



# Act 129 Statewide Evaluator Semiannual Report

2<sup>nd</sup> Quarter, Program Year 5

Presented to the Pennsylvania Public Utility Commission



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## 1 Introduction

As part of the Evaluation Framework the Statewide Evaluation team (SWE or SWE team) is required to submit semiannual 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) Plans<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 first half of Program Year 5 (PY5) and details the Act 129 program activities occurring via the implementation of energy savings programs per the EDC energy efficiency and conservation (EE&C) plans. Thus, impacts reported as Phase II savings include those since the implementation of Phase II programs (June 1<sup>st</sup>, 2013) through November 30<sup>th</sup>, 2013.

The findings, conclusions, and recommendations contained in the SWE's Semiannual Report are the findings, conclusions, and recommendations of the SWE 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 SWE's Semiannual 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, *Evaluation Framework for Pennsylvania*

## 2 Semiannual 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/Portfolio Phase II Inception to Date (Phase II Savings) reported gross MWh and MW impacts based exclusively on savings accumulated since the start of Phase II (June 1, 2013) as well as Phase II savings including Carry Over Savings (Phase II+CO) based on reported gross MWh and MW impacts from Phase II added to verified impacts carried over from Phase I.

The following table also includes estimates in the reduction of CO<sub>2</sub> emissions through the end of the second quarter for PY5 (PY5Q2) based on Phase I-CO MWh savings. This quarter ended on November 30<sup>th</sup>, 2013.

**Table 2-1: Summary of EDC Semiannual Report Impacts – Program Year 5, 1<sup>st</sup> and 2<sup>nd</sup> Quarters**

	Phase II+CO Reported Impact	Phase II Reported Gross Impact
Total Energy Savings (MWh)	1,374,435	329,628
Total Demand Reduction (MW) <sup>[a]</sup>	30.0	30.0
TRC Benefits (\$) <sup>[b]</sup>	Not Applicable	Not Applicable
TRC Costs (\$) <sup>[c]</sup>	Not Applicable	Not Applicable
TRC Benefit-Cost Ratio <sup>[d]</sup>	Not Applicable	Not Applicable
CO <sub>2</sub> Emissions Reduction <sup>[e][f]</sup> (Tons)	872,766	209,313
<b>NOTES:</b>		
[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.		
[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] 6.35 x 10 <sup>-1</sup> metric tons of CO <sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.		
[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.		

## 2.2 Impact Summary by EDC

The following table contains a summary of the energy and demand savings impacts of each EDC during PY5.<sup>2</sup>

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

	Statewide	Duquesne	PECO	PPL	Met-Ed	Penelec	Penn Power	West Penn
Phase II+CO Energy Savings (MWh)	<b>1,374,435</b>	214,948	308,243	564,077	91,656	64,445	33,093	97,973
Phase II Reported Gross <sup>3</sup> Energy Savings (MWh)	<b>329,628</b>	64,995	65,526	68,441	44,469	37,640	10,513	38,044
Phase II Compliance MWh Savings Targets (To be achieved by May 31, 2016)	<b>NA</b>	276,722	1,125,851	821,072	337,753	318,813	95,502	337,553
<b>% of 2016 Energy Savings Target Achieved</b>	<b>41%</b>	<b>78%</b>	<b>27%</b>	<b>69%</b>	<b>27%</b>	<b>20%</b>	<b>35%</b>	<b>29%</b>
Phase II+CO Demand Reduction (MW)	<b>29.96</b>	7.54	7.10	6.95	2.82	2.49	0.63	2.43
Phase II Reported Gross Demand Reduction (MW)	<b>29.96</b>	7.54	7.10	6.95	2.82	2.49	0.63	2.43

### Cumulative Portfolio Energy Impacts

- The Phase II+CO reported gross energy savings is 1,374,435 MWh.
- The Phase II gross energy savings is 329,628 MWh.

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

- The Phase II gross demand reduction is 29.96 MW.
- The Phase II+CO gross demand reduction is 29.96 MW.

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<sup>2</sup> The “Savings Achieved as a % of 2016 Targets” are based on Phase II+CO reported savings. Thus, this achievement is subject to change pending results of final impact evaluation activities.

<sup>3</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>4</sup> While there are no compliance targets for Demand Reduction in Phase II, EDCs continue to reduce demand through the installation of energy efficiency measures and the demand reduction associated with voluntary demand response programs. Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.

**Table 2-3: Summary of EDC Energy and Demand Savings for Low Income and GNI Programs**

	Statewide	Duquesne	PECO	PPL	Met-Ed	Penelec	Penn Power	West Penn
Phase II Reported Gross <sup>5</sup> Low Income Energy Savings (MWh)	<b>38,160</b>	6,755	6,636	2,053	6,220	8,647	2,061	5,788
Phase II low-income savings compliance goal (% of Phase II savings attributed to low income )	<b>NA</b>	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
<b>Actual % of Phase II savings attributed to low income</b>	<b>NA</b>	10%	10%	<b>3%</b>	14%	23%	20%	15%
Phase II-CO Reported Gross GNI Energy Savings (MWh)	<b>210,551</b>	7,722	908	95,994	33,775	31,881	9,550	33,753
Phase II Reported Gross GNI Energy Savings (MWh)	<b>13,602</b>	204	908	3,851	101	765	19	236
Phase II GNI savings compliance goal (To be achieved by May 31, 2016)		27,672	112,585	82,107	33,775	31,881	9,550	33,753
<b>% of 2016 Energy Savings Target Achieved<sup>6</sup></b>		28%	1%	117%	16%	36%	3%	262%

### Low-Income Sector

- The number of measures offered to the Low-Income Sector comprises approximately 20% of the total number of measures offered through all programs.
- The Phase II reported gross energy savings for low-income sector programs is 38,160 MWh.

### Government and Non-Profit Sector

- The Phase II+CO gross energy savings for government and non-profit sector programs is 210,552 MWh.
- The Phase II reported gross energy savings for government and non-profit sector programs is 13,603 MWh.

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

- The program-year-to-date (PYTD) reported gross energy savings is 271,472 MWh.
- The PYTD reported gross demand reduction is 29.96 MW.
- The PYTD reported participation is 753,540 participants.<sup>7</sup>

## 2.3 Statewide Evaluator Summary

Below is a summary of the activities undertaken by the SWE team during the first half of PY5.

The SWE has reviewed the EDC Quarterly Reports for PY5Q1 and PY5Q2 for completeness against the requirements of the SWE Evaluation Framework. The SWE reviewed the available Phase II+CO reported

<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> The "Savings Achieved as a % of 2016 Targets" are based on Phase II-CO reported savings. Thus, this achievement is subject to change pending results of final impact evaluation activities.

<sup>7</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.

gross impacts and Phase II 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>8</sup> 50 programs have been implemented and are generating savings across the state.
- Progress towards 2016 MWh savings targets ranges from 20% to 78%.

Key SWE team activities during the first half of PY5 included the following:

- Updates to the 2014 Pennsylvania Technical Reference Manual
- Development of Phase II Evaluation Framework
- Review of EDC Evaluation Plans
- Commercial and Industrial (C&I) and Residential Lighting Metering Studies
- C&I and Residential Baseline Study
- Review of EDCs' process and market evaluation tasks
- Development of Phase II templates for EDC and SWE Reports
- Residential program desk audits.
- Low-Income program desk audits.
- Non-residential program desk audits and on-site inspections.
- Participation in Program Evaluation Group meetings and monthly meetings with EDCs.

### **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 monthly 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. 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 PY5Q1 and PY5Q2 reports. An update on these audits, by program type and EDC, is provided in the following sections.

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<sup>8</sup> Currently as of January 2014.

### 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>9</sup> There is a major area where the SWE does not have the information that it requires. Updates on site visit findings (requested in the template for EDC Quarterly Reports) have not been provided by any of the EDCs in PY5, and the SWE has found that it lacks a complete picture of the extent to which these site inspections are performed by each of the EDCs. Because of this, the SWE is in the process of gathering further information on site visits in terms of quantity, type, frequency, and personnel. On February 24, 2014 the SWE sent out a supplemental data request, due March 7th, to obtain this QA/QC information relating to low-income program site inspections. Initial responses have been received as of the date of this report and follow-up requests are being sent out the first week of April. Thus, the most important component of the SWE audit will be completed once we get this requested information from the EDCs, and our results will be reported in our annual report to the PUC for PY5. However, a summary of preliminary findings from the initial low-income site visit data request can be seen in Appendix A. This review is being performed with an eye towards developing a more consistent and efficient approach towards low-income post-installation verification in the future,

### 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 (not including GNI programs) into meta-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:

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<sup>9</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.

- Review of program tracking data to confirm that the data matched both (a) the savings impacts in the project files' supporting documentation and (b) the ex-ante impacts reported in the EDC quarterly and annual reports.
- Desk reviews of project files to verify that TRM algorithms and values were used in the reported savings calculations.
- Review and approval of EM&V plans and sample designs submitted by the EDCs' evaluation contractors.
- Performing ride-along and independent site inspections.
- Audit of the M&V approaches used by the EDCs' evaluation contractors to determine verified savings estimates for sampled projects.
- Verifying the inputs and calculations of program and portfolio TRC ratios.

For the PY5 semi-annual report, the SWE performed the following activities for non-residential programs:

- Review of Tracking Database and Reporting
- Review of EDC EM&V Plans
- Review of PY5 Sampling Plans

### **3.2 Program Evaluation Group (PEG) Meetings**

#### **3.2.1 Program Evaluation Group Meeting, June 26, 2013**

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on June 26, 2013. The following topics were discussed.

- Updates to the 2014 Pennsylvania Technical Reference Manual
- Work plans for the Residential and C&I Baseline Studies
- Work Plans for the Residential and C&I Metering Studies
- Updates on the Price Suppression Study
- Development of the Phase II Evaluation Framework

#### **3.2.2 Program Evaluation Group Meeting, July 16, 2013**

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on July 16, 2013. The following topics were discussed.

- Phase II TRC and Net to Gross Issues
- Updates to the 2014 Pennsylvania TRM
- Discussion of thresholds for metering in the C&I Baseline Study
- Development of the survey instruments for use in the Residential and C&I Baseline Studies

#### **3.2.3 Program Evaluation Group Meeting, September 18, 2013**

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on September 18, 2013. The following topics were discussed.

- Updates on the Residential and Commercial Baseline Studies and Reporting Schedules
- Updates on the Residential and Commercial Metering Studies and Reporting Schedules
- SWE Team comments on the EDC's Draft Evaluation Plans
- Modifications to Residential Lighting Audit Activities
- Updates on the Price Suppression Study
- Discussion of costs and savings of Act 129 Low Income programs compared to LIURP Program Results

#### **3.2.4 Program Evaluation Group Meeting, October 16, 2013**

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on October 16, 2013. The following topics were discussed.

- Phase I Reporting and policies on retroactive MWh and MW savings
- Updates on the Residential and Commercial Baseline Studies and Reporting Schedules
- Updates on the Residential and Commercial Metering Studies and Reporting Schedules
- Draft schedule for development of 2015 Pennsylvania TRM
- Presentation of Net-to-Gross Framework
- Phase II Tracking of EDC actions taken on process evaluation recommendations
- SWE Team comments on the EDC's Draft Evaluation Plans

#### **3.2.5 Program Evaluation Group Meeting, November 13, 2013**

The SWE participated in a Program Evaluation Group meeting with the TUS staff, EDC representatives and EDC evaluators on November 13, 2013. The following topics were discussed.

- Status and schedule of Commission Orders
- Responses from EDCs on Net to Gross Methodology
- Schedule for Development of Net to Gross Framework
- Updates on the Residential and Commercial Baseline Studies and Reporting Schedules
- Updates on the Residential and Commercial Metering Studies and Reporting Schedules
- SWE Team comments on the EDC's Draft Evaluation Plans
- Discussion of costs and savings of Act 129 Low Income programs compared to LIURP Program Results
- Discussion of "On Bill Financing" Report Schedule
- Discussion of "participation" definition in EDC Reports

### **3.3 EDC Meetings**

The SWE and TUS staffs conduct monthly 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. Thus far in PY5, EDCs have used these calls to discuss reporting schedules, updates to the Technical Reference Manual, questions concerning appropriate use of realization rates and other savings protocols, SWE data requests, net-to-gross approaches and a variety of other topics.

### **3.4 Status of Technical Reference Manual (TRM) Update**

The Commission approved the 2014 Technical Reference Manual and 2014 TRM Final Order at Public Meeting on December 19, 2013. The 2014 TRM will be used to guide the calculation of energy and peak demand savings for measures installed and commercially operable during Program Year 6 (June 1, 2014 to May 31, 2015).

A TRM Working Group was initiated in January 2014 to address a large number of issues identified during the 2014 update process that were deferred to the PEG for resolution during the 2015 TRM update. The TRM Working Group is chaired by the SWE and composed of EDC representatives and their evaluation contractors.

The tentative schedule of the 2015 TRM update process is as follows:

- January – June 2014: SWE conducts PEG conference calls and meetings to discuss new and revised protocols and other TRM issues.
- July 2014: SWE begins drafting 2015 TRM.
- September 2014: 2015 TRM and TRM Tentative Order at Public Meeting.
- September 2014: 2015 TRM and TRM Tentative Order notice published in *Pennsylvania Bulletin*.
- October 2014: Initial comments due.
- November 2014: Reply comments due.
- December 2014: 2015 TRM and TRM Final Order at Public Meeting.

