implementation contractor;
- Extent to which the trade ally has talked to other trade allies about the program; and
- Recommendations for program improvement

### **Evaluating the Procedures for Administering and Managing the Program**

In addition to the above interviews, evaluation team members will conduct interviews with the Companies' internal staff to assess program implementation and processes including but not limited to the following issues:

- Program goals and objectives;
- Development and structure of the program;
- Program activities, their outputs, and their expected outcomes;
- Internal processes and communications;
- Marketing, communication, and outreach activities;
- Step-by-step description of customer participation for each program track;
- Roles of staff members and adequacy of resources;
- Relation to other programs;
- Customer awareness of and satisfaction with program services;
- Reasons for lack of program participation;
- Data collection and tracking practices;
- Processing of projects and payments;
- Quality control and quality assurance; and
- Effectiveness of the program design, including strengths and weaknesses.

Information from the above interviews will be used to construct a "logic model" for the program. Developing a logic model for the program will help to identify gaps in the program, to develop measures for assessing progress, to identify critical issues that need attention, and to communicate with stakeholders about the program and their outcomes.

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

SAIC was contracted to administer this program and has sent out a request for qualifications (RFQ) to gather interested energy auditors for all nonresidential sectors. This list has been provided to commercial and industrial customers. In addition, an application form has been posted on the Companies' website. Customers will contract with these vendors directly and it is the expectation that audits will generate additional applications to other programs. SAIC will track original audit activities that culminate into equipment installations.

#### **4.10.6 Program Finances**

As Small Commercial lighting is marketed via Standard and Nonstandard lighting incentives, project finances for this program have been combined in table 4-13 with the C&I Equipment Program for reporting purposes.

**Table 4-10: Included in Table 4-13**

### **4.11 Commercial / Industrial Small Sector Equipment Program**

This program provides for the implementation of cost effective, high efficiency measures through the Standard Lighting, Nonstandard Lighting, Heating Ventilating and Air-conditioning, Motors & Drives, Specialty Equipment and Custom incentive programs.

#### **4.11.1 Program Logic**

The program is designed to reduce the first cost of high efficiency equipment thereby encouraging the adoption of this equipment in lieu of standard at the end of the useful life measures, or as early replacement. The savings and budget from the Energy Audit and Technical Assessment Program will be combined with this program for reporting purposes.

Incentives are provided to offset a portion of the incremental technology costs (“capital costs”) of high efficiency equipment as well as technical support when needed. Penn Power currently supports high efficiency measures targeting existing buildings, new construction, and building addition for small commercial and industrial customers.

Incentives will be set at a schedule of payments per unit to address the incremental cost of commercially available energy efficient technology for each equipment category, when compared to the commonly available replacement.

Custom measures will be rebated based upon an analysis of potential energy savings on a case by case basis.

#### **4.11.2 Program M&V Methodology**

This program implements both custom measures and prescriptive measures.

Approximately 95% of the gross reported energy savings for this program were attributable to prescriptive lighting measures, 4% of the savings were attributable prescriptive and custom motors projects, and remainder to custom projects. The M&V methodology for this program is described below.

#### **Tracking system review:**

ADM worked with Penn Power and SAIC to set up quarterly reports from the implementer’s tracking system - EPMIS. Each quarterly report included information for all rebates in the EPMIS database at the time of the report. This information was used to monitor the ‘pulse’ of each program as it was implemented and also used to inform quarterly sampling. At the end of each quarter ADM reviewed an updated dataset to define a discrete set of rebates that would be included into the population for that quarter’s evaluation. Eligibility was based on an application’s status and approval date.

ADM also reviewed each dataset and identified sites at which multiple rebates were incentivized. The additional site documentation was used to confirm invoice counts when a multiple rebates covered a single project, and in some cases enabled ADM to reduce the impact on sites with multiple large rebates in separate quarters.

### **Analytical Desk Review: Prescriptive and Custom**

Each sampled site received a thorough desk review before ADM visited the site or calculated Ex Post Verified savings. The desk review included verifying invoices, re-calculating claimed savings using TRM algorithms and/or Ex Ante assumptions (i.e. fixture quantities, motor horse-powers, EFLHs, etc), and identifying key parameters to be researched on-site. This review informed ADM's fieldwork by identifying missing data and sites at which ADM needed to install monitoring equipment. The desk review was also used to flag sites that were claimed using prescriptive algorithms, but whose savings needed to be calculated using a custom approach. This is the case for several of 'Motors & Drives' rebates which were flagged late in the fourth quarter.

