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October 24, 2011

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
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**RE: Act 129 Energy Efficiency and Conservation Program for
PPL Electric Utilities Corporation - Docket No. M-2008-2069887**

Dear Secretary Chiavetta:

Enclosed please find the original and three (3) copies of PPL Electric Utilities Corporation's Annual Report to the Pennsylvania Public Utility Commission for the period ending May 2010 – Program Year 1 in the above-referenced proceeding.

If you have any questions concerning this matter, please contact me at the address or telephone numbers provided above.

Respectfully Submitted,


Andrew S. Tubbs

AST/jl

Enclosures

cc: Richard Spellman, GDS Associates, Inc. Act 129 Statewide Evaluator

Annual Report to the Pennsylvania Public Utility Commission

For the period ending May 2010
Program Year 1

For Act 129 of 2008
Energy Efficiency and Conservation Program
PPL Electric Utilities

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Prepared by PPL Electric and The Cadmus Group
September 15, 2010

Amended September 30, 2010 to reflect "unverified savings" for measures without an approved protocol as requested by the Statewide Evaluator in its September 8, 2010 memo

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Abbreviations (see Glossary for definitions)

CPITD	Cumulative Program/Portfolio Inception to Date
EM&V	Evaluation Measurement and Verification
IQ	Incremental Quarter
kW	Kilowatt
kWh	Kilowatt-hour
M&V	Measurement and Verification
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-Gross
PYTD	Program/Portfolio Year to Date
TRC	Total Resource Cost

1 Introduction

PPL Electric's program evaluation and continuous improvement process has three basic components: activity tracking, quality assurance/quality control (QA/QC), and evaluation, measurement and verification (EM&V).

Activity Tracking

PPL Electric's Energy Efficiency Management Information System (EEMIS) is the infrastructure for tracking all program activities and transactions, including participant information, measure installations, participant costs, incentive payments, and other technical data related to individual projects. The EEMIS database tracks all transactions, including date enrolled, participant's customer number and name, date of measure installation, name of measure, name of program, key information specific to that measure to verify eligibility or determine the savings (such as seller, manufacturer, model number, serial number, capacity, efficiency rating), incentives paid, and other information as required. It also calculates *ex ante* reported gross savings for some measures by multiplying quantity and deemed savings listed in a Measures Table. EEMIS records savings reported by CSPs for other programs (Appliance Recycling, CFL Distribution).

Quality Assurance, Quality Control

Quality assurance and quality control (QA/QC) are integral to PPL Electric's program delivery processes and customer and CSP relations-management processes. To ensure the highest standards, PPL Electric has incorporated a plan describing the QA/QC procedures for each program in its portfolio.

Quality assurance involves activities designed to ensure that both an effective process and the necessary resources are in place for the implementation process to operate efficiently and for the Plan to meet its objectives. Quality assurance includes:

- Developing a business process map of the implementation and operation of the portfolio and each individual program.
- Conducting evaluability assessments to ensure that all data necessary for EM&V is properly collected.

Quality assurance provides the basis for establishing an effective implementation process and, more importantly, preserving the institutional memory of program operation and maintenance. The quality assurance process may be complemented with occasional *ad hoc* process evaluations to investigate specific issues related to a particular program's design, implementation, and operation.

Quality control measures ensure that the outcomes of the implementation process and its results conform to performance expectations for each program and for the portfolio as a whole. The quality control component of the QA/QC process includes developing a set of reliable key performance indicator (KPIs) for each element of the process, and then operationalizing metrics to track and measure the KPI. These may include process efficiency, data integrity and accuracy, energy and demand savings, and customer satisfaction.

QA/QC has many elements in common with EM&V. Process evaluations are, in many respects, extensions of the QA process and a complement to it. Similarly, impact evaluations and the QC process both aim to measure various outcomes of the portfolio using similar data and collection methods.

Table 1-1. Generic Key Performance Indicators, Metrics, and Measurement Methods

Key Performance Indicator	Metric	Verification Method & Data Source
Process-Related Indicators		
Process Efficiency	Application processing time	Analyze data in EEMIS
Transactional Data Quality	Error ratio(s)	Regular statistical check of EEMIS data. Sample-based inspection of applications, invoices, and other records
Materials and Work Quality	Number of measures installed, installation quality, operating conditions	Sample-based physical inspections
Cost Management	Accuracy in payment processing, average cost, maximum, minimum, cost-to-budget ratios, etc.	Sample-based inspection of invoices and rebate applications
Customer Satisfaction	Approval or satisfaction rating	Sample-based surveys
Impact-Related Indicators		
Market Penetration	Number of measures installed, percent of market saturated	CSP reports, EEMIS
Progress to Target	Actual-to-goal ratio	Monitor EEMIS
Actual Installation	Number of measures	Sample-based inspections
Actual Savings	Number of measures	Sample-based surveys and inspections
Savings Realization	Realization rate	Engineering review, surveys and on-site inspections
Installation Quality	Operating condition	On-site inspection

Evaluation, Measurement and Verification (EM&V)

The key objective in impact evaluations (encompassing EM&V activities) is to determine, at the specified statistical levels of confidence and precision in the Audit Plan, the *ex post* gross and net energy (MWh/yr) and peak demand savings (MW) attributable to each program in PPL Electric's portfolio. Measurement of gross MWh/yr and MW impacts for each program and for the portfolio as a whole are based on actual program impacts as defined in the TRM, Audit Plan, and PPL Electric's Evaluation Plan and these were assessed using the procedures prescribed in the Audit Plan and PPL Electric's Evaluation Plan.

In addition, the impact evaluation estimated the *ex post* savings impacts of program measures that have fully deemed, partially deemed, or non-deemed savings. Econometric models of electricity consumption will be used to estimate some measure impacts, based on the definitions from the Act 129 Glossary of Terms.

Ex ante Savings Estimate (Reported Gross Savings): Savings calculated based on the data in the utility's tracking system and reported to the Act 129 Statewide Evaluator (SWE). Note that these savings may not be the same as those in the utility's initial plan due to changes in TRM values or other planning assumptions and actual participation. (PPL Electric's data tracking system is called EEMIS)

Ex post Savings Estimate: Saving estimates reported by an evaluator after the M&V process has been completed.

Savings Realization Rate: The term is used in several contexts in the development of reported program savings. As indicated in the Act 129 Audit Plan prepared by the Statewide Evaluator (SWE), the reported realization rate is calculated as:

$$\text{Ex post savings} / \text{Ex ante (reported) savings}$$

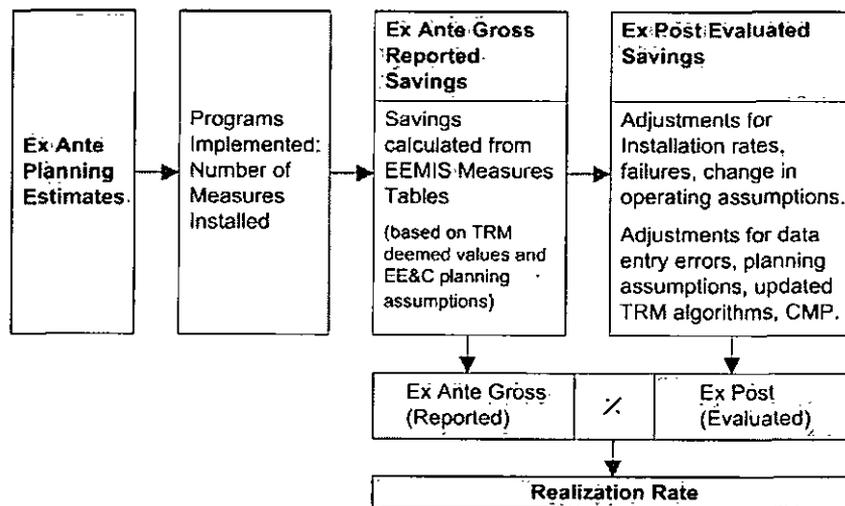
Calculation of Ex post Savings

Determination of these savings involves adjusting the *ex ante* saving estimates for a number of factors that affect calculation of savings, including:

- Corrections to data or calculation errors by the program implementers (CSPs) during the transfer of data to the tracking system, or within the tracking system
- Adjustments or corrections to open variables or assumptions about measure characteristics, e.g., geographic distribution, mix of measures. These could be based on actual project application records, surveys, or site visits.
- Revised parameters used in calculation of unit savings, e.g., geographic distribution, mix of measures.
- Actual installation rates
- Possible failure rates
- Changes in operating assumptions, e.g., business closure

These adjustments are identified and, where applicable, reported for each program to provide a better perspective on the specific components of savings realization rate for each program. Figure 1-1: illustrates the discussion above, progressing from *ex ante* to *ex post* evaluated savings.

Figure 1-1: Ex ante to Ex post Savings Estimates



Measurement of Savings

Gross program savings are those savings expected to result from the program based on the as-installed performance of measures, as defined in the Audit Plan.

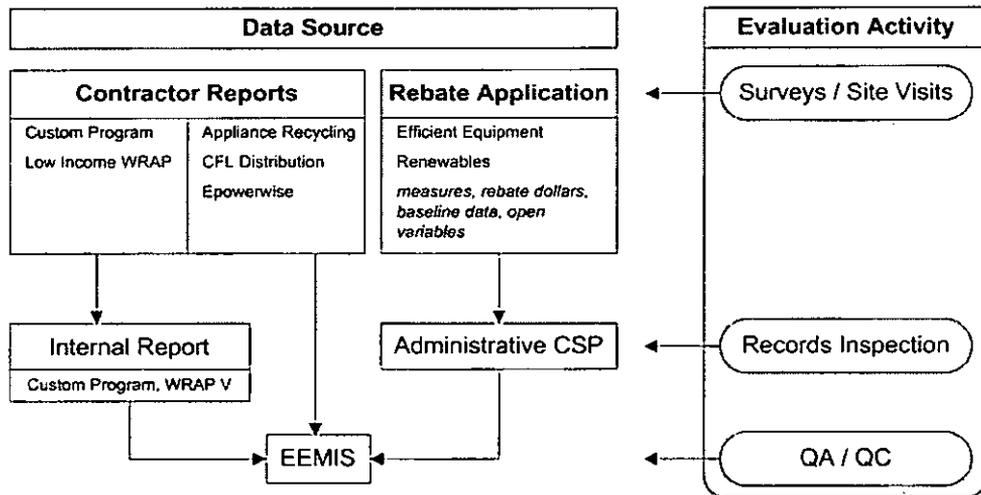
Sample-based surveys or site inspections are the main methods for verification of installations, as well as for verification of savings for measures in the TRM with fully deemed savings. For partially deemed measures specified in the TRM, operating assumptions and other parameters will be validated using the procedures recommended in the Audit Plan and described in detail in program-specific EM&V plans.

Measures offered under the Custom Incentive Program will have unique methods for verification of savings, which will be described in full for each project. Measures not included in the TRM will have custom methods for determination and verification of savings, called Custom Measure Protocols, submitted to and approved by the SWE.

Methods for measurement of savings for each program in the Plan are described in detail, according to the specifications of the Audit Plan and based on the IPMVP.

Figure 1-2 shows the data sources and activity tracking for the PPL Electric Utilities Act 129 programs, along with evaluation activities discussed in Table 1-1.

Figure 1-2: Data Sources, Activity Tracking and Evaluation Activities



Net-to-Gross (NTG) Ratios

Net savings estimate program savings using a net-to-gross ratio composed of two factors: free-ridership and spillover. Free-ridership quantifies the percentage of participants who report they would have installed a measure in the absence of the program. Spillover is the additional energy efficiency savings that occur when a program participant independently installs energy efficiency measures after participating in the energy efficiency program as a result of the program’s influence. According to the Audit Plan, until a Commission order is issued, only gross savings will be reported and verified.¹ That is, there will be no adjustment of gross savings by the NTG ratio. Information regarding free-ridership and spillover will be used for program planning purposes. Appendix A provides additional detail regarding the methodology used in this evaluation to assess free-ridership.

¹ Statewide Evaluation Team, Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs, Dec. 2009. Pages 25, 93, 95

2 Overview of Portfolio

Act 129, signed October 15, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDC) in Pennsylvania. Pursuant to their goals, energy efficiency and conservation (EE&C) plans were submitted by each EDC and approved by the Pennsylvania Public Utility Commission (PUC). This quarterly report documents the progress and effectiveness of the EE&C accomplishments for PPL Electric through the end of Program Year 1, Quarter 4.

Compliance goal progress as of the end of the reporting period²:

Cumulative Portfolio Energy Impacts

- The CPITD reported gross energy savings is 81,697 MWh/yr.
- The CPITD preliminary verified energy savings is 84,243 MWh/yr³.
- Achieved 22% of the 382,000 MWh/yr May 31, 2011 energy savings compliance target.
- Achieved 7% of the 1,146,000 MWh/yr May 31, 2013 energy savings compliance target.

Portfolio Demand Reduction

- The CPITD reported gross demand reduction is 6.19 MW.
- The CPITD preliminary verified demand reduction is 7.37 MW.
- Achieved 2% of the 297 MW May 31, 2013 demand reduction compliance target.

Low-income Sector

- There are 178 measures offered to the Low-Income Sector, comprising 56% of the total measures offered.
- The CPITD reported gross energy savings for low-income sector programs is 1,087 MWh/yr.
- The CPITD preliminary verified energy savings for low-income sector programs is 1,087 MWh/yr.

Government and Non-Profit Sector⁴

- The CPITD reported gross energy savings for government and non-profit sector programs is 109 MWh/yr.
- The CPITD preliminary verified energy savings for government and non-profit sector programs is 34 MWh/yr.
- Achieved 0.09% of the 38,200 MWh/yr May 31, 2011 energy savings compliance target.
- Achieved 0.03% of the 114,600 MWh/yr May 31, 2013 energy savings compliance target.
- Achieved 0.02% of the 29.7 MW May 31, 2013 demand reduction compliance target.

² Percentage of compliance target achieved is calculated using verified Cumulative Program/Portfolio Inception to Date values (or Preliminary verified value, if not available) divided by compliance target value.

³ In this report, verified savings are restricted to measures with established methodologies for calculating *ex post* savings that have been approved by the Commission. Measures that do not have established and approved methodologies are included in this report as Unverified *Ex Post* Savings. In Program Year 1, the only measures that met the criteria for Unverified Savings were Programmable thermostats for nonresidential customers and high-efficiency gas furnaces for RTS customers. Savings for all other measures were calculated by approved methodologies.

⁴ PPL Electric recognizes that savings from the Government & Non-Profit sector and the C&I sectors (small and large) are behind the target. PPL Electric is evaluating alternatives, such as a dedicated C&I CSP, to significantly accelerate C&I and Government & Non-Profit savings.

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

- The PYTD reported gross energy savings is 81,697 MWh/yr.
- The PYTD preliminary verified energy savings is 84,243 MWh/yr.
- The PYTD reported gross demand reduction is 6.19 MW.
- The PYTD preliminary verified demand reduction is 7.37 MW.
- The PYTD reported participation is 30,861 participants in all programs excluding the CFL program.⁵

PPL Electric's Portfolio of programs approved in the EE&C Plan includes 14 programs. All are in various stages of development and implementation. Of these, there were six programs with claimed savings in PY1. The Appliance Recycling Program offers customer incentives to turn in refrigerators, freezers and air conditioners. The Efficient Equipment Program offers prescriptive rebates to residential and non-residential customers. The Custom Incentive Program offers custom incentives per kWh/yr saved to non-residential customers. The CFL Distribution Program is an upstream program offering incentives to manufacturers to buy down the cost of CFLs; manufacturers and retailers in-turn lower the cost to consumers. The Renewables Program encourages PPL Electric's customers to install a solar photovoltaic array or ground-source heat pumps through financial incentives that reduce upfront system costs. Low-income WRAP provided weatherization for low-income customers with Act 129 funding expanded the existing low-income usage reduction program.

Each of the current programs except for portions of the Renewable Energy Program will continue in PY2, with expected growth in participation. Other programs that will claim savings in PY2 include Energy Assessment and Weatherization (residential), Energy Efficiency Behavior and Education (residential), E-PowerWise (low-income residential), and HVAC Tune-Up (commercial). The residential New Construction program is in development. In PY3, additional programs will focus on demand reduction, including Direct Load Control and Load Curtailment. These programs are also in development.

The status of PY1 evaluation activities for each of these programs is shown in Figure 12 of the *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010.

⁵ CFL participants are separately from other program participant numbers.

2.1 Summary of Portfolio Impacts

A summary of the portfolio reported impacts is presented in Table 2-1.

Table 2-1: EDC Reported Portfolio Impacts through the End of the Reporting Period

Impact Type	Total Energy Savings (MWh/yr) ^[a]	Total Demand Reduction (MW)
Reported Gross Impact: Incremental Quarterly	79,325	5.84
Reported Gross Impact: Program Year to Date	81,697	6.19
Reported Gross Impact: Cumulative Portfolio Inception to Date	81,697	6.19
Unverified <i>Ex Post</i> Savings ^[b]	337	0.001
Estimated Impact: Projects in Progress ^[c]	12,064	0.81
Estimated Impact: PYTD Total Committed	93,761	7.00
Preliminary PYTD Verified Impact ^[d]	84,243	7.37
Preliminary PYTD Net Impact ^[e]	61,345	4.90
NOTES:		
[a] Includes only measures that have been rebated and approved prior to May 31, 2010.		
[b] Unverified <i>Ex Post</i> Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.		
[c] Projects that meet SWE qualifications for "projects in progress" are currently limited to the Custom Program.		
[d] Portfolio Verified Impact calculated by aggregating Program PYTD Verified Impacts. Program PYTD Verified Impacts are calculated by multiplying Program PYTD Reported Gross Impacts by program realization rates.		
[e] Portfolio Net Impact calculated by aggregating Program Net Impacts. Program Net Impacts are calculated by multiplying Program PYTD Verified Impacts by program net-to-gross ratios. Measures with Unverified <i>Ex Post</i> Savings are not included in Net Impacts. Net-to-gross ratios are provided as information only and are not required for compliance purposes.		

A summary of total evaluation adjusted impacts for the portfolio is presented in Table 2-2.

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

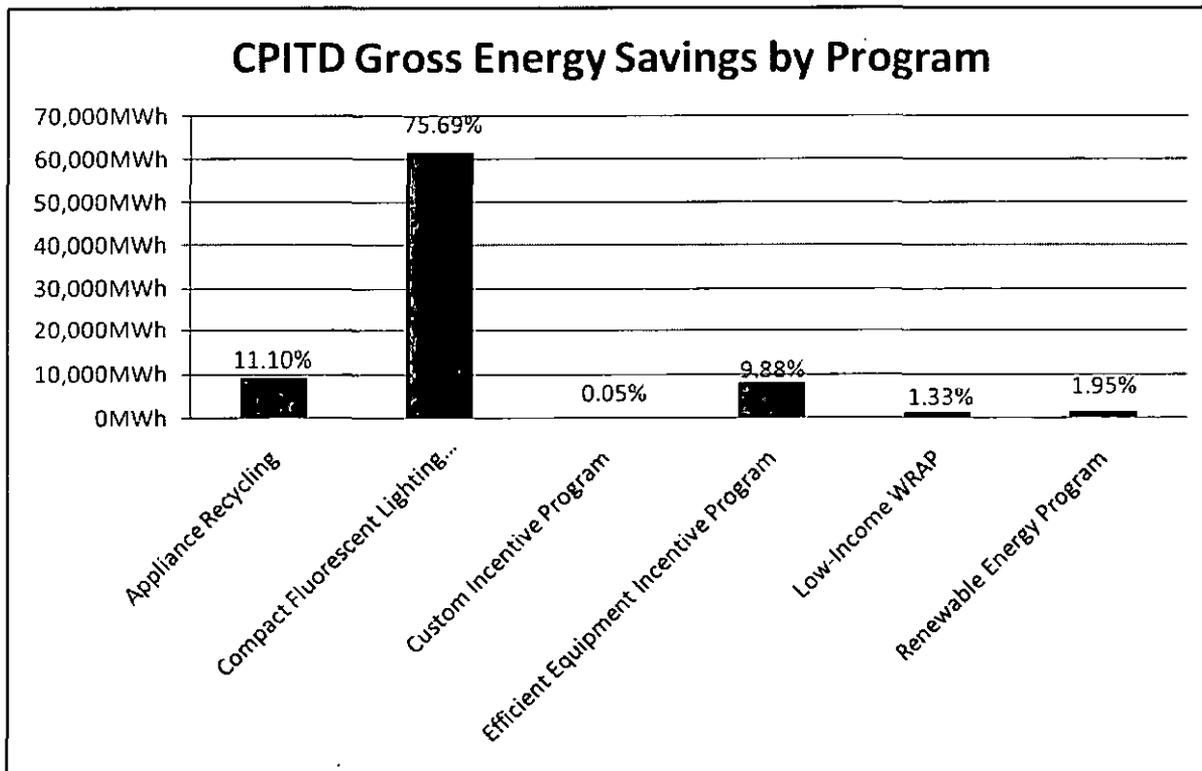
TRC Category	IQ ^[a]	PYTD ^[a]	CPITD
TRC Benefits (\$)		\$52,405,331	\$52,405,331
TRC Costs (\$)		\$23,441,352	\$23,441,352
TRC Benefit-Cost Ratio		2.24	2.24
NOTES:			
[a] Based on reported gross savings.			

