

# **Act 129 Statewide Evaluator Quarterly Report**

3<sup>rd</sup> Quarter, Program Year 4

*Presented to:*

**Pennsylvania Public Utility Commission**

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## 1 Introduction

As part of the *Audit Plan* the Statewide Evaluation team (SWE or SWE team) is required to submit quarterly reports to the Pennsylvania Public Utility Commission (PUC or Commission) with updates on energy (MWh) and demand (MW) savings, impact evaluations, cost-effectiveness, and process evaluations related to the programs implemented under PA Act 129 and detailed in the following Electric Distribution Company's (EDC) respective Energy Efficiency and Conservation (EE&C) Plan<sup>1</sup>:

- Duquesne Light Company (Duquesne);
- PECO Energy Company (PECO), and
- PPL Electric Utilities (PPL).The FirstEnergy companies –
  - Metropolitan Edison Company (Met-Ed),
  - Pennsylvania Electric Company (Penelec), and
  - Pennsylvania Power Company (Penn Power);
  - West Penn Power Company (West Penn or West Penn Power);

This report covers the third quarter of Program Year 4 (PY4Q3) and details the Act 129 program activities occurring in both the current program year and since the implementation of energy savings programs per the EDC EE&C plans. Thus, impacts reported as Program Year to Date (PYTD) include impacts occurring between September 1, 2013 and February 28, 2013. Impacts reported as Cumulative Program Inception to Date (CPITD) include savings since the implementation of Act 129 programs (June 1, 2009) through February 28, 2013.

The findings, conclusions, and recommendations contained in the Statewide Evaluator's Quarterly Report are the findings, conclusions, and recommendations of the Statewide Evaluator only and, as such, are not necessarily agreed to by the EDCs or the Commission. The Commission, while not adopting the findings, conclusions, and recommendations contained in the Statewide Evaluator's Quarterly Report, may consider and adopt some or all of them at a later date in appropriate proceedings, such as the annual Technical Reference Manual update, Total Resource Cost Test Manual update, and individual EDC Energy Efficiency and Conservation Plan revision proceedings.

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<sup>1</sup> See Statewide Evaluation Team, *Audit Plan and Evaluation Framework for Pennsylvania*, December 1 2009, page 138.

## 2 Quarterly Report Summary

The following sections present a summary of the EDC program impacts and SWE activities completed to date.

### 2.1 Aggregated EDC Portfolio Impact Summary

Table 2-1 presents the seven EDCs' aggregated cumulative program inception to date (CPITD<sup>2</sup>) reported gross MWh and MW impacts and cumulative program inception to date – quarter (CPITD-Q<sup>3</sup>) gross MWh and MW impacts based on verified savings through Program Year 3 (PY3) and gross savings from PY4. The following table also includes estimates in the reduction of CO<sub>2</sub> emissions through the end of the third quarter for PY4 (PY4Q3) based on CPITD-Q MWh savings. This quarter ended on February 28, 2013.

**Table 2-1: Summary of EDC Quarterly Report Impacts – Program Year 4, 3<sup>rd</sup> Quarter**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact
Total Energy Savings (MWh)	4,814,719	4,688,677
Compliance Demand Reduction (MW) <sup>[a]</sup>	1,360	1,360
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	3,899,922	3,797,828
<b>NOTES:</b>		
[a] These MW reductions represent only those MW savings that occurred during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.		
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.		
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.		
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.		
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC's eGRID2007 Version 1.1, RFCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).		
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.		

<sup>2</sup> CPITD Reported Gross = CPITD Reported Gross Savings through PY3 + PYTD Reported Gross Savings. All savings reported as CPITD are reported this way.

<sup>3</sup> CPITD-Q Gross = CPITD Verified Gross Savings through PY3 + PYTD Reported Gross Savings. All savings reported as CPITD –Q gross savings are computed this way. CPITD-Q savings provide the best available estimate of savings achieved through the current quarter. CPITD Verified Gross savings will be reported in the Annual Report.

## 2.2 Impact Summary by EDC

The following table contains a summary of the energy and demand savings impacts of each EDC during PY4.<sup>4</sup>

**Table 2-2: Summary of EDC Energy and Demand Savings**

	Statewide	Duquesne	PECO	PPL	Met-Ed	Penelec	Penn Power	West Penn
PYTD Reported Gross <sup>5</sup> Energy Savings (MWh)	1,102,007	143,188	143,823	345,991	140,241	108,338	41,335	179,091
CPITD Reported Gross <sup>6</sup> Energy Savings (MWh)	4,814,719	459,186	1,361,502	1,351,899	461,993	445,182	156,484	578,473
CPITD-Q Gross <sup>7</sup> Energy Savings (MWh)	4,688,677	451,603	1,336,310	1,318,334	441,639	418,315	149,147	573,329
<b>% of 2013 Energy Savings Target Achieved</b>	<b>107%</b>	<b>107%</b>	<b>113%</b>	<b>115%</b>	<b>99%</b>	<b>97%</b>	<b>104%</b>	<b>91%</b>
PYTD Reported Gross Demand Reduction (MW)	825	85	185	192	92	107	33	132
CPITD Compliance Reported Gross Demand Reduction (MW)	1,361	119	433	320.6	133	126	49	180
CPITD-Q Compliance Gross Demand Reduction (MW)	1,361	119	433	320.6	133	126	49	180
<b>% of 2013 Demand Reduction Target</b>	<b>114%</b>	<b>106%</b>	<b>122%</b>	<b>108%</b>	<b>112%</b>	<b>117%</b>	<b>111%</b>	<b>114%</b>

### Cumulative Portfolio Energy Impacts

- The CPITD reported gross energy savings is 4,814,719 MWh.
- The CPITD-Q gross energy savings is 4,688,677 MWh.

### Portfolio Demand Reduction<sup>8</sup>

- The CPITD-Q compliance gross demand reduction is 1,361 MW.

<sup>4</sup> Note: The “Savings Achieved as a % of 2011 Targets” are based on CPITD-Q reported savings. Thus, this achievement is subject to change pending results of final impact evaluation activities.

<sup>5</sup> Gross savings represent change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

<sup>6</sup> Gross savings represent change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

<sup>7</sup> CPITD-Q Gross = CPITD Verified Gross Savings through PY3 + PYTD Reported Gross Savings. All savings reported as CPITD –Q gross savings are computed this way. CPITD-Q savings provide the best available estimate of savings achieved through the current quarter. CPITD Verified Gross savings will be reported in the Annual Report. Verified gross impact is calculated by applying the realization rate to reported gross impacts. Realization rate is a term used in several contexts in the development of reported program savings. The primary applications include the ratio of project tracking system savings data (e.g. initial estimates of project savings) to savings (a) adjusted for data errors and (b) that incorporate evaluated or verified results of the tracked savings.

<sup>8</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.

### **Low-Income Sector**

- The number of measures offered to the Low-Income Sector comprises approximately 31% of the total number of measures offered through all programs.
- The CPITD reported gross energy savings for low-income sector programs is 316,479 MWh.

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

- The CPITD reported gross energy savings for government and non-profit sector programs is 616,283 MWh.
- The CPITD-Q gross energy savings for government and non-profit sector programs is 572,879 MWh.

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

- The PYTD reported gross energy savings is 1,102,007 MWh.
- The PYTD reported gross demand reduction is 825 MW.
- The PYTD reported participation is 1,618,526 participants.<sup>9</sup>

## **2.3 Statewide Evaluator Summary**

Below is a summary of the activities undertaken by the SWE team during PY4Q3.

The SWE has reviewed the EDC Quarterly Reports for PY4Q3 for completeness against the requirements of the SWE Audit Plan. The SWE reviewed the available CPITD reported gross impacts, CPITD-Q gross impacts, and PYTD gross impacts for each EDC. The SWE team audit activities and findings related to the savings reported in the EDCs' quarterly reports can be found in Section 3 of this report.

A summary of the SWE team findings includes:

- Currently<sup>10</sup> 82 programs have been implemented and are generating savings across the state.
- Progress towards 2013 MWh savings targets ranges from 91% - 115%
- Progress towards 2013 MW reduction targets ranges from 106% - 122%

Key SWE team activities during the PY4Q3 included the following:

- Residential program desk audits.
- Low-Income program desk audits.
- Non-residential program desk audits and on-site inspections.
- Participation in Program Evaluation Group meetings.
- Development of Audit Plan updates.

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<sup>9</sup> Statewide participants are based upon the participant numbers reported by each EDC. Most EDCs excluded the number of CFL bulbs distributed from these numbers; other EDCs estimated the number of bulbs per participant and included that estimate in their totals.

<sup>10</sup> Currently as of February 2013.

### **3 Statewide Evaluator Audit Activities**

As part of the SWE audit activities, the members of the SWE team meet with each EDC to review current program implementation and evaluation activities and to address any pressing issues. Currently, the SWE team holds bi-weekly teleconferences with each EDC to discuss current and planned M&V activities, to schedule upcoming site-visits and audit activities, and to address any unresolved questions or issues that may arise throughout the evaluation process. During the current program year, the SWE team travels to each EDC and to specific project sites to conduct on-site audits of the various programs implemented in PY4. Additionally, the SWE team is in the process of conducting desktop audits for various programs. An update on each of these activities is provided in the following sections.

#### **3.1 Audit Activities**

##### **3.1.1 Residential Programs**

The residential program audits typically consist of a desktop audit which includes a review of: program kWh and kW savings calculations and database quality. The information required to conduct these reviews was provided by the EDCs in conjunction with their respective PY4Q3 reports. An update on these audits, by program type and EDC, is provided in the following sections.

##### **3.1.2 Low-Income Programs**

The low-income audit process involves quarterly desktop reviews to ensure that EDCs are utilizing technical reference manual (TRM) protocols and assumptions correctly, to verify that EDCs are reporting savings in accordance with custom protocols, and to validate that savings reported in EDC quarterly reports align with database extracts. In addition, the SWE verifies that EDCs are in compliance with the Act 129 mandate that the number of measures offered to the low-income sector is proportionate to the low-income sector's share of total energy usage.<sup>11</sup> The following sections offer EDC-specific low-income audit findings and recommendations.

For EDCs that conduct on-site inspections of low-income installations, the SWE conducts a desktop review of a select number of site visit reports. The review is intended to evaluate whether all measures are being satisfactorily installed by contractors, that "job types" are being characterized correctly in accordance with EDC custom protocols, and whether the corresponding savings are correctly reported. For SWE review of EDC site visit reports, in lieu of the SWE conducting site visits, the reports must meet the requirements outlined in Guidance Memo 16.<sup>12</sup> Otherwise, EDCs can elect to have the SWE conduct the quarterly site inspections of low-income installations.

##### **3.1.3 Non-Residential Programs**

The following sections detail audit findings for non-residential programs. Each quarter, the SWE audits each of the non-residential programs run by the EDCs. Whereas residential programs are typically separated into discrete programs, most EDCs combine their non-residential programs into meta-

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<sup>11</sup> Act 129 includes a provision requiring EDCs to offer a number of energy conservation measures to low-income households "proportionate to those households' share of the total energy usage in the service territory" (66 Pa.C.S. §2806.1(b)(i)(G)). The legislation contains no provisions regarding participation targets, or energy or demand savings.

<sup>12</sup> Guidance Memo 16 (distributed to the EDCs on September 6, 2012) provides guidance relating to the low-income site inspection process in PY4. If an EDC already conducts low-income site inspections, either with an independent evaluator or third-party contractor, site inspection reports can be submitted to the SWE in lieu of the SWE conducting independent inspections, provided the reports meet the SWE's needs. Otherwise, the SWE will conduct site inspections of 10 low-income installations per quarter and provide a report to the EDC.

programs for reporting and evaluation purposes. For example, a lighting program and an HVAC program may be combined into one efficient equipment program. The SWE audit of non-residential programs typically aligns with evaluation groups developed by EDC evaluators such that SWE audit findings and recommendations would be relevant and directly applicable to each EDC. One drawback to this approach is that program groupings are not always consistent between EDCs. For example, one EDC may group all prescriptive and custom projects into one program, whereas another will evaluate those two programs separately. In addition, there may be situations where one EDC uses different criteria to define their programs (e.g., building type vs. measure type). The SWE believes that auditing programs based on EDC program groupings produces the best and most relevant review.

The SWE audit activities vary from quarter to quarter based on what was accomplished by the EDCs and the EDC evaluators. The reviews generally target the following categories:

- Tracking Database and Reporting
- Reported kWh and kW Savings
- Sampling Plan
- Verified kWh and kW Savings
- TRC Calculations

For the PY4Q3 report, the SWE performed the following activities:

- Review of Tracking Database and Reporting
- Review of Reported kWh and kW Savings
- Review of EDC Sampling Plans

## **3.2 Program Evaluation Group Meetings**

### **3.2.1 Program Evaluation Group Meeting, January 16<sup>th</sup>, 2013**

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on January 16<sup>th</sup>, 2013 via teleconference. The following topics were discussed.

- Due dates for EDC Demand Response (DR) data responses to be sent to the PUC TUS staff
- Issue relating to which TRM to use for energy efficiency projects that straddle two Program Years
- Discussion of EDC evaluator recommendations based on Program Year 3 process evaluation reports
- Discussion of avoided cost forecasts used in TRC calculations
- Status of the DR Attribution Survey
- Revisions made to the SWE Residential and Commercial Incremental Cost database
  - Verification of values in the database by comparison with two-three secondary sources
  - Additional research required on LED exit signs
- Discussion of Installation Rate for CFL's
- Update on status of DR Study
  - Interim report completed

### 3.2.2 Program Evaluation Group Meeting, February 20<sup>th</sup>, 2013

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on February 20<sup>th</sup>, 2013 via teleconference. The following topics were discussed.

- Issue relating to which TRM to use for energy efficiency projects that straddle two Program Years
- Status of Uniform Methods Project Protocols<sup>13</sup> for Determining Savings
  - Plans for using protocols in Pennsylvania
- Post Mortem on the EDCs Review of the SWE PY3 Draft Report and Lessons Learned
- DR Attribution Survey
- Clarification of how to present and use avoided cost forecasts in TRC calculations
- Line Loss Issues
- Distribution of SWE Residential and Commercial Incremental Cost Database
- Update on Act 129 Program CFL issues
  - CFLs purchased through Act 129 residential lighting programs but installed in commercial facilities
  - Hours of use for CFL bulbs purchased through an Act 129 residential program but installed in commercial facilities
  - Peak Load Coincidence factor issue for bulbs purchased through an Act 129 residential program but installed in commercial facilities
  - Installation rate factor for residential CFLs
  - Interactive effects for CFLs

### 3.3 EDC Meetings

The SWE and TUS staff conduct bi-weekly meetings held by teleconference with each EDC. These calls provide an opportunity for the SWE to communicate with each EDC on their specific program and evaluations. Topics discussed on these calls are specific to the EDC's and SWE's needs. In the past quarter, EDCs have used these calls to discuss reporting schedules, questions concerning appropriate use of realization rates and other savings protocols, SWE data requests and a variety of other topics.

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<sup>13</sup> See [http://www1.eere.energy.gov/office\\_eere/de\\_ump.html](http://www1.eere.energy.gov/office_eere/de_ump.html) for more information about these protocols.

### 3.4 Status of TRM Update

The Program Evaluation Group will be updating both residential and commercial & industrial (C&I) protocols for the 2014 TRM Update. The SWE team recommended that several measure protocols be revised based on the 2013 TRM Final Order, 2012 TRM Final Order, SWE Audit Activities, and miscellaneous teleconferences & email exchanges. Additionally, the SWE team received feedback from the EDCs and their evaluators on the proposed list of 2014 TRM issues developed by the SWE and TUS Staff. The SWE will consider these measures and investigate and research for the 2014 TRM update.

The approximate timeline for the 2014 TRM update is shown below:

**Table 3-1: Technical Reference Manual Order Update Schedule**

<b>Date:</b>	<b>Action:</b>
<b>August 29, 2013<sup>14</sup></b>	2014 TRM and TRM Tentative Order at Public Meeting
<b>December 19, 2013<sup>15</sup></b>	2014 TRM and TRM Final Order at Public Meeting
<b>June 1, 2014</b>	Effective Date of the 2014 TRM

#### 3.4.1 Interim Measure Protocols (IMPs)

The EDCs have proposed kWh and kW savings protocols for interim energy efficiency measures. As of May 16, 2013, the SWE team has received 21 measures for consideration during this round of interim TRM protocol development; the SWE team expects to receive a few additional protocols in the next few weeks. These protocols are currently being reviewed by the SWE team for accuracy, consistency and reasonableness. These interim measure protocols will be included in the 2014 TRM update once they are approved by the SWE and TUS Staff.

### 3.5 Demand Response Issues

In PY4Q3 the SWE began to audit several EDC DR programs and savings reported by EDCs in their PY4Q3 reports. For Duquesne, PECO and PPL's C&I DR programs, the SWE first verified that the EDC customer baseline loads and the associated load impacts were calculated as specified by the SWE in the TRM. Additionally, using the load data provided by EDCs, the SWE performed an independent assessment of the hourly load reductions achieved by the DR programs at a sample of sites according to its interpretation of the PJM business practices that were in place during the summer of 2012. Through this check and discussions with EDCs, the SWE discovered there was a difference in interpretation by the SWE and that of two EDCs (PECO and PPL) of the "PJM business rules" called for in the TRM. In these cases, the PECO and PPL interpretations produces larger load reduction estimates than the SWE interpretation. This issue is discussed further in Section 5.5.4 and Section 6.5.4. The DR Audit findings for Residential DR Programs as well as First Energy's C&I DR Programs findings are ongoing and will be presented in the SWE PY4 Final Annual Report.

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<sup>14</sup> This date is tentative and subject to change.

<sup>15</sup> This date is tentative and subject to change.

### **3.6 Net to Gross Issues**

Net-to-Gross (NTG) analysis is conducted by EDC evaluation contractors on an annual basis. No NTG research or findings were presented in the EDC reports for Q3. The SWE audit of NTG methodology and findings will be included in the SWE PY4 Final Annual Report.