Many prescriptive applications with rebate amounts under \$10,000 were submitted through the "Standard Lighting for Business" program component. This program component targeted smaller rebates and strived to simplify the application process for small commercial applicants who may not have the required time or skill to fill out a detailed inventory of the lighting projects. At the time of program design, the 2009 PA TRM was the prevailing guidance document, and Table 12 of that "deemed" the baseline fixtures based on the new efficient fixtures. ADM evaluated all sampled "Standard Lighting for Business" (SLB) projects by applying Appendix C from the 2010 PA TRM and by determining the baseline fixtures through on-site inspection (post only), site contact interviews, and by baseline fixture descriptions available in rebate project documentation. The SLB projects tended to have high verification rates and much of the variability in the realization rates was attributable to differences between Appendix C of the 2010 TRM and Table 12 of the 2009 TRM. The SLB rebate forms are being phased out in favor of the "Non-Standard Lighting for Business" rebate forms described below.

The great majority (over 80% of all prescriptive lighting savings in the C/I sector) of lighting projects were submitted through the "Non-Standard Lighting for Business" (NSLB) program. The NSLB application process requires the applicant to fill out a version of the Appendix C calculator from the 2010 TRM. As such, these projects generally conformed with TRM algorithms. Inconsistencies were limited to discrepancies in EFLH claims and occasionally, usage of 'cut-sheets' for novel lighting fixtures<sup>35</sup>. The overall realization rates for the prescriptive lighting measures are near unity across all three operating companies, indicating that for the most part, results are reported in accordance to TRM protocols.

For custom projects desk reviews were performed in order to create an Evaluation, Measurement, & Verification plan for each sampled site. ADM used the project documentation and site contact to determine what monitoring equipment needed to be installed and if baseline monitoring was required. ADM worked closely with SAIC and Penn Power to identify custom sites at which pre-monitoring would be required by reviewing site documentation for sites early in SAIC's approval process and flagging sites which would only be evaluable with monitored baseline data. ADM reviewed each Custom Incentive application before its approval to ensure its evaluability.

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<sup>35</sup> The general guidance used in this impact evaluation is that if one can find a similar fixture in Appendix C with a connected load within 5% of the proposed fixture, then one should defer to Appendix C.

### Verification /Data Acquisition (DAQ)

ADM used surveys, On-Site Verification, and/or data logging in order to address uncertainties identified in the desk review process. ADM determined the requisite level of additional verification by applying the following general rule-set:

Measure Category	Measure Type	Survey	On-Site Verification	Data Logging
Prescriptive	Lighting		X	X*
Prescriptive	Motors & Drives		X	X*
Prescriptive	Other		X	X*
Custom	All		X	X

\* As required by the TRM

In this way ADM ensured that enough information was gathered to make accurate and robust site analyses.

#### Post DAQ analysis

In order to promote consistency and accuracy, ADM created a Microsoft Excel based calculator for each prescriptive measure rebated in the program that has a stipulated savings algorithm in the Pennsylvania TRM. Each calculator has one spreadsheet that is used to recreate the claimed savings values by entering in values according to the rebate application and site documentation during the desk review. There is a second sheet that is then used to calculate Ex Post Verified savings by updating key parameters according to On-Site data collection. In many cases no changes were made between these two sheets, as all key variables were identified correctly through the desk review.<sup>36</sup>

Custom measures were evaluated according to the EM&V plan that was written during the desk review and in accordance with IPMVP. Given the nature of these measures, the custom analyses employed monitored data, cut-sheets, and one-time power measurements to characterize energy use and energy savings. For measures installed on equipment used in industrial processes, ADM also collected annual production data (in addition to any production collected during the monitored time period). This was used to normalize energy savings to production.

#### 4.11.3 Program Sampling

ADM evaluated the commercial and industrial programs using stratified ratio estimation. Separate samples were drawn, at the 85% confidence level with 15% precision at the annual evaluation level, for each operating company, program, and quarter. A ‘sample point’ denotes a particular rebate which was randomly sampled within its population.

<sup>36</sup> This is particularly true for rebates incentivized through the “Non-Standard Lighting for Business” program and whose connected load reduction was less than 50 kW. These rebates usually included itemized invoices, an itemized list of fixtures and their locations, and fixture cut-sheets. Since the TRM stipulates hours of use by space type for sites whose connected load reduction is less than 50 kW, this documentation proved sufficient much of the time.

At the end of each quarter ADM reviewed tracking data from SAIC to define a discrete list of rebates that became the sample population for that quarter. Once separated into their respective operating companies and programs, this population was then stratified according to measure category (prescriptive vs. custom), common drivers of realization rates or the variability of the realization rates, modes (e.g. “Standard Lighting Rebate” rebates vs. other prescriptive rebates), and the magnitude of rebated savings (used to create ‘certainty’ strata). ADM used a coefficient of variation (CV) of 0.5 for all prescriptive strata, and a CV of 1.0 for all custom strata.