A summary of portfolio finances may be found below in Section 2.5.

2.2 Summary of Energy Impacts by Program

A summary of the reported energy savings by program is presented in Figure 2-1.

Figure 2-1: CPITD Reported Gross Energy Savings by Program through the End of the Reporting Period



A summary of energy impacts by program through the 4th Quarter, Program Year 1 is presented in Table 2-3 and Table 2-4.

Table 2-3: EDC Reported Participation and Gross Energy Savings by Program through the End of the Reporting Period

Program	Participants			Reported Gross Impact (MWh/yr)		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Appliance Recycling	3,650	4,740	4,740	6,945	9,069	9,069
Compact Fluorescent Lighting Campaign ^[a]	192,771	192,771	192,771	61,838	61,838	61,838
Custom Incentive Program	1	1	1	39	39	39
Efficient Equipment Incentive Program	25,087	25,087	25,087	8,074	8,074	8,074
Low-income WRAP	499	649	649	838	1,087	1,087
Renewable Energy Program	384	384	384	1,591	1,591	1,591
TOTAL PORTFOLIO	222,392	223,632	223,632	79,325	81,697	81,697
NOTES:						
[a] As an upstream program, exact participation for the Compact Fluorescent Lighting Campaign is not known for certain. The value reported for the number of CFL participants was estimated by dividing the total number of bulbs discounted (1,342,595) by a bulb-per-participant value derived from survey data (6.96 bulbs, with a sample population of 85). The 1,342,595 bulbs reflect the total number of program bulbs, including discounted bulbs and the give-away component.						

Table 2-4: EDC Reported Gross Energy Savings by Program through the End of the Reporting Period

Program	Unverified <i>Ex Post</i> Savings (MWh/yr)	Projects In Progress (MWh/yr)	PYTD Total Committed (MWh/yr)	EE&C Plan Estimate for Program Year (MWh/yr)	Percent of Estimate Committed (%)
Appliance Recycling	N/A	N/A	9,069	8,828	103%
Compact Fluorescent Lighting Campaign	N/A	N/A	61,838	13,911	445%
Custom Incentive Program	N/A	12,064	12,102	5,001	242%
Efficient Equipment Incentive	337	N/A	8,074	35,509	23%
Low-income WRAP	N/A	N/A	1,087	3,943	28%
Renewable Energy Program	N/A	N/A	1,591	1,539	103%
TOTAL PORTFOLIO	337	12,064	93,761	68,731	136%
NOTES:					
Unverified <i>Ex Post</i> Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.					
Total EE&C Plan Estimates include only the programs actually reporting savings in Program Year 1.					

A summary of evaluation verified energy impacts by program is presented in Table 2-5.

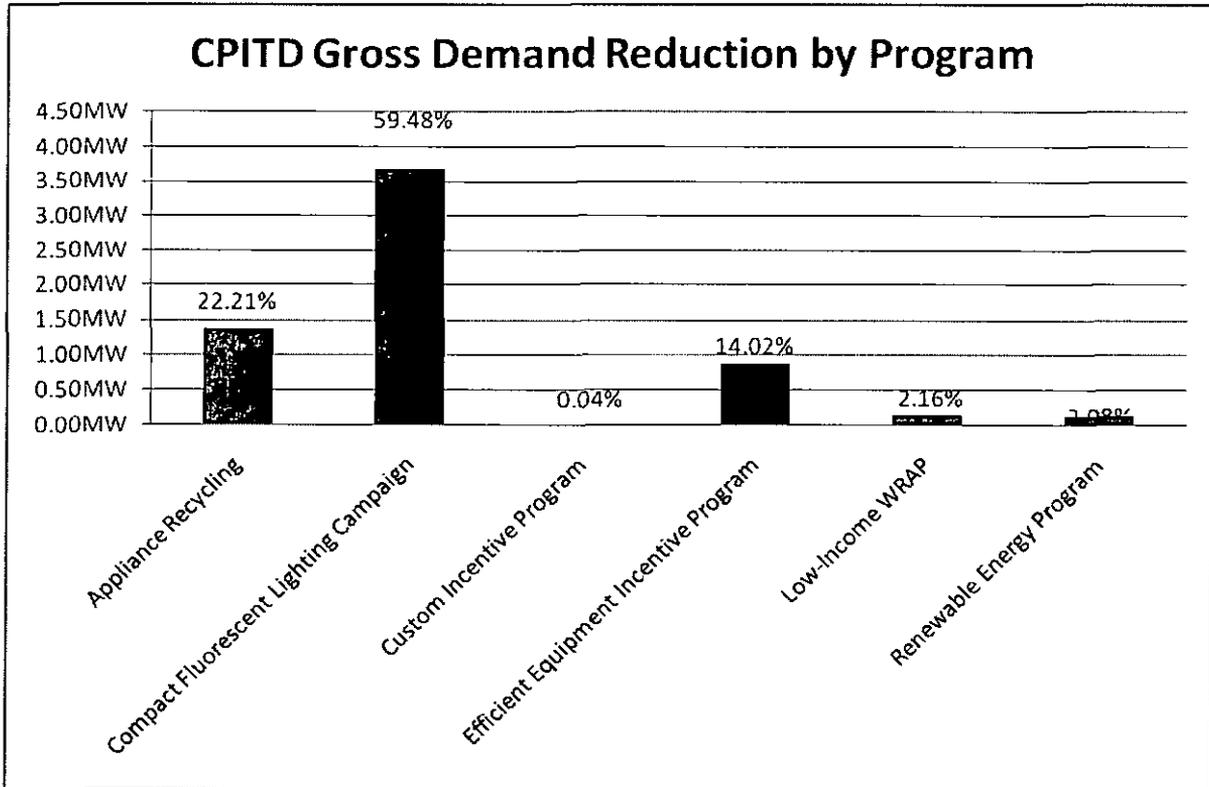
Table 2-5: Preliminary Energy Savings by Program through the End of the Reporting Period

Program	PYTD Reported Gross Impact (MWh/yr)	Preliminary Realization Rate	Preliminary PYTD Verified Impact (MWh/yr)	Net-to-Gross Ratio	PYTD Net Impact (MWh/yr)
Appliance Recycling	9,069	102%	9,237	0.57	5,265
Compact Fluorescent Lighting Campaign	61,838	100%	61,838	0.80	49,460
Custom Incentive Program	39	144%	56	1.00	56
Efficient Equipment Incentive	8,074	119%	9,236	0.51	4,714
Low-income WRAP	1,087	100%	1,087	1.00	1,087
Renewable Energy Program	1,591	175%	2,791	0.27	753
TOTAL PORTFOLIO	81,697	104%	84,243	0.75	61,345
NOTES:					
Please note that realization rates and net-to-gross ratios are rounded to the nearest percent.					
Program-level realization rates are the average, weighted by total savings, of calculated measure-level realization rates and reflect the difference between gross and verified savings at the program level. Unverified <i>Ex Post</i> Savings are included in the calculation of program-level realization rates.					

2.3 Summary of Demand Impacts by Program

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

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



A summary of demand reduction impacts by program through the 4th Quarter, Program Year 1 is presented in Table 2-6 and Table 2-7.

Table 2-6: Participation and Reported Gross Demand Reduction by Program through the End of the Reporting Period

Program	Participants			Reported Gross Impact (MW) ^[a]		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Appliance Recycling	3,650	4,740	4,740	1.05	1.37	1.37
Compact Fluorescent Lighting Campaign ^[b]	192,771	192,771	192,771	3.68	3.68	3.68
Custom Incentive Program	1	1	1	0.003	0.003	0.003
Efficient Equipment Incentive Program	25,087	25,087	25,087	0.87	0.87	0.87
Low-income WRAP	499	649	649	0.10	0.13	0.13
Renewable Energy Program	384	384	384	0.13	0.13	0.13
TOTAL PORTFOLIO	222,392	223,632	223,632	5.84	6.19	6.19

NOTES:
[a] Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.
[b] As an upstream program, exact participation for the Compact Fluorescent Lighting Campaign is not known for certain. The value reported for the number of CFL participants was estimated by dividing the total number of bulbs discounted (1,342,595) by a bulb-per-participant value derived from survey data (6.96 bulbs, with a sample population of 85). The 1,342,595 bulbs reflect the total number of program bulbs, including discounted bulbs and the give-away component.

Table 2-7: Reported Gross Demand Reduction by Program through the End of the Reporting Period

Program	Unverified Ex Post Savings (MW)	Projects In Progress (MW)	PYTD Total Committed (MW)	EE&C Plan Estimate for Program Year (MW)	Percent of Estimate Committed (%)
Appliance Recycling	N/A	N/A	1.37	1.01	136%
Compact Fluorescent Lighting Campaign	N/A	N/A	3.68	2.17	169%
Custom Incentive Program	N/A	0.81	0.82	1.04	78%
Efficient Equipment Incentive Program	0.001	N/A	0.87	6.18	14%
Low-income WRAP	N/A	N/A	0.13	0.57	23%
Renewable Energy Program	N/A	N/A	0.13	0.17	77%
TOTAL PORTFOLIO	0.001	0.81	7.00	11.15	63%

NOTES:
Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.
Total EE&C Plan Estimates include only the program's reporting savings in Program Year 1.
Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.

A summary of evaluation adjusted demand impacts by program is presented in Table 2-8.

Table 2-8: Verified Demand Reduction by Program through the End of the Reporting Period

Program	PYTD Reported Gross Impact (MW)	Preliminary Realization Rate	Preliminary PYTD Verified Impact (MW)	Net-to-Gross Ratio	PYTD Net Impact (MW)
Appliance Recycling	1.37	141%	1.94	0.57	1.11
Compact Fluorescent Lighting Campaign	3.68	100%	3.68	0.80	2.94
Custom Incentive Program	0.003	164%	0.005	1.00	0.005
Efficient Equipment Incentive Program	0.87	133%	1.16	0.51	0.59
Low-income WRAP	0.13	100%	0.13	1.00	0.13
Renewable Energy Program	0.13	352%	0.45	0.27	0.12
TOTAL PORTFOLIO	6.19	119%	7.37	0.66	4.90
NOTES: Program-level realization rates are the average, weighted by total savings, of calculated measure-level realization rates and reflect the difference between gross and verified savings at the program level. Unverified <i>Ex Post</i> Savings are included in the calculation of program-level realization rates.					

2.4 Summary of Evaluation

Realization rates are calculated to adjust reported savings based on statistically significant verified savings measured by independent evaluators. The realization rate is defined as the percentage of reported savings that is achieved, as determined through the independent evaluation review. A realization rate of 1 or 100% indicates no difference between the reported and achieved savings. Realization rates are determined by certain attributes relative to one of three protocol types. Fully deemed TRM measure realization rates are driven by differences in the number of installed measures. Partially deemed TRM measure⁶ realization rates are driven by (1) differences in the number of installed measures and (2) differences in the variables. Custom measure realization rates are driven by differences in the energy savings determined by approved protocols. The protocol type determines the data type that is sampled.

2.4.1 Impact Evaluation

The realization rates for each program are presented in Table 2-9. PYTD Sample Participants includes the measures in the samples selected for verification activities, including records review, surveys, and site visits. The sample included participant measures that were in one, two, or all three verification activities. The column labeled "Program Year Sample Participation Target" was based on planning estimates, using participation rates anticipated in the approved EE&C Plan.

The Renewables Program had only four commercial participants so the target of 25 sample points, based on planning estimates, was not realized. In two programs (CFL Distribution and Custom Incentive Program), the census of records were verified. In the low-income WRAP program, stipulated savings were assigned to participants based on one of three job types.

⁶ TRM measures with stipulated values and variables.

The Efficient Equipment Program participants reflect the number of measures installed. A total of 480 measures were verified through QA/QC activities, which included documentation and records review, surveys, and site visits. Some of these measures were verified by more than one of these methods.

Table 2-9: Summary of Realization Rates and Confidence Intervals (CI) for kWh/yr

Program	PYTD Sample Participants	Program Year Sample Participant Target (planned)	Preliminary Realization Rate for kWh	Confidence and Precision for kWh	Preliminary Realization Rate for kW	Confidence and Precision for kW
Appliance Recycling	359 measures	210 (70 records review 140 surveys)	102%	± 0.1% @ 90% Confidence	141%	± 0.1% @ 90% Confidence
Compact Fluorescent Lighting Campaign	Census	70 (70 records)	100%	100%	100%	100%
Custom Incentive Program	Census	90/10 (Records, surveys, site visits)	144%	100%	100%	100%
Efficient Equipment Incentive Program	480 measures	335 (140 records review 140 surveys 55 site visits)	119%	± 8.4% @ 90% Confidence	133%	± 8.4% @ 90% Confidence
Low-income WRAP	Census	12 (Records)	100%	100%	100%	100%
Renewable Energy Program	107 measures	134 (10 records review 64 surveys 60 site visits)	175%	± 0.04% @ 90% Confidence	352%	± 0.04% @ 90% Confidence
TOTAL PORTFOLIO						
NOTES:						

Realization rates were estimated for each program as the sum of the verified savings divided by the sum of the reported savings for a random sample of program participants. Estimates were weighted by the inverse of the selection probabilities for each program and a finite population correction. The 90% confidence interval for the ratio is given by:

$$R \pm 1.64 \sqrt{v(R)}$$

where R is the realization rate and $v(R)$ is the variance of the realization rate. The variance of the realization rate is given by Cochran.⁷ It is:

$$v(R) = \frac{1-f}{n\bar{K}_r^2} (s_v^2 + R^2 s_r^2 - 2R s_{vr})$$

where:

- f = the sampling fraction,
- n = the sample size,
- s_v and s_r = the standard deviations for verified and reported savings, respectively,
- s_{vr} = the covariance between verified and reported savings, and
- \bar{K}_r = the average reported savings

⁷ Cochran, William G., *Sampling Techniques*, 3rd edition. John Wiley and Sons: New York. 1977.

Total savings achieved were estimated by multiplying reported savings for each program by the realization rate. The 90% confidence was derived from the estimate of the confidence interval for the realization rate. The variance of the estimated total verified savings is given by:

$$V(\hat{K}_v) = \left(\sum_{i=1}^N K_{ri} \right)^2 v(R)$$

The 90% confidence interval for the estimate is given by:

$$\hat{K}_v \pm z \sqrt{v(\hat{K}_v)}$$

2.4.2 Process Evaluation

The PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation was submitted September 15, 2010.

2.5 Summary of Finances⁸

The TRC test demonstrates the cost-effectiveness of a program by comparing the total economic benefits to the total costs. A breakdown of the portfolio finances is presented in Table 2-10.

Table 2-10: Summary of Portfolio Finances: TRC Test⁹

	Category	iQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$4,779,933	\$5,173,145	\$5,173,145
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$4,779,933	\$5,173,145	\$5,173,145
B.1	Design & Development ^(a)	\$100,211	\$1,678,343	\$1,678,343
B.2	Administration ^(b)	\$891,573	\$2,125,140	\$2,125,140
B.3	Management ^(c)	\$1,559,122	\$2,439,689	\$2,439,689
B.4	Marketing	\$1,268,462	\$2,429,806	\$2,429,806
B.5	Technical Assistance	\$0	\$0	\$0
B	Subtotal EDC Implementation Costs	\$3,819,368	\$8,672,978	\$8,672,978
C	EDC Evaluation Costs	\$525,688	\$877,222	\$877,222
D	SWE Audit Costs	\$0	\$91,879	\$91,879
E	Participant Costs ^(d)	\$8,563,628	\$8,626,128	\$8,626,128
	Total Costs	\$17,751,118	\$23,441,352	\$23,441,352
F.1	Annualized Avoided Supply Costs – Residential ^(e)		\$75.79	\$75.79
F.2	Annualized Avoided Supply Costs – Small C&I		\$61.10	\$61.10
F.3	Annualized Avoided Supply Costs – Large C&I		\$51.14	\$51.14

⁸ The SWE clarified on September 13, 2010 that a TRC cost-effectiveness evaluation is not required for PY 1. However, since PPL Electric had already completed the TRC cost-effectiveness evaluation, results are included in this Annual Report.

⁹ Definitions for terms in the following table are subject to TRC Order. Various cost and benefit categories are subject to change pending the outcome of TRC Technical Working Group discussions.

G	Lifetime Avoided Supply Costs		\$52,405,331	\$52,405,331
	Total Lifetime Economic Benefits		\$52,405,331	\$52,405,331
	Portfolio Benefit-to-Cost Ratio		2.24	2.24
NOTES: [a] PYTD and CPITD include EE&C Plan development charges from January 2009 through May 31, 2010. [b] Includes Administrative CSP (application and rebate processing), PPL Electric's general administrative/clerical costs, and PPL Electric's tracking system. [c] Includes direct program management costs as well as common costs associated with overall portfolio management. [d] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs. [e] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1.				

The TRC for each program is presented in Table 2-11.

Table 2-11: Summary of Portfolio Budget by Program

Program	TRC Benefits (\$)	TRC Costs (\$)	TRC Benefit-Cost Ratio
Appliance Recycling	\$7,289,702	\$794,832	9.17
Compact Fluorescent Lighting Campaign	\$29,338,026	\$6,105,830	4.80
Custom Incentive Program	\$25,460	\$101,208	0.25
Efficient Equipment Incentive Program	\$10,897,538	\$6,046,548	1.80
Low-income WRAP	\$1,169,798	\$1,388,858	0.84
Renewable Energy Program	\$3,684,807	\$1,221,242	3.02
Common Costs ^[a]		\$7,782,834	N/A
Portfolio	\$52,405,331	\$23,441,352	2.24
NOTES: [a] Common Costs also includes costs attributable to programs not reporting savings in Program Year 1.			

3 Portfolio Results by Sector

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

1. Residential EE (excluding Low-Income)
2. Residential Low-Income EE
3. Small Commercial & Industrial EE
4. Large Commercial & Industrial EE
5. Government & Non-Profit EE

A summary of portfolio gross energy savings and gross demand reduction by sector is presented in Figure 3-1 and Figure 3-2.