#### 4 Duquesne Light Impact Summaries and Audit Findings

Section 4 contains information on Duquesne’s energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 4-1: Summary of Duquesne Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	459,186	451,603	107%
Compliance Demand Reduction (MW) <sup>[a]</sup>	119	119	106%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	37,194,066	36,579,843	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC’s eGRID2007 Version 1.1, RfCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

Duquesne has reported PY4 gross energy savings for 16 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 4-2: Summary of Program Impacts on Gross Reported Portfolio Savings – Duquesne**

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings Portfolio</b>
Residential: EE Program (REEP): Rebate Program	6%
Residential: EE Program Upstream Lighting	30%
Residential: School Energy Pledge	0%
Residential: Appliance Recycling	3%
Residential: Low-Income EE	2%
Residential: Low-Income EE (Upstream Lighting)	0%
Commercial Sector Umbrella EE	1%
Healthcare EE	5%
Industrial Sector Umbrella EE	0%
Chemical Products EE	1%
Mixed Industrial EE	4%
Office Building – Large – EE	16%
Office Building – Small EE	2%
Primary Metals EE	8%
Public Agency/Non-Profit	11%
Retail Stores – Small EE	4%
Retail Stores – Large EE	0%
Large Curtailable Demand Response	4%
<b>Total</b>	<b>100%</b>

#### 4.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 4-3: Summary of Programs Implemented to Date by Duquesne**

<b><i>Programs Reporting PY4 Gross Savings:</i></b>
<ul style="list-style-type: none"><li>• Residential: EE Program (REEP): Rebate Program</li><li>• Residential: EE Program Upstream Lighting</li><li>• Residential: Appliance Recycling</li><li>• Residential: Low-Income EE</li><li>• Commercial Sector Umbrella EE</li><li>• Healthcare EE</li><li>• Chemical Products EE</li><li>• Mixed Industrial EE</li><li>• Office Building – Large – EE</li><li>• Office Building – Small EE</li><li>• Primary Metals EE</li><li>• Public Agency/Non-Profit</li><li>• Retail Stores – Small EE</li><li>• Retail Stores – Large EE</li><li>• Residential Demand Response</li><li>• Large Curtailable Demand Response</li></ul>
<b><i>Programs to be Implemented or with No Reported PY4 Savings:</i></b>
<ul style="list-style-type: none"><li>• Residential: School Energy Pledge</li><li>• Residential: Low-Income EE (Upstream Lighting)</li><li>• Industrial Sector Umbrella EE</li></ul>

#### 4.2 Status of EM&V Activities

##### 4.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

#### 4.2.2 Status of M&V Activities

- **Direct Load Control Program (Residential Demand Response):** On-site visits were conducted by Navigant (Duquesne's Evaluation Contractor) at 30 installations, including a mix of M&V metered sites and non-metered sites, to verify that the data control unit (DCU) switches were actually installed, the installations met reasonable quality standards, and the switches had the potential to generate the predicted savings. All sites were found to meet all conditions of the verification. Additionally, Navigant conducted a preliminary analysis of the total demand reduction achieved by the program during the top 100 hours of system peak load for the summer of 2012.
- **Curtable Load Program (Large Curtable Demand Response):** Navigant conducted a preliminary assessment of the total demand reduction achieved through the program, including the following activities:
  - Confirmation of demand baselines used for each program participant;
  - Confirmation of demand reductions achieved by each program participant, as estimated by the utility and/or its CSPs.;
  - Execution of attribution surveys to support efforts by the SWE to estimate the extent to which the demand reductions achieved through this program would have occurred, even in the absence of the program, due to the existence of PJM demand response programs; and
  - Confirmation of Duquesne's assessment of the top 100 hours of system peak load.
- **Energy Efficiency Project Verification:** Navigant prepared its sample designs for verifying PY4Q1 and PY4Q2 energy and demand savings from residential and non-residential energy efficiency projects. In PY4Q3, Navigant also began scheduling and conducting on-site verification visits with sampled non-residential program participants according to the sample design plan. In addition, Navigant started to design a research plan to investigate certain parameters associated with estimating energy and demand savings from Duquesne's Upstream Lighting program, to be presented to the SWE for review and approval prior to implementation. Finally, efforts are underway to initiate selected process evaluation research and residential impact evaluation verification work.

### 4.3 Residential Program Audit Summary

#### 4.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q3 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 4-4: Summary of CFL Program Audit - Duquesne**

Category:	PY4Q3Report:	Database Verification:	Notes:
Gross Energy Savings	IQ: 18,920 MWh	√	This represents the savings from bulbs sold through the upstream CFL program administered through Ecos.
Gross Demand Reduction	IQ: 0.0 MW	√	This represents the savings from bulbs sold through the upstream CFL program administered through Ecos.
Use of TRM Protocols	Not Applicable	√	All savings calculated in accordance with the TRM protocols.
Baseline Assumptions	Not Applicable	√	All baseline assumptions valid.
Invoice Review	Not Applicable	√	Two individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

#### 4.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

#### 4.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encountered any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

#### 4.3.4 New Construction Program

Duquesne did not have an active Residential New Construction program in PY4Q3.

#### 4.4 Low-Income Program Audit Summary

The SWE requested that Duquesne provide all spreadsheets and supporting calculations detailing low-income program participation, energy and demand savings, and other relevant information such as measures installed. The Low-Income Energy Efficiency Program (LIEEP) consists primarily of kits, bulb giveaways, and appliance removal and replacement. The program also includes a portion of the residential Upstream Lighting program, which is assumed to have low-income population participation. Savings for the latter is allocated annually and thus is not reported for the PY4Q3 report. Table 4-5 presents the LIEEP participation, energy savings, and demand impact listed in Duquesne’s quarterly report and the corresponding information gleaned from the SWE’s review of the database extract. The SWE applied a peak line loss factor of 6.9% to database demand impacts to facilitate a comparison with reported figures. The adjustment is reflected in the database demand impact listed in Table 4-5. Also, it should be noted that Duquesne’s original PY4Q3 report listed a LIEEP participation count of 1. The SWE made Duquesne aware of the participation count discrepancy between the report and the database extract, which Duquesne confirmed was the result of an inadvertent spreadsheet error. Subsequently, Duquesne submitted an updated PY4Q3 report with the participation count listed in Table 4-5.

**Table 4-5: Low-Income Energy Efficiency Program Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	2,347	1,009	0.062
Database	2,347	1,009	0.062
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>0</b>	<b>0.00</b>

The SWE also verified that all measure and kit calculations were consistent with the 2012 TRM protocols. For refrigerator recycling, Duquesne explained that a savings value of 1,190 kWh was assigned to secondary units based on updated survey results on the percentage of recycled appliances that are replaced and the assumption that 87% of replaced secondary units are ENERGY STAR models. Also, Duquesne noted that the kit definitions included as part of the quarterly data request response incorrectly stated that one 20 watt CFL is included among the measures in Apogee Kits. The definition should be modified from 20 watts to 18 watts. The SWE confirmed that the per-kit savings assumption recorded in Duquesne’s database extract is consistent with an 18 watt CFL.

During PY4Q3, low-income site inspections were performed by Duquesne’s third-party verification contractor of PY4Q1 and PY4Q2 low-income installations. Ten site inspections were completed for each quarter and site inspection reports were provided to the SWE for review once all inspections were complete. The inspections included 13 refrigerator replacements, four Apogee Kits, two Smart Comfort Smart Strips, and one dehumidifier rebate. All measures were installed except for seven CFLs (44% of inspected CFLs not installed). The primary reason CFLs were not installed was because participants had the bulbs in storage. In addition, the SWE asked Duquesne to collect information on whether LED night lights replaced incandescent night lights and whether smart strips were properly installed.<sup>16</sup> Of the eight

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<sup>16</sup> Smart power strips are equipped with a “master” outlet, “control” outlets and “always on” outlets. Many electronics continue to draw power even when off and therefore the smart power strip is intended to turn off electronics plugged into the “control” outlets when the power draw from the “master” outlet is reduced by a fixed percentage. Non-energy-efficient use of the smart strips occurs when participants plug equipment into the “always on” outlets and do not utilize the “control” outlets.

LED night lights installed, five replaced incandescent night lights. The other three were incremental energy users. Three of six smart strips were installed in an energy saving configuration, while the other smart strips only had equipment plugged into the “always on” outlets and thus were not reducing participants’ energy consumption. Duquesne should continue to emphasize, through education, the importance of using LED night lights to replace incandescent night lights and the importance of proper installation of smart power strips.

Duquesne reported 26 measures available to the low-income sector in PY4Q3, which is 38% of the total number of measures offered by Duquesne across all sectors. Therefore, Duquesne is in compliance with its 7.88% proportion of measures target.

#### 4.5 Non-Residential Program Audit Summary

Duquesne lists 11 programs under its non-residential portfolio. Seven of these programs are offered to the Commercial and Government/Non-Profit sectors and four are offered to the Industrial sector. Each of Duquesne’s non-residential programs achieved energy and demand impacts during PY4Q3. The Office Building Large EE Program resulted in the largest energy savings whereas the Healthcare EE Program contributed the largest peak demand savings of Duquesne’s non-residential energy efficiency programs. The gross reported energy savings for these programs was 16,158 MWh, the gross reported demand impact was 3.02 MW, and \$1.46 million in incentives were paid to participants. Table 4-6 provides the reported number of participants, energy savings, demand savings and incentives paid from PY4Q3. The two Retail EE programs are presented together because Duquesne did not report the incentives paid to the Small and Large program separately. Demand impact figures were adjusted to reflect a peak line loss factor of 7.0% for all non-residential programs prior to reporting.

**Table 4-6: Duquesne Non-Residential Programs Quarterly Summary**

Program	Participants	MWh Impact	MW Impact	Incentive Amount
Commercial Sector Umbrella EE	12	418	0.05	\$41,000
Healthcare EE	3	2,484	0.81	\$216,000
Industrial Sector Umbrella EE	1	0	0.00	\$8,000
Chemical Products EE	6	642	0.10	\$36,000
Mixed Industrial EE	9	1,827	0.30	\$154,000
Office Building Large EE	20	3,849	0.65	\$245,000
Office Building Small EE	22	1,172	0.20	\$180,000
Primary Metals EE	3	1,477	0.19	\$96,000
Public Agency/Non-Profit	18	442	0.16	\$260,000
Retail Stores- Small EE	77	1,866	0.32	\$224,000
Retail Stores- Large EE	12	1,981	0.25	
<b>Totals</b>	<b>183</b>	<b>16,158</b>	<b>3.02</b>	<b>\$1,460,000</b>

##### 4.5.1 Review of Savings Database

Duquesne provided a database of all PY4Q3 activity to the SWE team for review. Several of Duquesne’s programs are composed of multiple sub-programs. For example, Duquesne’s Public Agency/Non-Profit program is made up of the Education, PAPP Public Agency Partnership, and Non-Profit customer segments. The abbreviations which follow these sub-programs further classify projects by type and CSP in Duquesne’s tracking system, PMRS. The SWE counted energy and demand impacts from several sub-programs from the extract level database and matched with the figures at the program level in Duquesne’s PY4Q3 report.

As with the previous section, the two retail programs (small and large) are presented together. The SWE applied a peak line loss factor of 7.0% to demand impacts for all non-residential programs to facilitate a

comparison with reported figures. Table 4-7 provides the participant count, energy impact, demand impact and total incentives paid by program according to the Duquesne database extract.

**Table 4-7: Duquesne Non-Residential Programs Savings Database Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh Impact</b>	<b>MW Impact</b>	<b>Incentive Amount</b>
Commercial Sector Umbrella EE	11	418	0.05	\$38,332
Healthcare EE	2	2,484	0.75	\$209,088
Industrial Sector Umbrella EE	0	0	0.00	\$0
Chemical Products EE	5	642	0.10	\$32,302
Mixed Industrial EE	8	1,827	0.27	\$124,882
Office Building Large EE	19	3,849	0.61	\$235,412
Office Building Small EE	22	1,172	0.19	\$180,231
Primary Metals EE	2	1,477	0.17	\$88,614
Public Agency/Non-Profit	17	442	0.14	\$28,620
Retail Stores- Small EE	89	3,847	0.53	\$218,066
Retail Stores- Large EE				
<b>Totals</b>	<b>175</b>	<b>16,158</b>	<b>2.81</b>	<b>\$1,155,546</b>

In Table 4-8, the discrepancies between the reported figures and the information contained in the database are presented. All discrepancies are reported as follows:

***Reported Figure – Database Summary = Discrepancy***

**Table 4-8: Duquesne Non-Residential Program Discrepancies**

<b>Program</b>	<b>Participants</b>	<b>MWh Impact</b>	<b>*MW Impact</b>	<b>Incentive Amount</b>
Commercial Sector Umbrella EE	1	0	0.00	\$2,668
Healthcare EE	1	0	0.00	\$6,913
Industrial Sector Umbrella EE	1	0	0.00	\$8,000
Chemical Products EE	1	0	0.00	\$3,698
Mixed Industrial EE	1	0	0.00	\$29,118
Office Building Large EE	1	0	0.00	\$9,588
Office Building Small EE	0	0	0.00	-\$231
Primary Metals EE	1	0	0.00	\$7,386
Public Agency/Non-Profit	1	0	0.00	\$231,380
Retail Stores- Small EE	0	0	0.00	\$5,934
Retail Stores- Large EE				
<b>Totals</b>	<b>8</b>	<b>0</b>	<b>0.00</b>	<b>\$304,454</b>
* Database demand impacts adjusted to reflect a peak loss factor of 7.0% for all non-residential programs. Note: The SWE audit findings for Duquesne's non-residential demand response program is presented in Section 4.5.4.				

Table 4-8 shows perfect agreement between the reported energy and demand savings for each of Duquesne’s non-residential programs. Table 4-8 shows that there was minor variation between the participant counts and incentives in the report and the values contained in the Duquesne tracking data. The total reported participant counts for PY4Q3 were eight higher than the participant counts shown in the savings database. Duquesne’s PY4Q3 report shows one participant for the Industrial Sector Umbrella Program; however, the report does not show any savings impacts for PY4Q3. The database does not include any projects for the Industrial Sector Umbrella Program. The total reported incentive amounts for PY4Q3 were \$304,454 higher than the rebates shown in the savings database. This is because Duquesne reports the incentives that were actually paid during the quarter rather than the sum of the incentives associated with projects completed in the quarter.

**4.5.2 Review of Sample Design**

Duquesne’s evaluation contractor provided the SWE with a memo on March 29, 2013 that detailed the PY4 gross impact sample design for non-residential programs. In previous years, Duquesne grouped the non-residential sector into two overarching programs: Commercial and Industrial, with each having

multiple sub-programs. In PY4, the Government/Educational/Non-Profit(GNP) projects were separated from the Commercial projects into a new evaluation group because the GNP kWh savings accounted for over 20% of the total for non-residential sector (per the SWE's requirement in the Audit Plan<sup>17</sup>). Each of the three overarching programs (Commercial, GNP, and Industrial) still contained multiple sub-programs. The SWE team reviewed this approach and determined that it is in accordance with the guidance of the SWE Audit Plan.

In order to achieve the minimum precision and confidence levels required by the SWE Audit Plan, (90/10 for the non-residential sector, and 85/15 at the program level), the same sampling approach was taken in PY4 as was taken in PY2 and PY3. This approach includes project-level sampling for the Commercial and GNP programs, and measure-level sampling for Industrial program. The Industrial program projects received measure level verification due to the large numbers of the measures typically included within an industrial project. The distribution of savings and coefficient of variation in each program group in PY4 were assumed to be the same as those used in the PY3 for the sample design.

The stratification of the C&I population is the same method used in PY3, which is based on kWh savings. Required sample sizes for kWh and kW were calculated separately for each stratum and the final PY4 sample size was the higher of the two. The  $C_v$  value used for each stratum is at least 0.5.

#### 4.5.3 On-site Inspections

The SWE conducted six ride-along site inspections of Duquesne non-residential installations in PY4Q3. The installations included both custom and prescriptive projects. The SWE will issue ride-along site inspection reports to Duquesne once the evaluator's analyses and reports for the projects are received.

#### 4.5.4 Non-Residential Demand Response Audit

Duquesne reported 74.033 MW of peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Watt Choices Curtailable Load program. This assessment of the top 100 hours was still preliminary at the filing of the Duquesne PY4Q3 report and will be finalized prior to the Final Annual report. The 2012 PA TRM states "*Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices.*"<sup>18</sup> In order to verify that customer baseline loads (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in Duquesne's Curtailable Load program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a Duquesne curtailment event.

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<sup>17</sup> *Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs*. November, 2011. Page 75.

<sup>18</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL
- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the Duquesne program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>19</sup>

Table 4-9 shows the reported savings impacts from these five participants during the top 100 hours of 2012. These values represent *ex post* savings values submitted to the SWE on February 4, 2013 following verified savings analysis by Duquesne’s evaluation contractor.

**Table 4-9: Reported Load Reductions by Customer – SWE Audit Sample**

PMRS ID	CBL Method	Count of Top 100 Hours Curtailed	Verified kWh Savings in the Top 100	Average Verified kW Impact in the Top 100
1000006356.36.01	Standard with SAA	70	42,187	421.9
5000006607.35.01	Standard with SAA	60	37,517	375.2
7000648845.33.01	Consecutive Day with SAA	92	53,521	535.2
8000006714.33.01	Standard with SAA	47	30,695	307.0
9000008787.35.01	Standard with SAA	83	48,194	481.9

Using the load data provided by Duquesne, the SWE performed an independent assessment of the hourly load reductions achieved by the Duquesne program at these five sites according to its interpretation of the PJM business practices that were in place during the summer of 2012. Table 4-10 compares the unverified peak demand impacts reported by Duquesne to the independent SWE impact calculations.

**Table 4-10: SWE Load Reduction Estimates - Duquesne Audit Sample**

PMRS ID	Average kW Impact in the Top 100 (Duquesne)	Average kW Impact in the Top 100 (SWE)	SWE Site Level Realization Rate Estimate
1000006356.36.01	421.9	421.9	100%
5000006607.35.01	375.2	375.2	100%
7000648845.33.01	535.2	535.2	100%
8000006714.33.01	307.0	307.0	100%
9000008787.35.01	481.9	481.9	100%
<b>Total</b>	<b>2,121.2</b>	<b>2,121.2</b>	<b>100%</b>

<sup>19</sup> Ibid.

For each of 352 top 100 event hours across the five participating sites in the audit sample, the SWE's impact calculations matched the Duquesne estimates identically for all hours. Based on this audit, the SWE has confidence that PJM business rules and CBL calculations were applied correctly in the verified savings analysis for the Curtailable Load program.

#### **4.6 Finals Recommendations**

Based on SWE audit findings, the SWE team recommends the following:

- Duquesne and its evaluator compare its LIEEP participant count reported in its quarterly reports with those listed in the quarterly database extracts to ensure the two are identical.
- Duquesne and its evaluator perform a comparison between the values reported in quarterly reports and those listed in quarterly tracking data extracts. This comparison will help ensure that the participant counts and incentives shown in the filed reports match to that of the database.
- Duquesne should implement the approved non-residential sample design as planned.
- Duquesne should finalize the assessment of the top 100 hours and sum the verified savings impacts from the Load Curtailment program participants during these hours.