### **3.5 Demand Response Issues**

The Commission elected not to include any peak demand reductions in Phase II of Act 129. However, the Phase II Implementation Order stated that “EDCs may continue, under the Act 129 EE&C Program, residential demand response curtailment measures, such as direct load control programs, that will be cost effective if continued.”<sup>10</sup> PECO was the only EDC who elected to offer an optional demand response program in Phase II. The Residential AC Saver program reported approximately 75,000 active participants in PY5 and the Commercial AC Saver program reported approximately 2,000 active participants in PY5. No reported gross MW impacts were claimed by PECO in its PY5Q1 or PY5Q2 reports for the programs, but the several events were called for dispatch in the PJM markets.

The SWE produced an addendum to the SWE Demand Response Study<sup>11</sup> that was released for stakeholder comment on November 14, 2013. This addendum included preliminary estimates of wholesale capacity price suppression benefits and a prospective TRC analysis of Act 129 demand response under an alternative structure to the top 100 hours performance definition. This addendum was accompanied by a Peak Demand Cost Effectiveness Determination Tentative Order<sup>12</sup> from the Commission which proposed that the SWE conduct an in-depth wholesale price suppression analysis and DR potential study.

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<sup>10</sup> Phase II Implementation Order, p. 42.

<sup>11</sup> <http://www.puc.pa.gov/pdocs/1256728.docx>

<sup>12</sup> <http://www.puc.pa.gov/pdocs/1256724.doc>

### **3.6 Process Evaluation Audit Activities**

Key process evaluation audit activities, program year five, second quarter:

- Reviewing and commenting on data collection instruments
- Providing guidance on best practices for process evaluations through review of evaluation plans
- Developing systems to facilitate EDCs taking action on findings and recommendations in process evaluations

The SWE team process evaluation sub-team reviewed each of the evaluation plans for compliance with the framework guidance. For each aspect of a plan that did not meet the minimum standards, the SWE team recommended changes to the plan. These changes, as follows, were typically minor, but important: 1) inclusion of research objectives for each program, 2) sampling plans for each program, and 3) alignment of research objectives to planned activities. Three EDCs have submitted revised plans, which the SWE team reviewed. The process and market sections of the plans were improved consistent with the recommendations.

The SWE team requested that each EDC provide a schedule for when their data collection instruments would be ready for review; the EDCs and their evaluators provided the information in a timely fashion. The SWE team therefore, established a schedule for data collection instrument reviews. The EDCs are submitting their instruments for review in adherence to the schedule. The first instruments arrived in the later part of January 2014; the review process will go into the spring.

The SWE team uses a checklist for the review and provides a summary of the review to the EDC evaluation team along with a track-changes version of the instrument with comments and suggested wording revisions. The review process is averaging 3-4 business days of the allotted 5-day period.

The SWE team has identified additions to the Annual Report template so that the EDCs will have guidance on what to report on their process and market evaluations. The guidance will be included in the template to the EDCs in the second quarter. This guidance will increase the amount of information the EDCs provide on their process and market evaluations, and will facilitate the review of recommendations and the status of EDC response to recommendations.

### **3.7 Net to Gross (NTG) Issues**

Key NTG evaluation audit activities, program year five, second quarter:

- Development of memos on common approaches for free-ridership and spillover measurement for downstream and appliance recycling programs
- Identification of programs that will use the common approaches
- Review of NTG items in data collection instruments
- As needed engagement with EDCs through NTG working group

The SWE team developed three memos for NTG: 1) a Common Approach for Free-ridership Measurement for Downstream Programs (free-rider memo), 2) a Common Approach for Spillover

Measurement for Downstream Programs (spillover memo), and 3) Common Approach for Measuring Free-riders for Appliance Retirement Programs (ARP memo).

The SWE presented the draft free-rider memo at the October PEG meeting. The EDCs submitted comments and the SWE presented a revised memo to the November PEG meeting along with the appliance recycling NTG memo. At the November PEG, the SWE requested that the EDCs recommend approaches to spillover for the SWE to review and use to prepare a common approach for spillover.

The EDCs provided comments on the free-rider and ARP memos as well as suggestions for spillover measurement. The SWE presented solutions to the comments on the free-rider memo at the December PEG. The final version of the free-rider memo was completed at the end of December 2013.

The SWE presented the proposed spillover approach at the December PEG based on input from the EDCs. EDCs provided comments on this approach in early January 2014. The SWE presented a final spillover approach at the January PEG. Comments on the method were incorporated in the final version of the memo at the end of January 2014. The final version of the ARP memo was distributed in February 2014.

At the suggestion of the EDCs, the SWE team established a working group to address remaining NTG issues. The issues include: 1) additional issues on spillover approach, 2) recognition that some programs could not use the common approaches as they primarily apply to downstream programs, and 3) ongoing concern about how to apply the approaches.

The EDCs had some additional concerns about the spillover approach, especially concerning sampling and nonparticipant spillover. The SWE agreed that non-participant spillover is not required and will provide a revised spillover memo in early March 2014. As issues surface on spillover they will be discussed by the working group.

To address application of the approaches, the SWE requested that the EDCs nominate programs into one of four categories: 1) can use common approach, 2) may be able to use common approach, 3) likely cannot use common approach, and 4) will not have NTG research.

The working group met twice in February 2014. At the first meeting the working group reviewed the program nominations and found that some nominations were unclear. The SWE proposed, and the EDCs agreed, that those in the “can use” and those in the “may be able to use” categories would proceed through the survey development and review process. The SWE team will review and provide comment to assist the EDCs in using the common approach for each of those programs.

The EDCs provided slightly revised nomination lists for the second NTG working group meeting. The working group identified a few programs in the “likely cannot use” the common approach category most of which, have small savings associated with them, and the SWE acknowledged that the NTG approach could be of the EDCs’ choosing for those programs. For the lighting programs, which have substantial savings, the SWE agreed that the NTG method could be of the EDC evaluators’ choosing.

Further, the issues of NTG for these programs are being addressed in the TRM discussions, and research associated with the baseline. Thus, no further discussion could occur until these issues are addressed.

The working group will meet on an as needed basis, with a meeting to review the experience of the 2014 evaluations in Fall 2014.

### **3.8 Baseline Study Updates**

In an effort to inform the implementation of a possible Phase III of Act 129, the SWE was tasked with conducting residential and non-residential end use and saturation studies. As a first step in this process, the SWE conducted 981 on-site surveys (490 residential, 491 non-residential) across the state. The surveys were conducted during the months of August 2013 through December 2013 and collected end-use and saturation data that will enable the characterization of energy usage and electric energy efficiency opportunities throughout the seven largest EDCs in the state.

Following the on-site data collection period, the SWE compiled, reviewed, and analyzed the data throughout January and February of 2014. The sample size allowed the results for each EDC to be presented at a precision of  $\pm 10\%$  with 90% confidence. The data for all EDCs were then aggregated to the statewide level, yielding results with a precision of  $\pm 5\%$  with 95% confidence. Further, the aggregated statewide data was provided by housing type for the residential sector. For the non-residential study, the aggregated statewide results were parsed into three sub-sectors: industrial, institutional, and commercial. Each sub-sector's sample allowed for the sector-level results to also be presented at a precision of  $\pm 10\%$  with 90% confidence.

After a formal review and comment period from stakeholders in March 2014, the final report for the study will be issued in April 2014. The results of this study will serve as key inputs to the Market Potential Study and inform future energy efficiency and demand response program development, system planning, and assist stakeholders in obtaining a better understanding of the energy consuming equipment located throughout the state of Pennsylvania.

### **3.9 Potential Study Updates**

As part of the Phase II scope of work, the SWE was contracted to conduct a statewide energy efficiency market potential study. The study approach builds upon the Phase I study completed in May of 2012. The purpose of the energy efficiency potential study is to determine the remaining opportunities for cost-effective electricity savings in the service areas of the EDCs subject to the energy efficiency requirements of Act 129.

The study is designed to build off of and leverage the findings of the statewide baseline study to be completed in March 2014. To this end, the SWE has already conducted the initial steps needed to disaggregate each EDC's baseline forecast including: 1) A detailed review of each EDC's 2012 customer billing database to segment the electrical load by sector, by building type; and 2) SWE established energy use intensity (EUI) values by segment, by end use. The SWE also worked to ensure that data collected during the baseline study (e.g. end use & equipment type saturations, fuel shares and efficiency values) would align with the potential study model inputs, to the extent possible. The SWE is

just now beginning to review the draft findings of the statewide baseline study to identify viable inputs in the market potential study model.

To date, the SWE has also invested time in benchmark research by reviewing each of the EDCs annual reports over the past few years to collect key performance metrics below. In addition to tracking the PA EDC performances, the SWE is also tracking the following similar metrics from utilities, regions and states throughout the northeast and U.S.:

- Acquisition Cost: Expenditures (\$) / kWh-saved
- Administrative Costs: Admin expenditures (\$) / kWh-saved
- Incentive Rates: Incentive expenditures (\$) / Total measure incremental costs (\$)
- Savings as % of Sales: kWh-saved / Total kWh Sales

Finally, the SWE has taken some initial steps to update and refine the MS Excel potential model to provide greater transparency and more resolution on the model inputs and outputs. To help inform these energy efficiency potential models, up-to-date measure data is being collected from a variety of sources including: the 2014 PA TRM, the SWE residential and C&I baseline studies as noted above, appliance saturation studies conducted by the EDCs, and additional input received from the individual EDCs regarding measure costs and savings.

#### 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 Semiannual Report Impacts**

	Phase II Reported Gross Impact	Phase II+CO Reported Impact	Savings Achieved as % of 2016 Targets <sup>[f]</sup>
Total Energy Savings (MWh)	64,995	214,948	78%
Total Demand Reduction (MW) <sup>[a]</sup>	7.5	7.5	Not Applicable
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]</sup> (Tons)	41,272	136,492	Not Applicable
<b>NOTES:</b>			
[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.			
[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] 6.35 x 10 <sup>-1</sup> metric tons of CO <sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.			
[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.			

Duquesne has reported PY5 gross energy savings for 18 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY5 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	22.9%
Residential: EE Program (Upstream Lighting)	34.5%
Residential: School Energy Pledge	0.0%
Residential: Appliance Recycling	1.9%
Residential: Low Income EE	1.6%
Residential: Low Income EE (Upstream Lighting)	8.8%
Commercial Sector Umbrella EE	0.1%
Commercial Sector Umbrella EE(Upstream Lighting)	22.3%
Healthcare EE	0.2%
Industrial Sector Umbrella EE	2.1%
Chemical Products EE	0.1%
Mixed Industrial EE	0.3%
Office Building–Large EE	2.8%
Office Building–Small EE	0.5%
Primary Metals EE	1.0%
Public Agency/Non-Profit	0.3%
Retail Stores–Small EE	0.6%
Retail Stores–Large EE	0.1%
TOTAL PORTFOLIO	100.0%

#### 4.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY5, 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 PY5 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>• Residential: Low Income EE (Upstream Lighting)</li><li>• Commercial Sector Umbrella EE</li><li>• Commercial Sector Umbrella EE(Upstream Lighting)</li><li>• Healthcare EE</li><li>• Industrial Sector Umbrella 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></ul>
<b><i>Programs to be Implemented or with No Reported PY5 Savings:</i></b>
<ul style="list-style-type: none"><li>• Residential: School Energy Pledge</li></ul>

#### 4.2 Status of EM&V Activities

In PY5Q1 and PY5Q2, Duquesne’s evaluator, Navigant conducted significant research to support Phase I and Program Year 4 evaluation efforts. Navigant also developed a draft evaluation plan for all Phase II evaluation activities which is currently being reviewed by the SWE.

#### 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 PY5Q1 and PY5Q2 reports and compared the information to the data tracked in the EDC’s database and tracking system. Subsequent savings analysis was received from the EDC evaluation contractor that may result in adjustments to the verified savings in a future report. The following table contains a summary of the SWE team audit findings and recommendations:

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

Category:	PY5Q1&Q2 Reports:	Database	
		Verification:	Notes:
<b>Gross Energy Savings (MWh)</b>	Q1 IQ: 14,493 Q2 IQ: 11,691 PYTD: 22,411*		*PYTD Reported savings were adjusted by the Evaluation Contractor and reflect an update to Q1 savings after the original report was issued.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: .711 Q2 IQ: .615 PYTD: 1.176*		*PYTD Reported savings were adjusted by the Evaluation Contractor and reflect an update to Q1 savings after the original report was issued.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>		√	The correct baselines were used.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

#### 4.3.2 Appliance Recycling Program

For Phase II, the SWE has decided 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 encountered very few quality control (QC) errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that Duquesne’s Appliance Recycling Program did not receive any substantial programmatic changes from the Phase I.

#### 4.3.3 Efficient Equipment Program

For Phase II, the SWE has decided to conduct database sample checks for the Efficient Products program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that Duquesne’s Efficient Product Program did not receive any substantial programmatic changes from the Phase I.