Figure 3-1: PYTD Reported Gross Energy Savings by Sector

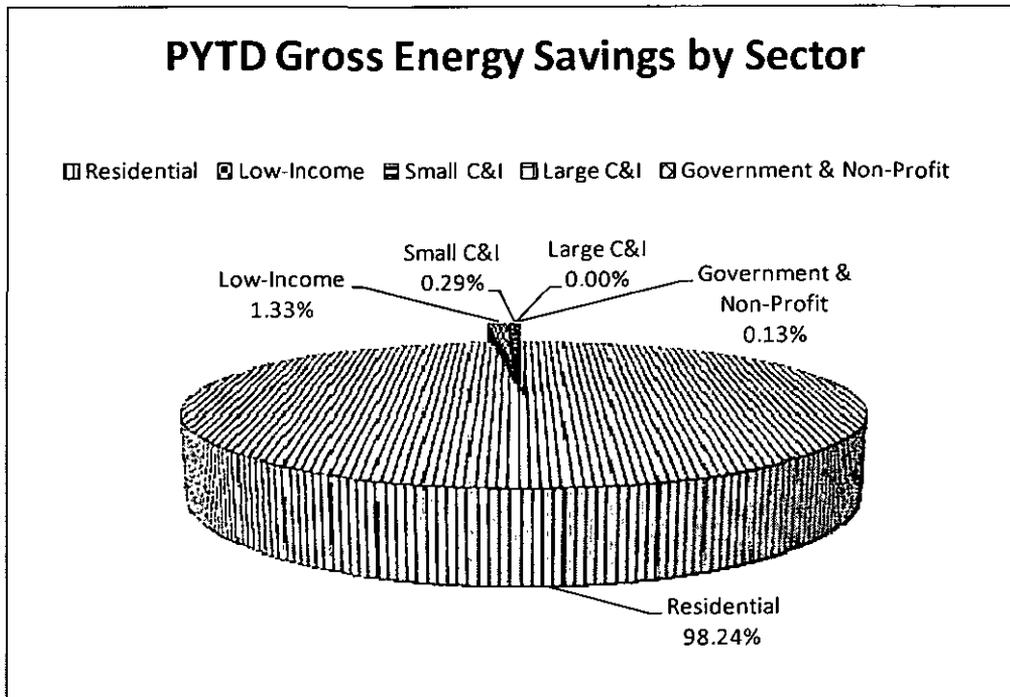


Figure 3-2: PYTD Reported Gross Demand Reduction by Sector

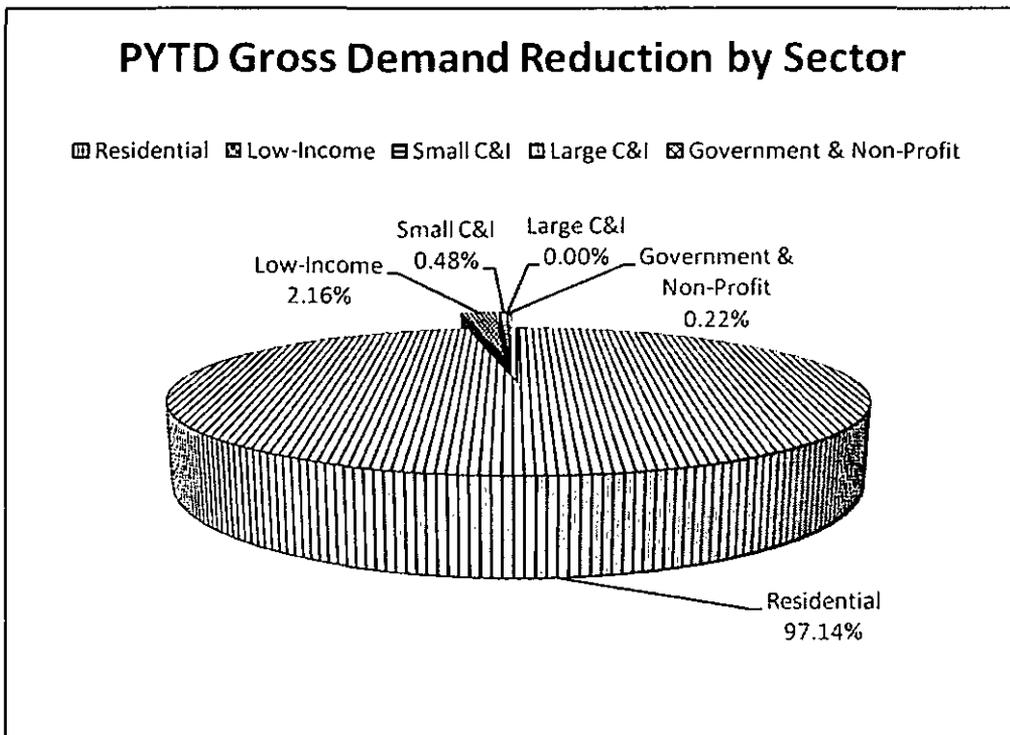


Table 3-1: Reported Gross Energy Savings by Sector through the End of the Reporting Period

Market Sector	Reported Gross Impact (MWh/yr)			Projects in Progress	Total Committed	Unverified Ex Post Savings [a]
	IQ	PYTD	CPITD			
Residential EE	78,155	80,262	80,262	N/A	80,262	280
Residential Low-Income EE	838	1,087	1,087	N/A	1,087	N/A
Small Commercial & Industrial EE	223	240	240	1,100	1,341	50
Large Commercial & Industrial EE	0.1	0.1	0.1	6,581	6,581	N/A
Government & Non-Profit EE	109	109	109	4,382	4,382	7
TOTAL PORTFOLIO	79,325	81,697	81,697	12,064	93,761	337
NOTES:						
[a] Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.						

Table 3-2: Reported Gross Demand Reduction by Sector through the End of the Reporting Period

Market Sector	Reported Gross Impact (MW)			Projects in Progress	Total Committed	Unverified Ex Post Savings [a]
	IQ	PYTD	CPITD			
Residential EE	5.69	6.01	6.01	N/A	6.01	0.001
Residential Low-Income EE	0.10	0.13	0.13	N/A	0.13	N/A
Small Commercial & Industrial EE	0.03	0.03	0.03	0.17	0.20	N/A
Large Commercial & Industrial EE	0.00002	0.00002	0.00002	0.65	0.65	N/A
Government & Non-Profit EE	0.01	0.01	0.01	N/A	0.01	N/A
TOTAL PORTFOLIO	5.84	6.19	6.19	0.81	7.00	0.001
NOTES:						
[a] Unverified Ex Post Savings are unverified savings pending approval of a TRM or Custom Measure Protocol by the Commission.						

3.1 Residential EE Sector

The Residential EE Sector target for annual energy savings is 27,313 MWh/yr and the sector target for annual peak demand reduction is 3.83 MW.

A sector summary of results by program is presented in Table 3-3 and Table 3-4.

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

Residential EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Appliance Recycling	3,596	6,834	1.04
Compact Fluorescent Lighting Campaign ^[a]	192,771	61,838	3.68
Efficient Equipment Incentive Program	24,854	7,990	0.86
Renewable Energy Program	382	1,494	0.12
Sector Total	221,603	78,155	5.69
NOTES:			
[a] As an upstream program, exact participation for the Compact Fluorescent Lighting Campaign is not known for certain. The value reported for the number of CFL participants was estimated by dividing the total number of bulbs discounted (1,342,595) by a bulb-per-participant value derived from survey data (6.96 bulbs, with a sample population of 85). The 1,342,595 bulbs reflect the total number of program bulbs, including discounted bulbs and the give-away component.			

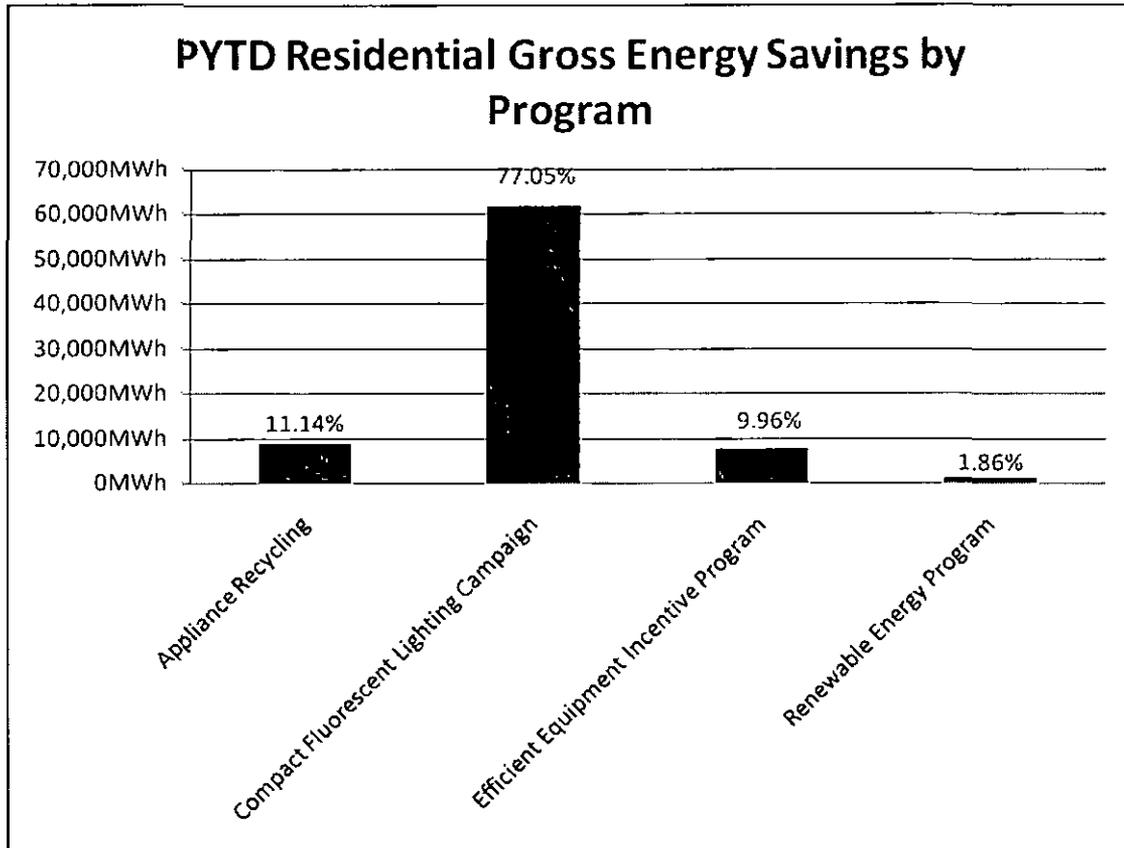
Table 3-4: Summary of Residential EE Sector PYTD Impacts by Program through the End of the Reporting Period

Residential EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Appliance Recycling	4,677	8,940	1.35
Compact Fluorescent Lighting Campaign ^[a]	192,771	61,838	3.68
Efficient Equipment Incentive Program	24,854	7,990	0.86
Renewable Energy Program	382	1,494	0.12
Sector Total	222,684	80,262	6.01

NOTES:
 [a] As an upstream program, exact participation for the Compact Fluorescent Lighting Campaign is not known for certain. The value reported for the number of CFL participants was estimated by dividing the total number of bulbs discounted (1,342,595) by a bulb-per-participant value derived from survey data (6.96 bulbs, with a sample population of 85). The 1,342,595 bulbs reflect the total number of program bulbs, including discounted bulbs and the give-away component.

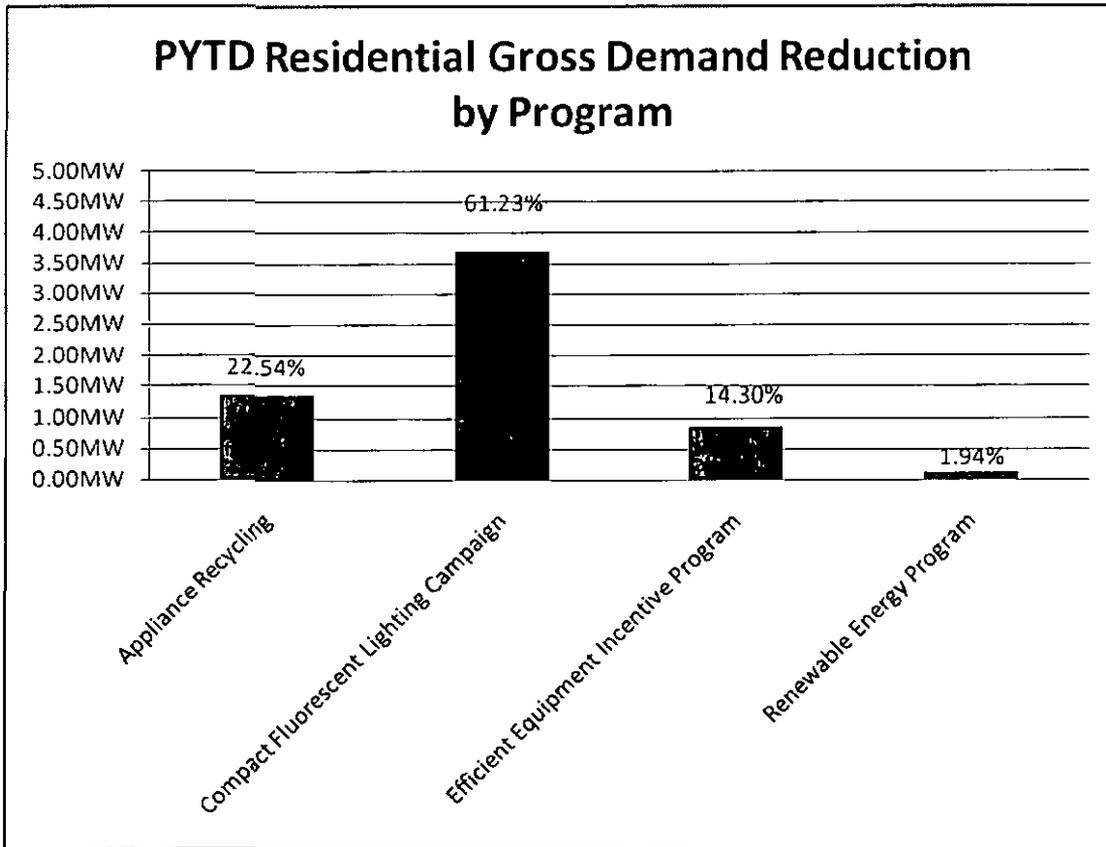
A summary of the sector energy savings by program is presented in Figure 3-3.

Figure 3-3: Summary of Residential EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 3-4.

Figure 3-4: Summary of Residential EE Sector PYTD Reported Demand Reduction by Program



3.2 Residential Low-Income EE Sector

The sector target for annual energy savings is 6,379 MWh/yr and the sector target for annual peak demand reduction is 0.95 MW.

A sector summary of results by program is presented in Table 3-5 and Table 3-6.

Table 3-5: Summary of Residential Low-Income EE Sector Incremental Impacts by Program through the End of the Reporting Period

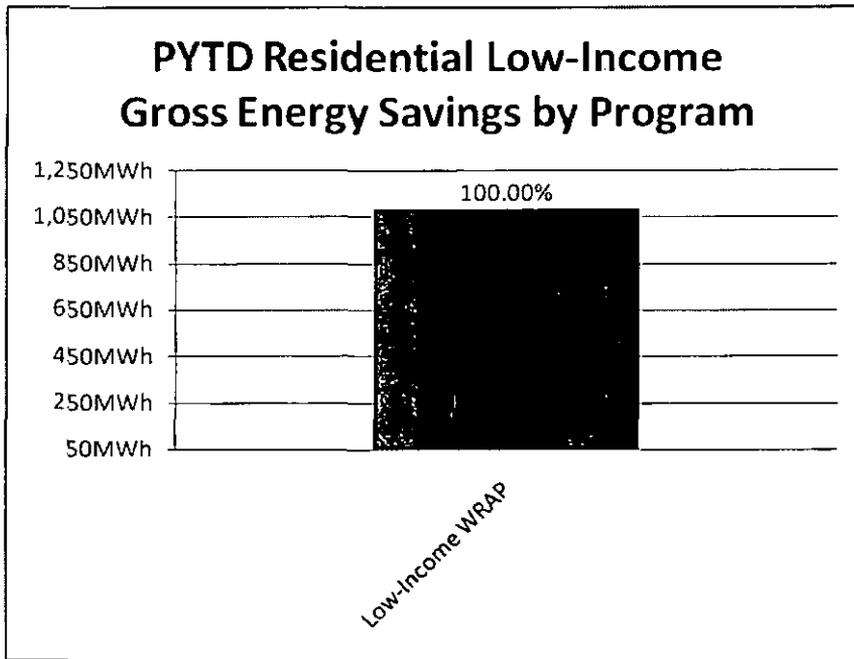
Residential Low-Income EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Low-income WRAP	499	838	0.10
Sector Total	499	838	0.10
NOTES:			

Table 3-6: Summary of Residential Low-Income EE Sector PYTD Impacts by Program through the End of the Reporting Period

Residential Low-Income EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Low-income WRAP	649	1,087	0.13
Sector Total	649	1,087	0.13
NOTES:			

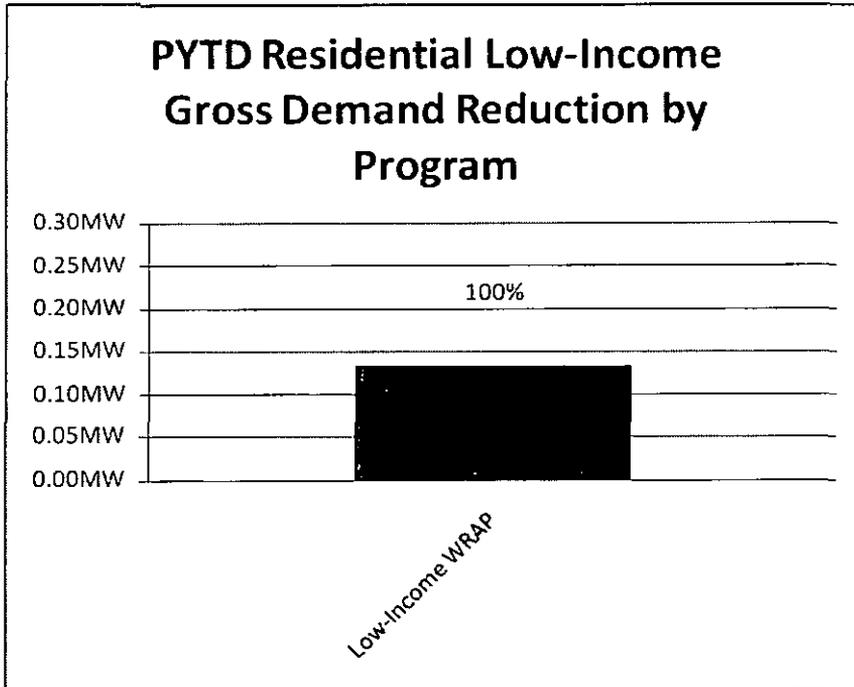
A summary of the sector energy savings by program is presented in Figure 3-5.

Figure 3-5: Summary of Residential Low-Income EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 3-6.

Figure 3-6: Summary of Residential Low-Income EE Sector PYTD Reported Demand Reduction by Program



3.3 Small Commercial & Industrial EE Sector

The sector target for annual energy savings is 25,894 MWh/yr and the sector target for annual peak demand reduction is 1.06 MW.

A sector summary of results by program is presented in Table 3-7 and Table 3-8.