## 5 PECO Impact Summaries and Audit Findings

Section 5 contains information on PECO’s energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 5-1: Summary of PECO Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	1,361, 502	1,336,310	113%
Compliance Demand Reduction (MW) <sup>[a]</sup>	433	433	122%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	110,281,662	108,241,110	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC’s eGRID2007 Version 1.1, RFCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

PECO has reported PY4 gross energy savings for nine programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 5-2: Summary of Program Impacts on Gross Reported Portfolio Savings – PECO**

Program:	Percent of PYTD Gross MWh Savings
	Portfolio
Smart Lighting Discounts Program	9%
Smart Appliance Recycling Program	2%
Smart Homes Rebates Program	5%
Residential Conservation Voltage Reduction	0%
Low-Income Energy Efficiency Program	17%
Low-Income Conservation Voltage Reduction	0%
C&I Smart Equipment Incentives- Retrofit	27%
C&I Smart Equipment Incentives- Multi-Tenant	0%
C&I Smart Equipment Incentives- Appliance Recycling	0%
C&I Smart Construction Incentives	1%
C&I Conservation Voltage Reduction	0%
GNP Smart Equipment Incentives- Retrofit	34%
GNP Smart Equipment Incentives- Multi-Tenant	0%
GNP Smart Equipment Incentives- Appliance Recycling	0%
GNP Smart Construction Incentives	5%
GNP Conservation Voltage Reduction	0%
Total	100%

## 5.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 5-3: Summary of Programs Implemented to Date by PECO**

<b><i>Programs Reporting PY4 Gross Savings:</i></b>
<ul style="list-style-type: none"><li>• Smart Lighting Discounts Program</li><li>• Smart Appliance Recycling Program</li><li>• Smart Homes Rebates Program</li><li>• Low-Income Energy Efficiency Program</li><li>• C&amp;I Smart Equipment Incentives- Retrofit</li><li>• C&amp;I Smart Equipment Incentives- Multi-Tenant</li><li>• C&amp;I Smart Equipment Incentives- Appliance Recycling</li><li>• C&amp;I Smart Construction Incentives</li><li>• GNP Smart Equipment Incentives- Retrofit</li><li>• GNP Smart Equipment Incentives- Multi-Tenant</li><li>• GNP Smart Incentives- New Construction</li><li>• Permanent Load Reduction</li></ul>
<b><i>Programs to be Implemented or with No Reported PY4 Savings:</i></b>
<ul style="list-style-type: none"><li>• Residential Conservation Voltage Reduction</li><li>• Low-Income Conservation Voltage Reduction</li><li>• C&amp;I Conservation Voltage Reduction</li><li>• GNP Smart Equipment Incentives- Appliance Recycling</li><li>• GNP Conservation Voltage Reduction</li></ul>

## 5.2 Status of EM&V Activities

### 5.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

### 5.2.2 Status of M&V Activities

Each program’s evaluation updates and findings are as follows:

- **Low-Income Energy Efficiency Program:** PECO will determine PY4 savings for Component 1 of LEEP using a four-year average of billing analysis results from the 2008—2009 Low-Income Usage Reduction Program (LIURP) and PY1 and PY2 LEEP data. PY4 savings for Components 2 through 5 will be verified via a review of the tracking system database. Process evaluation activities beginning in PY4Q4 will include in-depth interviews with utility and implementation contractor staff and telephone surveys of participants.
- **Smart Lighting Discount:** The M&V completed for PY4Q3 consisted of reviewing the tracking data provided to the evaluation team by PECO program staff, as well as reviewing all manufacturer invoices received and approved by PECO and the program implementer through the end of February 2013. After consistency was verified between the manufacturer invoices

and the program tracking data, the tracking data were used to verify the program PY4Q3, PYTD and CPITD saving.

- **Smart Appliance Recycling:** The M&V completed for PY4Q3 consisted of reviewing the PY4Q3 tracking data provided to the evaluation team by PECO program staff. The PY4 PYTD savings in this report were estimated by applying the TRM specified savings algorithm to this quarterly and program year-to-date tracking data provided by PECO, and verified by the evaluation team.
- **Smart Home Rebates:** In PY4Q3, the evaluation team conducted a desk review of Q1 and Q2 tracking data and calculated a preliminary realization rate of 99.8 percent for both energy and demand. Staff and implementation contractor interviews will begin in PY4Q4 as will mystery shopping activities with retail trade allies. The telephone survey of participants will begin after the close of PY4.
- **Smart Equipment Incentives Commercial and Industrial (SEI C&I) Program:** PECO's evaluation of the SEI C&I program will align closely with the PY3 evaluation in terms of approaches and tasks. In PY4, the team will complete an initial sample design based on Q1 and Q2 completed project files as well as any available pipeline project information. A total of 16 projects are being evaluated. The team requested Q1 and Q2 project files from PECO and KEMA<sup>20</sup> and is in the process of reviewing the files and drafting site specific M&V plans. The team will also review the sample design with Q3 and Q4 data, updated pipeline project information and updated waitlist status information. The team is planning to begin field verification in March 2013. The team has conducted five in depth interviews with program implementation personnel to assess the effectiveness of the program and to identify any barriers or potential improvements to the program implementation. The participant interview guides are currently being designed and these surveys are expected to be fielded in the coming months.
- **Smart Equipment Incentives Government, Nonprofit and Institutional Program:** Consistent with the evaluation of the SEI C&I program the site level EM&V was designed to achieve an 85/15 or better confidence level and relative precision at the program level. The team requested Q1 and Q2 project files from PECO/KEMA and is in the process of conducting EM&V activities for that sample. The team plans to re-visit the sample design and strata for evaluation of projects in Q3 and Q4, based on updated waitlist and pipeline project information. The team has conducted five in depth interviews with program implementation personnel to assess the effectiveness of the program and to identify any barriers or potential improvements to the program implementation. The participant interview guides are currently being designed and these surveys are expected to be fielded in the coming months.
- **Smart Construction Incentives:** Navigant conducted in-depth interviews with program staff during Q3 and provided some initial feedback to the program. The process evaluation will also include participant surveys and trade ally interviews, which will begin during PY4Q4. The impact evaluation will include file reviews and on-site verification of a sample of projects. Navigant may use billing data to calibrate modeled savings from whole building projects in the sample. Navigant will draw an initial sample in the next few weeks and draw additional projects as needed from Q4. The sample size and design will be based on the number and types of completed projects at the end of Q3 and the remaining pipeline projects for Q4.
- **Residential Smart AC Saver Program:** Navigant utilized the "Deemed Savings Estimates for Legacy Air Conditioning and Water Heating Direct Load Control Programs in PJM Region" report in conjunction with the PECO tracking database of residential customers to predict reduction by connected air conditioning load. A final survey of participants will be conducted to understand

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<sup>20</sup> KEMA is the program implementer for the Smart Equipment Program.

customer demographics, how customers learned of the program, satisfaction with the program, how the customers handled their AC on a typical summer day and during heat waves, if they noticed load control events, and how they and their homes responded to these events.

- **Commercial Smart AC Saver Program:** Navigant has utilized the data from the M&V group (a sample of participants that had additional metering equipment installed on their air conditioners) to calculate load reduction for the commercial direct load control population. A final survey of participants will be conducted to understand customer demographics, how customers learned of the program, satisfaction with the program, how the customers handled their AC on a typical summer day and during heat waves, if they noticed load control events, and how they and their businesses responded to these events.
- **Permanent Load Reduction (PLR):** Only one project has been completed in the PLR program. Project files have been requested for this program.
- **Demand Response Aggregator:** Navigant evaluated the demand savings for each participant in this program over PECO’s top 100 hours during the summer of 2012. The results were reported in PECO’s Preliminary Demand Reduction Compliance report, which was submitted to the PUC on March 1, 2013.
- **Distributed Energy Resources:** Similar to the Demand Response Aggregator program, Navigant evaluated the demand savings for each participant in this program over PECO’s top 100 hours during the summer of 2012. The results were reported in PECO’s Preliminary Demand Reduction Compliance report, which was submitted to the PUC on March 1, 2013.

### 5.3 Residential Program Audit Summary

#### 5.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q3 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 5-4: Summary of CFL Program Audit - PECO**

Category:	PY4Q3Report:	Database Verification:	Notes:
Gross Energy Savings	IQ: 4,883 MWh	√	This represents the savings from bulbs sold through the upstream CFL program administered through Ecos.
Gross Demand Reduction	IQ: 0.0 MW	√	This represents the savings from bulbs sold through the upstream CFL program administered through Ecos.
Use of TRM Protocols	Not Applicable	√	All savings calculated in accordance with the TRM protocols.
Baseline Assumptions	Not Applicable	√	All baseline assumptions valid.
Invoice Review	Not Applicable	√	Two individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

### 5.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 5.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encounter any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 5.3.4 New Construction Program

PECO did not have an active Residential New Construction program in PY4Q3.

## 5.4 Low-Income Program Audit Summary

The SWE requested that PECO provide a quarterly database extract, consisting of all spreadsheets and supporting calculations detailing program participation, energy and demand savings, and other relevant information such as measures installed. The SWE compared the data provided in the quarterly data extract to PECO's PY4Q3 report. As is shown in Table 5-5, no discrepancies were found between the two sources.

**Table 5-5: Low-Income Energy Efficiency Program Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	2,478	7,213	0.4
Database	2,478	7,213	0.4
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>0</b>	<b>0.0</b>

PECO's Low-Income Energy Efficiency Program (LEEP) consists of five "Components." Component 1 allocates participant savings based on "measure group," which is determined by both the type of space heating and measures installed. The SWE found that the values used in PECO's tracking data are preliminary values from PY3 and have yet to be updated to the most recent billing analysis results presented in PECO's PY3 Annual Report. Regardless, all PY4 results will be based on 2008-2009 LIURP and PY1 and PY2 LEEP data and therefore PY4Q3 results are subject to change. The SWE found that all participant counts and savings values by measure group were consistent with the Component 1 savings recorded in PECO's PY4Q3 data request response.

Because the LIURP program consistently distributed a maximum of four CFLs and the LIURP results are incorporated in PECO's four-year rolling average to evaluate LEEP, only energy savings for the first four CFLs installed can be included in the Component 1 billing analysis. For participants given more than four CFLs as part of Component 1 or Component 2 (LIURP participants) and CFLs distributed through Component 3, CFL savings are determined using the TRM residential ENERGY STAR Lighting protocol. The SWE calculated savings for all such bulbs using the incandescent baseline wattage assumptions listed in PECO's database and found no discrepancies with the PECO CFL savings values. However, the

SWE found that PECO recorded a 100 watt incandescent baseline for several participants, which should be adjusted to 72 watts in accordance with the 2012 TRM. PECO confirmed that this adjustment will be made at the conclusion of PY4 during the program evaluation.

The SWE also confirmed that participant savings for Component 4 of LEEP, which is a refrigerator replacement program, were assigned in accordance with the 2012 TRM. There was no participation in Component 5 (additional weatherization repairs) of PECO's low-income program during PY4Q3.

In addition to the desk audit, the SWE conducted site inspections of 10 LEEP installations. The site visits were conducted in March 2013 and were of PY4Q2 installations. The visits consisted of verifying installation and operability of all invoiced measures. Site visit results were cross-checked against the PECO database to verify that job types were properly assigned and measures correctly recorded. The SWE found that there were isolated instances of measure failures, but otherwise all measures were installed as reported.

Lastly, PECO offered 44 measures to the low-income sector in PY4Q3, which is 35.48% of the total number of measures offered across all sectors. Therefore, PECO is in compliance with its 8.05% proportion of measures target. It should be noted that PECO stated that the proportion of measures target is 3.1%, which is incorrect. The target it set at 8.05% for Phase I of Act 129.

### 5.5 Non-Residential Program Audit Summary

PECO reported savings impacts from four non-residential programs in PY4Q3: Smart Equipment Incentives C&I, Smart Equipment Incentives GNP, Smart Construction Incentives C&I, and Smart Construction Incentives GNP. There were no participants or savings reported for the multi-tenant components of the Smart Equipment Incentives programs. Likewise, there were no participants or savings reported for the Appliance Recycling Programs for the GNP sector. The gross reported energy savings of these programs was 36,595 MWh and the gross reported demand savings was 5.8 MW. Almost \$3.16 million in incentives were paid to participants. Table 5-6 provides the reported number of participants, energy savings, demand savings and incentives paid from PY4Q3. Demand impact figures were adjusted to reflect a peak line loss factor of 10.0% for C&I programs; 10.5% for GNP programs; and 10.2% for New Construction programs prior to reporting.

**Table 5-6: PECO Non-Residential Programs Quarterly Summary**

Program	Participants	MWh	MW	Incentives
Smart Equipment Incentives - C&I Retrofit	25	3,213	0.5	\$189,000
Smart Equipment Incentives - C&I Multi-tenant	0	0	0.0	\$0
Smart Equipment Incentives - C&I Appliance Recycling	7	62	0.0	\$8,000
Smart Equipment Incentives - GNP Retrofit	34	29,757	4.8	\$2,957,000
Smart Equipment Incentives - GNP Multi-tenant	0	0	0.0	\$0
Smart Equipment Incentives - GNP Appliance Recycling	0	0	0.0	\$0
Smart Construction Incentives - C&I	1	15	0.0	\$1,000
Smart Construction Incentives - GNP	8	3,548	0.5	
<b>Totals</b>	<b>75</b>	<b>36,595</b>	<b>5.8</b>	<b>\$3,155,000</b>

**5.5.1 Review of Savings Database**

PECO provided a database of all PY4Q3 activity to the SWE team for review. Table 5-7 provides the participant count, energy impact, demand impact and total incentives paid by program according to the PECO database extract. The SWE applied a peak line loss factor of 10.0% for C&I programs; 10.5% for GNP programs; and 10.2% for New Construction programs to demand impacts to facilitate a comparison with reported figures.

**Table 5-7: PECO Non-Residential Programs Savings Database Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>	<b>Incentives</b>
Smart Equipment Incentives - C&I Retrofit	25	3,213	0.5	\$189,000
Smart Equipment Incentives - C&I Multi-tenant	0	0	0.0	\$0
Smart Equipment Incentives - C&I Appliance Recycling	7	62	0.0	\$735
Smart Equipment Incentives - GNP Retrofit	34	29,757	4.3	\$2,957,000
Smart Equipment Incentives - GNP Multi-tenant	0	0	0.0	\$0
Smart Equipment Incentives - GNP Appliance Recycling	0	0	0.0	\$0
Smart Construction Incentives - C&I	1	15	0.0	\$1,000
Smart Construction Incentives - GNP	8	3,548	0.5	
<b>Totals</b>	<b>121</b>	<b>36,595</b>	<b>5.25</b>	<b>\$3,147,735</b>

In Table 5-8, the discrepancies between the reported figures and the information contained in the database are presented. All discrepancies are reported as follows:

$$\text{Reported Figure} - \text{Database Summary} = \text{Discrepancy}$$

**Table 5-8: PECO Non-Residential Program Discrepancies**

Program	Participants	MWh	MW	Incentives
Smart Equipment Incentives - C&I Retrofit	0	0	0.0	\$0
Smart Equipment Incentives - C&I Multi-tenant	0	0	0.0	\$0
Smart Equipment Incentives - C&I Appliance Recycling	0	0	0.0	\$7,265
Smart Equipment Incentives - GNP Retrofit	0	0	0.0	\$0
Smart Equipment Incentives - GNP Multi-tenant	0	0	0.0	\$0
Smart Equipment Incentives - GNP Appliance Recycling	0	0	0.0	\$0
Smart Construction Incentives - C&I	0	0	0.0	\$0
Smart Construction Incentives - GNP	0	0	0.0	
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>\$7,265</b>
* Database demand impacts reflect a transmission and distribution loss factor of 10.0% for C&I programs; 10.5% for GNP programs; and 10.2% for New Construction programs. Note: The SWE audit findings for PECO's non-residential demand response programs are presented in Section 5.5.4.				

The participation, energy savings, and demand savings in the project databases match the reported numbers perfectly for each of the non-residential programs. The incentive amounts PECO reports for the Smart Construction Incentives program in its quarterly reports only reflects the C&I portion of the program. Rebates paid to GNP participants in the Smart Construction Incentives program are reported along with Smart Equipment Incentives – GNP program. After accounting for this reporting procedure, the SWE was able to match the rebate amounts between the PECO tracking data and PY4Q3 report. Table 5-8 shows that there was minor variation between the incentives in the report and the values contained in the PECO tracking data for the Smart Equipment Incentives - C&I Appliance Recycling Program. The reported incentive amount was \$7,265 higher than the rebates shown in the savings database.

### 5.5.2 Review of Sample Design

PECO's evaluation contractor submitted a sample design memo to the SWE for the PY4 Smart Equipment Incentives (SEI) Program Evaluation. The memo included updated sampling information and a revised sample design for the C&I and GNP programs that are based on the updated project counts and information. In the sample design, the evaluator plans to achieve 15% precision at the 85%

confidence level (two-tailed) as required by the 2011 SWE Audit Plan<sup>21</sup>. To achieve this precision target, 31 C&I projects and 46 GNP sites will be evaluated. The 46 GNP sites will include on-site verification of seven municipal lighting projects. After Q4, the evaluator will review the sample design and adjust it as needed. In addition to the sampling approach, the memo also described the stratification method and verification activities for the SEI C&I and GNP programs. The SWE team conducted a detailed review of PECO's stratified sampling approach and determined that their plan is in accordance with the guidance in the Audit Plan.

#### **5.5.2.1 SEI Commercial and Industrial Program Impact Evaluation Sample**

A combination of project type and project size was used first to determine each project's appropriate stratum within the program. Energy management systems (EMSs) were considered as a separate stratum because it was likely to have a significantly different realization rate from the other measures. The evaluation team also considered Combined Heat and Power (CHP) projects in a separate stratum due to their size and distinct nature. The *ex ante* kWh savings for the remaining projects in the program tracking database were used to stratify the projects into three groups: Large, Medium, and Small. The initial kWh cutoffs were designed such that one-third of the overall energy savings fell into each stratum. The kWh cutoffs were then adjusted to allow for natural breakpoints in the project sizes.

The sampling approach used involved a stratified random sample of projects from the PY4 tracking database. A coefficient of variation ( $C_v$ ) value of 0.4 was used to calculate the required sample size, based on the error ratio observed in the PY3 evaluation of the SEI C&I program. Including some extra sites added as a cushion to ensure the 85/15 confidence and precision levels are met, the sample sizes for the strata are: six for large C&I, seven for medium C&I, 10 for small C&I, two (census) for CHP, and six for EMS; 31 in total. Projects that fall into the bottom 5% of savings will be excluded from the sample selection because they provide a low value of information.

#### **5.5.2.2 SEI Government, Nonprofit, Institutional Impact Evaluation Sample**

For most projects in the government, nonprofit, and institutional program, the stratification method is based on the *ex ante* kWh savings for each project in the program tracking database. The projects were stratified into three groups: Large, Medium and Small. The initial kWh cutoffs were designed such that one-third of the overall energy savings fell into each stratum. The kWh cutoffs were then adjusted to allow for natural breakpoints in the project sizes.