#### 4.3.4 New Construction Program

Duquesne did not have an active Residential New Construction Program in PY5Q2.

#### 4.4 Low-Income Program Audit Summary

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for Duquesne. The SWE Team examined Duquesne's kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis. The SWE requested and obtained the calculator used by Navigant for estimating EE kit savings and verified its accuracy. SWE noted that Duquesne used the Pennsylvania TRM to determine the kWh savings for recycled refrigerators in their low-income program and included a weighted average to factor in the percentages of ENERGY STAR and standard replacements.

As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by Duquesne. However, the SWE has learned that no site inspections are performed by either the Implementation Contractor or EM&V Contractor for its low-income sector savings. The EM&V Contractor does perform telephone inspections for each of the programs contributing to Duquesne's low-income savings, although none have yet been performed for PY5. Additional information from SWE's data request can be seen in Appendix A.

#### 4.5 Non Residential Program Audit Summary

Duquesne lists 12 programs under its non-residential portfolio. Seven of these programs are offered to the Commercial and Government/Non-Profit Institutional (GNI) sectors and four are offered to the Industrial sector. 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, Public Agency Partnership, and Non-Profit, customer segments.

Table 4-5 provides the reported number of participants, energy savings, and demand savings from the first two quarters of Program Year 5. The gross reported energy savings for these programs was 5,226 MWh and the gross reported demand impact was 0.92 MW. The participation and impacts to date in PY5 are lower than have been historically observed for Duquesne non-residential programs through Q2. This is largely due to a directive in the Phase II Implementation Order stating that *"In order to claim savings in Phase II for a measure, that measure must be installed and commercially operable no earlier than June 1, 2013. If a customer has installed and made commercially operable a measure on May 31, 2013, the savings for that measure will apply towards Phase I goals."*<sup>13</sup> The practical implication of this

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<sup>13</sup> Phase II Implementation Order, p. 114.

Commission order is that a total of 57 projects and over 10,000 MWh, which would have otherwise<sup>14</sup> fallen into Duquesne’s PY5Q1 reporting, were claimed in Program Year 4.

**Table 4-5: Duquesne Non-Residential Programs PY5Q2 Reported YTD Impacts**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Commercial Sector Umbrella EE	6	52	0.01
Healthcare EE	3	115	0.03
Industrial Sector Umbrella EE	1	1,344	0.27
Chemical Products EE	2	85	0.00
Mixed Industrial EE	2	176	0.03
Office Building Large EE	11	1,796	0.31
Office Building Small EE	12	338	0.06
Primary Metals EE	2	660	0.07
Public Agency/Non Profit	16	204	0.04
Retail Stores Small EE	33	390	0.09
Retail Stores Large EE	3	66	0.01
<b>Totals</b>	<b>91</b>	<b>5,226</b>	<b>0.92</b>

#### 4.5.1 Review of Savings Database

Duquesne provided an extract from its Performance Measuring and Reporting System (PMRS) tracking system detailing all PY5Q1 and PY5Q2 activity to the SWE team for review. This data was presented at the measure level and aggregated to the participant level by the SWE. Table 4-6 provides the participant count, energy impact, and peak demand impact by program according to the Duquesne database extract. The two retail programs (small and large) are presented together in Table 4-6 because the program tracking did not make a distinction between the two categories.

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<sup>14</sup> Within a Phase it is common for measures installed prior to May 31 to be claimed in the following Program Year because of participant lag (customer takes time to submit rebate application) and administrative lag (EDC takes time to process the rebate and claim savings).

**Table 4-6: Duquesne Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
CSUP Commercial Umbrella	6	52	0.01
HEEP (Health Care)	3	115	0.03
ISUP Industrial Umbrella	1	1344	0.25
Chemical Products	2	85	0.00
Mixed Industrial	2	176	0.03
Office Buildings-Large	11	1796	0.29
Office Buildings - Small	12	338	0.06
Primary Metals	2	660	0.06
PAPP Public Agency Partnership	1	5	0.00
Education	7	140	0.02
Non Profit	8	60	0.02
Retail Stores	36	456	0.09
<b>Total</b>	<b>91</b>	<b>5,225</b>	<b>0.86</b>

In Table 4-7, variances between the reported figures and the information contained in the database are presented. All variances are reported as follows:

$$\textit{Reported Figure} - \textit{Database Summary} = \textit{Variance}$$

The peak demand savings estimates in Table 4-5 include a line loss adjustment factor to gross up savings impacts from the meter level to the system level for reporting. The impacts stored in the program tracking data and summarized in Table 4-6 are all captured at the meter level. Prior to comparison, the SWE applied a line loss adjustment factor of 6.9% to the impacts in the tracking data.

**Table 4-7: Duquesne Non-Residential Program Variances**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Commercial Sector Umbrella EE	0	0	0.00
Healthcare EE	0	0	0.00
Industrial Sector Umbrella EE	0	0	0.00
Chemical Products EE	0	0	0.00
Mixed Industrial EE	0	0	0.00
Office Building Large EE	0	0	0.00
Office Building Small EE	0	0	0.00
Primary Metals EE	0	0	0.00
Public Agency/Non Profit	0	0	0.00
Retail Stores (Small and Large)	0	0	0.00
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0.00</b>

As shown in Table 4-7, the program tracking data and gross reported impacts for Duquesne’s non-residential programs were in perfect agreement for the first two quarters of PY5. This indicates that the PMRS tracking system and reporting procedures are functioning as intended.

**4.5.2 Review of Sample Design**

Duquesne’s evaluation contractor submitted a preliminary EM&V sampling plan for Program Year 5 to the SWE Team on February 7, 2014. The memo outlined the plans for Duquesne’s Commercial, Industrial, and Government/Non-Profit program groups, including 57 projects that were completed in PY4 but were processed too late in the year to be included in the PY4 evaluation cycle. Each program group contains multiple subgroups, and the incentives and measures are common across all programs. The evaluation contractor’s sampling plan is designed to meet the SWE’s minimum confidence and precision levels for verification activity, achieving +/- 15% precision at the 85% confidence level for each program group independently and +/- 10% precision at the 90% confidence level for the non-residential sector as a whole.

Sampling for the Commercial program group and the Government/Non-Profit program group project verification will be performed at the project level. Each project may include one or more different energy efficiency measures. Sampling for the Industrial program group project verification will be performed at the measure level. Both sampling approaches were successfully implemented in Phase I, and the SWE supports Duquesne’s continuation of these approaches in Phase II.

The sample design for non-residential programs includes stratification based on expected energy savings and demand reduction. For Program Year 5, Q1 and Q2 will be combined for sampling purposes, and only projects in the Medium and Large strata will be sampled initially. Q3 and Q4 are expected to be sampled independently. However, the sampling strategy and stratification will be re-evaluated as additional program activity occurs in Q3 and Q4 and updated as necessary.

Table 4-8 summarizes key elements of the Program Year 5 sampling strategy for the Commercial Program Group, Government/Non-profit Program Group and the Industrial Program Group. The table presents the expected population size and gross savings based on historical participation, the assumed error ratio of the realization rate, and the proposed annual sample size for each stratum. If these assumptions hold true, Duquesne’s verified savings estimates for non-residential programs should comfortably exceed the 85/15 sampling requirements established in the Phase II Evaluation Framework. Additionally, the coefficient of variation assumption (Cv Assumption) appears conservative based on observed Cv values from previous years. Thus the SWE expects Duquesne to comfortably exceed the relative precision requirements set forth in the Phase II Evaluation Framework.

**Table 4-8: Duquesne Non-Residential Program Sampling Plan Summary**

Strata Name	Expected Population Size	Expected Gross Savings (kWh)	Cv Assumption	Sample Size
Commercial - Large	6	2,078,826	0.3	6
Commercial - Medium	15	2,826,847	0.3	8
Commercial - Small	185	3,448,609	0.5	10
Post PY4 - Large Commercial	7	4,094,077	0.3	6
Post PY4 - Small Commercial	49	799,708	0.5	3
<b>Expected Relative Precision for the Commercial Program Group (90% Confidence)</b>				<b>8.5%</b>
Government/Non-Profit - Large	0	-	0.3	0
Government/Non-Profit - Medium	18	517,829	0.3	9
Government/Non-Profit - Small	30	100,142	0.5	12
Post PY4 - Government/Non-Profit	1	18,232	0.5	0
<b>Expected Relative Precision for the GNP Program Group (90% Confidence)</b>				<b>9.7%</b>
Industrial - Large	3	1,696,334	0.3	3
Industrial - Medium	18	4,143,703	0.3	7
Industrial - Small	42	1,022,117	0.5	8
<b>Expected Relative Precision for the Industrial Program Group (90% Confidence)</b>				<b>8.5%</b>

#### 4.5.3 On-site Inspections

Duquesne has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

#### 4.6 Final Recommendations

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

- Duquesne is including 57 non-residential projects that were completed prior to May 31, 2013 in its Program Year 5 evaluation sample frame. The SWE recommends that Duquesne’s evaluation contractor be mindful of the commercial operability date of efficiency measures selected for

verification and use the TRM that was in effect on that date when calculating verified savings estimates for sampled projects.

- The Commission's determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.
- Once realization rates are determined and applied the gross verified savings from the 57 projects installed prior to May 31, 2013 should be added to Duquesne's carry-over savings from Phase I.
- The SWE recommends that Duquesne and all EDCs include QA/QC information relating to the results of low income site inspections. This information should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.
- Duquesne apportioned the residential lighting savings to different sectors based on Phase I data with the intent of updating the savings in future reports, the SWE requests that any changes to the allocation of savings in the future reports be described with sufficient detail.
- The Residential Energy Efficiency Program (REEP) was a source of double counting from lighting savings estimates. It is recommended that the tracking system be adjusted to prevent this on the front end.

## 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’s Semiannual Report Impacts**

	Phase II Reported Gross Impact	Phase II+CO Reported Impact	Savings Achieved as % of 2016 Targets <sup>[f]</sup>
Total Energy Savings (MWh)	65,526	308,243	28%
Total Demand Reduction (MW) <sup>[a]</sup>	7.1	7.1	Not Applicable
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]</sup> (Tons)	41,609	195,734	Not Applicable
<b>NOTES:</b>			
[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.			
[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] 6.35 x 10 <sup>-1</sup> metric tons of CO <sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.			
[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.			

PECO has reported PY5 gross energy savings for 22 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY5 portfolio savings.

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

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings Portfolio</b>
Smart Appliance Recycling Program	5.5%
Smart Home Rebates Program	59.0%
Smart House Call	0.2%
Smart Builder Rebates	0.0%
Smart Energy Saver	5.3%
Smart Usage Profile	0.0%
Smart Multi-Family Solutions Res	0.7%
Low-Income Energy Efficiency Program	10.1%
Smart Equipment Incentives C&I - Retrofit	13.7%
Smart Equipment Incentives C&I - Appliance Recycling	0.0%
Smart Construction Incentives C&I	1.9%
Smart Business Solutions C&I	1.6%
Smart On-Site C&I	0.0%
Smart Multi-Family Solutions C&I	0.5%
Smart Equipment Incentives GNI - Retrofit	1.3%
Smart Equipment Incentives GNI - Appliance Recycling	0.0%
Smart Construction Incentives GNI	0.0%
Smart Business Solutions GNI	0.0%
Smart On-Site GNI	0.0%
Smart Multi-Family Solutions GNI	0.0%
Residential A/C Saver	0.0%
Commercial A/C Saver	0.0%
<b>TOTAL PORTFOLIO</b>	<b>100.0%</b>

### 5.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY5, 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 PY5 Gross Savings:</i></b>
<ul style="list-style-type: none"><li>• Smart Appliance Recycling Program</li><li>• Smart Home Rebates Program</li><li>• Smart House Call</li><li>• Smart Energy Saver</li><li>• Smart Multi-Family Solutions Res</li><li>• Low-Income Energy Efficiency Program</li><li>• Smart Equipment Incentives C&amp;I - Retrofit</li><li>• Smart Construction Incentives C&amp;I</li><li>• Smart Business Solutions C&amp;I</li><li>• Smart Multi-Family Solutions C&amp;I</li><li>• Smart Equipment Incentives GNI - Retrofit</li></ul>
<b><i>Programs to be Implemented or with No Reported PY5 Savings:</i></b>
<ul style="list-style-type: none"><li>• Smart Builder Rebates</li><li>• Smart Usage Profile</li><li>• Smart Equipment Incentives C&amp;I - Appliance Recycling</li><li>• Smart On-Site C&amp;I</li><li>• Smart Equipment Incentives GNI - Retrofit</li><li>• Smart Equipment Incentives GNI - Appliance Recycling</li><li>• Smart Construction Incentives GNI</li><li>• Smart Business Solutions GNI</li><li>• Smart On-Site GNI</li><li>• Smart Multi-Family Solutions GNI</li><li>• Residential A/C Saver</li><li>• Commercial A/C Saver</li></ul>

### 5.2 Status of EM&V Activities

In PY5Q1 and PY5Q2, PECO’s evaluator, Navigant, completed the following EM&V activities.

**Smart Appliance Recycling Program:** The measurement and verification (M&V) completed in PY5Q1 and PY5Q2 consisted of reviewing the tracking data provided to the evaluation team by PECO program staff.