Table 3-7: Summary of Small Commercial & Industrial EE Sector Incremental Impacts by Program through the End of the Reporting Period

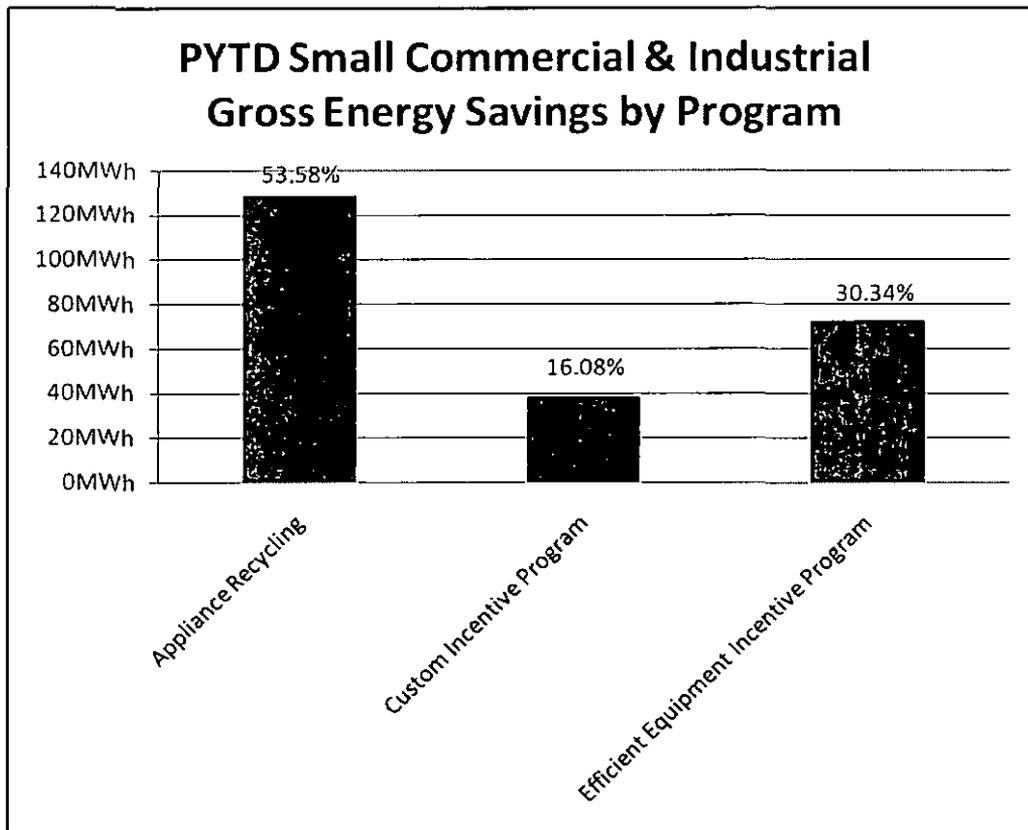
Small Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Appliance Recycling	54	111	0.02
Custom Incentive Program	1	39	0.003
Efficient Equipment Incentive Program	185	73	0.01
Sector Total	240	223	0.03
NOTES:			

Table 3-8: Summary of Small Commercial & Industrial EE Sector PYTD Impacts by Program through the End of the Reporting Period

Small Commercial & Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Appliance Recycling	63	129	0.02
Custom Incentive Program	1	39	0.003
Efficient Equipment Incentive Program	185	73	0.01
Sector Total	249	240	0.03
NOTES:			

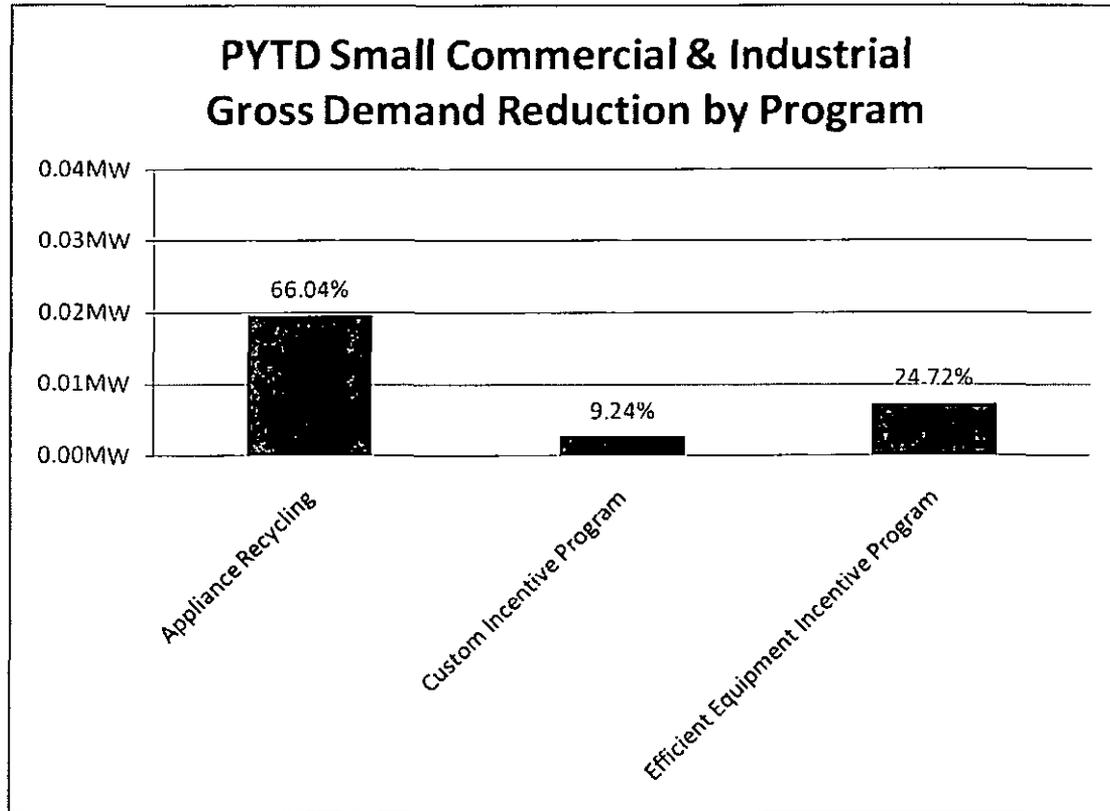
A summary of the sector energy savings by program is presented in Figure 3-7.

Figure 3-7: Summary of Small Commercial & Industrial EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 3-8.

Figure 3-8: Summary of Small Commercial & Industrial EE Sector PYTD Reported Demand Reduction by Program



3.4 Large Commercial & Industrial EE Sector

The sector target for annual energy savings is 5,669 MWh/yr and the sector target for annual peak demand reduction is 0.99 MW.

A sector summary of results by program is presented in Table 3-9 and Table 3-10.

Table 3-9: Summary of Large Commercial & Industrial EE Sector Incremental Impacts by Program through the End of the Reporting Period

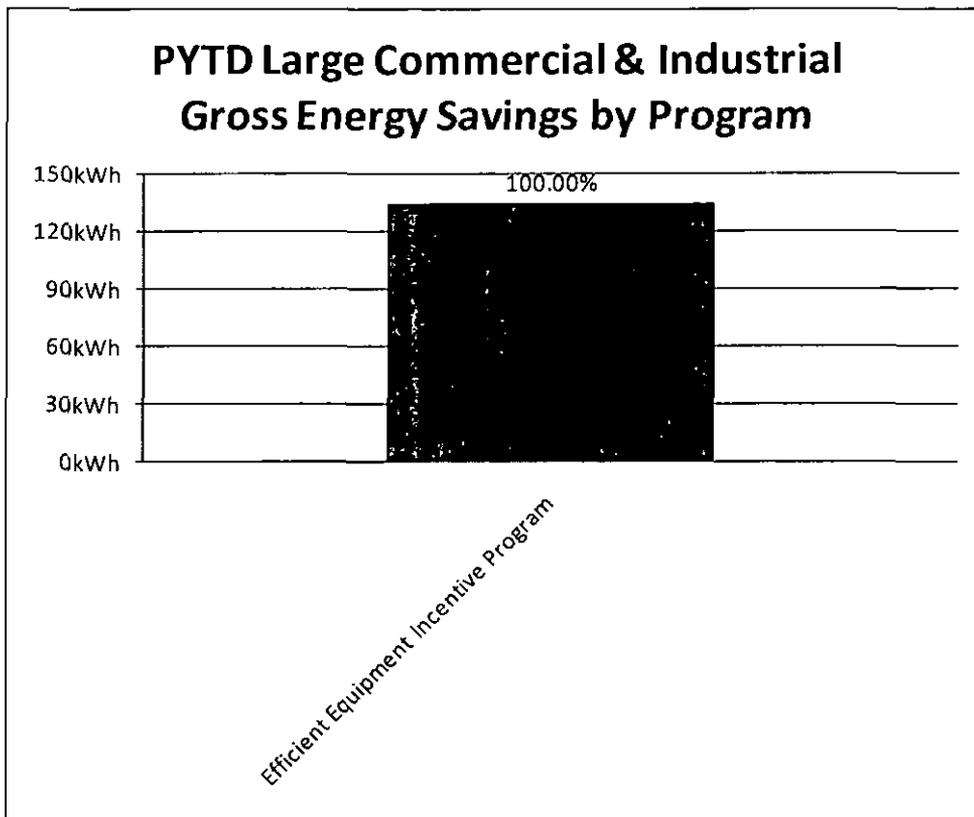
Large Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Efficient Equipment Incentive Program	1	0.1	0.00002
Sector Total	1	0.1	0.00002
NOTES:			

Table 3-10: Summary of Large Commercial & Industrial EE Sector PYTD Impacts by Program through the End of the Reporting Period

Large Commercial & Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Efficient Equipment Incentive Program	1	0.1	0.00002
Sector Total	1	0.1	0.00002
NOTES:			

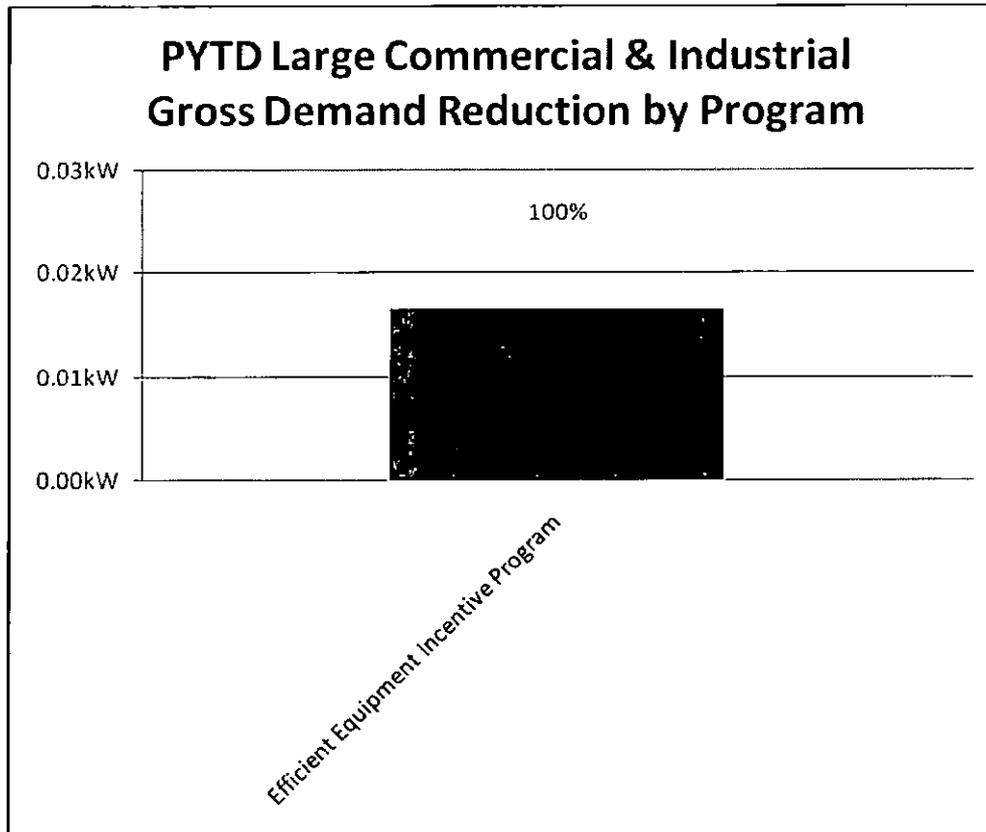
A summary of the sector energy savings by program is presented in Figure 3-9.

Figure 3-9: Summary of Large Commercial & Industrial EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 3-10.

Figure 3-10: Summary of Large Commercial & Industrial EE Sector PYTD Reported Demand Reduction by Program



3.5 Government & Non-Profit EE Sector

The sector target for annual energy savings is 5,982 MWh/yr and the sector target for annual peak demand reduction is 1.06 MW.

A sector summary of results by program is presented in Table 3-11 and Table 3-12.

Table 3-11: Summary of Government & Non-Profit EE Sector Incremental Impacts by Program through the End of the Reporting Period

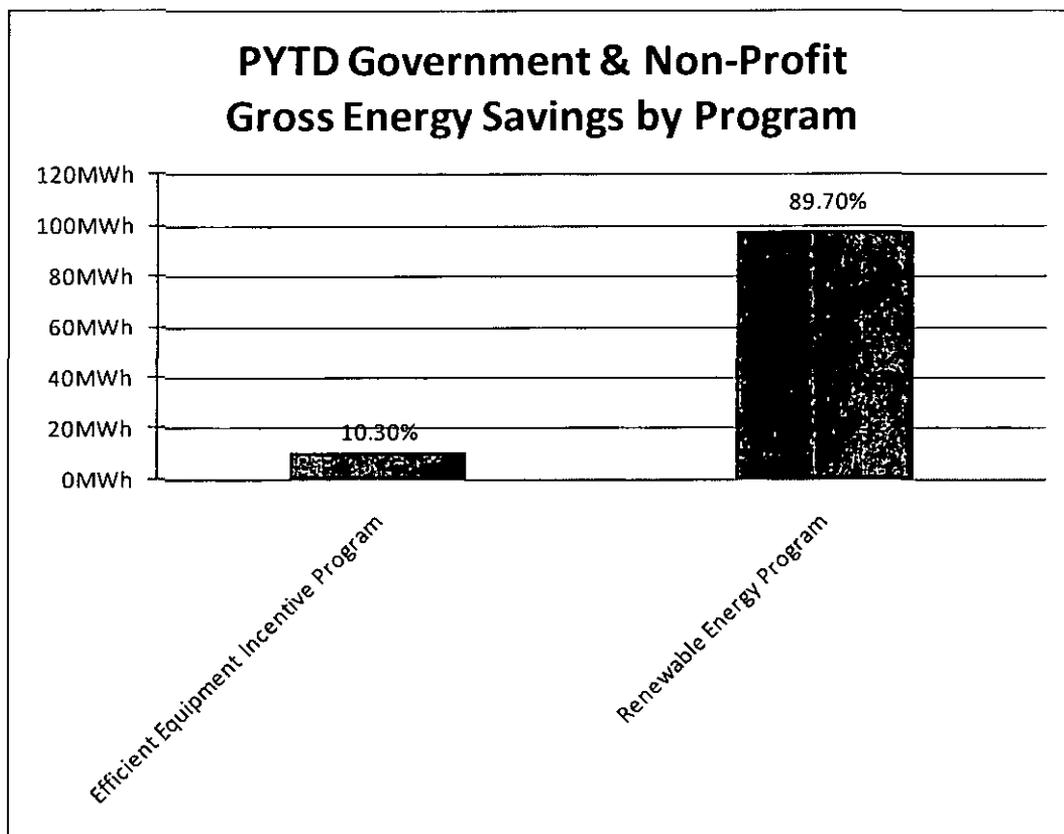
Government & Non-Profit EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Efficient Equipment Incentive Program	47	11	0.001
Renewable Energy Program	2	98	0.01
Sector Total	49	109	0.01
NOTES:			

Table 3-12: Summary of Government & Non-Profit EE Sector EE Sector PYTD Impacts by Program through the End of the Reporting Period

Government & Non-Profit EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Efficient Equipment Incentive Program	47	11	0.001
Renewable Energy Program	2	98	0.01
Sector Total	49	109	0.01
NOTES:			

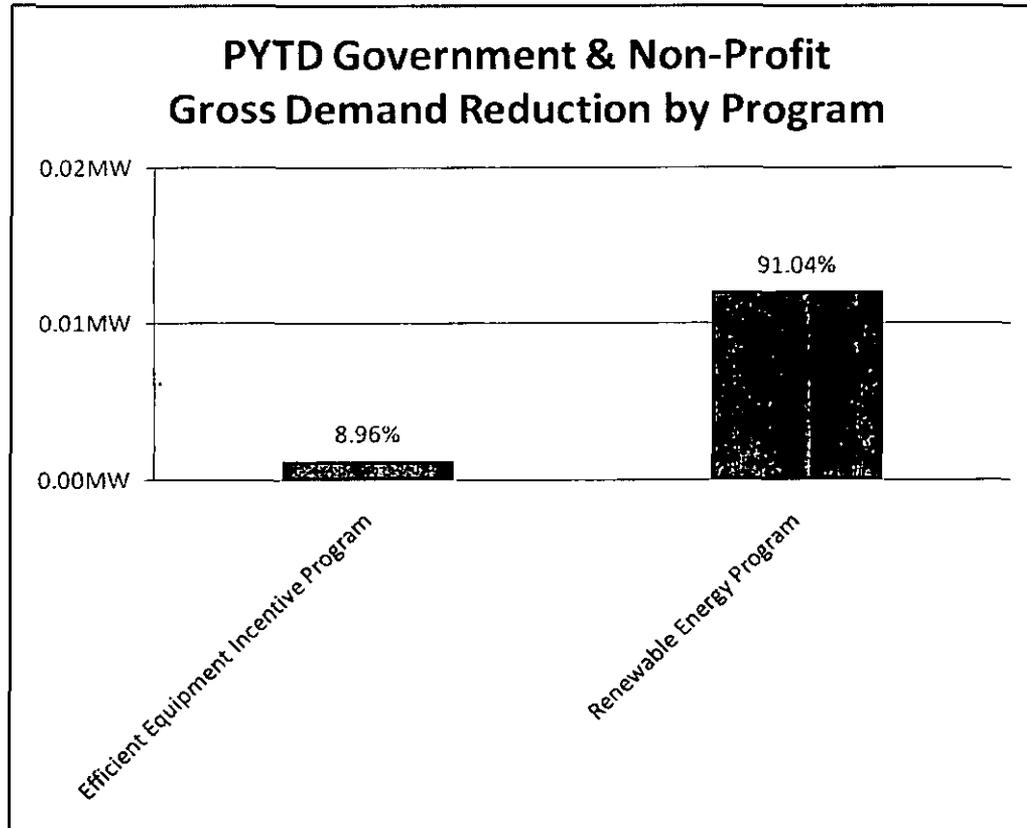
A summary of the sector energy savings by program is presented in Figure 3-11.

Figure 3-11: Summary of Government & Non-Profit EE Sector EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 3-12.

Figure 3-12: Summary of Government & Non-Profit EE Sector PYTD Reported Demand Reduction by Program



4 Portfolio Results by Program

4.1 Appliance Recycling

The Appliance Recycling Program (ARP) offers:

- Pick up and recycling of operating inefficient refrigerators and freezers; and
- Room air conditioner turn-in events.

The Appliance Recycling Program's overarching goal is to prevent continued operation of older, inefficient appliances by offering an incentive and free pick-up service to customers. The Appliance Recycling program's primary objectives include:

- Encouraging customers to dispose of their existing, inefficient appliances when they purchase new ones, or eliminating a second unit that may not be needed.
- Reducing the use of secondary, inefficient appliances.
- Ensuring appliances are disposed of in an environmentally responsible manner.
- On-site decommissioning to ensure appliances are not resold in a secondary market.
- Promoting other PPL Electric energy-efficiency programs.
- Collecting and recycling no fewer than 69,600 appliances through 2013, with a total reduction of 114,760 MWh/yr and 13,150 kW.

4.1.1 Program Logic

The program theory for the Appliance Recycling Program can be summarized as follows:

By permanently retiring older, inefficient appliances, the program will remove them from PPL Electric's grid. As a result, the program helps consumers save on their utility bills, and lessens baseload demand. Disposing of units in an environmentally sound manner reduces the likelihood of ozone-destroying chemicals from entering the atmosphere, improving air quality and reducing greenhouse gas emissions. The participation experience helps residential customers learn more about the benefits of energy efficiency and maintaining efficient appliance stock.

The Program's logic model, shown in Figure 1.3-1 in the EM&V Plan, highlights the program's key features, as understood by the EM&V CSP, indicating logical linkages between activities, outputs, and outcomes. Program inputs are: PPL Electric customers with a working residential grade refrigerator, freezer, or air conditioner; PPL Electric staff (including management, coordinators, and marketing); Appliance Recycling CSP; vehicles for appliance transport; recycling facility; applications and forms; incentive funding; and expertise and recycling technology.

The logic model's elements are:

Activities the program undertakes. The program's primary activities include marketing and outreach (including cross-program referrals), processing applications, verifying eligibility of customers, picking up and recycling inefficient refrigerators and freezers, and processing incentive payments.

Outputs produced by program activities. Outputs include marketing materials produced, applications processed, number of appliances scheduled, picked-up and subsequently recycled, and incentives paid.

Short-term outcomes (one year) resulting from customers participating in the program include secondary and inefficient appliances being permanently retired from use, and customer awareness of other PPL Electric EE&C programs.

Intermediate outcomes (two to three years) consist of increased participation due to customer familiarity with the Program; reduced number of operating secondary and inefficient appliances; and waste materials from recycled appliances are disposed of in an environmentally responsible manner.

Long-term outcomes (four to seven years) for this program include fewer old and inefficient appliances in existence and achieved energy and demand savings targets of 114,760 MWh/yr and 13 MW.

4.1.2 Program M&V Methodology

The complete discussion of the M&V methodology can be found in Chapters 3, 4 and 5 of the Appliance Recycling QA/QC and EM&V Plan.

Savings Realization Rate Methodology

The EM&V CSP utilized three methods for determining a realization rate for this program:

1. Records inspection;
2. Participant surveys to determine installation rates; and
3. Savings adjustment based on equivalent full load hours (EFLH) of operation, which vary by city, for room air conditioners.

First, a random sample of 70 records was selected for inspection to exceed 90% confidence and 10% precision. The sample consisted of 60 records selected from the program participants in the EEMIS database that recycled a refrigerator or freezer and a room air conditioner. These records were supplemented with 10 randomly selected application records from the ARP CSP (JACO) database from a sample of 20 records requested for review by the SWE. The quantity of units collected and the size of each unit were compared to the ARP CSP records to verify whether all units reported recycled were actually picked up by the Appliance Recycling CSP.

Second, a random sample of program participants was selected from EEMIS for participant surveys. The EM&V CSP completed 103 participant end-user surveys, stratified by measure type (n=103 for refrigerator/freezer; n=69 for room air conditioners) to exceed 90% confidence and 10% precision. The quantity and operational condition (whether or not the unit was in working condition) of units collected was verified to adjust reported energy savings.