The CHP and municipal lighting projects were placed into separate strata because of the distinct nature of the measures. PECO rounded up the  $C_v$  values observed in PY3 (0.55 for the large, 0.81 for the medium and 0.61 for the small savings stratum) to develop the sample design assumptions for PY4. Final  $C_v$  assumptions of 0.6 for large, 0.9 for medium, 0.7 for small, and 0.4 for the municipal lighting projects were used to calculate the required sample sizes for the PY4 evaluation. These larger  $C_v$  assumptions lead to larger sample sizes, which will in turn help to ensure the target confidence and precision levels

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<sup>21</sup> *Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs*. November, 2011. Page 74.

are met. As was the case in the C&I sampling approach, the projects that fall to the bottom 5% of the overall savings will not be included in the sample selection.

### 5.5.3 On-site Inspections

PECO began its on-site inspections of PY4 installations in PY4Q4. Therefore no SWE ride-along or independent site inspections were completed during PY4Q3, but have since commenced beginning in PY4Q4.

### 5.5.4 Non-Residential Demand Response Audit

PECO reported 106.0 MW of peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Demand Response Aggregators program. The Distributed Energy Resources program contributed an additional 15.4 MW of peak demand reduction. The figures presented in the PY4Q3 report match the verified savings estimates submitted to the SWE and TUS staff in a memo dated March 1, 2013.

The 2012 PA TRM states *“Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices.”*<sup>22</sup> In order to verify that customer baseline load (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in PECO’s Demand Response Aggregators program and three of the largest customers in the Distributed Energy Resources program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a PECO curtailment event.
- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL
- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the PECO program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>23</sup>.

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<sup>22</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

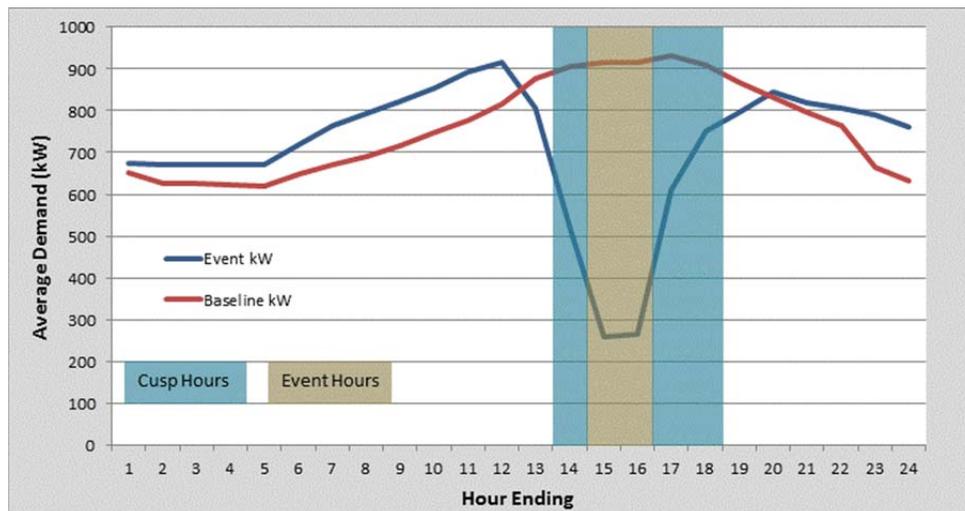
<sup>23</sup> Ibid.

Discussions between PECO and the SWE and a comparison of the SWE and PECO load reduction estimates revealed two differences with regard to the interpretation of PJM business rules. In both cases, the PECO interpretation produces larger load reduction estimates than the SWE interpretation. These two issues are discussed in more detail below:

- 1) **How should an “event hour” be defined?** – The 2012 TRM states “Peak load reductions from DLC, CPP and LC will be determined for each Act 129 DR event hour for June 1, 2012, through September 30, 2012.”<sup>24</sup> However, no definition is provided for what is or is not an event hour. Because PJM business rules are called for in the assessment of participant load reductions, the SWE believes that the PJM definition of an “event hour” is implied. In the PJM DR programs, an event hour is any hour that a site is dispatched to curtail load and is eligible to receive a settlement. This same logic works for Act 129 because PECO called events with fixed start and end times and participants are paid for their performance during these hours.

In analyzing the customer behavior on event days, PECO observed that customers often began to reduce load prior to the beginning of a PECO event and ramped load back up gradually after the event. This situation is presented graphically for a sample customer in Figure 5-1.

**Figure 5-1: Customer Load Reduction Before and After a PECO DR Event**



PECO believes that the load reductions during the hour before and two hours following a called event should be included in the impact analysis of its Demand Response Aggregators and Distributed Energy Resources programs if the hour is part of the top 100 hours. Using this approach provides PECO with load reductions during top 100 hours where events were not called and affects the calculation of the Symmetric Additive Adjustment (SAA) for customers who use a CBL method with a SAA. This interpretation of an “event hour” increases the combined impact of PECO’s two

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<sup>24</sup> 2012 Pennsylvania Technical Reference Manual. Page 302

non-residential DR programs by 18.2 MW. The SWE believes that these 18.2 MW should not be counted towards PECO's 355 MW Phase I peak demand reduction target.

- 2) **Exclusion of Days from the Baseline Calculation** – The 2012 TRM states that *“When determining customer baselines, Act 129 DR event days and PJM DR event days (e.g., for PJM emergencies and economic events for which participants have settlements) will be excluded to the extent that they are known.”*<sup>25</sup> The intent of this protocol is the prevent days during which a facility curtailed load from being included in the calculation of a customer baseline load (CBL) because it could cause the load reduction achieved by the facility on an event day to be under estimated.

The largest customer in PECO's Demand Response Aggregators program is a veteran of the PJM demand response markets, but was forced to re-register to the PJM Economic Load Response program following changes in the program in spring 2012. Due to some administrative delays, this registration was not completed until early July. Consequently, the steel mill curtailed load on several days but did not receive a settlement from PJM. A strict interpretation of the TRM would require these days to be included in the CBL calculation because the days were not Act 129 events and the customer did not receive a settlement from PJM. Including these days in the CBL calculation for other Act 129 events lowers the load reduction achieved by the facility over the top 100 hours of 2012 by 2.7 MW.

The SWE has reviewed the interval load data from the facility during the days in question and feels that it is clear that the facility was curtailing load on these days even though it did not ultimately receive a settlement from PJM. The SWE believes that excluding these days from the CBL calculation produces the most accurate assessment of the impact of the PECO program during the top 100 hours, but is not at liberty to authorize a departure from the protocols set forth in the TRM.

Aside from the two differences in interpretation discussed above, the SWE has no concerns about PECO's load reduction calculations for the Demand Response Aggregators and Distributed Energy Resources programs. The SWE was able to replicate the PECO calculation for each hour for each of the eight customers in the audit sample using the PECO interpretation of event start and end times.

## 5.6 Final Recommendations

Based on SWE audit findings, the SWE team recommends the following:

- PECO should continue to use the proportion of low-income measures target set for Phase I of Act 129 for PY4.
- PECO should ensure that all low-income savings calculations that assume a 100 watt incandescent baseline assumption are adjusted to a 72 watt baseline in accordance with the 2012 TRM.

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<sup>25</sup> 2012 Pennsylvania Technical Reference Manual. Page 302

- PECO should report peak demand reductions from its Demand Response Aggregators and Distributed Energy Resources programs as calculated under the various different interpretations of PJM business rules in its PY4 Final Annual Report. The SWE will work with Commission staff and PECO to determine which interpretation of PJM business rules is most appropriate when assessing PECO's compliance with its Phase I peak demand reduction target of 355 MW.

## 6 PPL Impact Summaries and Audit Findings

Section 6 contains information on PPL's energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 6-1: Summary of PPL Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	1,351,899	1,318,334	115%
Compliance Demand Reduction (MW) <sup>[a]</sup>	320	320	108%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	109,503,819	106,785,054	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC's eGRID2007 Version 1.1, RFCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

PPL has reported PY4 gross energy savings for 10 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 6-2: Summary of Program Impacts on Gross Reported Portfolio Savings – PPL**

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings Portfolio</b>
Appliance Recycling Program	7%
Residential Lighting Program	27%
Custom Incentive Program	9%
Energy Efficiency Behavior & Education Program	6%
Efficient Equipment Incentive Program (lighting and non-lighting measures)	49%
E-Power Wise Program	0%
Low-Income WRAP	2%
Renewable Energy Program	0%
HVAC Tune-Up Program	0%
Residential Energy Assessment & Weatherization Program	1%
<b>Total</b>	<b>100%</b>

## 6.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 6-3: Summary of Programs Implemented to Date by PPL**

<b>Programs Reporting PY4 Gross Savings:</b>
<ul style="list-style-type: none"><li>• Appliance Recycling Program</li><li>• Residential Lighting Program</li><li>• Custom Incentive Program</li><li>• Efficient Equipment Incentive Program</li><li>• E-Power Wise Program</li><li>• WRAP</li><li>• Renewable Energy Program</li><li>• HVAC Tune-Up Program</li><li>• Home Energy Assessment &amp; Weatherization Program</li><li>• Energy Efficiency Behavior &amp; Education Program</li><li>• Load Curtailment</li><li>• Direct Load Control</li></ul>
<b>Programs to be Implemented or with No Reported PY4 Savings:</b>
<ul style="list-style-type: none"><li>• none</li></ul>

## 6.2 Status of EM&V Activities

### 6.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

### 6.2.2 Status of M&V Activities

Each program’s evaluation updates and findings are as follows:

- **Residential Lighting Program:** During PY4Q3, the EM&V CSP reviewed a census of records exported from EEMIS to ensure that the recorded measure-level savings were consistent with savings equations specified in the TRM, as well as fielded the annual telephone survey. Survey results will be analyzed and reported in PY4Q4.
- **Custom Incentive Program:** Ongoing evaluation of large custom projects continued in PY4Q3.
- **Direct Load Control Program:** Events called during PY4Q1 were analyzed in Q2 and Q3, and verified savings are reported in this report.
- **Energy Efficiency Behavior & Education Program:** In PY4Q3 the EM&V QSP began a demand reduction analysis.
- **Efficient Equipment Incentive Program (non-lighting measures):** Cadmus, PPL’s evaluation contractor conducted a records review and site visits for projects rebated in PY4Q1 and Q2.
- **Efficient Equipment Incentive Program (C&I lighting):** During PY4Q3, the EM&V CSP conducted site visits for the PY4Q2 sample. Results from the Q2 analysis were completed during Q3. The

Q3 analysis and final determination of realization rates, currently underway, will be available in PY4Q4.

- **E-Power Wise Program:** Cadmus conducted a review of database records from PY4Q1 and Q2.
- **Load Curtailment Program:** Events called during PY4Q1 were analyzed in Q2 and Q3, and verified savings are reported in this report.
- **WRAP:** During PY4Q3, Cadmus reviewed PY4Q3 records.
- **Renewable Energy Program:** This program closed in PY3. A records review was conducted for GSHP projects committed in PY2 and PY3 that received their rebates in PY4Q3.
- **HVAC Tune-Up Program:** No EM&V activities occurred in Q3.
- **Residential Energy Assessment & Weatherization Program:** The EM&V CSP reviewed a sample of PY4Q3 records.

### 6.3 Residential Program Audit Summary

#### 6.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q3 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 6-4: Summary of CFL Program Audit - PPL**

Category:	PY4Q3Report:	Database Verification:	Notes:
Gross Energy Savings	IQ: 37,054 MWh	√	This represents the savings from bulbs sold through the upstream CFL program administered through Ecos.
Gross Demand Reduction	IQ: 1.69 MW	√	This represents the savings from bulbs sold through the upstream CFL program administered through Ecos.
Use of TRM Protocols	Not Applicable	√	All savings calculated in accordance with the TRM protocols.
Baseline Assumptions	Not Applicable	√	All baseline assumptions valid.
Invoice Review	Not Applicable	√	Two individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

#### 6.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that after the special winter promotion for this program, the incentive for recycled appliances returned to \$35 from \$50.

### 6.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encounter any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 6.3.4 New Construction Program

PPL did not have an active Residential New Construction program in PY4Q3.

## 6.4 Low-Income Program Audit Summary

The SWE requested that PPL provide a database extract, consisting of all spreadsheets and supporting calculations detailing program participation, energy and demand savings, and other relevant information such as measures installed. The SWE verified the participation and savings recorded in the database extract and compared these values to those reported in PPL’s quarterly report. The results for the E-Power Wise program are presented in Table 6-5 and those for the Winter Relief Assistance Program (WRAP) in

Table 6-6.

**Table 6-5: E-Power Wise Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	715	426	0.03
Database	715	426	0.03
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>0</b>	<b>0.00</b>

**Table 6-6: Winter Assistance Relief Program Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	836	1,566	0
Database	836	1,566	0
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>0</b>	<b>0</b>

The SWE reproduced measure calculations for all components of E-Power Wise kits. The kit components include low-flow faucet aerators, low-flow showerheads, LED nightlights and CFLs. All savings values followed TRM protocols or any deviation from TRM protocols was sufficiently explained by PPL. For example, the TRM deemed measure savings for low-flow showerheads is based on a flow rate of 1.5 gallons per minute (gpm). However, PPL distributes showerheads with a flow rate of 2.0 gpm and assigns a savings value of 217 kWh per showerhead in the tracking database. The TRM calculated savings for a showerhead with a flow rate of 2.0 gpm is 231 kWh. PPL adjusts the tracking database value to be in accordance with the TRM at the end of the program year before performing the program evaluation. Based on prior program evaluations, low-flow showerhead installation rates are typically less than 100% and therefore the verified measure savings for this measure is likely to be less than the TRM value. This adjustment process is also explained in detail in PPL’s PY3 Annual Report.

The SWE reviewed the savings assigned to all WRAP participants based on job type (Baseload, Low Cost, High Cost) and installation date. There SWE found eight jobs reported in PY4Q3 with PY2 installation dates, 72 jobs with PY3 installation dates, and 756 jobs with PY4 installation dates. Installations completed in PY2 were assigned the deemed savings values from PY2. Job types with an installation date in PY3 but prior to April of 2012 had reported savings that utilized billing analysis results from PY3Q1. New billing analysis results became available as of PY3Q4 that are applied to all jobs installed from April 2012 onward. PPL noted that retroactive savings adjustments are not made to the EEMIS tracking system when new billing analysis results are provided, but instead adjustments are made *ex ante*. Therefore, approximately two-thirds of the 72 jobs completed in PY3 and reported in PY4Q3 will be updated to the PY3Q4 values. This adjustment process is also explained in detail in PPL's PY3 Annual Report. All installations completed in PY4 incorporate the latest billing analysis results, though ultimately PPL will conduct another billing analysis in PY4, which will result in adjustments to the reported job-type savings for all PY4 installations.

The SWE did not conduct a review of PPL low-income site inspection forms during PY4Q3. The SWE will review PY4Q3 and PY4Q4 low-income site inspection forms following the close of PY4.

Lastly, PPL offered 54 measures to the low-income sector in PY4Q3, which is 36.99% of the total number of measures offered across all sectors. Therefore, PPL is in compliance with its 8.64% proportion of measures target.

## **6.5 Non-Residential Program Audit Summary**

PPL listed six programs under the non-residential umbrella, which includes the Small C&I, Large C&I, and GNP sectors. All six programs achieved energy and demand savings during PY4Q3. PPL's programs are designed to be cross-cutting, allowing customers from all rate classes to participate in the programs. Because the quarterly report format does not include sector level insight, the SWE did not separate the participation and impacts of the non-residential portions of PPL's programs from the participation and impacts from the residential portion.

### 6.5.1 Review of Savings Database

PPL provided a series of databases capturing all PY4Q3 activity to the SWE team for review. Table 6-7 provides the participant count, energy savings and demand savings, by program and sector, according to the PPL database extracts. The Small C&I sector contributed the largest *ex ante* energy savings (34,036 MWh) and the greatest *ex ante* peak demand savings (5.9 MW). Lighting retrofit projects accounted for almost 78% of the gross reported energy savings and almost 81% of the gross peak demand savings from non-residential customers in PY4Q3.

**Table 6-7: PPL Non-Residential Programs Savings Database Summary**

Sector	Program	Participants	MWh	MW	Incentives
GNP	C&I Lighting - New Construction	9	769	0.16	\$ 81,552
GNP	C&I Lighting Retrofit	118	4,698	0.96	\$ 442,644
GNP	Custom Incentives	2	413	0.04	\$ 24,603
GNP	EE Non-Lighting	49	29	0.02	\$ 160,824
GNP	Renewable Energy Program	69	424	0.05	\$ 236,111
Large C&I	C&I Lighting - New Construction	2	613	0.14	\$ 39,811
Large C&I	C&I Lighting Retrofit	30	7,560	0.97	\$ 396,355
Large C&I	Custom Incentives	6	3,557	0.44	\$ 251,955
Large C&I	EE Non-Lighting	28	28	0.02	\$ 31,485
Small C&I	Appliance Recycling	141	257	0.04	\$ 8,530
Small C&I	C&I Lighting - New Construction	14	3,141	0.47	\$ 169,893
Small C&I	C&I Lighting Retrofit	647	28,641	5.14	\$ 3,134,619
Small C&I	Custom Incentives	10	1,842	0.20	\$ 178,683
Small C&I	EE Non-Lighting	133	109	0.06	\$ 195,846
Small C&I	HVAC Tune-Up Program	19	44	0.00	\$ 1,900
<b>Totals</b>		<b>1,277</b>	<b>52,128</b>	<b>8.73</b>	<b>\$ 5,354,811</b>
Note: The SWE audit findings for PPL's non-residential demand response program is presented in Section 6.5.4.					

The SWE team did not compare PPL's reported non-residential impacts to this database summary because the program participation and impacts were not reported at a sector level in the PPL PY4Q3 report.

### 6.5.2 Review of Sample Design

PPL's evaluation contractor submitted a memo to the SWE detailing the sampling approach for the PY4 gross impact evaluation of non-residential programs. The PY4 sampling plan is designed to achieve 10% precision at the 90% confidence level by using  $C_v$  value of 0.5 at the sector level. Additionally, the sample sizes were designed to meet 85/15 confidence and precision levels at the program-level with a  $C_v$  assumption of 0.5. The initial PY4 sample sizes were based on the participation and the observed  $C_v$

values from PY3. There will be a quarterly review of the number of samples to ensure the precision/confidence targets are met. If needed, the final number of required samples will be revised in Q4. The SWE approves the PPL plan and believes it will satisfy the annual precision requirements established in the Audit Plan.<sup>26</sup>

#### **6.5.2.1 Efficient Equipment Program Non-residential Sector**

The stratification method used was based on the cumulative PY3 participation, verified savings, and number of participants. Measures were stratified into large, medium, and small groups according to *ex ante* savings. The large stratum is lighting measures. Given the relatively low volatility in realization rates of lighting measures, the  $C_v$  value used for this stratum is 0.4. The medium stratum included Variable Speed Drive (VSD) and Adjustable Speed Drive (ASD) measure groups and the small stratum included all other measures such as HVAC and office equipment.