**Smart Home Rebates Program:** The M&V completed in PY5Q1 and PY5Q2 report 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 Ecova through the end of November 2013. After confirming consistency between the manufacturer invoices and the program tracking data, Navigant used the tracking data to verify the reported PY5Q1, PY5Q2, program year-to-date (PYTD), and Phase II savings.

**Smart House Call Program:** The M&V completed in PY5Q1 and PY5Q2 report consisted of reviewing the tracking data provided to the evaluation team by PECO program staff, as well as reviewing all invoices from the CSP received and approved by PECO for labor and onsite audit and assessment costs through the end of November 2013. After confirming consistency between the CSP invoices and the program tracking data, Navigant used the tracking data to verify the reported PY5Q1, PY5Q2, PYTD, and Phase II savings, which in this case are all equal, since this is the first quarter with participants in the program.

**Smart Energy Saver:** The M&V completed in PY5Q1 and PY5Q2 consisted of providing PECO staff with guidance regarding TRM values and calculations and check-in meetings with program staff as needed.

**Smart Builder Rebates Program:** Evaluation activities in PY5Q1 were focused on developing and finalizing the PY5 evaluation plan which was presented to PECO program staff in August 2013. Navigant also provided input on evaluation data needs that were incorporated into the tracking system design and responded to questions from bidders on the CSP RFP. There were no M&V activities completed for PY5Q2 as the program has yet to certify any new homes.

**Smart Usage Profile Program:** The M&V completed in PY5Q1 and PY5Q2 consisted of reviewing the invoice data provided to the evaluation team by PECO program staff. Additionally, the evaluation team verified that customers were randomly assigned to the participant and control groups, consistent with a Randomized Controlled Trial design.

**Smart Multifamily Solutions Program:** The M&V completed in PY5Q1 and PY5Q2 consisted of reviewing the tracking data provided to the evaluation team by PECO program staff.

**Low-Income Energy Efficiency Program:** The M&V completed in PY5Q1 and PY5Q2 consisted of reviewing the tracking data provided to the evaluation team by PECO program staff and accompanying the implementer during 10 audits in PY5Q2.

**Smart Equipment Incentives:** The M&V of the SEI C&I program in PY5Q1 and PY5Q2 has consisted of In depth interviews with PECO / CSP personnel which will be completed by January 2014 to assess the effectiveness of the program and to identify any barriers or potential improvements to the program implementation.

**Smart Construction Incentives Program:** In PY5Q1, Navigant drew a final gross impact sample of 22 projects for the PY4 evaluation. The team conducted on-site M&V for eight sites and completed engineering desk reviews of the other 14 projects. Navigant also completed surveys with 14 of the 59 unique PY4 participants in the program, and conducted in-depth interviews with five of 17 PY4 trade allies. Navigant analyzed the evaluation research results and presented findings in the PY4 annual report.

**Smart Business Solutions Program:** Evaluation activity during PY5Q1 included developing and presenting the evaluation plan for this program to the PECO program manager. The evaluator also reviewed and discussed the structure of the program tracking system with PECO staff and in PY5Q1 and PY5Q2 conducted bi-weekly meetings with the program manager to discuss the status of program roll-out, program performance indicators (numbers of audits conducted, numbers of contracts signed, projected MWh for projects under contract and MWh savings from completed projects), and any difficulties the program may have encountered so far.

**Smart On-Site Program:** Evaluation activity during PY5Q1 included developing and presenting the evaluation plan for this program to the PECO program manager. The evaluator also reviewed and discussed the structure of the program tracking system with PECO staff. Evaluation activity during PY5 Q2 consisted primarily of periodic discussions with the program manager regarding the status of projects currently under construction and the current list of pipeline projects. The evaluator also conducted a thorough review of program materials during Q2.

### 5.3 Residential Program Audit Summary

#### 5.3.1 Smart Home Rebates Program (Residential Lighting component)

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 PY5Q1 and PY5Q2 reports and compared the information 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 Upstream Lighting Program Audit – PECO Smart Home Rebates Program**

Category:	PY5Q1&Q2 Reports:	Database	
		Verification:	Notes:
Gross Energy Savings	Q1 IQ: 12,116	√	As the upstream lighting program is a portion of the SHR Program, the

<b>(MWh)</b>	Q2 IQ: 23,688 PYTD: 35,804		savings are included in the SHR totals listed in the report.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: .593 Q2 IQ: 1.159 PYTD: 1.752	√	As the upstream lighting program is a portion of the SHR Program, the savings are included in the SHR totals listed in the report.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>		√	The correct baselines were used.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

### 5.3.2 Smart Appliance Recycling Program

For Phase II, the SWE has decided 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 encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that in PY5Q1 the incentive level was restored to the previous level of \$35/unit. This led to an increase in participation over PY4 levels. There were approximately 1,700 participants in Q1 which is more than 3 times as high as the average number of participants per quarter during PY4 when the incentive was only \$15. This growth continued in Q2 when participation increased to 2,328, an almost 40% increase for the quarter.

### 5.3.3 Smart Home Rebates Program (Efficient Equipment portion)

For Phase II, the SWE has decided to conduct database sample checks for the Smart Homes Rebate Program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that several program changes were made in PY5Q1 including a substantial increase in the lighting component of the program with the absorption of standard and specialty CFL sales that were formerly incentivized under the Smart Lighting Discounts program.

Additionally, PECO did not rebate Consumer Electronics in Q1 or Q2. In Q2, PECO added the following measures to this program, variable speed pool pumps and three fuel switching measures: electric heat to gas heat, domestic hot water electric to gas, and electric to natural gas clothes dryers.

### 5.3.4 New Construction Program

PECO did not have an active Residential New Construction Program in PY5Q2.

#### **5.4 Low-Income Program Audit Summary**

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for PECO. The SWE Team examined PECO's kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis. The SWE also conducted spot checks of program databases to ensure that measure data from contractor invoices was imported correctly to PECO's databases.

As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by PECO. As of now, the SWE has learned that 100% of appliance swap customers receive a phone inspection and that a post-installation subcontractor performs site inspections, all results being recorded in a database. The EM&V Contractor also performs phone inspections and several ride-alongs with the CSP. Additional information from SWE's data request can be seen in Appendix A.

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

PECO reported savings impacts from six non-residential programs during the first half of PY5: Smart Equipment Incentives, Smart Appliance Recycling, Smart Construction Incentives, Smart Business Solutions, Smart On-Site, and Smart Multi-Family Solutions. Impacts within each program are reported according to whether the participating customer was from the Commercial and Industrial sector or the Government, Non-Profit, and Institutional sector. The Smart Business Solutions, Smart On-Site, and Smart Multi-Family Solutions programs are new to PECO's EE&C plan for Phase II of Act 129.

The gross reported energy savings of these programs was 12,614 MWh and the gross reported demand savings was 2.2 MW; almost a million dollars in incentives were paid to participants. Table 5-5 provides the YTD reported number of participants, energy savings, and peak demand savings. Demand impact figures were adjusted to reflect transmission and distribution losses by applying a 1.111 line loss factor for C&I programs and a 1.117 line loss factor for GNI programs.

**Table 5-5: PECO Non-Residential Programs PY5Q2 Reported YTD Impacts**

Program	Participants	MWh	MW
Smart Equipment Incentives - C&I Retrofit	71	9,003	1.6
Smart Equipment Incentives - C&I Appliance Recycling	21	21	0.0
Smart Construction Incentives - C&I	4	1,255	0.2
Smart Business Solutions C&I	67	1,072	0.2
Smart On-Site C&I	0	0	0.0
Smart Multi-Family Solutions C&I	22	356	0.0
Smart Equipment Incentives - GNI Retrofit	14	872	0.2
Smart Equipment Incentives - GNI Appliance Recycling	0	0	0.0
Smart Construction Incentives - GNI	0	0	0.0
Smart Business Solutions GNI	1	19	0.0
Smart On-Site GNI	0	0	0.0
Smart Multi-Family Solutions GNI	2	16	0.0
<b>Totals</b>	<b>202</b>	<b>12,614</b>	<b>2.2</b>

The participation and impacts to date in PY5 are lower than have been historically observed for PECO non-residential programs through Q2. This is largely due to a directive in the Phase II Implementation Order stating that *“In order to claim savings in Phase II for a measure, that measure must be installed and commercially operable no earlier than June 1, 2013. If a customer has installed and made commercially operable a measure on May 31, 2013, the savings for that measure will apply towards Phase I goals.”*<sup>15</sup> The practical implication of this Commission order is that many projects that would have otherwise<sup>16</sup> fallen into PECO’s PY5Q1 reporting were claimed in Program Year 4.

#### 5.5.1 Review of Savings Database

PECO provided a database of all PY5 activity to date to the SWE team for review. Table 5-6 provides the participant count, energy impact, and demand impact by program according to the PECO database extract. The participation values shown for the Smart Multi-Family program reflect the number of bill account IDs in the tracking system, rather than the number of project IDs. The 24 participants in the Smart Multi-Family Solutions program actually represent 631 distinct apartments within 24 master-metered complexes and an average savings about 590 kWh per housing unit.

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<sup>15</sup> Phase II Implementation Order, p. 114.

<sup>16</sup> Within a Phase it is common for measures installed prior to May 31 to be claimed in the following Program Year because of participant lag (customer takes time to submit rebate application) and administrative lag (EDC takes time to process the rebate and claim savings).

**Table 5-6: PECO Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Smart Equipment Incentives - C&I Retrofit	71	9,003	1.4
Smart Equipment Incentives - C&I Appliance Recycling	21	21	0.0
Smart Construction Incentives - C&I	4	1,255	0.2
Smart Business Solutions C&I	67	1,072	0.2
Smart On-Site C&I	0	0	0.0
Smart Multi-Family Solutions C&I	21	356	0.0
Smart Equipment Incentives - GNI Retrofit	14	872	0.1
Smart Equipment Incentives - GNI Appliance Recycling	0	0	0.0
Smart Construction Incentives - GNI	0	0	0.0
Smart Business Solutions GNI	1	19	0.0
Smart On-Site GNI	0	0	0.0
Smart Multi-Family Solutions GNI	2	16	0.0
<b>Totals</b>	<b>201</b>	<b>12,615</b>	<b>2.0</b>

In Table 5-7, variances between the reported figures and the information contained in the database are presented. All variances are reported as follows:

$$\textit{Reported Figure} - \textit{Database Summary} = \textit{Variance}$$

The peak demand savings estimates in Table 5-5 include a line loss adjustment factor to gross up savings impacts from the meter level to the system level for reporting. The impacts stored in the program tracking data and summarized in Table 5-6 are all captured at the meter level. The SWE applied a peak line loss factor of 1.111 for C&I programs and 1.117 for GNI programs to demand impacts to facilitate a comparison with reported figures.

**Table 5-7: PECO Non-Residential Program Variances**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
Smart Equipment Incentives - C&I Retrofit	0	0	0.0
Smart Equipment Incentives - C&I Appliance Recycling	0	0	0.0
Smart Construction Incentives - C&I	0	0	0.0
Smart Business Solutions C&I	0	0	0.0
Smart On-Site C&I	0	0	0.0
Smart Multi-Family Solutions C&I	1	0	0.0
Smart Equipment Incentives - GNI Retrofit	0	0	0.0
Smart Equipment Incentives - GNI Appliance Recycling	0	0	0.0
Smart Construction Incentives - GNI	0	0	0.0
Smart Business Solutions GNI	0	0	0.0
Smart On-Site GNI	0	0	0.0
Smart Multi-Family Solutions GNI	0	0	0.0
<b>Totals</b>	<b>1</b>	<b>0</b>	<b>0</b>

As shown in Table 5-7, the program tracking data and gross reported MWh and MW impacts for PECO’s non-residential programs were in near-perfect agreement for the first two quarters of PY5. This indicates that the tracking system and reporting procedures are functioning as intended. The only variance appeared in the count of the number of distinct bill accounts in the Smart Multi-Family Solutions program. The SWE will follow-up with the appropriate PECO staff to ensure a common understanding of participant counts for this program in Phase II.

#### 5.5.2 Review of Sample Design

PECO’s evaluation contractor submitted a sample design memo for the PY5 evaluation of Smart Equipment Incentives (SEI) program to the SWE team on February 11, 2014. Projects within the SEI program are assigned into two groups for reporting and evaluation on the basis of sector: Commercial and Industrial and Government, Non-Profit and Institutional. The memo provided detail on the stratification of the program populations, the number of sites to be selected for verification, and the planned verification and data collection activities.

Due to issues with achieving the required levels of confidence and precision in program year evaluations, the PY5 sample was designed with two buffers built in:

- Higher coefficients of variation (CVs) than in prior years. The PY5 CV assumptions were based on PY4 results with a minimum assumed CV of 0.5.
- The sample was initially designed to achieve confidence and precision levels of 85% and 15%, respectively, for both the C&I and GNI programs separately. Additional sites were then added to all non-census strata to develop a sample that achieves greater than 85% confidence and 15% precision.