As described above in the *Analytical Desk Review: Prescriptive and Custom* section, several motors and drives rebates were flagged whose savings were claimed using prescriptive algorithms when the rebate should have followed the custom path. Since this represented a particularly unique potential for discrepancies between the reported and verified savings, these motors & drives measures were moved into custom strata and given a CV of 1.0.

#### **4.11.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies’ EE&C program staff. Following the interviews, the evaluation team drafted a process evaluation plan and a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

#### **4.11.5 Program Partners and Trade Allies**

SAIC is the CSP that administers this program and has conducted face to face presentations, email solicitations using Penn Power account representative leads. The program marketing strategy will utilize end-use technologies such as lighting, HVAC, motors and drives rather than just C&I Equipment. Using electronic tools (e.g., website, email-distributions, trade shows and case studies) SAIC has and will continue to market directly to customers. In addition, there has been a special emphasis on trade and professional organizations using event sponsorship, membership and speaking opportunities.

#### 4.11.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-11: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$845,811	\$1,217,472	\$1,230,577
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$845,811</b>	<b>\$1,217,472</b>	<b>\$1,230,577</b>
B.1	Design & Development <sup>1</sup>	\$613	\$1,462	\$12,835
B.2	Administration <sup>2</sup>	\$47,035	\$146,097	\$206,727
B.3	Management <sup>3</sup>	\$7,228	\$31,229	\$38,915
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$592	\$3,477	\$4,180
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$55,468</b>	<b>\$182,265</b>	<b>\$262,658</b>
C	<b>EDC Evaluation Costs</b>	\$2,166	\$10,642	\$14,460
D	<b>SWE Audit Costs</b>	\$0	\$4,648	\$8,513
E	<b>Participant Costs</b>	\$0	\$3,463,687	\$3,463,687
	<b>Total Costs</b>	<b>\$903,445</b>	<b>\$4,878,715</b>	<b>\$4,979,895</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$3,388,245	\$3,446,993
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$961,983	\$961,983
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$12,286,565	\$12,286,565
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$12,286,565</b>	<b>\$12,286,565</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>3.6</b>	<b>3.6</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.12 Commercial / Industrial Large Sector Demand Response Program – CSP Mandatory and Voluntary Curtailment Program**

For Commercial and Industrial, as well as government sector customers, the Companies will solicit registration for curtailment service providers (“DR-CSPs”) registering load in PJM programs. The Companies developed an RFP supporting a pilot for the mandatory program offering firm pricing for commitments for peak load reductions during the top 100 hours, and a voluntary program offering supplemental payment for economic market transactions during the top 100 hours. Contracts supporting launch of the 2011 Commercial/Industrial Demand Response program are pending award and approval. RFPs for 2012 are planned.

### **4.12.1 Program Logic**

The Companies will enter into an agreement with qualified DR-CSPs selected on a first come first serve basis up to the contracted MW of peak load reductions for annual performance periods. Annual performance periods will address the 2011/12, and 2012/13 PJM planning years.

Estimated MW required from this program to meet Act 129 minimum requirements will depend on the MW achieved through energy efficiency (EE) programs. Actual MW registered for the summer of 2012 will be subject to adjustment (up or down) based on actual EE program performance through 2011, as well as experience under this program in the first two years.

### **4.12.2 Program M&V Methodology**

Following the selection of load control technologies, the Companies will verify that demand reduction targets are being achieved consistent with PJM Economic Program protocols in effect during the summer of 2012. A "realization rate" will be developed based on review of PJM DR program transactions and compliance with the accepted CBL protocols. That realization rate will be used to assess the Companies' DR program impacts for Act 129 compliance during the top 100 hours. Details of how the realization rate will be calculated will be determined through evaluation technical working groups, with the participation of the EDCs, the EDC evaluators, and the PA Statewide Evaluator.

### **4.12.3 Program Sampling**

A stratified random sample will be constructed for the program. The number of sample sites will be sufficient to quantify the demand reduction with  $\pm 10\%$  relative precision at the 90% confidence level. If the population size is sufficiently small, the census of participants will be evaluated.

### **4.12.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team drafted a process evaluation plan and a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?

Participant surveys and non-participant surveys will help to assess the efficiency of the program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

#### **4.12.5 Program Partners and Trade Allies**

Contracts supporting launch of the 2011 Commercial/Industrial Demand Response program are pending award and approval. RFPs for 2012 are planned.