The Lighting Stratum was separated into four sub-strata: large, medium, small, and direct discount. The PY4 sampling will include 52 site visits and record reviews and 140 surveys across the lighting sub-strata. The non-residential non-lighting measures are in the medium stratum and small stratum groups. Both strata target 85/15 confidence and precision levels with  $C_v$  equal to 0.5. The sample size and design for the medium stratum includes 20 desk reviews and site visits. Measures that fall into the small stratum do not receive on site verification unless the small stratum measure is at the same site as a measure in the medium stratum. 20 projects within the small stratum will receive desk reviews. 35 random survey samples will also be conducted each for both small and medium stratum.

#### **6.5.2.2 Renewables Program**

This program only serves the GNP sector in PY4 with a few projects. The verification of installation will be done through records review and engineering analysis. The evaluator did not plan any site visits or surveys for this program.

#### **6.5.2.3 HVAC Tune-Up**

All units sampled in PY3, defined by being individually serviced, were under desk review and analysis. In PY4, the evaluator planned to take the same approach as that which was taken in PY3, so no site visits or surveys will be conducted in PY4.

#### **6.5.2.4 Custom Incentives Program**

Projects in the Custom Incentives program are defined as large or small projects for the purpose of verification. All large projects are included as samples in the impact evaluation (census approach). For the small projects, a sample will be selected from all the small projects that are completed and paid during PY4. The realization rate determined by this sample will be applied to the small project stratum population.

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<sup>26</sup> *Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs*. November, 2011. Page 74.

### 6.5.3 On-site Inspections

The SWE conducted four ride-along site inspections of PPL non-residential lighting installations in PY4Q3. The SWE recently received the evaluator's analyses and reports for these projects and will issue ride-along site inspection reports to PPL during PY4Q4.

### 6.5.4 Non-Residential Demand Response Audit

PPL reported 133.7 MW of gross verified peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Load Curtailment program. The Large C&I sector contributed 125.4 MW and the Small C&I sector contributed 8.3 MW. The figures presented in the PY4Q3 report match the verified savings estimates submitted to the SWE and TUS staff in a memo dated March 1, 2013.

The 2012 PA TRM states *"Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices."*<sup>27</sup> In order to verify that customer baseline load (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in PPL's Load Curtailment program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a PPL curtailment event.
- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL
- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the PPL program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>28</sup>

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<sup>27</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

<sup>28</sup> Ibid.

Table 6-8 shows the verified savings impacts from these five participants during the summer of 2012. These values represent *ex post* savings values submitted to the SWE following verified savings analysis by PPL’s evaluation contractor and reflect all hours during which the site curtailed load for the PPL program, not just the top 100 hours. Table 6-8 also shows the sum of the independent SWE load reduction estimates for each site.

**Table 6-8: PPL Verified Demand Reductions – SWE Audit Sample**

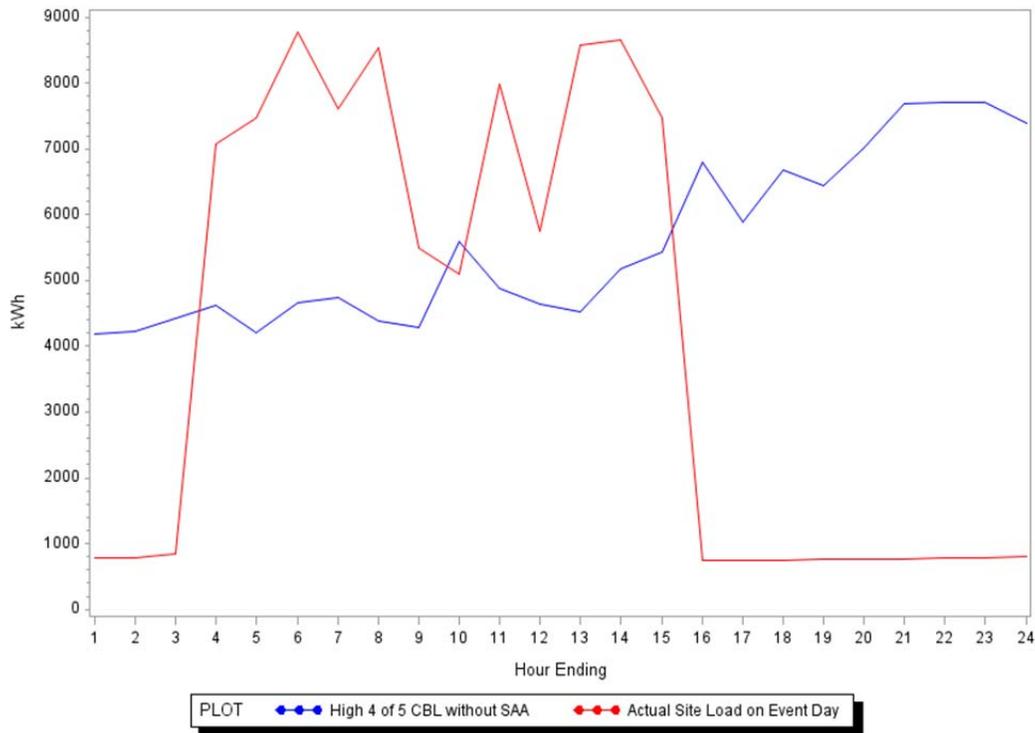
Unique ID	CBL Method	Sum of PPL kWh Savings Estimates	Sum of SWE kWh Savings Estimates	SWE Site Level Realization Rate Estimate
PPL0014810274	Standard 3-day Type	472,517	447,461	94.7%
PPL2120053001	Standard 3-day Type with SAA	800,591	792,851	99.0%
PPL2140053007	Standard 3-day Type	926,710	921,634	99.5%
PPL2259028005	Standard 3-day Type	798,381	797,355	99.9%
PPL6372715043	Standard 3-day Type	289,730	287,062	99.1%
<b>Total</b>		<b>3,287,929</b>	<b>3,246,363</b>	<b>98.7%</b>

Notice in Table 6-8 that the SWE savings estimate for each of the five sites is lower than the PPL savings estimate. These differences are the result of a difference in the interpretation of the “PJM business rules” called for in the TRM. A detailed comparison of the SWE and PPL load reduction calculations revealed that customer baselines were determined in an identical manner. However, during any five-minute interval<sup>29</sup> where the metered consumption in the facility was greater than the customer baseline load (CBL), PPL zeroed out the load impact estimate rather than counting a negative load reduction (a demand increase) for the site. Figure 6-1 presents the situation graphically for one customer.

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<sup>29</sup> PPL provided interval load data comprised of a demand reading (kW) every five minutes.

Figure 6-1: SWE Load Reduction Calculations – Site PPL0014810274 - August 8, 2012



Customer PPL0014810274 was dispatched to curtail load from 2:00 pm (Hour Ending 15) to 7:00 pm (Hour Ending 19) on August 8<sup>th</sup>. Notice in Figure 6-1 how the load in the facility on the event day (red line) is actually higher than the CBL (blue line) during Hour Ending 15. Under PPL’s interpretation of PJM business rules, a 0 kW load reduction is assessed for the site for Hour Ending 15 rather than the -2,032.2 kW difference between the load on the event day and the CBL.

The PJM Operating Agreement states *“For purposes of load reductions qualifying for compensation hereunder, an Economic Load Response Participant shall accumulate credits for energy reductions in those hours when the energy delivered to the end-use customer is less than the end-use customer’s Customer Baseline Load at the corresponding hourly rate. In the event the end-use customer’s hourly energy consumption is greater than the Customer Baseline Load, the Economic Load Response Participant will accumulate debits at the corresponding hourly rate for the amount that the end-use customer’s hourly energy consumption is greater than the Customer Baseline Load.”*<sup>30</sup> The SWE believes that the underlined portion of this passage makes clear that load impacts, both positive and negative, are to be quantified under PJM business rules.

Further, the SWE believes it is important to include these negative load reductions in the assessment of program impacts in order to cancel out “noise” in the data. The calculation of a Customer Baseline Load

<sup>30</sup> Amended and Restated Operating Agreement of the PJM Interconnection, L.L.C. pg.319.  
<http://www.pjm.com/~media/documents/agreements/oa.ashx>

(CBL) is not an exact science. Even if no curtailment were to take place in a facility, we would expect the CBL to marginally over and under estimate load in the facility due to natural variations in customer behavior. To attribute this “noise” to the program when the load is below the CBL and dismiss it when load is above the CBL produces a biased estimate of program impacts.

The SWE understands that the PPL Load Curtailment program is structured somewhat differently from the PJM demand response markets with regard to customer incentives. Because of these differences, PJM business rules may not always be a perfect solution. However, the 2012 TRM was clear that PJM business rules were to be followed in the assessment of Act 129 impacts from Load Curtailment programs and the SWE is not at liberty to authorize a departure from TRM protocols. PPL conducted a sensitivity analysis of the Load Curtailment program’s impacts using the alternate interpretation of PJM business rules (not zeroing out five-minute intervals where load was greater than CBL) and found that the verified savings impact of the program would be reduced by 15.5 MW, from 133.7 MW to 118.2 MW. The SWE will work with Commission staff and PPL to determine which interpretation of PJM business rules is most appropriate when assessing PPL’s compliance with its Phase I peak demand reduction target of 297 MW.

## **6.6 Finals Recommendations**

Based on SWE audit findings, the SWE team recommends the following:

- PPL should present impact estimates from its Load Curtailment program using both interpretations of the PJM business rules called for in the TRM in its PY4 Final Annual Report. PPL’s independent evaluation contractor should explain why it feels the chosen method produces the most accurate assessment of program impacts during the top 100 hours and should be used to assess compliance.

## 7 Met-Ed Impact Summaries and Audit Findings

Section 7 contains information on Met-Ed’s energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 7-1: Summary of Met-Ed Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	461,993	441,639	99%
Total Demand Reduction (MW)	133	133	112%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	37,421,433	35,772,759	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC’s eGRID2007 Version 1.1, RFCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

Met-Ed has reported PY4 gross energy savings for 13 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 7-2: Summary of Program Impacts on Gross Reported Portfolio Savings – Met-Ed**

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings</b>
	<b>Portfolio</b>
Demand Reduction	0%
Home Energy Audits and Outreach	25%
Appliance Turn-In	5%
EE HVAC	2%
EE Products	24%
New Construction	0%
Behavioral Modification and Education	9%
Multiple Family	1%
WARM Programs	1%
Small C&I Equipment	12%
Large C&I Equipment	16%
PJM Demand Response	0%
Street Lighting	0%
Non-Profit	0%
Remaining Government/Non-Profit	6%
<b>Total</b>	<b>100%</b>

## 7.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 7-3: Summary of Programs Implemented to Date by Met-Ed**

<b><i>Programs Reporting PY4 Gross Savings:</i></b>
<ul style="list-style-type: none"><li>• Home Energy Audits and Outreach</li><li>• Appliance Turn-In</li><li>• EE HVAC</li><li>• EE Products</li><li>• New Construction</li><li>• Multiple Family</li><li>• WARM Programs</li><li>• Small C&amp;I Equipment</li><li>• Large C&amp;I Equipment</li><li>• Non-Profit</li><li>• Remaining Government/Non-Profit</li><li>• Behavioral Modification and Education</li><li>• Street Lighting</li><li>• PJM Demand Response</li></ul>
<b><i>Programs to be Implemented or with No Reported PY4 Savings:</i></b>
<ul style="list-style-type: none"><li>• none</li></ul>

## 7.2 Status of EM&V Activities

### 7.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

### 7.2.2 Status of M&V Activities

Each program’s evaluation updates and findings are as follows:

- **Residential Demand Reduction Program:** Impact evaluation for this program is complete on a preliminary basis<sup>31</sup>. ADM has confirmed that the implementer, BPL Global, has calculated hourly impacts in accordance to the procedure described in the M&V plan.
- **Residential Home Energy Audits and Outreach Program:** The evaluation team has conducted a desk review of tracking data for all three components of this program (conservation kits, direct install of low-income measures and whole house comprehensive audits with capital cost measures installed.) ADM has also constructed preliminary realization rates that consider

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<sup>31</sup> The program’s impacts at the hourly level have been verified on a preliminary basis. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

historical “in service rates” and successful delivery rates, as well as changes in the TRM protocols for the conservation kit component of the program.

- **Residential Appliance Turn-In Program:** ADM has conducted preliminary desk reviews. First sample will be drawn from the Q1 and Q2 populations. Preliminary realization rates have been constructed from information gained from the recent evaluation effort conducted for PY3.
- **Residential Energy Efficiency HVAC Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols. The average efficiencies and capacities from the PY3 evaluation are used to generate preliminary realization rates for this program
- **Residential Energy Efficient Products Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols.
- **Residential New Construction Program:** ADM has met with the implementer to discuss the results of last year’s evaluation. ADM has reviewed tracking data to identify projects that may have potential modeling issues related to ground source heat pumps. The projects approved so far do not appear likely to have such modeling issues.
- **Residential Behavioral Modification and Education Program:** The impact evaluation effort for this program will involve billing analysis. M&V plans have been completed and initial data requests have been made by the M&V team.
- **Residential Multiple Family Program:** No sampling or surveying has occurred yet. ADM will begin sampling for surveys when the program population size is sufficiently large relative to the expected PY4 population size.
- **Residential Low-Income (WARM) Program:** For the WARM Plus Program, ADM has conducted desk reviews and has applied preliminary realization rates defined as the ratio of the verified per-unit savings from the PY3 evaluation to the reported per-unit savings in the PY4 tracking data. For the WARM Extra Measures Program, ADM has conducted a preliminary review of the tracking data. Verification surveys will occur late in the evaluation cycle.
- **Commercial / Industrial Small Sector Equipment Program:** ADM will be drawing samples from PY4Q1 and PY4Q2 for the “Lighting for Business” and the Prescriptive HVAC, Motors, and Refrigeration components of the program. For the custom applications component of the program, ADM conducts ongoing checks of evaluability for pending projects. ADM has completed a desk review for C&I CFL kits.
- **Commercial / Industrial Large Sector Performance Contracting / Equipment Program:** ADM will be drawing samples from PY4Q1 and PY4Q2 for the “Lighting for Business” and the Prescriptive HVAC, Motors, and Refrigeration components of the program. For the custom applications component of the program, ADM conducts ongoing checks of evaluability for pending projects.
- **Commercial / Industrial Large Sector Demand Response Program – CSP Mandatory and Voluntary Curtailment Program (“PJM Demand Response”):** Impact evaluation for this program is complete on a preliminary basis<sup>32</sup>. The evaluation effort involved stratified sampling and inspection of the hourly demand reduction calculations for selected projects. Projects that have base load estimation protocols accepted by and registered by PJM are evaluated on the basis of

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<sup>32</sup> Site-level hourly impacts verified on a preliminary basis are undergoing final quality assurance checks for a stratified sample of projects to meet 15% relative precision at the 85% confidence level. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

those protocols. Projects that do not have PJM registrations are evaluated with protocols that are identical to or similar to the PJM base load estimation protocols.

- **Governmental / Non-Profit Program:** ADM conducts ongoing checks of evaluability for pending projects.
- **Governmental / Remaining Non-Profit Program:** ADM conducts ongoing checks of evaluability for pending projects.

### 7.3 Residential Program Audit Summary

#### 7.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q3 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 7-4: Summary of CFL Program Audit – Met-Ed**

Category:	PY4Q3 Report:	Database Verification:	Notes:
<b>Gross Energy Savings</b>	Not Reported	TBD	Met-Ed does not report CFL savings separately in their reports. Met-Ed’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Gross Demand Reduction</b>	Not Reported	TBD	Met-Ed does not report CFL savings separately in their reports. Met-Ed’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Use of TRM Protocols</b>	Not Applicable	TBD	Met-Ed does not report CFL savings separately in their reports. Met-Ed’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Baseline Assumptions</b>	Not Applicable	TBD	Met-Ed does not report CFL savings separately in their reports. Met-Ed’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Invoice Review</b>	Not Applicable		A total of three individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

#### 7.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 7.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encounter any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 7.3.4 New Construction Program

Residential New Construction program audit activities are performed for all quarters at the end of the program year.

## 7.4 Low-Income Program Audit Summary

The SWE requested that Met-Ed provide a WARM programs database extract, consisting of all spreadsheets and supporting calculations detailing program participation, energy and demand savings, and other relevant information such as measures installed. Table 7-5 presents the participation, energy savings, and demand impact listed in Met-Ed's quarterly report, the corresponding information gleaned from the SWE's review of the database extract, and the discrepancy between the two. To determine a database participant count the SWE identified the number of unique projects listed in the database extract. The discrepancy with the quarterly report participation value appears to be the result of Met-Ed using a different method to determine participation or due to a spreadsheet error.

**Table 7-5: Met-Ed WARM Programs Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	264	206	0.04
Database	229	206	0.04
<b>Discrepancy (Report - Database)</b>	<b>35</b>	<b>0</b>	<b>0.00</b>

The SWE also reviewed the WARM Extra Measures savings assumptions for all measures distributed through the program in PY4Q3 to determine whether Met-Ed was appropriately applying the TRM algorithms and assumptions. Two discrepancies were found. First, Met-Ed applied the deemed in-service rate for all specialty CFLs except 17-20 watt bulbs. Therefore, the savings value for 17-20 watt specialty CFLs should be adjusted to incorporate the TRM in-service rate. The second discrepancy with the TRM is the assumed baseline for the 21-25 watt CFL, which was the 100 watt incandescent in prior program years, but has shifted to 72 watts in PY4 due to EISA 2007 standards. Met-Ed was made aware of this issue in prior quarters and noted to the SWE during PY4Q3 that adjustments will be made to correct these assumptions during the evaluation at the conclusion of PY4.

The SWE checked the Met-Ed WARM Plus savings by job type and noted that all savings were reported based on the 2009 LIURP billing analysis results. A more recent billing analysis of WARM Plus participants was completed by Met-Ed's evaluator at the conclusion of PY3, but Met-Ed's tracking database has not yet been updated to incorporate the results from that analysis. However, the PY4Q3 per-job savings will ultimately be determined at the conclusion of PY4 based on the results of another billing analysis conducted by Met-Ed's evaluator of recent WARM Plus participants.

The SWE requested 10 low-income site inspection reports for review from Met-Ed shortly before the publication of this report. The SWE will review the reports during PY4Q4 and provide findings and recommendations to Met-Ed.