The SEI C&I sampling plan calls for three strata (small, medium, and large) based on ex ante kWh estimates with a total sample size of 27 projects. The SEI GNI plan calls for a municipal lighting stratum with a census of the two pipeline projects being evaluated in addition to the small, medium, and large strata. The total sample size for the SEI GNI program is 28 projects. The SWE team believes that the approaches outlined in the memo will produce statistically significant estimates of energy savings and peak demand savings for the SEI C&I and SEI GNI programs in PY5 and no revisions were suggested.

Table 5-8 summarizes key elements of the Program Year 5 sampling strategy for the Commercial Program Group and the Government, Nonprofit, Institutional Program Group. The table presents the expected population size and gross savings based on historical participation, the assumed error ratio of the realization rate, and the proposed annual sample size for each stratum.

**Table 5-8: PECO’s Non-Residential Program Sampling Plan Summary**

Program	Strata Name	Expected Population Size	Expected Gross Savings (kWh)	Cv Assumption	Sample Size
Smart Equipment Incentive	Commercial - Large	7	15,029,263	0.5	7
	Commercial - Medium	53	16,302,300	0.5	12
	Commercial - Small	407	13,548,253	0.5	9
	Government/Non-Profit - Large	6	13,454,074	0.5	6
	Government/Non-Profit - Medium	22	10,411,182	0.6	9
	Government/Non-Profit - Small	102	4,623,700	0.8	12
	Municipal Lighting	4	2,112,046	0.5	3
Smart Construction Incentive	Commercial - Large	6	2,650,626	0.5	6
	Commercial - Medium	35	1,262,058	0.5	5
	Commercial - Small	4	795,868	0.5	4

### 5.5.3 On-site Inspections

PECO has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

### 5.6 Final Recommendations

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

- PECO’s evaluation contractor has submitted a detailed sampling plan for the Smart Equipment Incentives program that should provide statistically significant estimates of gross verified energy and demand savings for PY5. The SWE recommends that PECO continue to monitor the distribution of reported projects in Q3 and Q4 to determine if any adjustments to the plan are warranted.
- The Commission’s determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.

- Three of PECO's non-residential programs are new in Phase II of Act 129 and an evaluation plan has been established for each program. The SWE encourages PECO and its evaluation contractor to reach out to the SWE team as issues or challenges arise with the implementation of the evaluation plan so that solutions can be developed collaboratively.
- The SWE recommends that PECO and all EDCs include QA/QC information relating to the results of low-income site inspections. This information should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.

## 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’s Semiannual Report Impacts**

	<b>Phase II Reported Gross Impact</b>	<b>Phase II+CO Reported Impact</b>	<b>Savings Achieved as % of 2016 Targets<sup>[f]</sup></b>
Total Energy Savings (MWh)	68,441	564,077	69%
Total Demand Reduction (MW) <sup>[a]</sup>	6.95	6.95	Not Applicable
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]</sup> (Tons)	43,460	358,189	Not Applicable
<b>NOTES:</b>			
[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.			
[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] 6.35 x 10 <sup>-1</sup> metric tons of CO <sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.			
[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.			

PPL has reported PY5 gross energy savings for 13 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY5 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	9.5%
Continuous Energy Improvement	0.0%
Custom Incentive	1.3%
E-Power Wise	1.8%
Low-Income Energy-Efficiency Behavior and Ed	0.0%
Low-Income WRAP	1.2%
Master Metered Low-Income MF Housing	0.6%
Prescriptive Equipment	29.8%
Residential Energy-Efficiency Behavior and Ed	0.0%
Residential Home Comfort	1.0%
Residential Retail	54.7%
School Benchmarking	0.0%
Student and Parent Energy-Efficiency Education	0.0%
TOTAL PORTFOLIO	100.0%

### 6.1 Program Implementation and Evaluation Summary

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY5, 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><i>Programs Reporting PY5 Gross Savings:</i></b>
<ul style="list-style-type: none"> <li>• Appliance Recycling</li> <li>• Custom Incentive</li> <li>• E-Power Wise</li> <li>• Low-Income WRAP</li> <li>• Master Metered Low-Income MF Housing</li> <li>• Prescriptive Equipment</li> <li>• Residential Home Comfort</li> <li>• Residential Retail</li> </ul>

***Programs to be Implemented or with No Reported PY5 Savings:***

- Continuous Energy Improvement
- Low-Income Energy-Efficiency Behavior and Ed
- Residential Energy-Efficiency Behavior and Ed
- School Benchmarking
- Student and Parent Energy-Efficiency Education

## **6.2 Status of EM&V Activities**

In PY5Q1, no evaluation activities occurred. In PY5Q2 PPL completed the following evaluation activities.

**Appliance Recycling Program:** PPL began drafting interview guides for program manager interviews and planning PY5 process evaluation activities.

**Continuous Energy Improvement:** PPL began planning PY5 process evaluation activities.

**Custom Incentive:** PPL identified a number of projects that are expected to be in the “large” project strata. In PY5Q2 the Cadmus team (PPL’s evaluation contractor) worked with E-power Solutions to refine baselines and Site Specific Measurement and Verification Protocols (SSMVPs) for these projects. Pre-installation site visits were conducted when possible. PPL also began planning PY5 process evaluation activities.

**E-Power Wise:** PPL began reviewing Energy Efficiency Management Information System (EEMIS) data and planning PY5 process evaluation activities.

**Low-Income Energy-Efficiency Behavior & Education:** PPL began planning for PY5 interviews and PY6 analysis.

**Low-Income WRAP:** PPL began reviewing EEMIS data and selecting a sample for the quarterly records review. PPL also began planning PY5 process evaluation activities.

**Master Metered Low-Income Multifamily Housing:** PPL began planning PY5 process evaluation activities.

**Prescriptive Equipment:** PPL began planning PY5 process evaluation activities.

**Residential Energy-Efficiency Behavior & Education:** PPL began planning PY5 process evaluation activities.

**Residential Home Comfort:** PPL began reviewing EEMIS data and selecting a sample for the quarterly records review. PPL also began planning PY5 process evaluation activities.

**Residential Retail:** PPL began planning PY5 process evaluation activities.

**School Benchmarking:** PPL began planning PY5 process evaluation activities.

**Student and Parent Energy-Efficiency Education:** PPL finalized specifications for bulk upload of PY5 program data to EEMIS. PPL also began preparing Student and Parent surveys and planning PY5 process evaluation activities.

### 6.3 Residential Program Audit Summary

#### 6.3.1 Residential Retail Program (Residential Lighting component) Audit Summary

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 PY5Q1 and PY5Q2 reports and compared the information to the data tracked in the EDC’s database and tracking system. The EDC Evaluator performed an independent review of the savings data and observed minor savings discrepancies with regards to less than 1% of the reported savings. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 6-4: Summary of Lighting Program Audit – PPL Residential Retail Program**

Category:	PY5Q1&Q2 Reports:	Database Verification:	Notes:
<b>Gross Energy Savings (MWh)</b>	Q1 IQ: 10,569 Q2 IQ: 26,241 PYTD: 36,810	√	As the lighting program is a component of the entire Residential Retail Program, the savings totals listed in the report are inclusive of non-lighting reported savings.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: .52 Q2 IQ: 1.28 PYTD: 1.80	√	As the lighting program is a component of the entire Residential Retail Program, the savings totals listed in the report are inclusive of non-lighting reported savings.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>			Variations in the baselines exist.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

#### 6.3.2 Appliance Recycling Program

For Phase II, the SWE has decided 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 encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that PPL’s Appliance Recycling Program did not incur any substantial programmatic changes from the Phase I.

### **6.3.3 Residential Retail Program (Efficient Equipment component) Audit**

For Phase II, the SWE has decided to conduct database sample checks for the Efficient Products portion of the Residential Retail program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that PPL's Efficient Product Program did not receive any substantial programmatic changes from the Phase I.

### **6.3.4 New Construction Program**

PPL did not have an active Residential New Construction Program in PY5Q2.

## **6.4 Low-Income Program Audit Summary**

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for PPL. The SWE Team examined PPL's kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis. For example, PPL used a statistical billing analysis on data collected from low income program participants in prior years for Baseload jobs. The SWE also conducted spot checks of program databases to ensure that measure data from the contractors was imported correctly to PPL's databases.

As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by PPL. As of now, the SWE has learned that PPL performs phone inspections for all Baseload jobs. An inspection contractor performs 50 site visits per year for HPWH and full cost jobs, and Cadmus reviews the findings. Additional information from SWE's data request can be seen in Appendix A.

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

PPL reported non-residential impacts from six programs during the first half of Program Year 5. PPL's programs are designed to be cross-cutting, allowing customers from all rate classes to participate in the programs. All program impacts are classified in one of five sectors: Residential, Low Income, Small C&I, Large C&I, and Government\Non-Profit. Because PPL's quarterly reporting does not include sector level insight, the SWE did not separate the reported participation and impacts of the non-residential portions of PPL's programs from the reported participation and impacts from the residential portion.

### **6.5.1 Review of Savings Database**

PPL provided a series of databases capturing all PY5Q1 and PY5Q2 activity to the SWE team for review. Table 6-5 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 (16,809 MWh) and the greatest ex-ante peak demand savings (2.7 MW). The Prescriptive Equipment Commercial program contributed the vast majority (over 90%) of PPL's non-residential savings during the first half of PY5.

**Table 6-5: PPL Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

Program	Sector	Participants	MWh	MW
Appliance Recycling	Gov't/Non-Profit	49	121	0.02
Appliance Recycling	Large C&I	2	1	0.00
Appliance Recycling	Small C&I	174	158	0.03
Custom Incentive Program	Gov't/Non-Profit	4	179	0.02
Custom Incentive Program	Large C&I	2	208	0.03
Custom Incentive Program	Small C&I	13	494	0.06
Master Metered Multifamily	Gov't/Non-Profit	10	442	0.04
Prescriptive Equipment Commercial	Gov't/Non-Profit	114	3,108	0.45
Prescriptive Equipment Commercial	Large C&I	18	1,146	0.19
Prescriptive Equipment Commercial	Small C&I	549	16,150	2.59
Residential Home Comfort	Small C&I	3	4	0.00
Residential Retail	Gov't/Non-Profit	8	1	0.00
Residential Retail	Large C&I	1	0	0.00
Residential Retail	Small C&I	13	3	0.00
<b>Total</b>		<b>960</b>	<b>22,015</b>	<b>3.44</b>

The participation and impacts to date in PY5 shown in Table 6-5 are lower than have been historically observed for PPL non-residential programs through Q2. This is largely due to a directive in the Phase II Implementation Order stating that *“In order to claim savings in Phase II for a measure, that measure must be installed and commercially operable no earlier than June 1, 2013. If a customer has installed and made commercially operable a measure on May 31, 2013, the savings for that measure will apply towards Phase I goals.”*<sup>17</sup> The practical implication of this Commission order is that many projects that would have otherwise<sup>18</sup> fallen into PPL’s PY5Q1 reporting were claimed in Program Year 4. This is particularly apparent for the Custom Incentive Program. Custom projects are usually the most complex type of EE measures and have the longest lead times. PPL also requires its evaluation contractor to complete M&V on large custom projects prior to paying rebates and reporting ex-ante impacts. The SWE expects the second half of PY5 to show a substantial increase in reported savings from the Custom Incentive Program.

<sup>17</sup> Phase II Implementation Order, p. 114.

<sup>18</sup> Within a Phase it is common for measures installed prior to May 31 to be claimed in the following Program Year because of participant lag (customer takes time to submit rebate application) and administrative lag (EDC takes time to process the rebate and claim savings).

### 6.5.2 Review of Sample Design

The Phase II Evaluation Framework requires EDC evaluators to submit an updated sampling plan following the close of Q3 for review by the SWE. With three quarters completed, it is possible to develop a reasonable estimate of the final disposition of the program population for the year. Once PPL's evaluation contractor submits this information the SWE will either approve the sampling plan for the program year or suggest modifications.

### 6.5.3 On-site Inspections

PPL has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

## 6.6 Finals Recommendations

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

- PPL has not historically reported impacts from its cross-cutting programs by sector. This level of detail is available in the program tracking data as shown in Table 6-5. The SWE recommends PPL alter its quarterly reporting procedures to include sector level detail.
- The Commission's determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.
- The SWE recommends that PPL and all EDCs include QA/QC information relating to the results of low-income site inspections. This information should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.
- PPL's evaluation contractor found various instances in the tracking database extract where the baselines being used were incorrect or referencing incorrect information. As a result, it is recommended that the tracking information continue to be reviewed manually, in part.

## 7 Met-Ed Impact Summaries and Audit Findings

Section 7 contains information on Met-Ed's (a FirstEnergy company) 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's Semiannual Report Impacts**

	Phase II Reported Gross Impact	Phase II+CO Reported Impact	Savings Achieved as % of 2016 Targets <sup>[g]</sup>
Total Energy Savings (MWh)	44,469	91,556	27%
Total Demand Reduction (MW) <sup>[a]</sup>	2.82	2.82	Not Applicable
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)	28,238	58,138	Not Applicable

**NOTES:**

[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.

[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] 6.35 x 10<sup>-1</sup> metric tons of CO<sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.

[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.