#### 4.12.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-12: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$36	\$36	\$36
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$36</b>	<b>\$36</b>	<b>\$36</b>
B.1	Design & Development <sup>1</sup>	\$1,280	\$3,054	\$3,054
B.2	Administration <sup>2</sup>	\$0	\$0	\$0
B.3	Management <sup>3</sup>	\$14,395	\$35,303	\$35,303
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$1,236	\$7,262	\$7,262
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$16,911</b>	<b>\$45,620</b>	<b>\$45,620</b>
C	<b>EDC Evaluation Costs</b>	\$1,232	\$6,495	\$6,495
D	<b>SWE Audit Costs</b>	\$0	\$9,709	\$9,709
E	<b>Participant Costs</b>	\$0	\$0	\$0
	<b>Total Costs</b>	<b>\$18,179</b>	<b>\$61,859</b>	<b>\$61,859</b>
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$0	\$0
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$0	\$0
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Notes: <sup>1</sup> Includes cost of EE Expert				
<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.				
<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.				
<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.				
<sup>5</sup> Includes costs for Tracking and Reporting System				

## **4.13 Commercial / Industrial Large Sector Performance Contracting/Equipment Program**

Large commercial and industrial (and other non-residential) customers may elect to secure DSM/EE services through an Energy Services Company (ESCO) that will identify opportunities, implement retrofits and attain payment through the savings generated by the project over time

### **4.13.1 Program Logic**

This program is designed to reduce the first cost of high efficiency equipment thereby encouraging the adoption of this equipment in lieu of standard at the end of the useful life measures, or as early replacement. The program may be delivered through qualified ESCO contractors. The same incentive programs available to Small Sector customers, the Standard Lighting, Nonstandard Lighting, Heating Ventilating and Air-conditioning, Motors & Drives, Specialty Equipment and Custom, apply to this sector. Incentives can be provided to the ESCO or to the customer as directed by the customer.

### **4.13.2 Program M&V Methodology**

This program implements both custom measures and prescriptive measures. Approximately *all* of the gross reported energy savings for this program were attributable to prescriptive lighting measures. The M&V methodology for this program is identical to the approach used for the Small C/I equipment program described in section 4.11.2.

### **4.13.3 Program Sampling**

The sampling methodology for this program is identical to the approach used for the Small C/I equipment program described in section.

### **4.13.4 Process Evaluation**

The evaluation team has conducted the first set of the Companies' program staff interviews in May and June, 2010. Following the interviews, the evaluation team has drafted a process evaluation plan and a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

#### **4.13.5 Program Partners and Trade Allies**

SAIC is the CSP who is administering this program and is responsible for marketing by conducting face to face presentations, email solicitations and using Penn Power account representative leads. The program marketing strategy will utilize end-use technology such as lighting and HVAC rather than just C&I Equipment. Using electronic tools (e.g., website, email-distribution, trade shows and case studies) SAIC has marketed directly to customers and their performance contractors. In addition, there has been a special emphasis on trade and professional organizations using event sponsorship, membership and speaking opportunities.

### 4.13.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-13: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$784,438	\$1,172,905	\$1,205,510
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$784,438</b>	<b>\$1,172,905</b>	<b>\$1,205,510</b>
B.1	Design & Development <sup>1</sup>	\$341	\$814	\$13,673
B.2	Administration <sup>2</sup>	\$10,534	\$55,187	\$106,169
B.3	Management <sup>3</sup>	\$4,758	\$24,337	\$34,044
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$329	\$1,935	\$2,730
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$15,962</b>	<b>\$82,273</b>	<b>\$156,616</b>
C	<b>EDC Evaluation Costs</b>	\$17,095	\$43,936	\$49,996
D	<b>SWE Audit Costs</b>	\$0	\$2,587	\$6,957
E	<b>Participant Costs</b>	\$0	\$4,509,631	\$5,320,118
	<b>Total Costs</b>	<b>\$817,495</b>	<b>\$5,811,331</b>	<b>\$5,928,710</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$4,295,626	\$5,186,516
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$869,932	\$921,400
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$11,669,746	\$12,360,163
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$11,669,746</b>	<b>\$12,360,163</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>2.7</b>	<b>2.4</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.14 Commercial / Industrial Large Sector Industrial Motors and Variable Speed Drives Program**

This program is designed to encourage Penn Power's commercial and industrial customers to:

1. Upgrade their existing motors to NEMA Premium® motors when switching out old motors due to breakdowns and or programmed replacements; and,
2. Install variable speed drives on motors that do not always operate at the same speed.

The variable speed drive program is designed for commercial and industrial energy customers whose motors are utilized for increased operating hours and have a higher variability of loads on the system. Applications with low variability of loads where the motor runs at constant speed are not good candidates for a variable-speed drive.

### **4.14.1 Program Logic**

This program seeks to provide an incentive for Penn Power's customers when motors are upgraded to NEMA Premium® motors and/or when customers install a new variable speed drive. The incentives offered by Penn Power are provided to help initiate momentum among its customers.

Incentives will be available to customers and through motors distributors as a rebate per unit replaced on a first come first serve basis and will be limited to Penn Power's motor upgrade budget.