Third, savings adjustments were made to TRM room air conditioner savings values¹⁰ based on actual PY1 participation. In July 2010 the SWE issued new savings assumptions, deemed energy savings and demand impacts values for room air conditioner retirement. Energy savings varied by EFLH, as detailed in Table 4-1 below. The EM&V CSP accounted for the variation of actual program participation in the

¹⁰ Savings assumptions for room air conditioners are based on Table 2: RAC Retirement-Only EFLH and Energy Savings by City in the Room AC TRM interim working paper approved by the SWE.

realization rate and adjusted gross savings by producing a weighted average of kWh/yr savings and location for room air conditioners.

Table 4-1. Room Air Conditioner Retirement – Savings Assumptions and Participation by City

Measure	City	EFLH	CAPY	EER - ret	Energy Impact (kWh/yr)	CF	Demand Impact (kW)	EUL	Frequency- PY1 Participants
Room Air Conditioner Retirement	Allentown	243	10,000	9.07	268	0.58	0.64	4	312
	Harrisburg	288	10,000	9.07	318	0.58	0.64	4	183
	Scranton	193	10,000	9.07	213	0.58	0.64	4	252
	Williamsport	204	10,000	9.07	225	0.58	0.64	4	202

Based on this investigation, reported savings were adjusted by verified appliance recycling rates. As savings are deemed and no *in situ* metering was included in the impact evaluation methodology for this program, no other adjustments were made to determine the realization rate.

Savings Realization Rate Findings

The records review results found no discrepancies between EEMIS and the ARP CSP tracking database that affected the realization rate. A detailed discussion of the complete records review methodology and results is included in the PPL Electric Program Year 1 Process Evaluation report dated September 15, 2010.

Participant survey results included one respondent who claimed not to have recycled a room air conditioner. Both EEMIS and the ARP CSP records showed one unit was recycled for the respondent. The installation rate for room air conditioners was adjusted for this unit resulting in an installation rate of 99.89%. The installation rate for refrigerators and freezers is 100% because survey data did not reveal any discrepancies between EEMIS records and participant responses. Additionally, all participants confirmed that all units recycled through the program were in working condition; therefore, no adjustment was made for the working condition of recycled appliances.

The weighted average of kWh/yr savings by EFLH (participant location) resulted in 254 kWh/yr per room air conditioner for year one. This affected the final realization rate and adjusted gross savings for this measure considerably from the PPL Electric reported savings of 58.7 kWh/yr per unit¹¹ resulting in a 432% realization rate for the room air conditioner measure. Demand impacts also increased from 0.03 kW as reported by PPL Electric to the newly deemed value of 0.64 kW per retired room air conditioner.

Findings from the records review, survey data (installation rate) and EFLH adjustment for room air conditioners resulted in the realization rates shown in Table 4-2 for each measure type and for the program overall. The complete Appliance Recycling Program impact evaluation results, including the realization rates and adjusted gross savings, are summarized in Table 2-5.

¹¹ 58.7 kWh was the average deemed value for the service territory assumed by PPL Electric before the Interim TRM was issued.

Table 4-2. ARP Realization Rates and *Ex post* Savings by Measure Type

Measure Type	Realization Rate	<i>Ex post</i> kWh/yr Savings per Unit	<i>Ex post</i> kW Savings per Unit
Refrigerator/Freezer	100%	1,728	0.24
Room Air Conditioner	432%	253	0.64

Net-to-Gross (NTG) Ratio Methodology

Free-ridership

The EM&V CSP utilized the methodological approach used in the 2004–2005 and 2006–2008 California Residential Appliance Recycling Program evaluations. This methodology has gained acceptance as the industry standard for assessing appliance recycling program NTG. Specifically, NTG was calculated by determining the percentage of participants that would have, in the absence of the program, disposed of their appliances in a manner leading to discontinued use. Independent of program intervention, participating appliances would have been subject to four potential scenarios:

1. The appliance would have been kept by the participating household and still used;
2. The appliance would have been kept by the participating household but stored unused;
3. The appliance would have been discarded/sold by the participating household in a manner leading to its continued operation; or
4. The appliance would have been discarded by the participating household in a manner leading to its eventual destruction.

Of these scenarios, two indicate free-ridership. Instances where the appliances would have been kept and stored unused (2) or discarded and destroyed (4) would have the same impact on energy consumption independent of program participation.

The EM&V CSP has found in other evaluations that the majority of participants in most Appliance Recycling Programs report they would have discarded the participating appliance even if they had not participated in the program. Therefore, it is critical the evaluation focus not on changes within a participating home but rather changes at the service territory level. The study aimed to understand whether the discarded appliance would have remained in use within PPL Electric's service territory, either inside or outside the participating home. This critical concept is different from most demand-side management programs and does not lend itself to the standard evaluation methods. The notion of replacement within a participating home has no bearing on the program's gross savings although it may be important information for understanding the efficiency of the utility's appliance stock.

A more complete discussion of the NTG methodology can be found in Chapter 5 of the Appliance Recycling QA/QC and EM&V Plan.

Spillover

To examine spillover attributable to the Appliance Recycling Program, survey respondents were asked if they made any energy-efficiency improvements or installed any energy-efficient measures where they did not receive a program rebate. They were also asked the likelihood of installing these measures if they had not participated in ARP. No adjustments were made to the *ex post* savings to incorporate spillover, per direction from SWE.

Net-to-Gross (NTG) Ratio Findings

Per the Audit Plan, until a Commission order is issued, only gross savings will be reported and verified. That is, gross savings will not be adjusted by the NTG ratio.

Free-ridership

The ARP program impact evaluation results, including the NTG ratio, are summarized above in Table 2-5. The NTG ratio computed from free-ridership results is .57 for this program.

Spillover

Thirty-seven percent of Appliance Recycling Program survey respondents (38 of 103) stated they made energy efficiency improvements without receiving a rebate. Of these 38 respondents, 66% (25) reported the program was strongly influential in their decision to make the energy efficiency improvements. The majority, 74%, stated they relied on the efficiency rating or ENERGY STAR® label to determine that the measure was energy efficient.

Survey respondents reported they installed 310 CFL, where 42% were “strongly influenced” by the program and the customer was “unlikely” to have installed the CFL otherwise. Respondents reported installing 15 appliances, heat pumps or air conditioners, including nine or 60%. The nine measures included three air conditioners, two heat pumps, two refrigerators, one hot water heater, and one dehumidifier. Other measures installed that were not influenced by ARP included windows, attic insulation, and exterior doors.

4.1.3 Program Sampling

Participant and nonparticipant surveys were conducted for QA/QC, impact and process evaluation. Participant survey instruments included questions affecting all evaluation activities and the same sample population was used for QA/QC, process and impact evaluations. The EM&V CSP completed a total of 103 participant surveys stratified by measure type, 69 of which included respondents that had recycled at least one room air conditioner in addition to at least one refrigerator or freezer. The achieved confidence and precision for participant surveys exceeded 90% confidence and 10% precision standard. Non-participant questions were included in program surveys and were used to identify customers who had not participated in PPL Electric’s Appliance Recycling Program. Those questions were aimed at identifying customers that recycled an appliance outside of the program. The disposition of EM&V samples for this program is shown in the Appliance Recycling QA/QC and EM&V Plan and is included below.

Note that some surveys and records reviewed included more than one measure recycled and incented. Altogether, 359 recycled appliances were verified.

Table 4-3. Appliance Recycling Program Sample Disposition

	Year 1 Reported Savings (kWh/yr)	Year 1 Participation (Units Recycled)	Year 1 Target	Year 1 Completes	Achieved Confidence/Precision
Participant Surveys					
Refrigerator/Freezer	9,018,432	5,219	70	103	Exceeds 90/10
Room Air Conditioner	50,541	861	70	69	Exceeds 90/10

Non-participant Surveys	--	--	0	47	--
Participant Records Review			70	70	90/10
Total	9,068,973	6,080	210	289 completes	

4.1.4 Process Evaluation

The PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation report dated September 15, 2010 contains the baseline process evaluation. Additional data collected from surveys and site visits will be available in future reports.

4.1.5 Program Partners and Trade Allies

PPL Electric's customer programs specialist provides general program management and oversight, monitors the program, provides program information to trade allies, approves invoices and program data, and resolves program issues. A single ARP implementation CSP, JACO Environmental Inc. (JACO), provides turn-key services to administer and manage the program's day-to-day operations. The ARP CSP's role includes marketing the program to customers; staffing a call center that performs customer intake and scheduling services and well as responds to customer questions and concerns; processing applications and rebates; tracking program data; and providing customer and transaction information to PPL Electric. Other trade allies are appliance dealers such as Best Buy and Sears in PPL Electric's service territory.

4.1.6 Program Finances

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

Table 4-4: Summary of Program Finances: TRC Test¹²

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$156,960	\$204,190	\$204,190
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$156,960	\$204,190	\$204,190
B.1	Design & Development	\$0	\$0	\$0
B.2	Administration	\$0	\$0	\$0
B.3	Management ^(a)	\$243,532	\$465,282	\$465,282
B.4	Marketing	\$66,625	\$125,360	\$125,360
B.5	Technical Assistance	\$0	\$0	\$0
B	Subtotal EDC Implementation Costs	\$310,157	\$590,642	\$590,642
C	EDC Evaluation Costs ^(b)	\$0	\$0	\$0
D	SWE Audit Costs	\$0	\$0	\$0
E	Participant Costs ^(c)	\$0	\$0	\$0

¹² Definitions for terms in the following table are subject to TRC Order.

	Total Costs	\$467,117	\$794,832	\$794,832
F.1	Annualized Avoided Supply Costs – Residential^[d]		\$75.79	\$75.79
F.2	Annualized Avoided Supply Costs – Small C&I		\$61.10	\$61.10
F.3	Annualized Avoided Supply Costs – Large C&I			
G	Lifetime Avoided Supply Costs		\$7,289,702	\$7,289,702
	Total Lifetime Economic Benefits		\$7,289,702	\$7,289,702
	Program Benefit-to-Cost Ratio		9.17	9.17
NOTES:				
[a] Includes PPL Electric's and the program CSP's implementation, management and oversight of this program.				
[b] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.				
[c] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs.				
[d] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1.				

4.2 Compact Fluorescent Lighting Campaign

The CFL Campaign has two components:

- An upstream retail lighting component provides incentives to CFL manufacturers. The upstream incentives then effectively “buy down” the retail price of ENERGY STAR® CFL bulbs. The majority of program-discounted CFLs are sold in retail brick-and-mortar stores, though PPL Electric also offers program-discounted CFLs through an on-line retail store.
- A giveaway component provides customers with ENERGY STAR® CFLs free-of-charge at events sponsored by PPL Electric.

PPL Electric's CFL Campaign's objectives are:

- Develop and execute strategies aimed at transforming the market for ENERGY STAR®-qualified CFLs with a goal of increasing the number of qualified products purchased and installed in PPL Electric's service territory.
- Provide a mechanism through which customers can easily obtain discounted ENERGY STAR®-qualified CFLs in the retail market.
- Provide opportunities that encourage customers to obtain and try CFLs free-of-charge through PPL Electric-sponsored giveaway events and activities.
- Increase consumer awareness and understanding of the CFL energy efficiency as well as CFL use in various lighting applications.
- Promote consumer awareness and understanding of the ENERGY STAR® label.
- Promote other PPL Electric EE&C programs to customers.

4.2.1 Program Logic

Logic models for upstream and giveaway program components are shown in the Compact Fluorescent Lighting Campaign EM&V plan in Figure 1.2-1 and Figure 1.2-2. The CFL Lighting Campaign theory is summarized as follows:

By using various program delivery mechanisms, PPL Electric encourages its customers to purchase new ENERGY STAR®-qualified CFLs and install them as replacements for inefficient incandescents, thereby producing energy and demand savings.

The CFL Campaign logic models highlight key program features and indicate logical linkages between activities, outputs, and outcomes. Both models' program inputs are: PPL Electric's strategic direction, program management, and other support; PPL Electric's funding; and the CSP's program implementation expertise.

The logic models' elements include:

Inputs. Inputs to the program include PPL Electric staff, PPL Electric customers, the CFL technology, trade allies (CFL manufacturers, retailers, and community groups), incentive funding, and the CFL CSP.

Activities the program undertakes. Primary program activities include: trade ally recruitment and coordination; bulk CFL pricing negotiations; marketing and outreach to customers; program material dissemination; and distribution of low- and no-cost CFLs to customers.

Outputs produced by program activities. Outputs include informed and active trade allies and community organizations; marketing materials; promotional campaigns and bulb giveaway events; and program-discounted CFLs.

Short-term outcomes (one year) include promotional campaigns to educate customers about CFLs; increased CFL availability; increased customer demand for CFLs; and reduced retail prices for program-discounted CFLs. These outcomes lead to immediate energy and demand savings.

Intermediate outcomes (two to three years) include increased customer familiarity and comfort with CFLs, leading to more CFL installations and resulting in more energy and demand savings; increased program participation by a growing set of manufacturers, retailers, and other trade allies; reduced CFL manufacturing costs due to economies of scale and technological improvements; and more efficient and effective program implementation resulting from the continuous evaluation and Quality Assurance/Quality Control (QA/QC) feedback loops.

Long-term outcomes (four to seven years) include customers thinking of CFLs as standard lighting equipment, i.e., transformation of the light bulb market, and substantial energy and demand savings, with a target of 292,100 MWh/yr and 45,630 kW planned through 2013.

4.2.2 Program M&V Methodology

The complete discussion of the M&V methodology can be found in Chapters 3, 4 and 5 of the CFL Campaign QA/QC and EM&V Plan.

Savings Realization Rate Methodology

The deemed savings equation for calculating energy and demand impacts from CFLs includes a factor to account for the average CFL in-service rate (84%). By definition, the in-service rate adjusts the total program savings calculation for the percentage of program-discounted CFLs that are installed. Because, as explained in the CFL Campaign EM&V and QA/QC Plan, the EM&V CSP does not believe any

adjustment is needed for leakage, the deemed in-service rate serves as the basis for computing a realization rate for the CFL Campaign.

The CFL Campaign program CSP works directly with CFL manufacturers to implement lighting promotions in retail stores, but does not have any direct contact with participating retailers. Thus, on a monthly basis, participating manufacturers collect CFL sales data on the approved program-discounted CFLs from participating retailers. The manufacturers then send their sales data to the program CSP, and the program CSP reformats these disparate data sets and uploads them to their own internal program database. Finally, the program CSP uploads the monthly sales data from its database to EEMIS. Only data from the CFL Campaign CSP's database and the data from EEMIS are available for the EM&V CSP to review.

Due to the upstream nature of the CFL Campaign, PPL Electric (and the program CSP) does not know which PPL Electric customers purchase CFLs discounted through the program. For the CFL Campaign, EEMIS (and the program CSP's database) is therefore designed to capture information about the program-discounted CFLs themselves. Each record in EEMIS is a unique combination of CFL SKU, retailer name and store identifier where the CFLs were sold, and date when the CFLs were sold to retail customers. Other variables captured in EEMIS for the CFL Campaign include CFL manufacturer, CFL wattage, wattage of equivalent incandescent light bulbs, and other CFL characteristics.

Operating within this context, the EM&V CSP began the realization rate analysis by randomly selecting 75 PY1 records (per the CFL Campaign EM&V and QA/QC Plan) from EEMIS. The EM&V CSP compared these to records in the program CSP's database by matching records by CFL SKU, retailer and store identifier, and date the CFLs were sold. Finally, the EM&V CSP compared the total PY1 energy and demand savings in EEMIS to the total PY1 energy and demand savings in the program CSP's database.

Savings Realization Rate Findings

For all 75 records in the sample, all of the EEMIS values used to calculate energy and demand savings were identical to the corresponding values in the program CSP's database. The energy (kWh/yr) and demand (kW) savings values calculated for each record (using the savings equations specified in the TRM) and stored in EEMIS and the program CSP's database were also exactly the same.

The EM&V CSP's initial comparison of the total PY1 energy and demand savings in EEMIS with the total PY1 energy and demand savings in the program CSP's database found that the savings values did not match. However, the differences appeared to be due to timing, i.e., when records were uploaded to each of the databases. To confirm this, the EM&V CSP matched and compared the census of EEMIS's PY1 records to all of the program CSP's PY1 records. For all variables related to energy and demand savings, the values in EEMIS were identical to those in the program CSP's database. Therefore the CFL Campaign's PY1 realization rate remains 84%; no adjustment to this rate is necessary.

Survey Findings on Installation Rates, Hours of Use and Delta Watts

The SWE requested PPL Electric collect self-report survey data on the topics of hours of use, installation rates, and delta watts. These data were collected to meet SWE requirements and were not used to adjust the TRM assumptions or *ex post* evaluated savings. Survey respondents who purchased CFLs were asked about the number installed and the number in storage, and location of the installed CFLs in order to approximate hours of use.

Self Report CFL Installation Rate

Through the self report survey, 85 of the customers contacted reported that they had purchased or been given CFLs within the past three months. These recent CFL purchasers were asked how many of the recently acquired CFLs were installed and how many were in storage. The EM&V CSP examined these responses for inconsistencies. Five cases were found and subsequently removed from the calculation. Once these five were removed, an installation rate was calculated for the eighty remaining recent purchasers as the number of CFLs installed divided by the number purchased. These individual installation rates were then averaged resulting in a survey-based installation rate of 79%. Given that the survey was designed to produce results with 90% confidence and 10% precision, this suggests that the true installation rate is between 71% and 86%. The deemed installation rate of 84% falls within the 90% confidence interval.

Self Report CFL Hours of Use

Recent purchasers were asked how many CFLs were installed in specific rooms in their homes. The EM&V CSP used respondents' survey answers, in combination with secondary research published by the Regional Technical Forum (RTF)¹³, to develop an estimate of the average hours of use (HOU) per day per CFL for PPL Electric customers. As shown in Table 4-5: the estimated average HOU for the mix of CFL locations reported by PPL Electric respondents was 2.51.

Table 4-5: CFL Estimated Hours of Use Analysis

Survey Question USE4 – Where are the CFL Installed?	Bulbs per Room	Share of Total	Hours In-Use Per Day	Weighted Average
a. Formal living room	138	15%	2.9	0.44
b. Formal dining room	58	6%	2.9	0.18
c. Family room	87	10%	2.9	0.27
d. Bedrooms	178	20%	1.3	0.26
e. Bathrooms	94	10%	1.8	0.18
f. Kitchen and dining area	113	12%	3.5	0.43
g. Laundry and utility rooms	28	3%	1.8	0.05
h. Entryway and hallways	50	5%	2.9	0.16
i. Closets	10	1%	1.3	0.01
j. Office/den	18	2%	2.9	0.06
k. Garage	33	4%	2.9	0.11
l. Outside locations	64	7%	3.3	0.23
m. Other rooms	39	4%	2.9	0.12
Total CFLs	910	100%	Average HOU	2.51

Self Report of Delta Watts

The survey asked respondents to provide the wattage of CFLs installed and incandescent replaced. Only about 20 of the 85 responses were plausible; the remaining respondents were not able to answer the questions or provided responses that did not appear to be valid. Of those with apparently valid answers, responses were consistent with the TRM assumptions.

¹³ The RTF, an organization chartered by the NW Power and Conservation Council, researched the average hours of lighting use per day by room. Refer to Excel file *EStarLighting_ExistingFY10v1_5.xls* at <http://www.nwcouncil.org/rtf/measures/Default.asp>.

The recent purchasers were asked how many of the installed CFLs replaced incandescent bulbs and how many replaced existing CFLs. Of the 85 recent purchasers, five were removed due to inconsistencies in the data. The rate of CFLs replacing incandescent bulbs was calculated using the remaining group. The individual installation rates were averaged to produce a (survey-based) self report replacement rate of 85%.

Net-to-Gross (NTG) Ratio Methodology

Upstream energy-efficiency programs, such as PPL Electric's CFL Campaign, present genuine challenges to evaluating program net impacts:

- Because light bulbs are generally inexpensive and purchased on a fairly regular basis, customers are able to accurately recall details about buying light bulbs, e.g., how many individual light bulbs and how many packages were purchased, when the purchase occurred, for only a short time after the purchase takes place. This is true for CFLs as well as for incandescent bulbs, especially after customers become somewhat familiar with CFLs and no longer view CFLs as novelty items.
- As described in Section 4.1 of the EM&V plan, the upstream CFL Campaign is largely invisible to PPL Electric's customers. Many end-use customer participants are therefore unaware they are taking part in the program. In fact, evaluations of upstream programs implemented elsewhere have found the majority of customer participants are unaware of their participation status.
- The program's marketing and outreach components are expected to lead not only to sales of program-discounted CFLs, but also potentially to sales of large numbers of non-program CFLs (spillover). Non-program CFL sales can occur at participating retailers, i.e., sales of non-discounted CFLs during program promotions, and CFL sales made outside of program promotional periods, as well as at non-participating retailers. Limiting the NTG analysis to only those few respondents who recall purchasing a program-discounted CFL, or receiving a CFL free-of-charge from a PPL Electric-sponsored give-away event, could significantly underestimate program impacts. In fact, studies conducted in Wisconsin, Massachusetts, and Vermont in 2005 and 2006 found NTG values exceeding 100% due to the influence programs exerted on the overall CFL market.