Met-Ed has reported PY5 gross energy savings for nine programs. The following table provides a breakdown of the contribution of each program's gross energy savings towards the PY5 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 Portfolio</b>
Appliance Turn-In	5.8%
Energy Efficient Products	22.1%
Home Performance	46.5%
Low Income / WARM	7.0%
C/I Small Energy Efficient Equipment	9.1%
C/I Small Energy Efficient Buildings	0.0%
C/I Large Energy Efficient Equipment	9.2%
C/I Large Energy Efficient Buildings	0.0%
Government & Institutional	0.2%
<b>TOTAL PORTFOLIO</b>	<b>100.0%</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 PY5, 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 PY5 Gross Savings:</i></b>
<ul style="list-style-type: none"><li>• Appliance Turn-In</li><li>• Energy Efficient Products</li><li>• Home Performance</li><li>• Low Income / WARM</li><li>• C/I Small Energy Efficient Equipment</li><li>• C/I Large Energy Efficient Equipment</li></ul>
<b><i>Programs to be Implemented or with No Reported PY5 Savings:</i></b>
<ul style="list-style-type: none"><li>• C/I Small Energy Efficient Buildings</li><li>• C/I Large Energy Efficient Buildings</li></ul>

## 7.2 Status of EM&V Activities

The PY5 EM&V plan for each program was completed in early September. Met-Ed’s evaluator, ADM, has communicated to the implementation staff the data collection requirements and calculation procedures outlined in the 2013 PA TRM for measures offered under each program. The first formal sample will be pulled from Q1 and Q2 data in late January 2014.

## 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 PY5Q1 and PY5Q2 reports and compared the information to the data tracked in the EDC’s database and tracking system. As the lighting program is included under the efficient products program umbrella, other savings make up the total listed in the quarterly reports. Slight variations were discovered in low wattage baseline calculations but are insignificant. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 7-4: Summary of Lighting Program Audit – Met-Ed Energy Efficient Products**

Category:	PY5Q1&Q2 Reports:	Database	
		Verification:	Notes:
<b>Gross Energy Savings (MWh)</b>	Q1 IQ: 0 Q2 IQ: 9,447 PYTD: 9,447	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: 0 Q2 IQ: .46 PYTD: .46	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>		√	The correct baselines were used.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

### 7.3.2 Appliance Recycling Program

For Phase II, the SWE has decided 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 encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that Small commercial appliance turn-in pick-ups began in Q1 and Met-Ed began developing cross marketing opportunities with the small commercial programs. In Q2, small commercial pick-ups lagged slightly and Met-Ed marketing strategies are being reviewed for spring 2014 implementation.

### 7.3.3 Efficient Products Program

For Phase II, the SWE has decided to conduct database sample checks for the Efficient Products program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that the new Consumer Electronics Program was launched in Q2 with two major retailers, with additional retailers to be added in 2014.

### 7.3.4 New Construction Program

In the first two quarters of PY5, 140 new homes were constructed as part of Met-Ed’s residential new construction program. In order to conduct a desktop audit of Met-Ed’s residential new construction program, the SWE selected a random sample of 10 homes (5 homes per quarter) from Met-Ed’s tracking database.

The SWE desktop audit process involved multiple steps:

1. REM/Rate™ verification
2. Demand savings verification
3. Construction verification

In general, the SWE checked for consistency with TRM standards in the baseline model, checked for proper calculation and accuracy of REM/Rate™ results, checked for proper usage of TRM algorithms, and checked for proof of completed construction.

The REM/Rate™ verification step required the review of all modeling inputs and results for the selected SWE sample of homes to ensure compliance with TRM rules. Per the TRM, REM/Rate™ is used to estimate energy savings results for weather-sensitive measures (e.g., HVAC equipment upgrades, insulation upgrades).

Demand savings verification involved checking that the algorithm provided in the TRM for estimating demand savings was being used and applied correctly.

Construction verification involved a review of builder certificates to confirm completed construction of each home.

#### **7.4 Low-Income Program Audit Summary**

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for Met-Ed. The SWE Team examined Met-Ed's kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis.

As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by Met-Ed. As of now, the SWE has learned that 50 phone verifications are performed for Conservation Kits per year, and 5-15 on-site inspections per year are performed for Comprehensive Audits. Additional information from SWE's data request can be seen in Appendix A.

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

Met-Ed lists five programs in its non-residential portfolio as part of its Commission approved EE&C plan. The two Energy Efficient Buildings programs are new in Phase II and FirstEnergy has retained a new CSP to implement all of its non-residential programs.

- C/I Small Energy Efficient Equipment
- C/I Small Energy Efficient Buildings
- C/I Large Energy Efficient Equipment
- C/I Large Energy Efficient Buildings
- Government & Institutional

Only three of these programs achieved energy and demand savings during the first half of Program Year 5. The Efficient Buildings programs have an updated website, applications, and a marketing plan to reach the desired market actors, but have no approved projects recorded during Q1 or Q2. The reported gross energy savings from non-residential programs was 8,243 MWh and the reported gross demand savings was 1.02 MW. The year-to-date number of participants, gross reported energy impact and gross reported demand impact are shown in Table 7-5.

**Table 7-5: Met-Ed Non-Residential Programs PY5Q2 Reported YTD Impacts**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	96	4,046	0.60
C/I Large Energy Efficient Equipment	6	4,111	0.40
Government, & Institutional	9	86	0.02
<b>Total</b>	<b>111</b>	<b>8,243</b>	<b>1.02</b>

#### 7.5.1 Review of Savings Database

FirstEnergy provided a database of all PY5 activity to date to the SWE team for review. Table 7-6 provides the participant count, energy impact, and demand impact by program for the Met-Ed operating company according to the database extract. The Small and Large Efficient Equipment programs were responsible for the majority of the PY5 non-residential savings to date.

**Table 7-6: Met-Ed Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	96	4,046	0.60
C/I Large Energy Efficient Equipment	6	4,111	0.40
Government& Institutional	9	86	0.02
<b>Total</b>	<b>111</b>	<b>8,243</b>	<b>1.02</b>

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

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

**Table 7-7: Met-Ed Non-Residential Program Variances**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
C/I Small Energy Efficient Equipment	0	0	0
C/I Large Energy Efficient Equipment	0	0	0
Government& Institutional	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

As shown in Table 7-7, the program tracking data and gross reported participation, MWh, and MW impacts for Met-Ed’s non-residential programs were in perfect agreement for the first two quarters of PY5. The change in CSP from Phase I to Phase II does not appear to have adversely affected the program tracking and reporting systems.

#### 7.5.2 Review of Sample Design

The Phase II Evaluation Framework requires EDC evaluators to submit an updated sampling plan following the close of Q3 for review by the SWE. With three quarters completed, it is possible to develop a reasonable estimate of the final disposition of the program population for the year. Once FirstEnergy’s evaluation contractor submits this information the SWE will either approve the sampling plan for the program year or suggest modifications.

#### 7.5.3 On-site Inspections

FirstEnergy’s evaluation contractor has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

### 7.6 Finals Recommendations

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

- FirstEnergy is offering two new non-residential programs in its Phase II EE&C plans: the C/I Small Efficient Buildings and C/I Large Efficient Buildings. These programs had no participation or reported saving in the first half of PY5. The SWE team recommends FirstEnergy continue to support the program CSP in its marketing plan and outreach strategies to gain awareness of the program within the targeted market segments and engage key account managers where appropriate to help the new programs gain traction.
- The Commission’s determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.
- FirstEnergy selected a different CSP to implement its Phase I and Phase II non-residential EE&C programs. Program tracking and reporting procedures appear unaffected by the change.

However the SWE team encourages FirstEnergy and its evaluation contractors to work collaboratively with the new CSP to understand the nuances of the PA TRM and Evaluation Framework to help ensure the transition is as seamless as possible and all of the necessary data elements are captured for the estimation of savings.

- The SWE recommends that the EDCs include QA/QC information relating to the results of low-income site inspections. This data should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.
- First Energy EDC's did not report lighting savings for the 1<sup>st</sup> quarter. It is recommended that future reports describe the absence of savings.
- The evaluation of the baselines being used for some smaller wattage LED bulbs has uncovered discrepancies. The evaluation contractor should continue to monitor the data at such a level and communicate with the SWE if these discrepancies appear to be inherent in smaller wattage bulbs.

## 8 Penelec Impact Summaries and Audit Findings

Section 8 contains information on Penelec’s (a FirstEnergy company) 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’s Semiannual Report Impacts**

	<b>Phase II Reported Gross Impact</b>	<b>Phase II+CO Reported Impact</b>	<b>Savings Achieved as % of 2016 Targets<sup>[f]</sup></b>
Total Energy Savings (MWh)	37,640	64,445	20.2%
Total Demand Reduction (MW) <sup>[a]</sup>	2.5	2.5	Not Applicable
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]</sup> (Tons)	23,901	40,923	Not Applicable
<b>NOTES:</b>			
[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.			
[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] 6.35 x 10 <sup>-1</sup> metric tons of CO <sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.			
[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.			

Penelec has reported PY5 gross energy savings for 9 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY5 portfolio savings.

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

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings Portfolio</b>
Appliance Turn-In	7.7%
Energy Efficient Products	23.7%
Home Performance	45.0%
Low Income / WARM	12.9%
C/I Small Energy Efficient Equipment	6.7%
C/I Small Energy Efficient Buildings	0.0%
C/I Large Energy Efficient Equipment	2.0%
C/I Large Energy Efficient Buildings	0.0%
Government & Institutional	2.1%
<b>TOTAL PORTFOLIO</b>	<b>100.0%</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 PY5, 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><i>Programs Reporting PY5 Gross Savings:</i></b>
<ul style="list-style-type: none"> <li>• Appliance Turn-In</li> <li>• Energy Efficient Products</li> <li>• Home Performance</li> <li>• Low Income / WARM</li> <li>• C/I Small Energy Efficient Equipment</li> <li>• C/I Large Energy Efficient Equipment</li> <li>• Government &amp; Institutional</li> </ul>
<b><i>Programs to be Implemented or with No Reported PY5 Savings:</i></b>
<ul style="list-style-type: none"> <li>• C/I Small Energy Efficient Buildings</li> <li>• C/I Large Energy Efficient Buildings</li> </ul>

## 8.2 Status of EM&V Activities

The PY5 EM&V plan for each program was completed in early September. Penelec’s evaluator, ADM, has communicated to the implementation staff the data collection requirements and calculation procedures outlined in the 2013 PA TRM for measures offered under each program. The first formal sample will be pulled from Q1 and Q2 data in late January 2014.

## 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 PY5Q1 and PY5Q2 reports and compared the information to the data tracked in the EDC’s database and tracking system. As the lighting program is included under the efficient products program umbrella, other savings make up the total listed in the quarterly reports. Slight variations were discovered in low wattage baseline calculations but are insignificant. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 8-4: Summary of Lighting Program Audit – Penelec Energy Efficient Products**

Category:	PY5Q1&Q2 Reports:	Database Verification:	Notes:
<b>Gross Energy Savings (MWh)</b>	Q1 IQ: 0 Q2 IQ: 8,619 PYTD: 8,619	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: 0 Q2 IQ: .42 PYTD: .42	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>		√	The correct baselines were used.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

### 8.3.2 Appliance Recycling Program

For Phase II, the SWE has decided 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 encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that small commercial appliance turn-in pick-ups began in Q1 and Penelec began developing cross marketing opportunities with the small commercial programs. In Q2, small commercial pick-ups lagged slightly and Penelec marketing strategies are being reviewed for spring 2014 implementation.

### 8.3.3 Efficient Products Program

For Phase II, the SWE has decided to conduct database sample checks for the Efficient Products program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that the new Consumer Electronics Program was launched in Q2 with two major retailers, with additional retailers to be added in 2014.

### 8.3.4 New Construction Program

In the first two quarters of PY5, 36 new homes were constructed as part of Penelec's residential new construction program. In order to conduct a desktop audit of Penelec's residential new construction program, the SWE selected a random sample of 10 homes (5 homes per quarter) from Penelec's tracking database.

The SWE desktop audit process involved multiple steps:

1. REM/Rate™ verification
2. Demand savings verification
3. Construction verification

In general, the SWE checked for consistency with TRM standards in the baseline model, checked for proper calculation and accuracy of REM/Rate™ results, checked for proper usage of TRM algorithms, and checked for proof of completed construction.

The REM/Rate™ verification step required the review of all modeling inputs and results for the selected SWE sample of homes to ensure compliance with TRM rules. Per the TRM, REM/Rate™ is used to estimate energy savings results for weather-sensitive measures (e.g., HVAC equipment upgrades, insulation upgrades).

Demand savings verification involved checking that the algorithm provided in the TRM for estimating demand savings was being used and applied correctly.

Construction verification involved a review of builder certificates to confirm completed construction of each home.

#### 8.4 Low-Income Program Audit Summary

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for Penelec. The SWE Team examined Penelec’s kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis. As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by Penelec. As of now, the SWE has learned that 50 phone verifications are performed for Conservation Kits per year, and 5-15 on-site inspections per year are performed for Comprehensive Audits. Additional information from SWE’s data request can be seen in Appendix A.

#### 8.5 Non-Residential Program Audit Summary

Penelec lists five programs in its non-residential portfolio as part of its Commission approved EE&C plan. The two Energy Efficient Buildings programs are new in Phase II and FirstEnergy has retained a new CSP to implement all of its non-residential programs.