To qualify for an incentive, the motor(s) must operate a minimum of 3,000 hrs/yr. The motor upgrade program's individual incentives per motor start at \$20 for a 1HP. The variable-speed drive incentive is a flat rate of \$30 per motor horsepower controlled.

The program is being administered by SAIC.

### **4.14.2 Program M&V Methodology**

The Motors and Variable Speed Drives Program is evaluated separately from all other C/I programs. This is done in part because the impact evaluation team expects to include all or most of the projects in the M&V sample. This program implements both custom measures and prescriptive measures. The M&V methodologies for each type of measure are briefly described below.

#### **Custom Measures**

Custom measures are evaluated according to the custom measures protocol specified in the PA Statewide Evaluator's Audit Plan. The PA statewide evaluator has created a custom measure protocol for motors and drives in non-HVAC applications. The protocol will be used to determine both ex-ante and ex-post savings. In most cases, pre-installation and post-installation monitoring will be required to inform the calculations in the custom motors and drives protocol.

#### **Prescriptive Measures**

Prescriptive measures for the motors and drives program are partially deemed according to protocols in the PA TRM. Most of the prescriptive measures are expected to target HVAC loop pumps and fans. The impact evaluation activities for such measures involve on-site inspections to verify that the measures are installed and commercially operable, and that the associated energy savings and demand reductions are calculated appropriately according to the relevant protocol in the PA TRM.

#### **4.14.3 Program Sampling**

Depending on the EDC, ADM's sample included a census or near-census of the program population. The four projects accounted for 89% of the gross reported impacts. The sampling scheme achieved better than 15% relative precision at the 85% confidence level<sup>37</sup>.

#### **4.14.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team drafted a process evaluation plan and a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

#### **4.14.5 Program Partners and Trade Allies**

SAIC is the CSP that administers this program and has conducted face to face presentations, email solicitations and using Penn Power account representative leads. This program will be marketed to both commercial and industrial customers using tools such as a website, email-based distribution lists, trade shows and case studies. In addition, there will be special promotions to motor equipment suppliers.

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<sup>37</sup> See Table 1-9.

#### 4.14.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-14: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$25,619	\$25,619	\$25,619
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$25,619</b>	<b>\$25,619</b>	<b>\$25,619</b>
B.1	Design & Development <sup>1</sup>	\$34	\$80	\$5,651
B.2	Administration <sup>2</sup>	\$8,174	\$29,729	\$60,930
B.3	Management <sup>3</sup>	\$471	\$2,369	\$6,165
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$33	\$191	\$536
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$8,711</b>	<b>\$32,370</b>	<b>\$73,283</b>
C	<b>EDC Evaluation Costs</b>	\$563	\$5,853	\$10,570
D	<b>SWE Audit Costs</b>	\$0	\$256	\$2,149
E	<b>Participant Costs</b>	\$0	\$110,739	\$110,739
	<b>Total Costs</b>	<b>\$34,893</b>	<b>\$174,836</b>	<b>\$222,359</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$138,030	\$183,660
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$45,531	\$45,531
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$628,450	\$628,450
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$628,450</b>	<b>\$628,450</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>4.6</b>	<b>3.4</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.15 Governmental / Non-Profit Street Lighting Program**

The Street Lighting Program is offered to municipalities regardless of ownership of the street lights. This segment of the Government program will seek to convert existing street lights to high pressure sodium units. In addition to street lights conversion, this program also provides an option to municipalities to upgrade existing outdoor area lights to high pressure sodium units and traffic and pedestrian signals to LEDs.

### **4.15.1 Program Logic**

This program provides incentives to offset the incremental technology costs (“capital costs”) for energy efficient retrofit projects.

### **4.15.2 Program M&V Methodology**

The energy savings and demand reductions attributable to LED traffic and pedestrian signals are deemed in the PA TRM. Currently, Municipal Street Lighting Upgrades are not included in the TRM. However, it is likely that a deemed hours of operation for municipal lighting will be approved by the SWE and PA PUC. In this context, a deemed savings approach to impact evaluation is appropriate. The energy savings will be the product of the wattage reduction from the old Mercury Vapor lamps to the new High Pressure Sodium lamps, and the annual hours of operation. The impact evaluation of these measures will involve verification of installation and operation, coupled with verification that energy savings calculations are performed in accordance with the appropriate protocols in the PA TRM. Large projects will also be subject to on-site baseline verification.

### **4.15.3 Program Sampling**

The sampling approach for this program is batch-wise stratified sampling, updated on a quarterly basis. The stratification is based on the total ex-ante kWh savings with municipal retrofit projects as sampling units. The number of sampled sites will be sufficient to quantify the energy savings and demand reduction with  $\pm 15\%$  relative precision at the 85% confidence level.