Met-Ed offered seven measures to the low-income sector in PY4Q3, which is 17% of the total number of measures offered across all sectors. Therefore, Met-Ed is in compliance with its 7.84% proportion of measures target. It should be noted that Met-Ed stated that the proportion of measures target is 9%, which is incorrect. The target it set at 7.84% for Phase I of Act 129.

### **7.5 Non-Residential Program Audit Summary**

Met-Ed lists six programs in its non-residential portfolio. Met-Ed defines programs within its non-residential portfolio primarily by customer sector. Four of these programs achieved energy and demand savings during PY4Q3. The reported gross energy savings from non-residential programs was 8,669 MWh and the reported gross demand savings was 1.40 MW. The number of participants, gross reported energy impact and gross reported demand impact for PY4Q3 are shown in Table 7-6.

**Table 7-6: Met-Ed Non-Residential Programs Quarterly Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Small C&I Performance Contracting/Equipment	104	3,728	0.65
Large C&I Performance Contracting/Equipment	4	2,117	0.12
Non-Profit	6	140	0.01
Remaining Government/Non-Profit	87	2,684	0.62
<b>Totals</b>	<b>201</b>	<b>8,669</b>	<b>1.40</b>

**7.5.1 Review of Savings Database**

FirstEnergy provided the SWE team a database of project activity for each of its operating companies. This database contained the key reporting metrics for each project reporting savings in the quarter as well as additional detail on the types of efficient equipment installed at each site to generate savings. The SWE team identified each of the distinct participants and the energy and demand impacts associated with that participant for each Met-Ed’s non-residential programs. Table 7-7 contains the total participant counts, energy savings and demand savings by program, from Met-Ed non-residential projects in the FirstEnergy savings database. Incentive amounts were not provided in the FirstEnergy extract for the non-residential projects and are omitted from Table 7-7.

**Table 7-7: Met-Ed Non-Residential Programs Savings Database Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Small C&I Performance Contracting/Equipment	104	3,728	0.65
Large C&I Performance Contracting/Equipment	4	2,117	0.12
Non-Profit	6	140	0.01
Remaining Government/Non-Profit	86	2,664	0.62
<b>Totals</b>	<b>200</b>	<b>8,649</b>	<b>1.40</b>

In Table 7-8, the discrepancies between the reported figures and the information contained in the FirstEnergy tracking database are presented. All discrepancies are reported as follows:

$$\text{Reported Figure} - \text{Database Summary} = \text{Discrepancy}$$

**Table 7-8: Met-Ed Non-Residential Program Discrepancies**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Small C&I Performance Contracting/Equipment	0	0	0.00
Large C&I Performance Contracting/Equipment	0	0	0.00
Non-Profit	0	0	0.00
Remaining Government/Non-Profit	1	20	0.00
<b>Totals</b>	<b>1</b>	<b>20</b>	<b>0.00</b>
Note: Met-Ed’s non-residential demand response programs are discussed in Section 7.5.4.			

The total number of non-residential participants and total demand impacts in the database summary match perfectly with the figures reported in Met-Ed PY4Q3 report for all the programs except for the Remaining Government/Non-Profit Program. The reported savings impacts were 20 MWh higher than the impacts shown in the savings database and show one additional participant.

### 7.5.2 Review of Sample Design

Met-Ed's evaluation contractor plans to use the same stratification and sampling methods for non-residential programs in PY4 that were used in PY3. The plan targets relative precision of 15% at the 85% confidence level annually for each program. Tracking data from Q1 and Q2 will be used to draw a sample population at the end of Q2 of PY4. Similarly, tracking data from Q3 and Q4 will be used to draw a sample population at the end of Q4. The sample populations were separated by operating companies and programs first, and then were stratified at the measure level based on realization rates, variability of the realization rates, modes, and rebated savings. The evaluator used qualitative stratification with a minimum  $C_v$  value of 0.4 for each stratum based on the PY3 error ratios.

In the PY4 C&I Sampling Plan, each non-residential program contains multiple strata and the  $C_v$  values are equal to or greater than 0.4. The sample sizes, by program, for the sample draw at the end of Q2 are: nine for Large C&I, 16 for Small C&I, 12 for Remaining Government/Non-Profit, one for Street Lighting, and three for Non-Profit. The Q4 sample draw should roughly double these sample sizes. The evaluator is also expecting custom solar projects will fall into the Q3 and Q4 sample and plans on establishing a separate stratum for these projects with an assumed  $C_v$  value of 0.5 initially. After reviewing the short description of Met-Ed's sample design and supporting documents submitted by the evaluator, the SWE has determined the sample design approach is appropriate and approves the plan.

### 7.5.3 On-site Inspections

Met-Ed is planning to begin its on-site inspections of PY4 installations in PY4Q4. The SWE plans to conduct ride-along site inspections of PY4 installations at that time.

### 7.5.4 Non-Residential Demand Response Audit

Met-Ed estimated 48.88 MW of gross reported peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Commercial and Industrial Load Curtailment program. This estimate represents approximately 41% of Met-Ed's 119 MW Phase I peak demand reduction target.

The 2012 PA TRM states "*Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices.*"<sup>33</sup> In order to verify that customer baseline load (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in Met-Ed's Load Curtailment program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a Met-Ed curtailment event.
- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL

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<sup>33</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the Met-Ed program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>34</sup>

At the time of this report, Met-Ed’s evaluation contractor was working to finalize its verified savings analysis for the C&I Demand Response programs implemented by the FirstEnergy companies in PY4. Once this analysis is complete, the SWE will compare the verified savings analysis for the five sites in the audit sample to the independent estimates developed by the SWE. The results of this comparison will be presented in the SWE PY4 Final Annual Report.

## **7.6 Finals Recommendations**

Based on SWE audit findings, the SWE team recommends the following:

- Low-income savings calculations for CFLs that assumed a 100 watt baseline in prior program years should be adjusted to a 72 watt baseline in accordance with the 2012 TRM. In addition, the TRM in-service rate should be applied to the savings calculations for WARM Extra Measures 17-20 watt specialty CFLs to be consistent with the TRM and the other Met-Ed specialty bulb calculations.
- Met-Ed should continue to use the proportion of low-income measures target set for Phase I of Act 129 for PY4.
- Met-Ed should work to finalize the verified savings analysis for the C&I Load Curtailment program and work with the SWE to understand any complications which arise from the interpretation of the “PJM business rules” called for in the TRM.

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<sup>34</sup> Ibid.

## 8 Penelec Impact Summaries and Audit Findings

Section 8 contains information on Penelec’s energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 8-1: Summary of Penelec Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	445,182	418,315	97%
Compliance Demand Reduction (MW) <sup>[a]</sup>	126	126	117%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	36,059,742	33,883,515	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC’s eGRID2007 Version 1.1, RfCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

Penelec has reported PY4 gross energy savings for 13 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 8-2: Summary of Program Impacts on Gross Reported Portfolio Savings – Penelec**

<b>Program:</b>	<b>Percent of PYTD Gross</b>
	<b>MWh Savings Portfolio</b>
Demand Reduction	0%
Home Energy Audits and Outreach	25%
Appliance Turn-In	7%
EE HVAC	1%
EE Products	28%
New Construction	0%
Behavioral Modification and Education	7%
Multiple Family	0%
WARM Programs	1%
Small C&I Equipment	10%
Large C&I Equipment	6%
PJM Demand Response	0%
Street Lighting	1%
Non-Profit	0%
Remaining Government/Non-Profit	13%
<b>Total</b>	<b>100%</b>

## 8.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 8-3: Summary of Programs Implemented to Date by Penelec**

<b>Programs Reporting PY4 Gross Savings:</b>
<ul style="list-style-type: none"><li>• Home Energy Audits and Outreach</li><li>• Appliance Turn-In</li><li>• EE HVAC</li><li>• EE Products</li><li>• Multiple Family</li><li>• WARM Programs</li><li>• Small C&amp;I Equipment</li><li>• Large C&amp;I Equipment</li><li>• Street Lighting</li><li>• Non-Profit</li><li>• Remaining Government/Non-Profit</li><li>• New Construction</li><li>• Behavioral Modification and Education</li><li>• Demand Reduction</li><li>• PJM Demand Response</li></ul>
<b>Programs to be Implemented or with No Reported PY4 Savings:</b>
<ul style="list-style-type: none"><li>• none</li></ul>

## 8.2 Status of EM&V Activities

### 8.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

### 8.2.2 Status of M&V Activities

Each program’s evaluation updates and findings are as follows:

- **Residential Demand Reduction Program:** Impact evaluation for this program is complete on a preliminary basis<sup>35</sup>. ADM has confirmed that the implementer, BPL Global, has calculated hourly impacts in accordance to the procedure described in the M&V plan.
- **Residential Home Energy Audits and Outreach Program:** ADM has conducted a desk review of tracking data for all three components of this program (conservation kits, direct install of low-income measures and whole house comprehensive audits with capital cost measures installed.) ADM has also constructed preliminary realization rates that consider historical “in service rates”

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<sup>35</sup> The program’s impacts at the hourly level have been verified on a preliminary basis. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

and successful delivery rates, as well as changes in the TRM protocols for the conservation kit component of the program.

- **Residential Appliance Turn-In Program:** ADM has conducted preliminary desk reviews. First sample will be drawn from the Q1 and Q2 populations. Preliminary realization rates have been constructed from information gained from the recent evaluation effort conducted for PY3.
- **Residential Energy Efficiency HVAC Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols. The average efficiencies and capacities from the PY3 evaluation are used to generate preliminary realization rates for this program
- **Residential Energy Efficient Products Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols.
- **Residential New Construction Program:** ADM has met with the implementer to discuss the results of last year's evaluation. ADM has reviewed tracking data to identify projects that may have potential modeling issues related to ground source heat pumps. The projects approved so far do not appear likely to have such modeling issues.
- **Residential Behavioral Modification and Education Program:** The impact evaluation effort for this program will involve billing analysis. M&V plans have been completed and initial data requests have been made by the M&V team.
- **Residential Multiple Family Program:** No sampling or surveying has occurred yet. ADM will begin sampling for surveys when the program population size is sufficiently large relative to the expected PY4 population size.
- **Residential Low-Income (WARM) Program:** For the WARM Plus Program, ADM has conducted desk reviews and has applied preliminary realization rates defined as the ratio of the verified per-unit savings from the PY3 evaluation to the reported per-unit savings in the PY4 tracking data. For the WARM Extra Measures Program, ADM has conducted a preliminary review of the tracking data. Verification surveys will occur late in the evaluation cycle.
- **Commercial / Industrial Small Sector Equipment Program:** ADM will be drawing samples from PY4Q1 and PY4Q2 for the "Lighting for Business" and the Prescriptive HVAC, Motors, and Refrigeration components of the program. For the custom applications component of the program, ADM conducts ongoing checks of evaluability for pending projects. ADM has completed a desk review for C&I CFL kits.
- **Commercial / Industrial Large Sector Performance Contracting / Equipment Program:** ADM will be drawing samples from PY4Q1 and PY4Q2 for the "Lighting for Business" and the Prescriptive HVAC, Motors, and Refrigeration components of the program. For the custom applications component of the program, ADM conducts ongoing checks of evaluability for pending projects.
- **Commercial / Industrial Large Sector Demand Response Program – CSP Mandatory and Voluntary Curtailment Program ("PJM Demand Response"):** Impact evaluation for this program is complete on a preliminary basis<sup>36</sup>. The evaluation effort involved stratified sampling and inspection of the hourly demand reduction calculations for selected projects. Projects that have base load estimation protocols accepted by and registered by PJM are evaluated on the basis of

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<sup>36</sup> Site-level hourly impacts verified on a preliminary basis are undergoing final quality assurance checks for a stratified sample of projects to meet 15% relative precision at the 85% confidence level. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

those protocols. Projects that do not have PJM registrations are evaluated with protocols that are identical to or similar to the PJM base load estimation protocols.

- **Governmental / Non-Profit Program:** ADM conducts ongoing checks of evaluability for pending projects.
- **Governmental / Remaining Non-Profit Program:** ADM conducts ongoing checks of evaluability for pending projects.

### 8.3 Residential Program Audit Summary

#### 8.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q3 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 8-4: Summary of CFL Program Audit – Penelec**

Category:	PY4Q2 Report:	Database Verification:	Notes:
Gross Energy Savings	Not Reported	TBD	Penelec does not report CFL savings separately in their reports. Penelec’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Gross Demand Reduction	Not Reported	TBD	Penelec does not report CFL savings separately in their reports. Penelec’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Use of TRM Protocols	Not Applicable	TBD	Penelec does not report CFL savings separately in their reports. Penelec’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Baseline Assumptions	Not Applicable	TBD	Penelec does not report CFL savings separately in their reports. Penelec’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Invoice Review	Not Applicable		A total of three individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

#### 8.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 8.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encounter any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 8.3.4 New Construction Program

Residential New Construction program audit activities are performed for all quarters at the end of the program year.

## 8.4 Low-Income Program Audit Summary

The SWE requested that Penelec provide a WARM programs database extract, consisting of all spreadsheets and supporting calculations detailing program participation, energy and demand savings, and other relevant information such as measures installed. Table 8-5 presents the participation, energy savings, and demand impact listed in Penelec's quarterly report, the corresponding information gleaned from the SWE's review of the database extract, and the discrepancy between the two. To determine a database participant count the SWE identified the number of unique projects listed in the database extract. The discrepancy with the quarterly report participation value appears to be the result of Penelec using a different method to determine participation or due to a spreadsheet error.

**Table 8-5: Penelec WARM Programs Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	636	324	0.05
Database	558	324	0.05
<b>Discrepancy (Report - Database)</b>	<b>78</b>	<b>0</b>	<b>0.00</b>

The SWE also reviewed the WARM Extra Measures savings assumptions for all measures distributed through the program in PY4Q3 to determine whether Penelec was appropriately applying the TRM algorithms and assumptions. Two discrepancies were found. First, Penelec applied the deemed in-service rate for all specialty CFLs except 17-20 watt bulbs. Therefore, the savings value for 17-20 watt specialty CFLs should be adjusted to incorporate the TRM in-service rate. The second discrepancy with the TRM is the assumed baseline for the 21-25 watt CFL, which was the 100 watt incandescent in prior program years, but has shifted to 72 watts in PY4 due to EISA 2007 standards. Penelec was made aware of this issue in prior quarters and noted to the SWE during PY4Q3 that adjustments will be made to correct these assumptions during the evaluation at the conclusion of PY4.

The SWE checked the Penelec WARM Plus savings by job type and noted that all savings were reported based on the 2009 LIURP billing analysis results. A more recent billing analysis of WARM Plus participants was completed by Penelec's evaluator at the conclusion of PY3, but Penelec's tracking database has not yet been updated to incorporate the results from that analysis. However, the PY4Q3 per-job savings will ultimately be determined at the conclusion of PY4 based on the results of another billing analysis conducted by ADM, Penelec's evaluator of recent WARM Plus participants.

The SWE requested ten low-income site inspection reports for review from Penelec shortly before the publication of this report. The SWE will review the reports during PY4Q4 and provide findings and recommendations to Penelec.

Penelec offered seven measures to the low-income sector in PY4Q3, which is 17% of the total number of measures offered across all sectors. Therefore, Penelec is in compliance with its 9.51% proportion of measures target.

### **8.5 Non-Residential Program Audit Summary**

Penelec lists six programs in its non-residential portfolio. Penelec defines programs within its non-residential portfolio primarily by customer sector. The Small C&I Equipment, Large C&I Equipment, Street Lighting, and Remaining Government/Non-Profit programs each reported energy and demand savings in PY4Q3. The reported gross energy savings from non-residential programs was 13,190 MWh and the reported gross demand savings was 2.55 MW. The number of participants, gross reported energy impact and gross reported demand impact for PY4Q3 are shown in Table 8-6.

**Table 8-6: Penelec Non-Residential Programs Quarterly Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Small C&I Performance Contracting/Equipment	79	5,237	1.32
Large C&I Performance Contracting/Equipment	6	1,870	0.29
Street Lighting	4	168	0.00
Remaining Government/Non-Profit	39	5,915	0.94
<b>Totals</b>	<b>128</b>	<b>13,190</b>	<b>2.55</b>

### 8.5.1 Review of Savings Database

FirstEnergy provided the SWE team a database of project activity for each of its operating companies. This database contained the key reporting metrics for each project reporting savings in the quarter as well as additional detail on the types of efficient equipment installed at each site to generate savings. The SWE team identified each of the distinct participants and the energy and demand impacts associated with that participant for each Penelec’s non-residential programs. The tracking data provided by FirstEnergy did not include incentive amounts. Table 8-7 provides the participant counts and the sum of the energy and demand impacts for each program.

**Table 8-7: Penelec Non-Residential Programs Savings Database Summary**

Program	Participants	MWh	MW
Small C&I Performance Contracting/Equipment	79	5,237	1.32
Large C&I Performance Contracting/Equipment	6	1,870	0.29
Street Lighting	4	168	0.00
Remaining Government/Non-Profit	39	5,915	0.94
<b>Totals</b>	<b>128</b>	<b>13,190</b>	<b>2.55</b>

In Table 8-8, the discrepancies between the reported figures and the information contained in the database are presented. All discrepancies are reported as follows:

$$\text{Reported Figure} - \text{Database Summary} = \text{Discrepancy}$$

**Table 8-8: Penelec Non-Residential Program Discrepancies**

Program	Participants	MWh	MW
Small C&I Performance Contracting/Equipment	0	0	0.0
Large C&I Performance Contracting/Equipment	0	0	0.0
Street Lighting	0	0	0.0
Non-Profit	0	0	0.0
Remaining Government/Non-Profit	0	0	0.0
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0.0</b>

Note: Penelec’s non-residential demand response program is discussed in Section 8.5.4.

The total number of participants, energy impact and peak demand impact from the program tracking data matched perfectly with the figures in the quarterly report. Rebate amounts were not included in the program tracking data so the SWE was not able to audit the incentives payment amounts reported for non-residential programs.

### 8.5.2 Review of Sample Design

Penelec's evaluation contractor presented a memo to the SWE team detailing the sample design for the gross impact evaluation of non-residential programs. The stratification and sampling methods for PY4 are similar to what was used in PY3 and target 15% precision at the 85% confidence level for each program. Tracking data from Q1 and Q2 will be used to draw a sample population at the end of Q2 of PY4. Similarly, tracking data from Q3 and Q4 will be used to draw a sample population at the end of Q4. The sample populations were separated by the operating companies and programs first, and then were stratified at the measure level based on realization rates, variability of the realization rates, modes, and rebated savings. The evaluator used qualitative stratification (by measure type) with a minimum Cv value of 0.4 for each stratum based on the PY3 error ratios.