- C/I Small Energy Efficient Equipment
- C/I Small Energy Efficient Buildings
- C/I Large Energy Efficient Equipment
- C/I Large Energy Efficient Buildings
- Government & Institutional

Only three of these programs achieved energy and demand savings during the first half of Program Year 5. The Efficient Buildings programs have an updated website, applications, and a marketing plan to reach the desired market actors, but have no approved projects were recorded during Q1 or Q2. The reported gross energy savings from non-residential programs was 4,029 MWh and the reported gross demand savings was 0.79 MW. The year-to-date number of participants, gross reported energy impact and gross reported demand impact are shown in Table 8-5.

**Table 8-5: Penelec Non-Residential Programs PY5Q2 Reported YTD Impacts**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	118	2,504	0.55
C/I Large Energy Efficient Equipment	5	750	0.11
Government, & Institutional	16	775	0.13
<b>Total</b>	<b>139</b>	<b>4,029</b>	<b>0.79</b>

##### 8.5.1 Review of Savings Database

FirstEnergy provided a database of all PY5 activity to date to the SWE team for review. Table 8-6 provides the participant count, energy impact, and demand impact by program for the Penelec operating company according to the database extract. The Small Efficient Equipment program was responsible for the majority of the PY5 non-residential savings to date in PY5.

**Table 8-6: Penelec Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
C/I Small Energy Efficient Equipment	118	2,530	0.55
C/I Large Energy Efficient Equipment	4	750	0.11
Government, & Institutional	16	775	0.13
<b>Total</b>	<b>138</b>	<b>4,055</b>	<b>0.79</b>

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

***Reported Figure – Database Summary = Variance***

**Table 8-7: Penelec Non-Residential Program Variances**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
C/I Small Energy Efficient Equipment	0	-26	0
C/I Large Energy Efficient Equipment	1	0	0
Government, & Institutional	0	0	0
<b>Total</b>	<b>1</b>	<b>-26</b>	<b>0</b>

As shown in Table 8-7, there was a small discrepancy in the participation counts and energy savings for the first two quarters of PY5 between the program tracking data and the PY5Q2 Penelec report. The energy savings discrepancy could be the result of a project’s impacts being updated between when the program tracking data excerpt was created and when the PY5Q2 report was completed. The SWE understands that program tracking is a continuous process and impacts are subject to change following the close of a quarter if better information becomes available or errors are discovered. The SWE will confirm that this error is rectified in the future.

**8.5.2 Review of Sample Design**

The Phase II Evaluation Framework requires EDC evaluators to submit an updated sampling plan following the close of Q3 for review by the SWE. With three quarters completed, it is possible to develop a reasonable estimate of the final disposition of the program population for the year. Once FirstEnergy’s evaluation contractor submits this information the SWE will either approve the sampling plan for the program year or suggest modifications.

**8.5.3 On-site Inspections**

FirstEnergy’s evaluation contractor has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

## 8.6 Finals Recommendations

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

- FirstEnergy is offering two new non-residential programs in its Phase II EE&C plans: the C/I Small Efficient Buildings and C/I Large Efficient Buildings. These programs had no participation or reported saving in the first half of PY5. The SWE team recommends FirstEnergy continue to support the program CSP in its marketing plan and outreach strategies to gain awareness of the program within the targeted market segments and engage key account managers where appropriate to help the new programs gain traction.
- FirstEnergy selected a different CSP to implement its Phase I and Phase II non-residential EE&C programs. Program tracking and reporting procedures appear unaffected by the change. However the SWE team encourages FirstEnergy and its evaluation contractors to work collaboratively with the new CSP to understand the nuances of the PA TRM and Evaluation Framework to help ensure the transition is as seamless as possible and all of the necessary data elements are captured for the estimation of savings.
- The SWE recommends that the EDCs include QA/QC information relating to the results of low-income site inspections. This information should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.
- First Energy EDC's did not report lighting savings for the 1<sup>st</sup> quarter. It is recommended that future reports describe the absence of savings.
- The evaluation of the baselines being used for some smaller wattage LED bulbs has uncovered discrepancies, the evaluation contractor should continue to monitor the data at such a level and communicate with the SWE if these discrepancies appear to be inherent in smaller wattage bulbs.
- The Commission's determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.

## 9 Penn Power Impact Summaries and Audit Findings

Section 9 contains information on Penn Power’s (a FirstEnergy company) 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’s Semiannual Report Impacts**

	<b>Phase II Reported Gross Impact</b>	<b>Phase II+CO Reported Impact</b>	<b>Savings Achieved as % of 2016 Targets<sup>[f]</sup></b>
Total Energy Savings (MWh)	10,513	33,093	34.7%
Total Demand Reduction (MW) <sup>[a]</sup>	0.63	0.63	Not Applicable
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]</sup> (Tons)	6,676	21,014	Not Applicable

**NOTES:**

[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.

[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] 6.35 x 10<sup>-1</sup> metric tons of CO<sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs.

[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.

Penn Power has reported PY5 gross energy savings for 9 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY5 portfolio savings.

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

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings Portfolio</b>
Appliance Turn-In	19.0%
Energy Efficient Products	39.7%
Home Performance	25.4%
Low Income / WARM	6.3%
C/I Small Energy Efficient Equipment	3.2%
C/I Small Energy Efficient Buildings	0.0%
C/I Large Energy Efficient Equipment	6.3%
C/I Large Energy Efficient Buildings	0.0%
Government & Institutional	0.0%
<b>TOTAL PORTFOLIO</b>	<b>100.0%</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 PY5, 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 PY5 Gross Savings:</i></b>
<ul style="list-style-type: none"> <li>• Appliance Turn-In</li> <li>• Energy Efficient Products</li> <li>• Home Performance</li> <li>• Low Income / WARM</li> <li>• C/I Small Energy Efficient Equipment</li> <li>• C/I Large Energy Efficient Equipment</li> </ul>
<b><i>Programs to be Implemented or with No Reported PY5 Savings:</i></b>
<ul style="list-style-type: none"> <li>• C/I Small Energy Efficient Buildings</li> <li>• C/I Large Energy Efficient Buildings</li> <li>• Government &amp; Institutional</li> </ul>

## 9.2 Status of EM&V Activities

The PY5 EM&V plan for each program was completed in early September. Penn Power’s evaluator, ADM, has communicated to the implementation staff the data collection requirements and calculation procedures outlined in the 2013 PA TRM for measures offered under each program. The first formal sample will be pulled from Q1 and Q2 data in late January 2014.

## 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 PY5Q1 and PY5Q2 reports and compared the information to the data tracked in the EDC’s database and tracking system. As the lighting program is included under the efficient products program umbrella, other savings make up the total listed in the quarterly reports. Slight variations were discovered in low wattage baseline calculations but are insignificant. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 9-4: Summary of Lighting Program Audit – Penn Power Energy Efficient Products**

Category:	PY5Q1&Q2 Reports:	Database	
		Verification:	Notes:
<b>Gross Energy Savings (MWh)</b>	Q1 IQ: 0 Q2 IQ: 4,253 PYTD: 4,253	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: 0 Q2 IQ: .01 PYTD: .01	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>		√	The correct baselines were used.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

### 9.3.2 **Appliance Recycling Program**

For Phase II, the SWE has decided 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 encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that Small commercial appliance turn-in pick-ups began in Q1 and Met-Ed began developing cross marketing opportunities with the small commercial programs. In Q2, small commercial pick-ups lagged slightly and Penn Power marketing strategies are being reviewed for spring 2014 implementation.

### 9.3.3 **Efficient Equipment Program**

For Phase II, the SWE has decided to conduct database sample checks for the Efficient Products program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that the new Consumer Electronics Program was launched in Q2 with two major retailers, with additional retailers to be added in 2014.

### 9.3.4 **New Construction Program**

In the first two quarters of PY5, 56 new homes were constructed as part of Penn Power's residential new construction program. In order to conduct a desktop audit of Penn Power's residential new construction program, the SWE selected a random sample of 10 homes (5 homes per quarter) from Penn Power's tracking database.

The SWE desktop audit process involved multiple steps:

1. REM/Rate™ verification
2. Demand savings verification
3. Construction verification

In general, the SWE checked for consistency with TRM standards in the baseline model, checked for proper calculation and accuracy of REM/Rate™ results, checked for proper usage of TRM algorithms, and checked for proof of completed construction.

The REM/Rate™ verification step required the review of all modeling inputs and results for the selected SWE sample of homes to ensure compliance with TRM rules. Per the TRM, REM/Rate™ is used to estimate energy savings results for weather-sensitive measures (e.g., HVAC equipment upgrades, insulation upgrades).

Demand savings verification involved checking that the algorithm provided in the TRM for estimating demand savings was being used and applied correctly.

Construction verification involved a review of builder certificates to confirm completed construction of each home.

#### 9.4 Low-Income Program Audit Summary

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for Penn Power. The SWE Team examined Penn Power’s kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis. As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by Penn Power. As of now, the SWE has learned that 50 phone verifications are performed for Conservation Kits per year, and 5-15 on-site inspections per year are performed for Comprehensive Audits. Additional information from SWE’s data request can be seen in Appendix A.

#### 9.5 Non-Residential Program Audit Summary

Penn Power lists five programs in its non-residential portfolio as part of its Commission approved EE&C plan. The two Energy Efficient Buildings programs are new in Phase II and FirstEnergy has retained a new CSP to implement all of its non-residential programs.

- C/I Small Energy Efficient Equipment
- C/I Small Energy Efficient Buildings
- C/I Large Energy Efficient Equipment
- C/I Large Energy Efficient Buildings
- Government & Institutional

Only three of these programs achieved energy and demand savings during the first half of Program Year 5. The Efficient Buildings programs have an updated website, applications, and a marketing plan to reach the desired market actors, but have no approved projects recorded during Q1 or Q2. The reported gross energy savings from non-residential programs was 519 MWh and the reported gross demand savings was 0.06 MW. The year-to-date number of participants, gross reported energy impact and gross reported demand impact are shown in Table 9-5.

**Table 9-5: Penn Power Non-Residential Programs PY5Q2 Reported YTD Impacts**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	25	172	0.02
C/I Large Energy Efficient Equipment	2	324	0.04
Government, & Institutional	1	23	0.00
<b>Total</b>	<b>28</b>	<b>519</b>	<b>0.06</b>

### 9.5.1 Review of Savings Database

FirstEnergy provided a database of all PY5 activity to date to the SWE team for review. Table 9-6 provides the participant count, energy impact, and demand impact by program for the Penn Power operating company according to the database extract. The Small Efficient Equipment program had the largest number of participants during the first half of PY5, but the Large Efficient Equipment program produced the largest energy and peak demand savings.

**Table 9-6: Penn Power Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	25	172	0.02
C/I Large Energy Efficient Equipment	2	324	0.04
Government, & Institutional	1	23	0.00
<b>Total</b>	<b>28</b>	<b>518</b>	<b>0.06</b>

In Table 9-7, variances between the reported figures and the information contained in the database are presented. All variances are reported as follows:

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

**Table 9-7: Penn Power Non-Residential Program Variances**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	0	0	0
C/I Large Energy Efficient Equipment	0	0	0
Government, & Institutional	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

As shown in Table 9-7, the program tracking data and gross reported participation, MWh, and MW impacts for Penn Power’s non-residential programs were in perfect agreement for the first two quarters of PY5. The change in implementation CSP from Phase I to Phase II does not appear to have adversely affected the program tracking and reporting systems.

### 9.5.2 Review of Sample Design

The Phase II Evaluation Framework requires EDC evaluators to submit an updated sampling plan following the close of Q3 for review by the SWE. With three quarters completed, it is possible to develop a reasonable estimate of the final disposition of the program population for the year. Once FirstEnergy’s evaluation contractor submits this information the SWE will either approve the sampling plan for the program year or suggest modifications.

### 9.5.3 On-site Inspections

FirstEnergy's evaluation contractor has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

## 9.6 Finals Recommendations

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

- FirstEnergy is offering two new non-residential programs in its Phase II EE&C plans: the C/I Small Efficient Buildings and C/I Large Efficient Buildings. These programs had no participation or reported saving in the first half of PY5. The SWE team recommends FirstEnergy continue to support the program CSP in its marketing plan and outreach strategies to gain awareness of the program within the targeted market segments and engage key account managers where appropriate to help the new programs gain traction.
- FirstEnergy selected a different CSP to implement its Phase I and Phase II non-residential EE&C programs. Program tracking and reporting procedures appear unaffected by the change. However the SWE team encourages FirstEnergy and its evaluation contractors to work collaboratively with the new CSP to understand the nuances of the PA TRM and Evaluation Framework to help ensure the transition is as seamless as possible and all of the necessary data elements are captured for the estimation of savings.
- The SWE recommends that the EDCs include QA/QC information relating to the results of low-income site inspections. This information should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.
- First Energy EDC's did not report lighting savings for the 1<sup>st</sup> quarter. It is recommended that future reports describe the absence of savings.
- The evaluation of the baselines being used for some smaller wattage LED bulbs has uncovered discrepancies. The evaluation contractor should continue to monitor the data at such a level and communicate with the SWE if these discrepancies appear to be inherent in smaller wattage bulbs.
- The Commission's determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.