With these challenges in mind, the EM&V CSP conducted a NTG analysis based on the method outlined in the CFL Campaign QA/QC and EM&V Plan. The approach relied on findings from customer telephone surveys and corporate-level CFL retailer interviews. The CFL Campaign's NTG results were then corroborated with the results from recently published upstream CFL program evaluations conducted in other areas of the country.

The CFL customer survey and retailer interviews and results are discussed in more detail in Appendix A of this report.

NTG Ratio Findings

Based on the free-ridership estimates derived from the customer survey, the CFL Campaign's NTG ratio ranges from 69% to 81%. Since it is highly unlikely that all recent CFL purchasers who were unaware of the CFL Campaign before they participated in the customer survey were free riders, the program's actual NTG ratio is likely at the higher end of the 69%-81% range. Furthermore, because this NTG ratio does not incorporate any program spillover, the EM&V CSP considers these values to be conservative (low-end) estimates. Using a preponderance of evidence approach and incorporating the NTG ratio of 78%

derived from the retailer interviews, the EM&V CSP estimates that the NTG ratio for PY1 of the CFL Campaign is 80%.

Recent evaluations of other relatively new upstream lighting programs have found similar NTG ratios. As shown in Table 4-6, NTG ratios for these other utilities have ranged from 75% to 100%.

Table 4-6: NTG Values from Other Recent Upstream CFL Evaluations

Program	Program Year		
	2007	2009	2010
APS Consumer Products Program	78%		
SRP Upstream Lighting		78%	75%
Ameren Illinois Utilities Lighting and Appliance Program		100%	

Although the NTG ratio was computed for the CFL Campaign for PY1, no NTG adjustments were applied to the program's gross savings. Going forward, NTG adjustments will not be applied to the program's savings until required by the Commission and specified in the TRM.

4.2.3 Program Sampling

The EM&V CSP conducted a records review with sample target of 75 randomly selected records submitted by the CFL CSP to PPL Electric. As described above, the EM&V CSP completed a records review of the census of records submitted to PPL Electric.

The EM&V CSP fielded a customer telephone survey for the PY1 CFL Campaign evaluation, described in more detail in Appendix A. The telephone survey sample frame was developed from PPL Electric's customer database. To ensure the telephone survey would provide useful results for both participants and non-participants while staying within a reasonable budget, the survey was conducted using the maximum and minimum target number of completed interviews with respondents shown in Appendix A.

The EM&V CSP completed surveys with a total of 352 respondents of PPL Electric's 1.2 million residential customers. Thus, the survey achieved 95/5 levels of confidence/precision.

4.2.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. Additional data collected from surveys and site visits will be available in future reports.

4.2.5 Program Partners and Trade Allies

PPL Electric's customer programs specialist provides general program management and oversight, monitors the program, approves invoices and program data, and resolves program issues. A single third party CFL implementation CSP, ECOS, works on both the upstream and giveaway CFL Campaign components. For the program's upstream component, the CFL CSP recruits manufacturer and retailer participants; negotiates memorandum of understanding (MOU) agreements with participant manufacturers; coordinates CFL shipment and transportation logistics; coordinates CFL marketing and outreach with participant retailers; tracks program data; and provides program reports to PPL Electric. The CFL CSP uses a broad range of retailers, including chain stores, e.g., national big box and mass

merchandise retailers, as well as smaller local and independent stores throughout PPL Electric's territory. The CFL CSP is also responsible for establishing convenient drop-off points for CFL recycling in PPL Electric's service territory.

For the giveaway program component, the CFL CSP and PPL Electric recruit community-based organizations, retailers, home show coordinators, and other local organizations to participate in CFL giveaway events. These events are used as a forum for education and outreach to help increase customers' awareness of (1) CFL benefits, (2) appropriate CFL use and installation, (3) CFL safe handling and recycling, and (4) the range of energy efficiency and conservation (EE&C) programs PPL Electric offers. The CFL CSP negotiates with manufacturers for CFLs to distribute at these events and provides point-of-purchase (POP) displays and educational materials to use at the events.

The CFL CSP maintains a call center to respond to all end-use customer questions about the CFL Campaign. While the CFL CSP does the majority of marketing for the program, the Marketing CSP oversees the general branding of the program's marketing materials. Retailer trade allies sell qualifying CFLs to end-use customers.

Typical delivery processes for the upstream buy-down and giveaway components of the CFL Campaign are shown in Appendix C of the EM&V Plan. Trade allies include participant and non-participant manufacturers and retailers. Participant trade allies (retailers) can be identified through the CFL CSP's monthly reports. Non-participant trade allies can also include manufacturers and retailers who were approached by the CFL CSP but who declined to participate. Additional non-participant trade allies can be identified through secondary research.

4.2.6 Program Finances

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

Table 4-7: Summary of Program Finances: TRC Test¹⁴

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$1,482,695	\$1,482,695	\$1,482,695
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$1,482,695	\$1,482,695	\$1,482,695
B.1	Design & Development	\$0	\$0	\$0
B.2	Administration	\$0	\$0	\$0
B.3	Management ^(a)	\$498,167	\$620,969	\$620,969
B.4	Marketing	\$83,492	\$114,481	\$114,481
B.5	Technical Assistance	\$0	\$0	\$0
B	Subtotal EDC Implementation Costs	\$581,660	\$735,450	\$735,450
C	EDC Evaluation Costs^(b)	\$0	\$0	\$0
D	SWE Audit Costs	\$0	\$0	\$0

¹⁴ Definitions for terms in the following table are subject to TRC Order.

	Category	IQ	PYTD	CPITD
E	Participant Costs ^[c]	\$3,205,045	\$3,887,685	\$3,887,685
	Total Costs	\$5,269,400	\$6,105,830	\$6,105,830
F.1	Annualized Avoided Supply Costs – Residential ^[d]		\$75.79	\$75.79
F.2	Annualized Avoided Supply Costs – Small C&I			
F.3	Annualized Avoided Supply Costs – Large C&I			
G	Lifetime Avoided Supply Costs		\$29,338,026	\$29,338,026
	Total Lifetime Economic Benefits		\$29,338,026	\$29,338,026
	Program Benefit-to-Cost Ratio		4.80	4.80
<p>NOTES:</p> <p>[a] Includes PPL Electric's and the program CSP's implementation, management and oversight of this program.</p> <p>[b] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.</p> <p>[c] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs.</p> <p>[d] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1. [a] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.</p>				

4.3 Custom Incentive Program

The Custom Incentive Program includes the following features:

- Incentives for individual equipment measures or systems not covered by other PPL Electric programs.
- Incentives based on avoided or reduced kilowatt hours (kWh) resulting from the project in amounts up to 50% of the cost of a technical study and additional reimbursement may be awarded following successful implementation of a cost-effective project.
- PPL Electric will reimburse customers for up to 50% of the cost of a technical study and may provide additional reimbursement following successful implementation of a cost-effective project capping incentives at 50% of the incremental cost of the project.

The objectives of the Custom Incentive Program include:

- Providing customers with opportunities and the flexibility to reduce their energy costs and increase their energy-efficiency by implementing cost-effective measures that are not included in other programs.
- Encouraging customers to install high-efficiency HVAC, process, compressed air, and other measures or processes.
- Promoting strategies that encourage and support market transformation for energy efficient products and services in the non-residential sectors.
- Identifying new measures or technologies that should be added to the Efficient Equipment or other programs so they no longer need to be treated as custom.
- Promoting other PPL Electric EE&C programs.
- Achieving energy and demand savings of 140,459 MWh/yr of energy savings and 27 MW of peak demand impacts with roughly 400 custom projects (anticipated to include over 1,500 measures) over the initial 4-year term of the program.

- Reducing the first-cost barrier and making the high-efficiency equipment a more viable option for customers through incentives that serve to partially offset the difference in costs between high-efficiency equipment and standard (baseline) equipment. The incentives offered for Technical Assessments reduce the cost of energy audits, thus expanding their use and leading to the identification of cost effective energy efficiency projects.

4.3.1 Program Logic

The program theory for the Custom Incentive Program can be summarized as follows:

By providing rebates for high-efficiency equipment not included in other PPL Electric programs, the Custom Incentive Program will increase market saturation and acceptance of high efficiency equipment. Customers will learn of the energy benefits and achieve energy and demand savings by installing qualifying equipment. Increased market penetration of high-efficiency equipment will further increase sales, achieving additional energy and demand savings.

The program logic model is shown in Table 1.4.1 of the Custom Incentive EM&V Plan. The elements of the logic model are as follows:

Program Inputs. The program inputs include the target customers, support from PPL Electric staff, support from the CSP's, rebates for technical studies and energy efficiency measures, support from the trade allies, quality assurance and quality control CSP, the efficient equipment, applications and forms, and expertise.

Program Activities. The primary program activities include the management and strategic direction, the trade allies' support, marketing, rebate form submission and processing, eligibility verification and application processing, project development through trade allies, technical and cost benefit analysis, evaluation of technical report by CSP's, installation of the equipment by the customer or by a contractor, field verification of completed projects, and the adjustment of energy savings estimates.

Outputs produced by program activities. Outputs include the number of marketing materials distributed, the number of marketing channels utilized, the number of referrals to other EE&C programs, the number of customer applications processed, the number of projects developed, the number of technical reports approved and qualified by CSP, the number of projects completed, the number of projects field verified, and the rebates processed.

Short-term outcomes (one year) include more energy efficiency assessments to occur than would in the absence of the program and installations of high-efficiency equipment, repairs, and optimization or process changes that reduce electricity consumption and peak demand in higher numbers than they would have without the program.

Intermediate outcomes (two to three years) include participants using less energy than non-participating structures.

Long term outcomes (four to seven years) include PPL Electric meeting a goal of reducing energy consumption by 140,460 MWh/yr and reducing peak demand by 27 MW by 2013 through this program.

4.3.2 Program M&V Methodology

The complete discussion of the M&V methodology can be found in Chapters 3, 4 and 5 of the Custom Incentive QA/QC and EM&V Plan.

Savings Realization Rate Methodology

Only one project completed all phases of the Custom Incentive Program in PY1. The savings realization rate methodology described here (and in more detail in the M&V methodology in the evaluation plan) will be applied to projects completed in PY2. All projects entering the program in PY1 were assigned to the sample or were designated large projects and reviewed. Large project savings will be determined by following custom measure protocols and customer incentives will be paid on the basis of the evaluated savings. Because the EM&V CSP will review a census of large projects, their savings will be known with no statistical uncertainty. Smaller projects will be sampled and a realization rate will be determined based on a review of the sample. The evaluated savings will be based on custom measure protocols. The realization rate determined from the sample will be applied to the rest of the population of small projects. Although some projects will involve installation of unique measures, the EM&V CSP anticipates the mix of measures will be distributed evenly across all projects of comparable size (< 500,000 kWh/yr).

Savings Realization Rate Findings

Only one project was completed in the Custom Incentive Program in PY1. This was a commercial application including a bulk purchase of CFLs. C&I CFLs are normally handled through the Efficient Equipment Program. This transaction was processed through the Custom Program as an exception because the C&I CFL rebate forms were not yet available for the Efficient Equipment Program. The baseline and installation rates were verified through a call to the energy services company that purchased and installed the lamps. It was confirmed that all lamps were installed, with none being reserved as spares. The wattage of the baseline incandescent lamps and the usage areas into which the fixtures were installed were also determined in the interview. The quantity and wattage of the installed fixtures was consistent with the invoice. The *ex post* savings were obtained in the TRM Lighting Audit Tool.

Table 4-8: Custom Incentive Program Average Savings and Realization Rates

Sector	EEMIS, kWh/yr Savings	EEMIS kW Savings	Realized kWh/yr Savings	Realized kW Savings	Realization Rate - kWh	Realization Rate - kW
Small C&I	38,614	2.53	55,731	4.16	144%	164%

Net-to-Gross (NTG) Ratio

Beginning in PY2, the EM&V CSP will develop NTG ratios based on self-reported data from participants. The battery of questions proposed in Appendix B, page 152 of the Audit Plan, will be modified to fit the unique features of each program. NTG ratios will be determined but no adjustments will be applied to savings until required by the SWE.

4.3.3 Program Sampling

The EM&V CSP will conduct EM&V reviews for the stratum of all large savers, defined as projects with anticipated savings greater than 500,000 kWh/year. The small savers stratum will be further divided into two strata with stratum one populated with projects with anticipated savings less than or equal to 500,000 kWh/year but greater than 250,000 kWh/year, and stratum two populated with projects with

anticipated savings equal to or less than 250,000 kWh/year. Stratum one projects will be sampled by selecting every third recruit while stratum two projects will be sampled by selecting every ninth recruit. This approach further weights the EM&V research towards the larger projects. Additional detail can be found in the Custom Incentive Program Evaluation Plan.

This sampling strategy has been applied to all Custom Incentive Program applicants. Only one project completed their project in PY1. This site was not included in the M&V sample at the time of application but was added to the sample at the close of the program year when it was found to be the only project.

4.3.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. Additional data collected from surveys and site visits will be available in future reports.

4.3.5 Program Partners and Trade Allies

For the Custom Incentive Program, key staff members include the PPL Electric Energy Efficiency and Conservation Programs Director and staff, the EM&V Program Manager and staff, the Administrative CSP (Helgeson Enterprises), and the PPL Electric staff and CSP developing the EEMIS system (CGI). The EM&V CSP expects that PPL Electric staff will provide the participant and non-participant customer information including name, address, phone number and account number.

Trade allies are entities that provide services for participants of the Custom Incentive Program. Trade allies include, for example, HVAC contractors installing qualifying equipment, lighting contractors installing qualifying lighting, contractors selling qualifying motors to customers, and contractors conducting various audits or otherwise assisting the participant. Trade allies will be identified through customer applications, and from records kept by the PPL Electric Custom Incentive Program Managers, QA/QC CSP, or KAMs. Customer rebate forms include contractor information, as appropriate for the technology. The Administrative CSP will record the contractor information in their database. These data will be uploaded to the EEMIS database.

4.3.6 Program Finances

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

Table 4-9: Summary of Program Finances: TRC Test¹⁵

	Category	IQ	PYTD	CP1D
A.1	EDC Incentives to Participants	\$1,805	\$1,805	\$1,805
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$1,805	\$1,805	\$1,805
B.1	Design & Development	\$0	\$0	\$0
B.2	Administration	\$0	\$0	\$0
B.3	Management ^[a]	\$42,097	\$99,038	\$99,038
B.4	Marketing	\$0	\$0	\$0
B.5	Technical Assistance	\$0	\$0	\$0
B	Subtotal EDC Implementation Costs	\$42,097	\$99,038	\$99,038
C	EDC Evaluation Costs^[b]	\$0	\$0	\$0
D	SWE Audit Costs	\$0	\$0	\$0
E	Participant Costs^[c]	\$365	\$365	\$365
	Total Costs	\$44,267	\$101,208	\$101,208
F.1	Annualized Avoided Supply Costs – Residential^[d]			
F.2	Annualized Avoided Supply Costs – Small C&I		\$61.10	\$61.10
F.3	Annualized Avoided Supply Costs – Large C&I			
G	Lifetime Avoided Supply Costs		\$25,460	\$25,460
	Total Lifetime Economic Benefits		\$25,460	\$25,460
	Program Benefit-to-Cost Ratio		0.25	0.25
NOTES:				
[a] Includes PPL Electric's implementation, management and oversight of this program.				
[b] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.				
[c] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs.				
[d] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1. [a] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.				

¹⁵ Definitions for terms in the following table are subject to TRC Order.

4.4 Efficient Equipment Incentive Program

The Efficient Equipment Incentive Program promotes the purchase and installation of a wide range of high-efficiency equipment, including technologies appropriate to specific building types and specific sectors. The program provides customers with financial incentives to offset the higher purchase costs of energy-efficient equipment and offers information on the features and benefits of energy-efficient equipment. Targeted equipment includes electric heating, cooling, lighting, water heating, appliances, and other measures (ENERGY STAR®-labeled equipment is specified where available).

The objectives of the Efficient Equipment Incentive Program include:

- Provide customers with opportunities to reduce their energy costs and increase the energy-efficiency of their buildings.
- Encourage customers to install high-efficiency HVAC, lighting equipment, and electric appliances.
- Support the use of high-efficiency and ENERGY STAR®-rated equipment.
- Encourage and support market transformation for high-efficiency appliances and equipment.
- Promote other PPL Electric Energy Efficiency and Conservation programs.
- Achieve energy and demand savings.

4.4.1 Program Logic

The Efficient Equipment Program theory can be summarized as follows:

By providing a rebate for high-efficiency/ENERGY STAR®-rated equipment (such as HVAC measures, motors, appliances and lighting), the Program will increase market saturation and acceptance of high-efficiency equipment. Customers will learn of the energy benefits and achieve energy and demand savings by installing qualifying equipment. Increased market penetration of high-efficiency/ENERGY STAR®-rated equipment will further increase sales, achieving additional energy and demand savings.

The program logic model is shown in Table 1.4.1 of the Efficient Equipment EM&V Plan. The elements of the logic model are as follows:

Program Inputs. The program inputs include the target customers, support from PPL Electric staff, support from the CSP's, support from the trade allies, and the efficient equipment.

Program Activities. The primary program activities include the management and strategic direction, the trade allies' support, marketing, rebate form submission, eligibility verification, education, installation of the equipment by the customer or by a contractor, and rebate processing and payment.

Outputs produced by program activities. Outputs include the number of marketing materials distributed, the number of customers submitting rebate forms, the number of customers verified as eligible, the number of measures installed, and the number and amount of rebates paid.

Short-term outcomes (one year) include increased program awareness, increased customer and trade ally awareness of energy efficient equipment, and an increase in the installations of energy efficient equipment. Rebated equipment is installed leading to immediate energy and demand savings. Program effectiveness is confirmed through EM&V and QA/QC.

Intermediate outcomes (two to three years) include a reduction in annual energy consumption and peak load, and lower electric bills for program participants.

Long term outcomes (four to seven years) include PPL Electric meeting their goal of reducing energy consumption by 716 GWh and reducing peak demand by 127 MW by 2013.

4.4.2 Program M&V Methodology

The complete discussion of the M&V methodology can be found in Chapters 3, 4 and 5 of the Efficient Equipment EM&V Plan.

Savings Realization Rate Methodology

The reported program savings were verified using various methods to determine the savings attributable to the measure and the realization rate of the measures installed. These methods included verification through surveys and a comparison of rebate records and documentation to EEMIS reported values. Non-residential measures were also verified through site visits conducted at a sample of sites.

The *ex post* evaluated savings incorporate two levels of adjustments. First, reported savings were adjusted from those reported in EEMIS (*ex ante* reported gross savings) based on information about the systems installed through the program (tonnage, efficiency, and geographic location). This adjustment accounted for differences between planning assumptions and installed equipment and relied solely on information in the EEMIS tracking database. Second, adjustments were made for installation rates and qualifying equipment using survey data, site visits, and records review. These adjustments reflect the results of measurement and verification activities.

For the first adjustment, which reflects savings for the reported measures installed, adjustments were made to HVAC savings based on actual PY1 participation as captured in EEMIS. Energy savings for central air conditioners (CAC), air-source heat pumps (ASHP), thermostats, and room air conditioners, as calculated according to the TRM, vary according to assumed EFLH for each city. The EM&V CSP accounted for that variation of actual program participation in the adjusted gross savings.

Savings values for central air conditioners and air-source heat pumps also vary according to equipment size. Each EEMIS record for those measures in the sample was reviewed to determine the tonnage and adjust, as appropriate, the overall savings. Savings for these measures also vary according to SEER, EER, and HSPF values. The EM&V CSP used participant information from EEMIS to adjust the gross savings for these factors.

Savings for ENERGY STAR® dehumidifiers vary based on the size of the unit (pints). The reported manufacturer and model information reported through EEMIS were reviewed and used to determine the size of installed units. That information was then used to calculate an adjusted gross savings for this measure. The same approach was used to account for ENERGY STAR® refrigerators savings, which vary by configuration.