In the PY4 C&I Sampling Plan, each non-residential program contains multiple strata and Cv values are equal to or greater than 0.4. The sample sizes, by program, for the sample draw at the end of Q2 are: seven for Large C&I, 15 for Small C&I, 10 for Remaining Government/Non-Profit, five for Street Lighting and three for Non-Profit. These sample sizes should roughly double after the second sample selection at the end of Q4. After reviewing the short description of Penelec's sample design and supporting documents submitted by the evaluator, the SWE approves the plan pending any changes in program participation patterns.

### 8.5.3 On-site Inspections

Penelec is planning to begin its on-site inspections of PY4 installations in PY4Q4. The SWE plans to conduct ride-along site inspections of PY4 installations at that time.

### 8.5.4 Non-Residential Demand Response Audit

Penelec estimated 86.72 MW of gross reported peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Commercial and Industrial Load Curtailment program. This estimate represents over 80% of Penelec's Phase I peak demand reduction target of 108 MW. The SWE believes this estimate is actually the estimate for West Penn Power's Load Curtailment program and that the impact of the Penelec program was closer to 55 MW.

The 2012 PA TRM states "*Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices.*"<sup>37</sup> In order to verify that customer baseline load (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in Penelec's Load Curtailment program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a Penelec curtailment event.

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<sup>37</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL
- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the Penelec program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>38</sup>

At the time of this report, Penelec's evaluation contractor was working to finalize its verified savings analysis for the C&I Demand Response programs implemented by the FirstEnergy companies in PY4. Once this analysis is complete, the SWE will compare the verified savings analysis for the five sites in the audit sample to the independent estimates developed by the SWE. The results of this comparison will be presented in the SWE PY4 Final Annual Report.

## **8.6 Finals Recommendations**

Based on SWE audit findings, the SWE team recommends the following:

- Low-income savings calculations for CFLs that assumed a 100 watt baseline in prior program years should be adjusted to a 72 watt baseline in accordance with the 2012 TRM.
- The TRM in-service rate should be applied to the savings calculations for WARM Extra Measures 17-20 watt specialty CFLs to be consistent with the TRM and the other Penelec specialty bulb calculations.
- Penelec should work to finalize the verified savings analysis for the C&I Load Curtailment program and work with the SWE to understand any complications which arise from the interpretation of the "PJM business rules" called for in the TRM.
- Penelec should confirm that impact estimates are being reported for the correct operating company. The SWE believes that the 86.72 MW reported demand savings estimate for the C&I Load Curtailment program was actually for West Penn Power.

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<sup>38</sup> Ibid.

## 9 Penn Power Impact Summaries and Audit Findings

Section 9 contains information on Penn Power’s energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 9-1: Summary of Penn Power Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	156,484	149,147	104%
Compliance Demand Reduction (MW) <sup>[a]</sup>	49	49	111%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	12,675,204	12,080,907	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC’s eGRID2007 Version 1.1, RFCE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

Penn Power has reported PY4 gross energy savings for 10 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 9-2: Summary of Program Impacts on Gross Reported Portfolio Savings – Penn Power**

<b>Program:</b>	<b>Percent of PYTD Gross</b>
	<b>MWh Savings Portfolio</b>
Demand Reduction	0%
Home Energy Audits and Outreach	27%
Appliance Turn-In	5%
EE HVAC	2%
EE Products	33%
New Construction	0%
Behavioral Modification and Education	5%
Multiple Family	0%
WARM Programs	0%
Small C&I Equipment	19%
Large C&I Equipment	7%
PJM Demand Response	0%
Street Lighting	0%
Non-Profit	0%
Remaining Government/Non-Profit	2%
<b>Total</b>	<b>100%</b>

## 9.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 9-3: Summary of Programs Implemented to Date by Penn Power**

<b><i>Programs Reporting PY4 Gross Savings:</i></b>
<ul style="list-style-type: none"><li>• Home Energy Audits and Outreach</li><li>• Appliance Turn-In</li><li>• EE HVAC</li><li>• EE Products</li><li>• Multiple Family</li><li>• Small C&amp;I Equipment</li><li>• Large C&amp;I Equipment</li><li>• Remaining Government/Non-Profit</li><li>• New Construction</li><li>• Behavioral Modification and Education</li><li>• PJM Demand Response</li></ul>
<b><i>Programs to be Implemented or with No Reported PY4 Savings:</i></b>
<ul style="list-style-type: none"><li>• WARM Programs</li><li>• Street Lighting</li><li>• Non-Profit</li></ul>

## 9.2 Status of EM&V Activities

### 9.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

### 9.2.2 Status of M&V Activities

Each program’s evaluation updates and findings are as follows:

- **Residential Demand Reduction Program:** Impact evaluation for this program is complete on a preliminary basis<sup>39</sup>. ADM has confirmed that the implementer, BPL Global, has calculated hourly impacts in accordance to the procedure described in the M&V plan.
- **Residential Home Energy Audits and Outreach Program:** ADM has conducted a desk review of tracking data for all three components of this program (conservation kits, direct install of low-income measures and whole house comprehensive audits with capital cost measures installed.) ADM has also constructed preliminary realization rates that consider historical “in service rates” and successful delivery rates, as well as changes in the TRM protocols for the conservation kit component of the program.

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<sup>39</sup> The program’s impacts at the hourly level have been verified on a preliminary basis. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

- **Residential Appliance Turn-In Program:** ADM has conducted preliminary desk reviews. First sample will be drawn from the Q1 and Q2 populations. Preliminary realization rates have been constructed from information gained from the recent evaluation effort conducted for PY3.
- **Residential Energy Efficiency HVAC Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols. The average efficiencies and capacities from the PY3 evaluation are used to generate preliminary realization rates for this program
- **Residential Energy Efficient Products Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols.
- **Residential New Construction Program:** ADM has met with the implementer to discuss the results of last year’s evaluation. ADM has reviewed tracking data to identify projects that may have potential modeling issues related to ground source heat pumps. The projects approved so far do not appear likely to have such modeling issues.
- **Residential Behavioral Modification and Education Program:** The impact evaluation effort for this program will involve billing analysis. M&V plans have been completed and initial data requests have been made by the M&V team.
- **Residential Multiple Family Program:** No sampling or surveying has occurred yet. ADM will begin sampling for surveys when the program population size is sufficiently large relative to the expected PY4 population size.
- **Residential Low-Income (WARM) Program:** For the WARM Plus Program, ADM has conducted desk reviews and has applied preliminary realization rates defined as the ratio of the verified per-unit savings from the PY3 evaluation to the reported per-unit savings in the PY4 tracking data. For the WARM Extra Measures Program, ADM has conducted a preliminary review of the tracking data. Verification surveys will occur late in the evaluation cycle.
- **Commercial / Industrial Small Sector Equipment Program:** ADM will be drawing samples from PY4Q1 and PY4Q2 for the “Lighting for Business” and the Prescriptive HVAC, Motors, and Refrigeration components of the program. For the custom applications component of the program, ADM conducts ongoing checks of evaluability for pending projects. ADM has completed a desk review for C&I CFL kits.
- **Commercial / Industrial Large Sector Performance Contracting / Equipment Program:** ADM will be drawing samples from PY4Q1 and PY4Q2 for the “Lighting for Business” and the Prescriptive HVAC, Motors, and Refrigeration components of the program. For the custom applications component of the program, ADM conducts ongoing checks of evaluability for pending projects.
- **Commercial / Industrial Large Sector Demand Response Program – CSP Mandatory and Voluntary Curtailment Program (“PJM Demand Response”):** Impact evaluation for this program is complete on a preliminary basis<sup>40</sup>. The evaluation effort involved stratified sampling and inspection of the hourly demand reduction calculations for selected projects. Projects that have base load estimation protocols accepted by and registered by PJM are evaluated on the basis of those protocols. Projects that do not have PJM registrations are evaluated with protocols that are identical to or similar to the PJM base load estimation protocols.

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<sup>40</sup> Site-level hourly impacts verified on a preliminary basis are undergoing final quality assurance checks for a stratified sample of projects to meet 15% relative precision at the 85% confidence level. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

- **Governmental / Non-Profit Program:** ADM conducts ongoing checks of evaluability for pending projects.
- **Governmental / Remaining Non-Profit Program:** ADM conducts ongoing checks of evaluability for pending projects.

### 9.3 Residential Program Audit Summary

#### 9.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q2 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 9-4: Summary of CFL Program Audit – Penn Power**

Category:	PY4Q2 Report:	Database Verification:	Notes:
<b>Gross Energy Savings</b>	Not Reported	TBD	Penn Power does not report CFL savings separately in their reports. Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Gross Demand Reduction</b>	Not Reported	TBD	Penn Power does not report CFL savings separately in their reports. Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Use of TRM Protocols</b>	Not Applicable	TBD	Penn Power does not report CFL savings separately in their reports. Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Baseline Assumptions</b>	Not Applicable	TBD	Penn Power does not report CFL savings separately in their reports. Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
<b>Invoice Review</b>	Not Applicable		A total of three individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

#### 9.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 9.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encounter any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 9.3.4 New Construction Program

Residential New Construction program audit activities are performed for all quarters at the end of the program year.

## 9.4 Low-Income Program Audit Summary

Penn Power's WARM Plus program closed at the end of January 2012 and WARM Extra Measures closed in March 2012. Therefore there was no WARM program activity in PY4Q3 and as a result there are no values presented in Table 9-5.

**Table 9-5: Penn Power WARM Programs Quarterly Report and Database Summary**

	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
PY4Q3 Report	0	0	0.00
Database	0	0	0.00
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>0</b>	<b>0.00</b>

Penn Power reported offering seven measures to the low-income sector in PY4Q3, which is 17% of the total number of measures offered across all sectors. However, it does not appear that Penn Power accounted for the fact that the WARM programs are now closed. Factoring in the removal of the WARM programs reduces the number of measures offered to the low-income sector to four, which is 9.76% of the total measures offered by Penn Power. Therefore, even with the removal of the WARM programs, Penn Power is in compliance with its 8.16% proportion of measures target. It should be noted that Penn Power stated that the proportion of measures target is 11%, which is incorrect. The target it set at 8.16% for Phase I of Act 129.

### 9.5 Non-Residential Program Audit Summary

Penn Power lists six programs under its non-residential umbrella, which includes the Small C&I Equipment, Large C&I Equipment, and Remaining Government/Non-Profit programs. Only three of these programs reported savings during PY4Q3. The reported number of participants, energy savings and demand savings are presented for these programs in Table 9-6. The gross reported energy savings of these programs was 6,425 MWh and the gross reported demand savings were 1.15 MW. Incentive amounts were not included in the tracking database for non-residential customers, so these figures are not included in Table 9-6.

**Table 9-6: Penn Power Non-Residential Programs Quarterly Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Small C&I Performance Contracting/Equipment	49	3,484	0.52
Large C&I Performance Contracting/Equipment	10	2,320	0.48
Remaining Government/Non-Profit	15	621	0.15
<b>Totals</b>	<b>74</b>	<b>6,425</b>	<b>1.15</b>

### 9.5.1 Review of Savings Database

FirstEnergy provided the SWE team a database of project activity for each of its operating companies for PY4Q3. Similar to the other FirstEnergy Companies, the database for Penn Power contained the key reporting metrics for each project reporting savings in the quarter as well as additional detail on the types of efficient equipment installed at each site to generate savings. The SWE team identified each of the distinct participants and the energy and demand impacts associated with that participant for each of Penn Power’s non-residential programs. The tracking data provided by FirstEnergy did not include incentive amounts. Table 9-7 provides the participant counts and the sum of the energy and demand impacts for each program.

**Table 9-7: Penn Power Non-Residential Programs Quarterly Summary**

Program	Participants	MWh	MW
Small C&I Performance Contracting/Equipment	49	3,484	0.52
Large C&I Performance Contracting/Equipment	10	2,320	0.48
Remaining Government/Non-Profit	15	621	0.15
<b>Totals</b>	<b>74</b>	<b>6,425</b>	<b>1.15</b>

In Table 9-8, the discrepancies between the figures reported in Penn Power’s quarterly report and the information contained in the savings database are presented. All discrepancies are reported as follows:

$$\text{Reported Figure} - \text{Database Summary} = \text{Discrepancy}$$

**Table 9-8: Penn Power Non-Residential Program Discrepancies**

Program	Participants	MWh	MW
Small C&I Performance Contracting/Equipment	0	0	0.00
Large C&I Performance Contracting/Equipment	0	0	0.00
Remaining Government/Non-Profit	0	0	0.00
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0.00</b>

Note: Penn Power’s non-residential demand response program is discussed in Section 9.5.4.

The number of participants, energy impact and peak demand impact from the program tracking data matched perfectly with the figures in the quarterly report. Rebate amounts were not included in the program tracking data so the SWE was not able to audit the incentives payment amounts reported for non-residential programs.

### 9.5.2 Review of Sample Design

In PY4, Penn Power’s evaluator plans to use the same stratification method that was used in PY3, which targeted precision of 15% at the 85% confidence level annually. Tracking data from Q1 and Q2 will be used to draw a sample population at the end of Q2 of PY4. Similarly, tracking data from Q3 and Q4 will

be used to draw a sample population at the end of Q4. The sample populations were separated by the operating companies and programs first, and then were stratified at the measure level based on realization rates, variability of the realization rates, modes, and rebated savings. The evaluator used qualitative stratification with a minimum Cv value of 0.4 for each stratum based on the PY3 error ratios.

In the PY4 C&I Sampling Plan, each non-residential program contains multiple strata and the Cv values are equal to or greater than 0.4. The sample sizes, by program, after the Q2 sample selection procedure are: four for Large C&I, seven for Small C&I, and four for Remaining Government/Non-Profit. These sample sizes should roughly double after the second sample selection at the end of Q4. After reviewing the short description of Penn Power's sample design and supporting documents submitted by the evaluator, the SWE has determined the sample design approach is appropriate and approves the plan pending any significant increase in program participation in PY4Q4.

### 9.5.3 On-site Inspections

Penn Power is planning to begin its on-site inspections of PY4 installations in PY4Q4. The SWE plans to conduct ride-along site inspections of PY4 installations at that time.

### 9.5.4 Non-Residential Demand Response Audit

Penn Power estimated 27.21 MW of gross reported peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Commercial and Industrial Load Curtailment program. This estimate represents almost 62% of Penn Power's Phase I peak demand reduction target of 44 MW.

The 2012 PA TRM states "*Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices.*"<sup>41</sup> In order to verify that customer baseline load (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in Penn Power's Load Curtailment program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a Penn Power curtailment event.
- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL
- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the Penn Power program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>42</sup>

At the time of this report, Penn Power's evaluation contractor was working to finalize its verified savings analysis for the C&I Demand Response programs implemented by the FirstEnergy companies in PY4.

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<sup>41</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

<sup>42</sup> Ibid.

Once this analysis is complete, the SWE will compare the verified savings analysis for the five sites in the audit sample to the independent estimates developed by the SWE. The results of this comparison will be presented in the SWE PY4 Final Annual Report.

### **9.6 Finals Recommendations**

Based on SWE audit findings, the SWE team recommends the following:

- Penn Power should update the low-income measure count to reflect that the WARM Program is not offered in PY4.
- Penn Power should continue to use the proportion of low-income measures target set for Phase I of Act 129 for PY4.
- Penn Power should work to finalize the verified savings analysis for the C&I Load Curtailment program and work with the SWE to understand any complications which arise from the interpretation of the “PJM business rules” called for in the TRM.

## 10 West Penn Power Impact Summaries and Audit Findings

Section 10 contains information on West Penn Power’s energy and demand impacts to date, current evaluation activities and findings, and current SWE audit activities, findings, and recommendations.

**Table 10-1: Summary of West Penn Power Quarterly Report Impacts**

	CPITD Reported Gross Impact	CPITD-Q Reported Impact	Savings Achieved as % of 2013 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	578,473	573,329	91%
Compliance Demand Reduction (MW) <sup>[a]</sup>	180	180	114%
TRC Benefits (\$) <sup>[b]</sup>	Not Reported	Not Reported	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Reported	Not Reported	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Reported	Not Reported	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	46,856,313	46,439,649	Not Applicable
<b>NOTES:</b>			
[a] These demand reductions represent only those occurring during the top 100 system demand hours of the summer of 2012, based only on installations in place and generating demand reductions during those hours.			
[b] Avoided supply costs, including the reduction in costs of electric energy, generation, transmission, and distribution capacity, and natural gas valued at marginal cost for periods when there is a load reduction. Subject to TRC Order. TRC Benefits reporting requirement is waived for quarterly reports.			
[c] Costs paid by the program administrator and participants plus the increase in supply costs for any period when load is increased. Subject to TRC Order. TRC Costs reporting requirement is waived for quarterly reports.			
[d] Subject to TRC Order. TRC Benefit-Cost Ratio reporting requirement is required in annual reports only.			
[e] 8.1x10 <sup>-4</sup> metric tons of CO <sub>2</sub> per kWh (EPC’s eGRID2007 Version 1.1, RICE Region annual non-baseload CO <sub>2</sub> output emissions rate, year 2005 data).			
[f] CO <sub>2</sub> Emissions are reported due to Stakeholder interest in this information and to recognize that reporting this information is recommended by the National Action Plan for Energy Efficiency.			
[g] Savings based on CPITD.			

West Penn Power has reported PY4 gross energy savings for 11 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY4 portfolio savings.

**Table 10-2: Summary of Program Impacts on Gross Reported Portfolio Savings – West Penn Power**

Program:	Percent of PYTD Gross MWh Savings
	Portfolio
Residential Appliance Turn-In	4%
Residential Energy Efficient Products	17%
Residential Energy Efficient HVAC Equipment	2%
Residential Home Performance	2%
Critical Peak Rebate (CPR)	1%
Limited Income Energy Efficiency (LIEEP)	0%
Join Utility Usage Management (JUUMP)	1%
Commercial and Industrial Equipment- Small	18%
Time of Use (TOU) with Critical Peak Pricing (CPP)	0%
Commercial and Industrial Equipment- Large	20%
Customer Load Response	0%
Customer Resources Demand Response	0%
Distributed Generation	0%
Conservation Voltage Reduction (CVR)	29%
Governmental and Institutional	5%
Total	100%

### 10.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY4, and programs to be implemented or with no reported savings. Programs “implemented” include only those programs with reported gross impacts; “evaluated” programs include programs with preliminary verified impacts.