### **4.15.4 Process Evaluation**

The evaluation team has conducted the first set of the Companies’ program staff interviews in May and June, 2010. Following the interviews, the evaluation team has drafted a process evaluation plan and a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- Is the marketing plan likely to reach the targeted customers?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. The process evaluation will identify specific best practices that may help the Companies improve program performance.



#### **4.15.5 Program Partners and Trade Allies**

More than 98% of streetlights that must be changed under this program are Penn Power owned. Penn Power plans to use internal resources or a combination of internal resources and external contractors to accomplish the conversion. Information pertaining to this program will be delivered to customers who own streetlights by contracted CSPs and Penn Power area managers or customer service representatives. Similarly, municipalities will receive information about the outdoor area lights and traffic and pedestrian signals change out options through the contracted CSP and Penn Power area managers. Also, the contracted CSP is marketing this program to electrical contractors and lighting distributors.

#### 4.15.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-15: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$124,439	\$175,326	\$175,326
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$124,439</b>	<b>\$175,326</b>	<b>\$175,326</b>
B.1	Design & Development <sup>1</sup>	\$56	\$133	\$996
B.2	Administration <sup>2</sup>	\$3,273	\$20,060	\$28,642
B.3	Management <sup>3</sup>	\$521	\$1,654	\$2,546
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$54	\$317	\$370
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$3,904</b>	<b>\$22,163</b>	<b>\$32,554</b>
C	<b>EDC Evaluation Costs</b>	\$259	\$1,366	\$2,956
D	<b>SWE Audit Costs</b>	\$0	\$423	\$716
E	<b>Participant Costs</b>	\$0	\$31,330	\$31,330
	<b>Total Costs</b>	<b>\$128,602</b>	<b>\$230,608</b>	<b>\$242,882</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$50,833	\$62,814
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$19,279	\$19,279
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$242,188	\$242,188
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$242,188</b>	<b>\$242,188</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>4.8</b>	<b>3.9</b>
Notes				
:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.16 Governmental / Non-Profit Program**

This program targets a small sector of customers on special non-profit rates. They include volunteer fire companies, ambulance associations, some schools and municipal customers. This sector is eligible for all the incentive programs the Small or Large C&I Sector is eligible for, including the Standard Lighting, Nonstandard Lighting, Heating Ventilating and Air-conditioning, Motors & Drives, Specialty Equipment and Custom. In April 2011, the Companies' received approval to enhance the program to include an opt-in CFL kit offering. Customers enrolled in this program are eligible to receive a single CFL kit or multiple CFL kits at no cost.

### **4.16.1 Program Logic**

This program provides incentives to offset the incremental technology costs ("capital costs") for energy efficient retrofit projects.

### **4.16.2 Program M&V Methodology**

This program offers the same set of measures as the general C/I program and is administered by the same conservation service provider, SAIC, and managed by the Companies' internal staff that also manage the C/I program. The M&V methodology for this program is identical to the approach used for the Small C/I equipment program described in section 4.11.2. This program accounted for 0.44% of the portfolio level energy savings for PY2.

### **4.16.3 Program Sampling**

The impact evaluation effort for this program is subsumed into the sample for the C/I Equipment program. However, the program participants are pooled into a separate "Government/Non-Profit" sample and the impacts are reported with  $\pm 15\%$  relative precision at the 85% confidence level.

### **4.16.4 Process Evaluation**

In May and June, 2010, ADM conducted the first set of interviews with the Companies' EE&C program staff. Following the interviews, the evaluation team drafted a process evaluation plan and a program logic model which will serve as a visual representation for the program processes (subject to periodic review and update). Additional interviews with program staff will seek information on researchable issues such as:

- Are IT processes in place and effective?
- Are program roles, hierarchies, and contracts clearly stated?
- How is the marketing plan specifically targeting the decision makers in this sector?

Participant surveys and non-participant surveys will help to assess the value of the marketing program, to characterize the customer experience, and to identify any barriers to customer participation. In addition to interviews, a literature review will help to determine if the program goals were set appropriately. With many aspects of the program being identical to the general C/I Equipment program, the evaluation team recognizes that the outreach to the government and non-profit sectors is this program's key characteristic. The process evaluation will focus on this program's outreach and marketing effort, since many of the other issues, such as IT system processes, will be addressed in the

process evaluations of the C/I Equipment program. The process evaluation will identify specific best practices that may help the Companies to improve program performance.

#### **4.16.5 Program Partners and Trade Allies**

SAIC is administering this program and is responsible for marketing by conducting face to face presentations, email solicitations and using Penn Power personnel to solicit participation. This program has been marketed primarily to County and local government, nonprofit and institutional customers. SAIC has marketed directly to customers using tools such as the website, email-based distribution lists, trade shows and case studies. Additionally, SAIC is responsible for shipping the CFL kits directly to customers.