## 10 West Penn Power Impact Summaries and Audit Findings

Section 10 contains information on West Penn Power’s (a FirstEnergy company) 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’s Semiannual Report Impacts**

	Phase II Reported Gross Impact	Phase II+CO Reported Impact	Savings Achieved as % of 2016 Targets <sup>[f]</sup>
Total Energy Savings (MWh)	38,044	97,973	29%
Total Demand Reduction (MW) <sup>[a]</sup>	2.43	2.43	Not Applicable
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]</sup> (Tons)	24,158	62,213	Not Applicable

**NOTES:**

[a] Phase II and Phase II+CO savings are equal because no MW savings were carried over from Phase I.

[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] 6.35 x 10<sup>-1</sup> metric tons of CO<sub>2</sub> per MWh. Based on PJM Executive Report (dated October 24, 2013) 2012 Marginal Off-Peak rate of 1,400 lbs per MWh. One metric ton = 2,204.63 lbs. [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.

West Penn Power has reported PY5 gross energy savings for 9 programs. The following table provides a breakdown of the contribution of each program’s gross energy savings towards the PY5 portfolio savings.

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

<b>Program:</b>	<b>Percent of PYTD Gross MWh Savings Portfolio</b>
Appliance Turn-In	8.5%
Energy Efficient Products	27.7%
Home Performance	43.1%
Low Income / WARM	3.2%
C/I Small Energy Efficient Equipment	10.8%
C/I Small Energy Efficient Buildings	0.0%
C/I Large Energy Efficient Equipment	6.0%
C/I Large Energy Efficient Buildings	0.0%
Government & Institutional	0.6%
<b>TOTAL PORTFOLIO</b>	<b>100.0%</b>

**10.1 Program Implementation and Evaluation Summary**

The following table contains a summary of programs reporting participation and savings to-date, programs evaluated in PY5, 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><i>Programs Reporting PY5 Gross Savings:</i></b>
<ul style="list-style-type: none"> <li>• Appliance Turn-In</li> <li>• Energy Efficient Products</li> <li>• Home Performance</li> <li>• Low Income / WARM</li> <li>• C/I Small Energy Efficient Equipment</li> <li>• C/I Large Energy Efficient Equipment</li> <li>• Government &amp; Institutional</li> </ul>
<b><i>Programs to be Implemented or with No Reported PY5 Savings:</i></b>
<ul style="list-style-type: none"> <li>• C/I Small Energy Efficient Buildings</li> <li>• C/I Large Energy Efficient Buildings</li> </ul>

## 10.2 Status of EM&V Activities

The PY5 EM&V plan for each program was completed in early September. West Penn Power’s evaluator, ADM, has communicated to the implementation staff the data collection requirements and calculation procedures outlined in the 2013 PA TRM for measures offered under each program. The first formal sample will be pulled from Q1 and Q2 data in late January 2014.

## 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 PY5Q1 and PY5Q2 reports and compared the information to the data tracked in the EDC’s database and tracking system. As the lighting program is included under the efficient products program umbrella, other savings make up the total listed in the quarterly reports. Slight variations were discovered in low wattage baseline calculations but are insignificant. The following table contains a summary of the SWE team audit findings and recommendations:

**Table 10-4: Summary of Lighting Program Audit – West Penn Energy Efficient Products**

Category:	PY5Q1&Q2 Reports:	Database Verification:	Notes:
<b>Gross Energy Savings (MWh)</b>	Q1 IQ: 0 Q2 IQ: 10,091 PYTD: 10,091	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Gross Demand Reduction (MW)</b>	Q1 IQ: 0 Q2 IQ: .49 PYTD: .49	√	Slight differences exist between the database and quarterly reports due to the difference in data pull dates.
<b>Use of TRM Protocols</b>		√	The correct algorithms were used.
<b>Baseline Assumptions</b>		√	The correct baselines were used.
<b>Invoice Review</b>		√	There are no invoice issues.
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• IQ: Incremental Quarterly</li> <li>• PYTD: Program Year to Date</li> <li>• N/A: Not applicable</li> <li>• √: No discrepancies found.</li> </ul>			

### 10.3.2 Appliance Recycling Program

For Phase II, the SWE has decided 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 encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that Small commercial appliance turn-in pick-ups began in Q1 and West Penn Power began developing cross marketing opportunities with the small commercial programs. In Q2, small commercial pick-ups lagged slightly and West Penn Power marketing strategies are being reviewed for spring 2014 implementation.

### 10.3.3 Efficient Equipment Program

For Phase II, the SWE has decided to conduct database sample checks for the Efficient Products program on an annual basis. This decision was made by the SWE and TUS in acknowledgement that the SWE encountered very few QC errors in Program Year Four at the close of Phase I. Results of the annual database sample check (with samples drawn from each quarter of PY5) will be available in the SWE PY5 Final Annual Report. The SWE notes that the new Consumer Electronics Program was launched in Q2 with two major retailers, with additional retailers to be added in 2014.

### 10.3.4 New Construction Program

In the second quarter of PY5, 62 new homes were constructed as part of West Penn Power's residential new construction program (no new homes were completed in the first quarter of PY5). In order to conduct a desktop audit of West Penn Power's residential new construction program, the SWE selected a random sample of 5 homes from West Penn Power's tracking database.

The SWE desktop audit process involved multiple steps:

1. REM/Rate™ verification
2. Demand savings verification
3. Construction verification

In general, the SWE checked for consistency with TRM standards in the baseline model, checked for proper calculation and accuracy of REM/Rate™ results, checked for proper usage of TRM algorithms, and checked for proof of completed construction.

The REM/Rate™ verification step required the review of all modeling inputs and results for the selected SWE sample of homes to ensure compliance with TRM rules. Per the TRM, REM/Rate™ is used to estimate energy savings results for weather-sensitive measures (e.g., HVAC equipment upgrades, insulation upgrades).

Demand savings verification involved checking that the algorithm provided in the TRM for estimating demand savings was being used and applied correctly.

Construction verification involved a review of builder certificates to confirm completed construction of each home.

#### 10.4 Low-Income Program Audit Summary

The SWE Team has been able to verify the gross kWh and kW savings reported for PY5, Quarter 1 and Quarter 2, for West Penn Power. The SWE Team examined West Penn Power's kWh and kW savings calculations and verified that these calculations either made use of correct values from the latest Pennsylvania TRM or were based upon an updated statistical billing analysis. As mentioned in Section 3.1.2, the SWE is in the process of gathering further information on post-installation verification performed by West Penn Power. As of now, the SWE has learned that 50 phone verifications are performed for Conservation Kits per year, and 5-15 on-site inspections per year are performed for Comprehensive Audits. Additional information from SWE's data request can be seen in Appendix A.

#### 10.5 Non-Residential Program Audit Summary

West Penn Power lists five programs in its non-residential portfolio as part of its Commission approved EE&C plan. The two Energy Efficient Buildings programs are new in Phase II and FirstEnergy has retained a new CSP to implement all of its non-residential programs.

- C/I Small Energy Efficient Equipment
- C/I Small Energy Efficient Buildings
- C/I Large Energy Efficient Equipment
- C/I Large Energy Efficient Buildings
- Government & Institutional

Only three of these programs achieved energy and demand savings during the first half of Program Year 5. The Efficient Buildings programs have an updated website, applications, and a marketing plan to reach the desired market actors, but have no approved projects recorded during Q1 or Q2. The reported gross energy savings from non-residential programs was 6,641 MWh and the reported gross demand savings was 0.94 MW. The year-to-date number of participants, gross reported energy impact and gross reported demand impact are shown in Table 10-5.

**Table 10-5: West Penn Power Non-Residential Programs PY5Q2 Reported YTD Impacts**

Program	Participants	MWh	MW
C/I Small Energy Efficient Equipment	117	4,126	0.64
C/I Large Energy Efficient Equipment	4	2,296	0.27
Government, & Institutional	8	219	0.03
<b>Total</b>	<b>129</b>	<b>6,641</b>	<b>0.94</b>

### 10.5.1 Review of Savings Database

FirstEnergy provided a database of all PY5 activity to date to the SWE team for review. Table 10-6 provides the participant count, energy impact, and demand impact by program for the West Penn Power operating company according to the database extract. The Small Efficient Equipment program had the largest number of participants and the greatest energy and peak demand savings during the first half of PY5, but the Large Efficient Equipment program produced the largest energy and peak demand savings.

**Table 10-6: West Penn Power Non-Residential Programs PY5Q1-Q2 Tracking Data Summary**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
C/I Small Energy Efficient Equipment	117	4,126	0.64
C/I Large Energy Efficient Equipment	4	2,296	0.27
Government, & Institutional	8	219	0.03
<b>Total</b>	<b>129</b>	<b>6,641</b>	<b>0.94</b>

In Table 10-7, variances between the reported figures and the information contained in the database are presented. All variances are reported as follows:

$$\textit{Reported Figure} - \textit{Database Summary} = \textit{Variance}$$

**Table 10-7: West Penn Power Non-Residential Program Variances**

<b>Program</b>	<b>Participants</b>	<b>MWh</b>	<b>MW</b>
C/I Small Energy Efficient Equipment	0	0	0
C/I Large Energy Efficient Equipment	0	0	0
Government, & Institutional	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

As shown in Table 10-7, the program tracking data and gross reported participation, MWh, and MW impacts for West Penn Power’s non-residential programs were in perfect agreement for the first two quarters of PY5. The change in implementation CSP from Phase I to Phase II does not appear to have adversely affected the program tracking and reporting systems.

### 10.5.2 Review of Sample Design

The Phase II Evaluation Framework requires EDC evaluators to submit an updated sampling plan following the close of Q3 for review by the SWE. With three quarters completed, it is possible to develop a reasonable estimate of the final disposition of the program population for the year. Once FirstEnergy’s evaluation contractor submits this information the SWE will either approve the sampling plan for the program year or suggest modifications.

### 10.5.3 On-site Inspections

FirstEnergy's evaluation contractor has not begun its on-site inspections of PY5 installations. The SWE plans to conduct ride-along site inspections of PY5 installations beginning in March 2014.

## 10.6 Finals Recommendations

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

- FirstEnergy is offering two new non-residential programs in its Phase II EE&C plans: the C/I Small Efficient Buildings and C/I Large Efficient Buildings. These programs had no participation or reported saving in the first half of PY5. The SWE team recommends FirstEnergy continue to support the program CSP in its marketing plan and outreach strategies to gain awareness of the program within the targeted market segments and engage key account managers where appropriate to help the new programs gain traction.
- FirstEnergy selected a different Conservation Service Provider to implement its Phase I and Phase II non-residential EE&C programs. Program tracking and reporting procedures appear unaffected by the change. However the SWE team encourages FirstEnergy and its evaluation contractors to work collaboratively with the new CSP to understand the nuances of the PA TRM and Evaluation Framework to help ensure the transition is as seamless as possible and all of the necessary data elements are captured for the estimation of savings.
- The SWE recommends that the EDCs include QA/QC information relating to the results of low-income site inspections. This data should include a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections in forthcoming EDC Act 129 quarterly reports to the PUC.
- First Energy EDC's did not report lighting savings for the 1<sup>st</sup> quarter. It is recommended that future reports describe the absence of savings.
- The evaluation of the baselines being used for some smaller wattage LED bulbs has uncovered discrepancies. The evaluation contractor should continue to monitor the data at such a level and communicate with the SWE if these discrepancies appear to be inherent in smaller wattage bulbs.
- The Commission's determination that all Phase II projects must have an installation date after June 1, 2013 mean that PY5 participation and impacts will be skewed toward the latter half of the year. The SWE team recommends PPL carefully examine the pipeline of projects when designing samples for PY5 because less prior information about the sample frame will be available than in previous years.

## 11 Summary Conclusions 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 in Phase II. 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 PY5Q1 and PY5Q2, the SWE team provides the following conclusions to the PA PUC relating to the Act 129 energy efficiency and demand response programs:

- EDCs should continue to support their new Phase II program CSPs in their marketing plans and outreach strategies to gain awareness of the new programs within the targeted market segments.
- In the template that the SWE sent out for the outline of the EDC quarterly reports for Phase II, the SWE requested that each EDC provide the results of their QA/QC on-site inspections for low-income households having measures installed through each EDC's low-income program. Unfortunately, the EDCs did not provide any of the QA/QC on-site inspection results information to the SWE Team in the PY5 Q1 and Q2 reports to the PUC. To remedy this situation, the SWE has revised the official SWE data request for quarterly information to request this QA/QC information relating to the results of these on-site or telephone inspections including a copy of the site inspection form, how many site inspections were conducted each quarter, and the results of these QA/QC site inspections. The SWE considers this QA/QC information as vital to completing our audits of the EDC low-income programs. The SWE has sent this revised data request to the EDCs. In addition, going forward, the SWE requests that the EDCs include all of this QA/QC site inspection information for all residential programs in the forthcoming EDC Act 129 quarterly reports to the PUC.
- EDCs and their evaluators should perform a comparison between the values reported in their quarterly reports and those listed in the quarterly tracking data extracts. This comparison will help ensure that the participant counts, baselines and incentives shown in the filed reports match that of the database.