**Table 10-3: Summary of Programs Implemented to Date by West Penn Power**

<b>Programs Reporting PY4 Gross Savings:</b>
<ul style="list-style-type: none"><li>• Residential Appliance Turn-In</li><li>• Residential Energy Efficient Products</li><li>• Residential Energy Efficient HVAC Equipment</li><li>• Residential Home Performance</li><li>• Limited Income Energy Efficiency (LIEEP)</li><li>• Join Utility Usage Management (JUUMP)</li><li>• Commercial and Industrial Equipment- Small</li><li>• Commercial and Industrial Equipment- Large</li><li>• Conservation Voltage Reduction (CVR)</li><li>• Governmental and Institutional</li><li>• Critical Peak Rebate (CPR)</li><li>• Customer Resources Demand Response</li></ul>
<b>Programs to be Implemented or with No Reported PY4 Savings:</b>
<ul style="list-style-type: none"><li>• Time of Use (TOU) with Critical Peak Pricing (CPP)</li><li>• Customer Load Response</li><li>• Distributed Generation</li></ul>

### 10.2 Status of EM&V Activities

#### 10.2.1 Status of EM&V Plans

No specific Energy Efficiency and Conservation Plan or program improvements were implemented in this quarter.

#### 10.2.2 Status of M&V Activities

Each program’s evaluation updates and findings are as follows:

- **Residential Appliance Turn-In Program:** ADM has conducted preliminary desk reviews. First sample will be drawn from the Q1 and Q2 populations.
- **Residential Energy Efficiency HVAC Program:** PY4 evaluation activities to date include calculation and *ex ante* reviews and assignment of preliminary realization rate based on desk review and application of updated TRM protocols. The average efficiencies and capacities from the PY3 evaluation are used to generate preliminary realization rates for this program.
- **Residential Home Performance Program:** ADM has conducted desk reviews of the tracking data and has constructed preliminary realization rates that consider historical “in service rates” and successful delivery rates, as well as changes in the TRM protocols for the conservation kits distributed through this program. For the Direct Install of Low-Cost Measures program component, ADM has conducted preliminary desk reviews and the sample was drawn shortly

after the PY4Q2 report was filed. M&V plans are completed and initial data requests have been made by the M&V team for the Behavior Modification component of the program.

- **Critical Peak Rebate (CPR) Rate:** Impact evaluation for this program is complete on a preliminary basis<sup>43</sup>, but as of this writing the regression models and baseline estimation schemes are undergoing final quality assurance steps. The initial realization rate is significantly higher than 100%.
- **Limited Income Energy Efficient Program (LIEEP):** ADM has conducted preliminary tracking data reviews for both the in-home services component and conservation kits distributed by this program.
- **Join Utility Usage Management Program:** ADM has conducted preliminary desk reviews for both the JUUMP Comprehensive Audits component and conservation kits distributed by this program.
- **Commercial / Industrial Small Sector Equipment Program:** ADM has completed a desk review for C&I CFL kits.
- **Time of Use with Critical Peak Pricing Rate:** This program had no participation; thus no impact evaluation will be performed.
- **Commercial / Industrial Large Sector Equipment Program:** ADM has conducted rebate application/ tracking and reporting reviews for a direct install program component. Some on/site and analysis work was completed in PY4Q2 for two custom projects with projected impacts above the threshold for the “certainty” stratum.
- **Customer Load Response:** Impact evaluation for this program is complete on a preliminary basis<sup>44</sup>. The evaluation effort involved stratified sampling and inspection of the hourly demand reduction calculations for selected projects. Projects that have base load estimation protocols accepted by and registered by PJM are evaluated on the basis of those protocols. Projects that do not have PJM registrations are evaluated independently, though with protocols that are similar to or derivative of the PJM base load estimation protocols.
- **Customer Resources Demand Response Program:** Impact evaluation for this program is complete on a preliminary basis<sup>45</sup>. The evaluation effort involved stratified sampling and inspection of the hourly demand reduction calculations for selected projects. Projects that have base load estimation protocols accepted by and registered by PJM are evaluated on the basis of

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<sup>43</sup> The program’s impacts at the hourly level have been verified. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

<sup>44</sup> Site-level hourly impacts verified on a preliminary basis are undergoing final quality assurance checks for a stratified sample of projects to meet  $\pm 15\%$  relative precision at the 85% confidence level. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

<sup>45</sup> Site-level hourly impacts verified on a preliminary basis are undergoing final quality assurance checks for a stratified sample of projects to meet  $\pm 15\%$  relative precision at the 85% confidence level. However the top 100 hour definitions and the hourly line loss factors may change based on the additional contributions from energy efficiency projects that are not yet evaluated.

those protocols. Projects that do not have PJM registrations are evaluated with protocols that are identical to or similar to the PJM base load estimation protocols.

- **Distributed Generation:** This program had no participation; thus no impact evaluation will be performed.
- **Conservation Voltage Reduction Program:** Three sets of retrofit isolation tests are planned: One in Winter 2013, one in Spring 2013, and one in Summer 2013.
- **Governmental & Institutional Program:** The first sample for this program will be drawn from PY4Q1 and PY4Q2.

### 10.3 Residential Program Audit Summary

#### 10.3.1 Residential Lighting Program

To audit these programs, the SWE team conducted the following activities:

- Verified the number of bulbs reported;
- Verified the savings protocol utilized to report kWh and kW savings;
- Verified the baseline assumptions utilized to calculate savings; and
- Verified the bulbs tracked against invoices received.

To verify each of these aspects, the SWE team reviewed those values reported in the PY4Q2 Report to the data tracked in the EDC’s database and tracking system. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 10-4: Summary of CFL Program Audit – West Penn Power**

Category:	PY4Q2 Report:	Database Verification:	Notes:
Gross Energy Savings	Not Reported	TBD	West Penn Power does not report CFL savings separately in their reports. West Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Gross Demand Reduction	Not Reported	TBD	West Penn Power does not report CFL savings separately in their reports. West Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Use of TRM Protocols	Not Applicable	TBD	West Penn Power does not report CFL savings separately in their reports. West Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Baseline Assumptions	Not Applicable	TBD	West Penn Power does not report CFL savings separately in their reports. West Penn Power’s program database was not available at the time of this report. The SWE will include results from the PY4Q3 audit in the SWE SWE PY4 Final Annual Report.
Invoice Review	Not Applicable		A total of three individual invoices were reviewed for bulbs sold and distributed during PY4Q3. Bulb counts and total dollars reimbursed were verified.

#### 10.3.2 Appliance Recycling Program

The SWE has started, in PY4, to conduct database sample checks for the Appliance Recycling program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE has not encountered any unresolved QC issues with this program in PY2 or PY3. Results of the annual database

sample check (with samples drawn from each quarter of PY4) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 10.3.3 Efficient Equipment Program

The SWE has started, in PY4, to conduct database sample checks for the Efficient Equipment program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE did not encounter any QC issues with this program in PY2 or PY3. Results of the annual database sample check (with samples drawn from each quarter of Program Year Four) will be available in the SWE PY4 Final Annual Report. The SWE notes that no program changes occurred in this quarter.

### 10.3.4 New Construction Program

West Penn Power did not have an active Residential New Construction program in PY4Q3.

## 10.4 Low-Income Program Audit Summary

The SWE requested that West Penn Power provide a database extract, consisting of all spreadsheets and supporting calculations detailing program participation, energy and demand savings and other relevant information such as measures installed. Participation, energy savings, and demand savings calculations were verified and compared to the figures reported in the West Penn Power quarterly report. A comparison of the quarterly report and database extract results for the Limited Income Energy Efficiency Program (LIEEP) are presented in Table 10-5 and for the Joint Utility Usage Management Program (JUUMP) in Table 10-6. In PY4Q3 West Penn Power provided energy efficiency kits to low-income customers and whole-house weatherization. Both offerings were reported under JUUMP.

**Table 10-5: Limited Income Energy Efficiency Program Quarterly Report and Database Summary**

	Participants	MWh	MW
PY4Q3 Report	0	0	0
Database	0	0	0
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>0</b>	<b>0.00</b>

**Table 10-6: Joint Utility Usage Management Program Quarterly Report and Database Summary**

	Participants	MWh	MW
PY4Q3 Report	3,025	1,445	0.14
Database	3,025	1,361	0.17
<b>Discrepancy (Report - Database)</b>	<b>0</b>	<b>84</b>	<b>-0.03</b>

West Penn Power explained that the discrepancy between the PY4Q3 report and the database extract is the result of an update to the deemed savings assumption for weatherization participants between when the report was filed and when the database extract was provided to the SWE. Because West Penn Power does not have billing analysis results for JUUMP, a savings value of 1,495 kWh per participant was used in prior quarters to estimated savings. This value was based on 2008 and 2009 Penn Power LIURP billing analysis results. Following the publication of West Penn Power’s PY4Q3 report, the value was updated to 1,140 kWh per participant based on the latest Penelec WARM Plus evaluation results. As a proxy, the Penelec non-electric job savings from the PY3 WARM Plus evaluation were used since the mix of measures between the programs is considered to be most similar. The SWE found that this

explanation accounted for 81 MWh of the discrepancy. The remaining 3 MWh discrepancy may be the result of modifications to the tracking data between when the PY4Q3 report was published and when the database extract was provided to the SWE.

The SWE reviewed the savings assumptions and calculations for the energy efficiency kits distributed through West Penn Power's low-income program. West Penn Power does not record savings on a per-measure basis, but instead only on a per-kit basis. The SWE relied on information on kit contents provided by West Penn Power in previous quarters to verify per-kit savings. The information provided included any assumptions that differed from the 2012 TRM, such as in-service rates from previous evaluations. The PY4 program evaluation will inform updates to these assumptions and adjust all PY4 per-kit savings values.

The lone discrepancy with the 2012 TRM that the SWE noted was that the baseline for 21-25 watt CFLs has not been adjusted from 100 watts to 72 watts. The shift in baseline is a result of EISA 2007 standards. West Penn Power communicated to the SWE that this baseline adjustment will be incorporated into the program evaluation at the conclusion of PY4.

The SWE also reviewed a sample of 20 low-income site inspection forms of PY4Q1 and PY4Q2 LIEEP and JUUMP installations. The documentation was reviewed to verify that the correct job type had been appropriately assigned in West Penn Power's tracking database based on the measures installed and whether customers receiving water conservation measures had electric hot water heating fuel. The most common issue found was measures removed or missing. West Penn Power should continue to work to minimize uninstalled measures and emphasize with participants the importance of not replacing measures with less energy efficient products.

West Penn Power offered 10 measures to the low-income sector in PY4Q3, which is 24% of the total number of measures offered across all sectors. Therefore, West Penn Power is in compliance with its 8.5% proportion of measures target. It should be noted that West Penn Power stated that the proportion of measures target is 10%, which is incorrect. The target it fixed at 8.5% for Phase I of Act 129.

### 10.5 Non-Residential Program Audit Summary

West Penn Power reported the impacts produced by its non-residential energy efficiency programs using the same categories as the other three FirstEnergy companies. Three programs achieved energy and demand savings for the PY4Q3 which include Small C&I Equipment, Large C&I Equipment, and GNP Program. The reported gross energy savings from non-residential programs was 39,103 MWh and the reported gross demand savings was 6.48 MW. The number of participants, gross reported energy impact and gross reported demand impact for PY4Q3 are shown in Table 10-7. Incentive amounts were not included in the tracking database for non-residential customers, so these figures are not included in Table 10-7.

**Table 10-7: West Penn Power Non-Residential Programs Quarterly Summary**

Program	Participants	MWh	MW
Commercial & Industrial Equipment - Small	4,139	14,351	3.2
Commercial & Industrial Equipment - Large	49	20,091	2.7
Governmental and Institutional	70	4,661	0.6
<b>Totals</b>	<b>4,258</b>	<b>39,103</b>	<b>6.48</b>

#### 10.5.1 Review of Savings Database

West Penn Power provided a tracking database to the SWE team detailing project activity during PY4Q3. The SWE team identified each of the distinct participants and the energy and demand impacts associated with that participant for each of West Penn Power’s non-residential programs. The tracking data provided by FirstEnergy did not include incentive amounts. Table 10-8 provides the participant counts and the sum of the energy and demand impacts for each program.

**Table 10-8: West Penn Power Non-Residential Programs Savings Database Summary**

Program	Participants	MWh	MW
Commercial & Industrial Equipment - Small	3,979	14,075	3.1
Commercial & Industrial Equipment - Large	48	20,091	2.7
Governmental and Institutional	71	4,516	0.4
<b>Totals</b>	<b>4,098</b>	<b>38,681</b>	<b>6.27</b>

In Table 10-9, the discrepancies between the reported figures and the information contained in the program databases are presented. All discrepancies are reported as follows:

$$\text{Reported Figure} - \text{Database Summary} = \text{Discrepancy}$$

**Table 10-9: West Penn Power Non-Residential Program Discrepancies**

Program	Participants	MWh	MW
Commercial & Industrial Equipment - Small	160	276	0.07
Commercial & Industrial Equipment - Large	1	0	0.00
Governmental and Institutional	-1	145	0.13
<b>Totals</b>	<b>160</b>	<b>421</b>	<b>0.21</b>
Note: West Penn Power’s non-residential demand response programs are discussed in Section 10.5.4.			

Table 10-9 shows that there was variation between the participant counts and savings impacts in the report and the values contained in the West Penn Power tracking data. The total reported participant counts for PY4Q3 were 160 higher than the SWE participant estimate from the savings database. This is because the tracking database did not assign a unique identification number for customers participating in the Power Direct – C&I Kits sub-program who received CFL Kits; therefore, the SWE attempted to replicate the participant count for the Small C&I Equipment Program by counting the total number of distinct customer account numbers who received kits along with other sub-programs. This produced participant counts close to the figures reported in PY4Q3 report, but not exactly the same. The total reported energy savings for PY4Q3 was 421 MWh higher than the savings shown in the savings database. Likewise, the total reported demand savings was 0.21 MW higher than the savings shown in the savings database. Rebate amounts were not included in the program tracking data so the SWE was unable to audit the incentive payments contained in the PY4Q3 report.

### 10.5.2 Review of Sample Design

In PY4, West Penn Power’s evaluator plans to use the same stratification method that was used in PY3, which targeted precision of 15% at the 85% confidence level annually. Tracking data from Q1 and Q2 will be used to draw a sample population at the end of Q2 of PY4. Similarly, tracking data from Q3 and Q4 will be used to draw a sample population at the end of Q4. The sample populations were separated by the operating companies and programs first, and then were stratified at the measure level based on realization rates, variability of the realization rates, modes, and rebated savings. The evaluator used qualitative stratification with a minimum Cv value of 0.4 for each stratum based on the PY3 error ratios.

In the PY4 C&I Sampling Plan, each non-residential program contains multiple strata and Cv values are equal to or greater than 0.4. The sample sizes, by program, from the sample draw at the end of Q2 are: 12 for Large C&I, 33 for Small C&I, and nine for Remaining Government/Non-Profit. These sample sizes should roughly double after the second sample selection at the end of Q4. After reviewing the short description of West Penn Power’s sample design and supporting documents submitted by the evaluator,

the SWE has determined the sample design approach is appropriate and approves the plan pending any major changes in program participation rates.

### 10.5.3 On-site Inspections

West Penn Power is planning to begin its on-site inspections of PY4 installations in PY4Q4. The SWE plans to conduct ride-along site inspections of PY4 installations at that time.

### 10.5.4 Non-Residential Demand Response Audit

West Penn Power estimated 86.72 MW of gross reported peak demand reduction across the top 100 hours of 2012 in its PY4Q3 report from its Commercial and Industrial Load Curtailment program. This estimate represents approximately 55% of West Penn Power's Phase I peak demand reduction target of 157 MW.

The 2012 PA TRM states "*Hourly peak load reductions from demand response (DR) measures for Direct Load Control (DLC) and Load Curtailment (LC) will be determined in accordance with PJM measurement & verification protocols, related business rules, protocol approval processes and settlement clearing due diligence practices.*"<sup>46</sup> In order to verify that customer baseline load (CBL) and the associated load impacts were calculated as specified in the TRM, the SWE requested detailed customer information for five of the largest customers in West Penn Power's Load Curtailment program. The requested items are listed below:

- The claimed peak load reduction for each hour that the site participated in a West Penn Power curtailment event.
- Interval load data from June 1, 2012 to September 30, 2012 as well as any additional interval load data used to determine the CBL
- The CBL method used to estimate the load that would have been observed in the facility absent intervention from the West Penn Power program.
- PJM event dates and hours excluded from the CBL calculation as allowed by the TRM<sup>47</sup>

At the time of this report, West Penn Power's evaluation contractor was working to finalize its verified savings analysis for the C&I Demand Response programs implemented by the FirstEnergy companies in PY4. Once this analysis is complete, the SWE will compare the verified savings analysis for the five sites in the audit sample to the independent estimates developed by the SWE. The results of this comparison will be presented in the SWE PY4 Final Annual Report.

## 10.6 Final Recommendations

Based on SWE audit findings, the SWE team recommends the following:

- Low-income savings calculations for CFLs that assumed a 100 watt baseline in prior program years should be adjusted to a 72 watt baseline in accordance with the 2012 TRM.

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<sup>46</sup> 2012 Pennsylvania Technical Reference Manual. Page 302.

<sup>47</sup> Ibid.

- West Penn Power should continue to use the proportion of low-income measures target set for Phase I of Act 129 for PY4.
- West Penn Power and its evaluator should provide a summary of how participation counts are determined for the Power Direct – C&I Kits sub-program. This comparison will help ensure that the SWE is able to duplicate the participant counts shown in quarterly and annual reports from the implementer tracking data.
- West Penn Power should work to finalize the verified savings analysis for the C&I Load Curtailment program and work with the SWE to understand any complications which arise from the interpretation of the “PJM business rules” called for in the TRM for the analysis of Act 129 demand response programs.

## **11 Summary and Recommendations**

The SWE team, the PA PUC TUS staff, the EDCs and the EDC evaluation contractors have worked hard to develop a solid foundation for the EM&V of the Act 129 energy efficiency and demand response programs. The SWE team notes that improvements continue to be made to the SWE audit processes and appreciates the support and responsiveness of the Energy Association, the Pennsylvania EDCs and their evaluation contractors.

Based on the findings from the SWE audit activities conducted in PY4Q3, the SWE team makes the following recommendations to the PA PUC relating to the Act 129 energy efficiency and demand response programs:

- EDCs and their evaluators should perform a comparison between the values reported in quarterly reports and those listed in quarterly tracking data extracts. This comparison will help ensure that the participant counts and incentives shown in the filed reports match to that of the database.
- EDCs should adjust low-income savings calculations for CFLs to assume a 72 watt baseline in accordance with the 2012 TRM.
- EDCs should finalize the assessment of the top 100 hours and sum the verified savings impacts from the DR program participants during these hours.
- The EDCs, TUS and SWE should work together to develop a common understanding of the proper application of the PJM business rules called for in the TRM for the evaluation of Act 129 demand response programs.
- EDCs with different interpretations of the PJM business rules in the TRM should report peak demand reductions and impact estimates from their DR programs as calculated under the various different interpretations of PJM business rules in its PY4 Final Annual Report.