Adjusted gross savings also reflect any updates in savings calculations made to the TRM. Measures updated for this factor are residential programmable thermostats, room air conditioners, and refrigerators. Gross savings were also adjusted for measures that include hot water savings, specifically clothes washers and dishwashers, where savings vary based on whether the home has electric or gas water heat. The assumed fuel saturation rate was adjusted based on records and surveys.

The realization rates for all measures incorporated installation rates and adjustments for non-qualifying equipment determined through the records review, survey data, and site visits. The adjusted gross savings, calculated using the equations in the TRM and adjusted as described above, were adjusted for the realization rates. These realized savings values were then compared to the *ex ante* reported savings to determine evaluated savings realization rates.

Air-source heat pumps were an exception to this process. The *ex ante* savings for air-source heat pumps was based on a deemed value from the planning assumptions rather than the TRM algorithm due to limited time to develop that functionality in EEMIS. PPL Electric plans to modify its tracking system in PY2 to use *ex ante* savings using the TRM algorithm.

Savings Realization Rate Findings

Table 4-10 and Table 4-11 show the results of the realization rate calculations for each measure and sector. These tables also show the *ex ante* and *ex post* savings values for energy and demand by measure.

Table 4-10: Residential Measure Level Realization Rates per Unit

Measure	Realization Rate (kWh)	Ex Post kWh/yr/Unit	Realization Rate (kW)	Ex Post kW/Unit
ASHP - SEER 14.5	152%	1,966	203%	0.189
ASHP - SEER 15	84%	1,229	230%	0.243
ASHP - SEER 16	90%	1,621	263%	0.342
CAC - SEER 14.5	108%	193	134%	0.189
CAC - SEER 15	114%	261	188%	0.243
CAC - SEER 16	112%	362	188%	0.342
Clothes Washer (Tier 2 MEF)	144%	200	90%	0.015
Dishwasher	102%	107	183%	0.023
ENERGY STAR® Dehumidifier	143%	334	9%	0.012
ENERGY STAR® Refrigerator	138%	108	170%	0.015
Heat Pump Hot Water Heater	114%	2,148	89%	0.197
High-efficiency Gas Furnace (RTS fuel switching)	100%	10,000	100%	0.038
Indoor ENERGY STAR® Light Fixtures (torchiere)	313%	138	111%	0.008
Indoor ENERGY STAR® Light Fixtures	130%	57	47%	0.003
Programmable Thermostat	159%	1,138	0%	0.000
Room AC (1st unit)	123%	73	177%	0.059

Table 4-11: Non-Residential Measure Level Realization Rates per Unit

Measure	Realization Rate kWh	Ex Post kWh/yr/Unit	Realization Rate kW	Ex Post kW/Unit
ASHP - SEER 15	106%	1,555	290%	0.308
ASHP - SEER 16	113%	2,040	333%	0.432
CAC - SEER 15	155%	355	237%	0.308
CAC - SEER 16	120%	387	237%	0.432
Clothes Washer (Tier 2 MEF)	144%	200	90%	0.015
Dishwasher	102%	107	183%	0.023
ENERGY STAR® Dehumidifier	143%	334	9%	0.012
ENERGY STAR® Refrigerator	138%	108	170%	0.015
Heat Pump Hot Water Heater	114%	2,148	89%	0.197

Measure	Realization Rate kWh	Ex Post kWh/yr/Unit	Realization Rate kW	Ex Post kW/Unit
Indoor ENERGY STAR® Light Fixtures	208%	92	75%	0.005
Programmable Thermostat	154%	1,198	0%	0.000
Room AC (1st unit)	123%	73	177%	0.059

The factors used to determine the adjusted gross savings and then the realization rates are shown in the tables below. The factors used to adjust reported savings included EFLH (which vary by location based on heating and cooling degree days), capacity, SEER values, TRM changes, and configuration.

Table 4-12 and Table 4-13 show, for each measure, the variables that contributed to the realization rate for programmable thermostats and room air conditioners as well as each variable's relative percentage impact on savings. A positive percentage reflects an increase in savings, a negative percentage reflects a decrease in savings, and 0% indicates that the variable had no impact on the change in savings.

Table 4-12: Factors Contributing to Residential and Non-Residential HVAC Energy Savings

Sector	Measure	Difference in kWh/yr	EFLH (Location)	Capacity	HSPF
Residential	ASHP - SEER 14.5	674	3%	-35%	133%
	ASHP - SEER 15	-239	-14%	114%	0%
	ASHP - SEER 16	-181	-27%	185%	-58%
Non-Residential	ASHP - SEER 15	87	41%	59%	0%
	ASHP - SEER 16	238	18%	27%	56%
Residential	CAC - SEER 14.5	15	383%	-283%	0%
	CAC - SEER 15	32	280%	-180%	0%
	CAC - SEER 16	40	302%	-202%	0%
Non-Residential	CAC - SEER 15	126	91%	9%	0%
	CAC - SEER 16	65	80%	20%	0%

While the gross savings for air-source heat pumps and central air conditioners were adjusted for the factors outlined in the table above, there were no adjustments to realized saving based on site visits and or the records review. That is, all reported measures were installed and there were no adjustments for measures that were not installed or for non-qualifying equipment.

Table 4-13: Factors Contributing to Residential and Non-Residential HVAC Demand Savings

Sector	Measure	Difference in kW	Capacity	TRM Changes
Residential	ASHP - SEER 14.5	0.10	-229%	329%
	ASHP - SEER 15	0.14	-255%	355%
	ASHP - SEER 16	0.21	-280%	380%
Non-Residential	ASHP - SEER 15	0.20	1979%	-1879%
	ASHP - SEER 16	0.30	2111%	2011%
Residential	CAC - SEER 14.5	0.05	-116%	216%
	CAC - SEER 15	0.11	-211%	311%
	CAC - SEER 16	0.16	-211%	311%
Non-Residential	CAC - SEER 15	0.18	1745%	-1645%
	CAC - SEER 16	0.25	1756%	-1646%

Table 4-14 and Table 4-15 show the variables that contributed to the realization rate for programmable thermostats and room air conditioners as well as each variable's relative percentage impact on savings. A positive percentage reflects an increase in savings, a negative percentage reflects a decrease in savings, and 0% indicates that the variable had no impact on the change in savings.

Table 4-14: Factors Contributing to Residential and Non-Residential Thermostat and Room AC Energy Savings

Sector	Measure	Difference in kWh/yr	EFLH (Location)	TRM Change	Non-Qualifying Equipment (M&V)
Residential	Programmable Thermostat	384	116%		-16%
Non-Residential	Programmable Thermostat	444	100%		0.00%
All	Room AC (1st unit)	14	100%	0%	0.00%

The increases in savings for programmable thermostats are due to updates in the TRM, including operating hours (effective full load hours based on heating and cooling degree days associated with geographic locations). The impact of that change on the *ex ante* savings, however, cannot be separated due to differences in the savings methodologies between planning assumptions and the TRM. It should also be noted that the updated TRM provides a deemed demand savings of 0 kW for programmable thermostats.

Table 4-15: Factors Contributing to Residential and Non-Residential Thermostat and Room AC Demand Savings

Sector	Measure	Difference in kW	EFLH (Location)	TRM Change
Residential	Programmable Thermostat	-0.054	0%	100%
Non-Residential	Programmable Thermostat	-0.054	0%	100%
All	Room AC (1st unit)	0.026	100%	0%

Table 4-16 and Table 4-17 show the variables that contributed to the realization rate for lighting measures (interior ENERGYSTAR® fixtures) and appliances as well as each variable's relative percentage impact on savings. A positive percentage reflects an increase in savings, a negative percentage reflects a decrease in savings, and 0% indicates that the variable had no impact on the change in savings. Configuration refers to the TRM tables that stipulate savings according to the specific configuration of an appliance. For example, the TRM assigns different savings to refrigerators with top freezers, bottom freezers, side-by-side configuration, etc. The *ex ante* reported savings assumed one savings value for all refrigerators. To determine *ex post* adjusted gross savings, participant records were used to determine the configuration via the refrigerator make and model. Savings from actual installations were compared to the *ex ante* savings and the TRM table to determine the *ex post* adjustment.

Table 4-16: Factors Contributing to Residential and Non-Residential Appliance and Lighting Energy Savings

Sector	Measure	Difference in kWh	Configuration	Installation Rate, Fuel Type or Equipment Qualifications (M&V)
All	Clothes Washer (Tier 2 MEF)	65	0%	100%
	Dishwasher	2	0%	100%

Sector	Measure	Difference in kWh	Configuration	Installation Rate, Fuel Type or Equipment Qualifications (M&V)
	ENERGY STAR® Dehumidifier	121	45%	55%
	ENERGY STAR® Refrigerator	28	33%	67%
	Heat Pump Hot Water Heater	264	100%	0%
Residential	High-efficiency Gas Furnace (RTS fuel switching)	0	N/A	N/A
	Indoor ENERGY STAR® Light Fixtures (torchiere)	94	N/A	100%
	Indoor ENERGY STAR® Light Fixtures	13	N/A	100%
Non-Residential	Indoor ENERGY STAR® Light Fixtures	48	N/A	100%

Table 4-17: Factors Contributing to Residential and Non-Residential Appliance and Lighting Demand Savings

Sector	Measure	Difference in kW	Configuration	TRM Change	Installation Rate, Fuel Type or Equipment Qualifications (M&V)
All	Clothes Washer (Tier 2 MEF)	-0.001	0%	0%	100%
	Dishwasher	0.010	0%	0%	100%
	ENERGY STAR® Dehumidifier	-0.108	0%	0%	100%
	ENERGY STAR® Refrigerator	0.006	0%	56%	44%
	Heat Pump Hot Water Heater	-0.024	100%	0%	0%
Residential	High-efficiency Gas Furnace (RTS fuel switching)	0.000	N/A	N/A	N/A
	Indoor ENERGY STAR® Light Fixtures (torchiere)	0.0008	N/A	N/A	100%
	Indoor ENERGY STAR® Light Fixtures	-0.0036	N/A	N/A	100%
Non-Residential	Indoor ENERGY STAR® Light Fixtures	-0.0017	N/A	N/A	100%

Net-to-Gross (NTG) Ratio Methodology

Free-ridership

The NTG ratio was determined through self-report participant surveys with a sample of participants. The survey included spillover and free-ridership questions. The free-ridership battery of survey questions were tailored to fit the measures installed by participants of the Efficient Equipment Program free-ridership. These questions were used to develop a free-ridership score through a scoring matrix. More detail about the free-ridership analysis and the scoring matrix are included in Appendix A. No adjustments for the NTG ratio were applied to savings, as specified by the Pa PUC. Information obtained by computing the NTG ratio will be used only to refine and improve program delivery.

Spillover

To examine spillover attributable to the Efficient Equipment Program, survey respondents were asked if they made any energy-efficiency improvements or installed any energy-efficient measures where they did not receive a program rebate. They were also asked the likelihood of installing these measures if

they had not participated in the program. No adjustments were made to the *ex post* savings to incorporate spillover, per direction from SWE.

NTG Ratio Findings

Free-ridership

Of the 233 non-residential program participants, a total of 69 customers completed the survey. An analysis of those surveys yielded an overall free-ridership score of 42% at the 90% level of confidence with +/- 8% precision. For the Efficient Equipment Commercial Program, 18 survey respondents were retro-active participants, that is, they installed the equipment before the program officially launched, allowable under Act 129 program rules. The savings-weighted free-ridership score for these 18 respondents was 48%. The remaining 51 respondents installed equipment after the program launch. Of these, self reports indicate 39% were free riders, after weighting for savings.

Of the 20,571 residential program participants, a total of 83 customers completed the survey, for an overall free-ridership score of 49%, at the 90% level of confidence with +/- 8% precision. A total of 27 respondents were retro-active participants. The free-ridership score for these 27 respondents was 75%. Self reports indicate 37% of the remaining 56 respondents who installed equipment after the program launch were free riders

Spillover

Of residential survey respondents, 32% (26 of 81), and 22% of commercial sector respondents (15 of 69), stated they made energy efficiency improvements without receiving a rebate. Only three of the 26 residential sector respondents (12%) and one non-residential respondent stated the Efficient Equipment program was highly influential to their decision to install efficiency measures, and it was unlikely they would have installed measures had they not been influenced by the program.

Almost half of residential respondents, 42% of those installing additional equipment, stated they relied on the efficiency rating or ENERGY STAR® label to determine that the measure was energy efficient. The remaining relied on dealers or some other means to determine if the measures were energy efficient. Of the 15 non-residential sector respondents, one third relied on the efficiency rating or ENERGY STAR® label, and one third relied on their equipment dealer to determine that the measure was energy efficient.

Residential respondents reported they installed 185 CFLs in addition to three water heaters, a total of three heat pumps and air conditioners, and seven appliances (three dryers, two washers, one dehumidifier, and one thermostat). Respondents also reported installing a total of 27 windows. Two respondents also reported installing attic insulation. Of these measures, only one customer stated it was unlikely they would have installed the additional measures (12 CFLs) without the influence of the program.

Non-residential customers installed 234 CFLs and other lighting fixtures, 27 appliances, four furnaces, two windows, and one air conditioner without receiving a rebate. Only one customer installing 24 appliances stated it was unlikely they would have installed measures had they not been influenced by the program.

4.4.3 Program Sampling

The EE&C Plan estimated that Efficient Equipment Program participants would install 15,855 residential equipment measures and 182,347 non-residential measures in PY1. The residential program exceeded expectations with 24,863 measures installed. In contrast, only 233 measures were installed in the non-residential sector. However, no motors, fans, or large lighting projects were recorded as approved projects with processed rebates in the EEMIS system in PY1 possibly understating overall participation.

Table 4-18 and Table 4-19 below show the expected and actual measure installations for PY1.

Table 4-18: Efficient Equipment Program Residential Sector Planned and Actual PY1 Measure Installations

Program Segment	Expected PY1 Measure Installations	Actual PY1 Measure Installations
Residential – Appliances	9,010	20,032
Residential – Lighting	4,240	206
Residential – HVAC	2,605	4,625
Total Residential	15,855	24,863

Table 4-19: Efficient Equipment Program Non-Residential Sector Planned and Actual PY1 Measure Installations

Program Segment	Expected PY1 Measure Installations	Actual PY1 Measure Installations
Non-residential – Lighting	178,991	47
Non-residential – HVAC	683	70
Non-residential – Motors/Fans	940	0
Non-residential – Other	1,733	116
Total Non-residential	182,347	233

Several activities were conducted for the Efficient Equipment Program's QA/QC efforts as well as for the impact, and process evaluations. Participant surveys were conducted and included questions that pertained to all evaluation activities.

Because it was expected that a much smaller number of residential equipment measures would be rebated in PY1, the target for records verification outlined in the EM&V Plan were fewer than needed to review a sample across measures rebated. Therefore, the sample size for records review for residential equipment was increased. In the commercial sector, the only lighting projects rebated and reported were interior residential-type fixtures. Residential appliances were also rebated in the commercial sector, as well as air conditioners, and programmable thermostats. Sample sizes were adjusted accordingly. Table 4-20 shows the target and achieved sample sizes for the various data collection activities. Note that some measures were verified by more than one method (survey, site visit, records review).

Table 4-20: Summary of Data Collection Activities for Efficient Equipment

Data Collection Activity	Target	Measures Verified/Achieved	Achieved Confidence/Precision Sample Size
Participant Surveys			
Residential	70	86	Greater than 90/10
Non-Residential	70	90	Greater than 90/10
Site Visits			
Non-Residential	55	21	Less than 90/10
Records Review – Measures Rebated			
Residential	70	236	Greater than 90/10
Non-Residential	70	160	Greater than 90/10

Non-residential participants were recruited for site visits as part of the surveys. The site visits were conducted by experienced engineers over the course of two weeks in late July and early August 2010. The target of 55 measures planned for verification via site visits was based on the total number of non-residential measures. However, a large number of the measures installed were refrigerators, clothes washers, and other small appliances typically found in residential buildings. Because these types of measures were verified by phone for the residential sector, site verifications were halted for the same measures installed in commercial settings. This reduced the sample size for the commercial sector site visits. In addition, not one of the six non-residential lighting participants agreed to a site visit.

4.4.4 Process Evaluation

The PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation report dated September 15, 2010 contains the baseline process evaluation. Additional data collected from surveys and site visits will be available in future reports.

4.4.5 Program Partners and Trade Allies

PPL Electric does not currently employ a customer programs specialist to oversee implementation of the Efficient Equipment Incentive Program for the residential and small non-residential sectors. PPL Electric's non-residential customer programs specialist oversees the Efficient Equipment Incentive program's implementation for large commercial and industrial customers. The customer programs specialist manages, oversees, and monitors program performance; ensures program information is available on PPL EU's ePower Web site; provides trade ally outreach; trains and manages the marketing and administrative CSPs; and reviews all program data, large project applications, and reports. PPL Electric's KAMs promote the program and provide program support to PPL Electric's large C&I customers.

U Marketing serves as the marketing CSP for the residential and small C&I sectors. In this role, they develop marketing and communication plans and materials, inform trade allies about the program through direct mailings, and inform customers about the program through direct mailings and mass media. Trade allies also promote the program by explaining the benefits of the program to their customers and incorporating rebate values and program materials into their equipment sales approach. Trade allies also install program-eligible equipment and support customers in submitting program documentation.

PPL Electric's Administrative CSP (Helgeson Enterprises) responds to customer questions through its call center. Helgeson Enterprises is also responsible for processing rebates for this program, entering all program data into internal tracking systems, and uploading program data to EEMIS.

Trade allies are entities that provide services for participants of the Efficient Equipment program. Trade allies include, for example, HVAC contractors installing qualifying equipment, lighting contractors installing qualifying lighting, and contractors selling qualifying motors to customers. Trade allies are identified through the customer applications and from records kept by the PPL Electric Efficient Equipment Program Managers. Customer rebate forms include contractor information, as appropriate for the technology. The Administrative CSP records the contractor information in their database. These data are uploaded to EEMIS.

4.4.6 Program Finances

A summary of the project finances are presented in Table 4-21.

Table 4-21: Summary of Program Finances: TRC Test¹⁶

	Category	1Q	PYTD	CPITD
A.1	EDC Incentives to Participants	\$2,122,593	\$2,122,593	\$2,122,593
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$2,122,593	\$2,122,593	\$2,122,593
B.1	Design & Development	\$0	\$0	\$0
B.2	Administration	\$0	\$0	\$0
B.3	Management ^(a)	\$32,383	\$50,646	\$50,646
B.4	Marketing	\$0	\$0	\$0
B.5	Technical Assistance	\$0	\$0	\$0
B	Subtotal EDC Implementation Costs	\$32,383	\$50,646	\$50,646
C	EDC Evaluation Costs^(b)	\$0	\$0	\$0
D	SWE Audit Costs	\$0	\$0	\$0
E	Participant Costs^(c)	\$3,873,309	\$3,873,309	\$3,873,309
	Total Costs	\$6,028,285	\$6,046,548	\$6,046,548
F.1	Annualized Avoided Supply Costs – Residential^(d)		\$75.79	\$75.79
F.2	Annualized Avoided Supply Costs – Small C&I		\$61.10	\$61.10
F.3	Annualized Avoided Supply Costs – Large C&I		\$51.14	\$51.14
G	Lifetime Avoided Supply Costs		\$10,897,538	\$10,897,538
	Total Lifetime Economic Benefits		\$10,897,538	\$10,897,538
	Program Benefit-to-Cost Ratio		1.80	1.80

¹⁶ Definitions for terms in the following table are subject to TRC Order.

Category	IQ	PYTD	CPITD
<p>NOTES:</p> <p>[a] Includes PPL Electric's implementation, management and oversight of this program.</p> <p>[b] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.</p> <p>[c] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs.</p> <p>[d] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1. [a] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.</p>			

4.5 Low-Income WRAP

The Universal Services Program (USP) Low-Income Winter Relief Assistance Program (WRAP) is a PPL Electric program that existed prior to Act 129 and has offered services since 1985. WRAP is designed to reduce electric consumption and improve living comfort for low-income customers. Eligible customers receive a free energy audit and their home is evaluated for eligible energy saving measures. A pre-approved list of cost-effective measures is used along with other criteria to determine if appliances and other larger equipment can be cost-effectively replaced. Implementer agencies have either in-house contractors or they contract out installation of the energy saving measures. Outdated and inefficient equipment in customer homes is replaced with energy-efficient equipment. Energy education is also offered through WRAP to encourage customers to conserve energy.