#### 4.16.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-16: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$655	\$9,735	\$9,735
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$655</b>	<b>\$9,735</b>	<b>\$9,735</b>
B.1	Design & Development <sup>1</sup>	\$3	\$7	\$46
B.2	Administration <sup>2</sup>	\$238	\$11,910	\$14,511
B.3	Management <sup>3</sup>	\$26	\$83	\$106
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$3	\$16	\$18
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$269</b>	<b>\$12,015</b>	<b>\$14,682</b>
C	<b>EDC Evaluation Costs</b>	\$2	\$103	\$135
D	<b>SWE Audit Costs</b>	\$0	\$21	\$35
E	<b>Participant Costs</b>	\$0	\$50,013	\$50,013
	<b>Total Costs</b>	<b>\$927</b>	<b>\$71,887</b>	<b>\$74,599</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$57,571	\$60,268
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$3,429	\$3,429
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$44,353	\$44,353
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$44,353</b>	<b>\$44,353</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>0.770</b>	<b>0.736</b>
Notes				
:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			

## **4.17 Governmental / Remaining Non-Profit Programs**

The Federal Facilities Program supports identifying energy savings opportunities to expedite the Federal Government agencies taking action.

Governmental Buildings and Schools Program will help better identify energy savings opportunities and expedite their implementation. The CSP would provide diagnostic assistance, technical support and rebates incentives necessary for school districts to install high-efficiency measures.

County and Local Buildings including schools will be provided energy audits free of charge up to \$2,000 as a way to increase the proportional share of saving received from governmental customers. In April 2011, the Companies' received approval to enhance the program to include an opt-in CFL Kit offering. Customers enrolled in this program are eligible to receive a single or multiple CFL kits at no cost.

### **4.17.1 Program Logic**

The program provides for the implementation of cost effective, high efficiency measures through a CSP for local and state government buildings, as well as for institutional customers. This sector is eligible for the same incentives as the Small or Large C&I sector (the Standard Lighting, Nonstandard Lighting, Heating Ventilating and Air-conditioning, Motors & Drives, Specialty Equipment and Custom).

### **4.17.2 Program M&V Methodology**

This program offers the same set of measures as the general C/I program and is administered by the same conservation service provider, SAIC, and managed by the Companies' internal staff that also manage the C/I program. The M&V methodology for that component of this program is identical to the approach used for the Small C/I equipment program described in section 4.11.2.

In addition, this program includes a novel CFL kit component that launched in May of 2011. The CFL kits program component targeted customers in the government/non-profit sector (i.e., Municipalities, Boroughs, Townships, Departments of Public Works, Sewer and Water Authorities, Government Controlled or Income Qualified Apartments, and Churches and other community organizations).

Although each account received one kit of up to 20 CFLs, some municipalities had scores of accounts. The CFL kits were generally mailed to a central facility and distributed by city personnel. This process posed M&V challenges because the CFL distribution process by participating municipalities or boroughs was not very well documented.

ADM's evaluation effort for these kits consisted of a two-tiered effort. First, the customers that received just one or two boxes of CFLs were surveyed by telephone by ADM's sub contractor, Research America. The survey assessed receipt of the kit, number of CFLs installed, number of CFLs replacing incandescent lights, number of CFLs broken, if not installed why bulbs were not installed and how many would be installed next year. Second, ADM interviewed or sent out email surveys to the larger savings customers to assess comparable information.

The two sets of surveys were used to construct in-service rates and operating hours for the CFL kits. The in-service rates were taken as the % of CFLs already installed as of the telephone interview. Savings for

larger energy savings customers were adjusted by the percentage of CFLs that replace incandescent, rather than CFLs lamps. This adjustment was not made to the Research America sample which represented the smaller savings customers because the responses for that answer, though often reported as 100%, had a relatively large fraction of responses such as “I don’t know”, or other omissions.

Realization rates were also informed by the hours of operation. While ex-ante savings estimations were determined with average hours of operation for several non-residential facility types groups as defined by Table 6-6 in the 2010 TRM, ADM adjusted the average hours of use by the site-specific hours of use for all sampled sites, and an adjustment for surveys reporting that CFLs were installed in residential settings. This was reported for some public housing and government controlled apartments, and in certain cases where a municipality distributed CFLs to employees for use at home. In these cases, savings were estimated consistent with residential CFL protocols (i.e., hours of use were set to 1095, the coincidence factor was set to 0.05, and the ISR was set to 0.84).

### **Evaluation Results**

The CFL kits had relatively low realization rates compared to other measures in the C/I portfolio, yet they were still much more cost effective than the average measure in the portfolio. The main factors that tended to reduce the realization rates were low reported ISRs, and low reported hours – especially in cases where the CFLs found their way into a residential setting.

It is quite likely that the October/November “snapshot” of the ISR underestimates the true ISR for these CFLs. Indeed, the ISRs, if customer responses regarding plans to install CFLs in the next year were incorporated, would have been much higher and the overall realization rates for this program would have approached 100%. It would be useful for the Company to revisit the ISR after more time has elapsed since the late May CFL mailings. For the purposes of this annual report, the lower ISR values that correspond to CFLs already installed are used to calculate gross verified savings.

#### **4.17.3 Program Sampling**

The impact evaluation sample for this program is consolidated with the sample for the C/I Equipment program. However, the program participants are separated into a “Government/Non-Profit” stratum. This stratum’s impacts will be reported with  $\pm 15\%$  relative precision at the 85% confidence level<sup>38</sup>.

#### **4.17.4 Process Evaluation**

As with the process evaluation for the Governmental /Non-Profit Program, in May and June 2010, ADM conducted the first set of interviews with the Companies’ EE&C program staff. The initial interviews have resulted in a logic model and process evaluation work plan. Additional interviews, particularly with program participants and non-participants will help to identify the value of the marketing and outreach campaign, and the needs and constraints of the target market. Ex-ante savings estimations could have been improved if the implementer interviewed all applicants that requested more than a certain number of CFLs (especially if the facility name included “housing” or “apartments”). However, even with 1095 hours of use, the kits were very cost effective, and the public housing and apartment survey respondents seemed to be satisfied with the program.

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<sup>38</sup> See Table 1-9.

#### **4.17.5 Program Partners and Trade Allies**

SAIC was contracted to administer this program and is responsible for marketing by conducting face to face presentations, email solicitations and using the Companies' Governmental Affairs representative leads.

This program has been marketed primarily to County and local government, nonprofit and institutional customers. SAIC will continue to market directly to customers using tools such as the website, email-distribution, trade shows and case studies. Additionally, SAIC is responsible for shipping the CFL kits directly to customers.



#### 4.17.6 Program Finances

A summary of the project finances are presented in the following table:

Table 4-17: Summary of Program Finances:

		IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$371,920	\$461,138	\$461,138
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	<b>Subtotal EDC Incentive Costs</b>	<b>\$371,920</b>	<b>\$461,138</b>	<b>\$461,138</b>
B.1	Design & Development <sup>1</sup>	\$276	\$659	\$1,472
B.2	Administration <sup>2</sup>	\$22,022	\$95,243	\$110,588
B.3	Management <sup>3</sup>	\$2,580	\$8,186	\$8,672
B.4	Marketing <sup>4</sup>	\$0	\$0	\$0
B.5	Technical Assistance <sup>5</sup>	\$267	\$1,567	\$1,617
B	<b>Subtotal EDC Implementation Costs</b>	<b>\$25,144</b>	<b>\$105,655</b>	<b>\$122,350</b>
C	<b>EDC Evaluation Costs</b>	\$386	\$2,787	\$3,622
D	<b>SWE Audit Costs</b>	\$0	\$2,095	\$2,371
E	<b>Participant Costs</b>	\$0	\$2,450,633	\$2,450,633
	<b>Total Costs</b>	<b>\$397,450</b>	<b>\$3,022,308</b>	<b>\$3,040,115</b>
	<b>Total Costs for TRC<sup>6</sup></b>		\$2,371,270	\$2,388,799
F	<b>Annualized Avoided Supply Costs</b>	\$0	\$655,794	\$655,794
G	<b>Lifetime Avoided Supply Costs</b>	\$0	\$7,264,037	\$7,264,037
	<b>Total Lifetime Economic Benefits</b>	<b>\$0</b>	<b>\$7,264,037</b>	<b>\$7,264,037</b>
	<b>Portfolio Benefit-to-Cost Ratio</b>	<b>0.00</b>	<b>3.1</b>	<b>3.0</b>
Notes:	<sup>1</sup> Includes cost of EE Expert			
	<sup>2</sup> Costs paid to Conservation Service Providers (CSPs) for program implementation. To define in the TRC Technical Working Group.			
	<sup>3</sup> Costs incurred to manage the CSPs and programs. To define in the TRC Technical Working Group.			
	<sup>4</sup> Includes umbrella marketing costs for programs. Marketing completed by the CSPs are included in Administration.			
	<sup>5</sup> Includes costs for Tracking and Reporting System.			
	<sup>6</sup> The total costs, benefits for TRC calculations are net present values at 2009. The costs generally exclude incentives, but for certain programs the incentives may serve as proxies for incremental costs, in other programs incentives are the direct installation costs.			