Act 129 WRAP targets customers up to 150% of the federal poverty level. The program is available to customers in existing single-family housing and in existing multi-family housing (with three or more dwelling units) where 50% or more of the tenants are low-income qualified. The Act 129 WRAP seeks to reach new participants, PPL Electric customers who received WRAP assistance in the past and may be in need of further WRAP services, and customers that may not have been eligible for low-income assistance due to eligibility rules, such as requiring at least one year of pre-participation kWh usage data.

A more detailed description of the WRAP's objectives and theory are provided in the program's QA/QC and EM&V Plan.

4.5.1 Program Logic

The program theory for low-income WRAP can be summarized as follows:

Assisting low-income households that lack the resources to invest in energy efficient equipment will reduce household energy use, energy bills, and energy burden. Providing this assistance will help the household stabilize bill payment and provide a more comfortable and energy efficient home.

The elements of the program's logic model are:

Program Inputs. Program inputs include the targeted low-income population, the staff members who implement various aspects of the program, energy audit and other technical equipment necessary for program implementation, computer systems, energy education materials, and applications, forms and any other paperwork used in implementation activities.

Program Activities. Program activities begin with qualifying participants' eligibility, conducting energy audits and measure eligibility assessments, and include installation of energy efficient measures, energy education, and referrals to other organizations.

Program Outputs. Program outputs include all the immediate results of the program activities, such as participant enrollment, income qualification of participants, audits completed, repairs completed and energy saving measures installed, and number of clients served. Typically, items that do not require verification or are not important enough to verify with limited dollars are included in the logic model as outputs but are not addressed separately in the evaluation plan.

Short-term outcomes (one year) include establishing participant eligibility for individual measures, improving safety and health of participant homes, increasing the energy efficiency of equipment in participant homes, increasing participant knowledge.

Intermediate outcomes (two to three years) include installation of selected measures that are cost-effective, reducing energy use of participant households through efficient equipment and conservation. Client energy usage stability also improves, resulting in better energy conservation and bill-paying behaviors.

Long term outcomes (four to seven years) are the desired final program impacts, and they include energy savings resulting from energy efficient equipment upgrades and conservation behaviors in the participating low-income population. Customer energy usage and payment behavior stability also improves.

4.5.2 Program M&V Methodology

The M&V methodology for PY1 included records verification. PPL Electric records WRAP participant data in their WRAP V database. Data include, for example, the job type, measures installed, and materials and labor costs. Data is uploaded from WRAP V to the EEMIS system. A measures table was developed to compute measure level savings for the Act 129 participants. EEMIS and WRAP program tracking databases assigned PY 1 *ex ante* savings based on the measure level deemed savings. The M&V analysis reviewed the savings calculations at the measure level and found a number of errors in the algorithms that compute savings. Extensive effort was expended by both PPL Electric and the EM&V CSP to document and correct the programming and reporting issues. (Additional discussion is included in the Process Evaluation.) Because of time and resource limitations, the savings are not reported on a measure-by-measure level. PPL Electric and their independent WRAP program evaluator evaluate the existing USP WRAP program and report energy savings achieved to the PA PUC on an annual basis. The Act 129 PY1 savings are reported using stipulated savings by job type approved by the PA PUC for 2008 installations. This method is consistent with recent discussions between the PA EDCs and the SWE in which the parties decided that Act 129 WRAP savings will be deemed values based on the most recent PA PUC-approved savings for each USP WRAP job-type from a prior period (based on billing/consumption analysis) until such time as a billing analysis can be completed for Act 129 WRAP projects. PPL Electric expects to submit a CMP to the SWE describing this method.

The revised Evaluation Plan incorporates decisions of the Low-income Working Group and extensive discussion between the EDCs, the SWE, and PPL. Analytic methods for future program years are described in the Evaluation Plan.

Savings Realization Rate Methodology

PY1 M&V included data review included review and verification of a random sample of contractor reports, WRAP V records and EEMIS data. Extensive reviews of the EEMIS and WRAP V database savings algorithms and underlying Measures Tables were conducted.

The EM&V CSP did not conduct on-site verification visits. PPL Electric inspects 60% of the full cost jobs and the SWE inspected a sample of Act 129 WRAP jobs. Given the contribution of this program's savings to the overall portfolio and limited resources, the EM&V CSP determined no additional site visits were necessary.

Savings Realization Rate Findings

The claimed program savings were not adjusted for Program Year 1, that is, the realization rate is assumed to be 100%. The evaluation considered installation rates determined from a sample of contractor's records compared to data entered in the WRAP V tracking system. Examination found only two measures installed but not recorded: one showerhead and one refrigerator. Other issues were identified in the SWE's verification reviews including, for example, CFLs that were reportedly not installed but invoiced. However, PPL Electric notes that WRAP regulations allow the contractors to leave two uninstalled replacement bulbs. In other cases there was slight underreporting of measures installed. Therefore, for the program overall, adjustments are too small to assume the realization rate is other than 100%.

Table 4-22: Act 129 WRAP Program Average Savings and Realization Rates

Sector	Ex ante kWh/yr Savings	Ex ante kW Savings	Realized kWh/yr Savings	Realized kW Savings	Realization Rate – kWh	Realization Rate - kW
Low Income	1,086,502	134	1,086,502	134	100%	100%

The *ex ante* and *ex post* savings are based on the following three job types and associated savings:

- Baseload jobs = 1042 kWh/yr * 491 jobs = 511,622 kWh/yr
- Low Cost jobs = 1588 kWh/yr * 112 jobs = 177,856 kWh/yr
- Full Cost jobs = 1306 kWh/yr * 304 jobs = 397,024 kWh/yr

Net-to-Gross (NTG) Ratio

Free-ridership

There is no free-ridership in this low-income weatherization program. Measures are installed at no cost to these income eligible customers. In addition, no adjustments were made to compute savings net of free-ridership for the Act 129 programs. Until directed otherwise by the SWE, the EM&V CSP will collect data and report the information for program process improvements only.

Spillover

There is no spillover assumed for this low-income weatherization program.

4.5.3 Program Sampling

No participant surveys were conducted for the evaluation. The M&V data review included review and verification of a random sample of 12 contractor's reports, WRAP V records, and EEMIS data (90%

confidence and 30% precision). The EM&V CSP analyzed all PY1 participant records and the application of savings methodology at the measure level. PPL Electric also reviews 100% of the Act 129 records entered into WRAP V database. The SWE conducted verification site visits for a sample of participants. PPL Electric conducts site visits at 60% of sites with full cost weatherization jobs.

4.5.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. Additional data collected from surveys and site visits will be available in future reports.

4.5.5 Program Partners and Trade Allies

The PPL Electric Customer Relations Specialist for the USP WRAP program oversees Act 129 WRAP activities. The Act 129 WRAP uses the same delivery and tracking system that the USP WRAP program uses. The WRAP Customer Relations Specialist oversees the development of the WRAP V data tracking system to capture Act 129 WRAP data and assign measure level deemed savings. The WRAP Specialist is responsible for ensuring that these data gathered for WRAP are extracted and uploaded to the EEMIS system.

PPL Electric funds, administers, monitors, and recruits customers to participate in WRAP. The program is delivered by Community Based Organizations (CBOs) and private contractors, which provide energy audits and the direct installation measures. CBOs also coordinate, under the direction of PPL Electric, the installation of larger equipment measures (weatherization, heating system equipment, appliances, etc.), minor repairs, and safety measures. PPL Electric also uses contractors to conduct third-party inspections. CBOs that currently deliver the company's WRAP will continue to provide these services under Act 129. CBOs will be encouraged to combine Act 129 funding with federal, state, or other human services funding to provide a whole-house energy-efficiency solution.

4.5.6 Program Finances

A summary of the project finances are presented in Table 4-23.

Table 4-23: Summary of Program Finances: TRC Test¹⁷

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$728,649	\$1,074,632	\$1,074,632
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$666,149	\$824,632	\$824,632
B.1	Design & Development	\$0	\$0	\$0
B.2	Administration	\$0	\$0	\$0
B.3	Management ^(a)	\$188,276	\$314,226	\$314,226
B.4	Marketing	\$0	\$0	\$0
B.5	Technical Assistance	\$0	\$0	\$0

¹⁷ Definitions for terms in the following table are subject to TRC Order.

	Category	1Q	PYTD	CPITD
B	Subtotal EDC Implementation Costs	\$188,276	\$314,226	\$314,226
C	EDC Evaluation Costs ^(b)	\$0	\$0	\$0
D	SWE Audit Costs	\$0	\$0	\$0
E	Participant Costs ^(c)	\$0	\$0	\$0
	Total Costs	\$916,925	\$1,388,858	\$1,388,858
F.1	Annualized Avoided Supply Costs – Residential ^(d)		\$75.79	\$75.79
F.2	Annualized Avoided Supply Costs – Small C&I			
F.3	Annualized Avoided Supply Costs – Large C&I			
G	Lifetime Avoided Supply Costs		\$1,169,798	\$1,169,798
	Total Lifetime Economic Benefits		\$1,169,798	\$1,169,798
	Program Benefit-to-Cost Ratio		0.84	0.84
NOTES: [a] Includes PPL Electric's implementation, management and oversight of this program. [b] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio. [c] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs. [d] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1. [a] EDC Evaluation, SWE Audit, and a majority of EDC Implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.				

Because incentives are not paid directly to participants in this program, incentive costs reflect the total cost of installing measures including hardware, labor, audit, and inspection costs.

4.6 Renewable Energy Program

The Renewable Energy Program encourages PPL Electric's customers to install a solar photovoltaic (PV) array or ground-source heat pump (GSHP) at their home or building. This program offers a financial incentive in the form of a rebate that reduces upfront system costs. Customers are also encouraged to reduce their loads by installing applicable energy-efficiency measures prior to installing a renewable energy system.

The program is available to residential and institutional customers (government, non-profit, and schools). For each of these customer segments, the program uses a consistent delivery and administrative strategy; however budgets, savings, and impacts will be tracked and reported separately.

The objectives of the Efficient Equipment Incentive Program include:

- Encourage customers to install renewable energy equipment.
- Support the use of renewable energy equipment.
- Promote other PPL Electric Energy Efficiency and Conservation programs.

- Achieve energy and demand savings.

4.6.1 Program Logic

The Renewable Program theory can be summarized as follows:

By providing an incentive for installation of renewable energy systems, systems will be installed that would not have been installed in the absence of the program. Customers will learn of the energy benefits and achieve energy and demand savings. Contractors/installers gain experience designing and installing this equipment, which will increase the knowledge base and further sales, achieving additional energy and demand savings.

The program logic examines key program features and describes linkages between inputs, activities, outputs, and outcomes. The program logic elements are as follows:

Program inputs. Program inputs include the target customers, PPL Electric staff support, program applications and forms, and market actor support and expertise.

Activities the program undertakes. The primary program activities include marketing, providing educational materials about renewable technologies, providing a list of trade allies, and providing up-front rebates to customers who install renewable technologies.

Outputs produced by program activities. Outputs include the number and types of marketing activities that have been done, the number of trade allies participating in the program, the number of program participants, the number and size of PV and GSHP systems installed, the quality of the installations, and the total amount of incentive money that has been paid out.

Short-term outcomes (one year) include increased program awareness, increased customer interest in renewable technologies, and increased customer knowledge of renewable technologies, and increased installations of renewable technologies.

Intermediate outcomes (two to three years) include a reduction in peak energy demand, a reduction in annual energy consumption and a decrease in participant electric bills.

Long-term outcomes (four to seven years) include a smoother and easier to manage demand curve, long-term reductions in peak energy demand and annual energy consumption, and aiding in market transformation toward cleaner energy sources.

The Renewable Energy Program logic model can be found in Section 1 of the Renewable Energy Evaluation Plan.

4.6.2 Program M&V Methodology

The complete discussion of the M&V methodology can be found in Sections 3, 4 and 5 of the Renewables QA/QC and EM&V Plan.

Savings Realization Rate Methodology

The reported program savings were verified using various methods to determine the savings attributable to the measure and the realization rate of the measures installed. These methods included verification through surveys and a comparison of rebate records and documentation to EEMIS reported values. Verification was also achieved through site visits conducted at a sample of sites.

The *ex post* evaluated savings incorporate two levels of adjustments. First, reported savings were adjusted from those reported in EEMIS (*ex ante* reported gross savings) based on systems installed through the program (tonnage, efficiency, and EFLH determined through heating and cooling degree days of cities stipulated in the TRM). This adjustment accounted for differences between planning assumptions and installed equipment and relied solely on information in the EEMIS tracking database. Second, adjustments were made for installation rates and qualifying equipment using survey data, site visits, and records review. These adjustments reflect the results of measurement and verification activities.

For a sample of measures, the site visits verified that the equipment type and quantity reported was installed. The records review verified data in the online EEMIS database, EEMIS extract, rebate applications, Administrative CSP records, and, in some cases, a database search to verify product specifications.

Adjustments were made to savings based on actual PY1 participation. Energy savings vary according to the assumed EFLH cooling and heating assumptions for each city represented in the TRM. The EM&V CSP accounted for that variation in program participation in the adjusted gross savings. Tonnage, average EER, and COP of installed units also impacted the savings realization. Over 70% of the models' EER and COP values were verified and those results were extrapolated to the population. In addition to reflecting information about installed measures, the adjusted gross savings reflect changes to the TRM made between the EE&C Plan approval and the PY1 evaluation.

The realization rates for each measure incorporated installation rates as verified through site visits and survey data. The records review also yielded an adjusted size value for installations and revealed that two non-residential systems were actually residential installations. These elements of the EM&V analysis are reflected in the realization rate.

The adjusted gross savings, calculated using the equations in the TRM, were adjusted for the realization rates. These realized savings values were then compared to the *ex ante* reported savings to determine evaluated savings and realization rates.

It is important to note that due to the small number of non-residential systems (two units) and their small capacity on the order of the residential sizes, the residential equations to calculate kWh/yr and kW savings were used in place of the commercial calculations that were geared for large system capacities.

Savings Realization Rate Findings

Realization rates were calculated for residential and non-residential systems and are shown below in Table 4-24. The realization rate for demand savings was impacted by a change in the TRM.

Table 4-24: Ground-Source Heat Pump Average Savings and Realization Rates per Unit and Sector

Sector	Realization Rate (kWh)	Ex Post kWh/yr	Realization Rate (kW)	Ex Post kW
Residential	186%	7,259	386%	1.09
Non-Residential	18%	8,961	23%	1.29

The residential savings realization rates increased primarily because of increased average system size over planning assumptions and more efficient average EER and COP values than expected. The non-residential savings values decreased dramatically because of a significant drop in average system size over the planning assumptions.

The following four tables discuss the relative impact of changes to savings related to each variable updated. The ordering of these variables represents the order of updates entered into the equation to estimate impact on savings. For example, the first update was system size, followed by geographical distribution (HDD/CDD), and so on. Adjusted gross variables account solely for differences between planning and reported (EEMIS) values. M&V variables reflect realization rates determined through surveys, site visits, and records verification.

Table 4-25: Explanation for Increase in Average Residential kWh/yr per Unit

Variable	Plan Value	Reported/Evaluated Value	% of Total Change
Adjusted Gross Variables			
Updating System Size	3 tons	3.4 tons	15%
EFLH (Location)	Scranton	4 Cities	-4%
EER	14.1	23.6	28%
COP	3.3	4.28	60%
M&V Variables			
Size		98.8%	0%
Percentages may not sum to 100% due to rounding.			

The average residential energy savings increased by 3,349 kWh/yr from 3,910 kWh/yr to 7,259 kWh/yr, a realization rate of 186%. This was due to the updated values outlined in the table above. The increase in EER and COP are responsible for the majority of the savings increase. The observed installation rate from surveys and site visits was 100% therefore producing no net change in savings. The realization rate from records review for system size was 98.8%, therefore decreasing the overall kWh/yr savings slightly.

Table 4-26: Explanation for Increase in Average Residential kW per Unit

Variable	Plan Value	Reported/Evaluated Value	% of Total Change
Adjusted Gross Variables			
Updated TRM kW Calculation in TRM	N/A	N/A	-22%
System Size	3 tons	3.4 tons	2%
EER	14.1	23.6	120%
M&V Variables			
Size		98.8%	0%
Percentages may not sum to 100% due to rounding.			

The average residential demand savings increased by 0.81 kW from 0.282 kW to 1.09 kW, a realization rate of 386%. This was due to the updated values outlined in the table above. The increase in EER was the primary variable increasing savings. While the observed installation rate from surveys and site visits was 100%, producing no net change in savings, the realization rate from records review for system size was 98.8%, decreasing overall kW savings slightly.

Table 4-27: Explanation for Decrease in Average Non-Residential kWh/yr per Unit

Variable	Plan Value	Reported/Evaluated Value	% of Total Change
Adjusted Gross Variables			
Updating System Size	146 tons	4.2 tons	-101%
EFLH (Location)	Scranton	4 Cities	-0.1%
EER	20	23.6	0.7%
COP	4.0	4.28	1.5%
M&V Variables			
Size		98.8%	-1.2%
Percentages may not sum to 100% due to rounding.			

The average non-residential energy savings decreased by 39,878 kWh/yr from 48,839 kWh/yr to 8,961 kWh/yr, a realization rate of 18% due to the adjustments outlined in the table above.

Table 4-28: Explanation for Decrease in Average Non-Residential kW per Unit

Variable	Plan Value	Reported/Evaluated Value	% of Total Change
Adjusted Gross Variables			
Updated TRM kW Calculation in TRM	N/A	N/A	-67%
System Size	146 tons	4.2 tons	-39%
EER	20	23.6	7%
M&V Variables			
Size		98.8%	0%
Percentages may not sum to 100% due to rounding.			

The average non-residential demand savings decreased by 4.3 kW from 5.6 kW to 1.29 kW, a realization rate of 23 due to the adjustments outlined in the table above.

NTG Ratio Methodology

Free-ridership

The NTG ratio was determined through self report participant surveys with a sample of participants. The questions proposed in the free-ridership battery of survey questions were tailored to participants of the Renewables Program to develop a free-ridership score using a scoring matrix. More detail about the free-ridership analysis can be found in Appendix A. No adjustments for the NTG ratio were applied to savings, as specified by the PA PUC. Information obtained by computing the NTG ratio will be used only to refine and improve program delivery.

Spillover

To examine spillover attributable to the Renewables Program, survey respondents were asked if they made any energy-efficiency improvements or installed any energy-efficient measures where they did not receive a program rebate. They were also asked the likelihood of installing these measures if they had not participated in the program. No adjustments were made to the *ex post* savings to incorporate spillover, per direction from SWE.

NTG Ratio Findings

Free-ridership

Of the 382 program participants, a total of 63 customers completed the survey for whom there is an overall free-ridership score of 73%. For the Renewables Program, 27 survey respondents were retro-active participants, that is, they installed the GSHP before the program officially launched, allowable under program rules. The free-ridership score for these 27 was 71%. The remaining 56 respondents installed GSHPs after the program launch. Of these, self reports indicate 47% were free riders.

Spillover

One quarter of the survey respondents (15 of 61) stated they made energy efficiency improvements without receiving a rebate. Only three of the 15 stated the program was highly influential and it was unlikely they would have installed measures had they not been influenced by the program. Almost half, 47% stated they relied on the efficiency rating or ENERGY STAR® label to determine that the measure was energy efficient. The remaining relied on their internet research or their contractors to determine if the measures were energy efficient.

Respondents reported they installed 218 CFL in addition to seven ceiling fans, three refrigerators, one heat pump water heater, and one dishwasher. Other measures respondents reported they installed included a total of 63 windows, 45 solar panels, three installed attic insulation, two thermostats, one windmill, and a wood burning fireplace.

4.6.3 Program Sampling

The Renewables Program was planned for both PV and GSHP systems rebated in PY1, however, there were no PV systems reported in PY1, and nearly four times the expected GSHP rebates. Table 4-29 below shows the expected and actual participation for PY1.

Table 4-29: Renewable Energy Program Expected and Actual Participation for PY1

Sector	Measure	Expected PY1 Participation	Actual PY1 Participation
Residential	PV	260	0
Non-Residential	PV	15	0
Residential	GSHP	75	382
Non-Residential	GSHP	25	2
Total		375	384

Several activities were conducted for the Renewable Program for QA/QC, impact, and process evaluations. Participant surveys were conducted and included questions affecting all evaluation activities. During this survey, participants were recruited for a possible site visit. These site visits were conducted by experienced engineers over two weeks in late July and early August. Because it was expected that a much smaller number of GSHPs would be rebated in PY1, the target for records verification was much less than deemed prudent with the final PY1 level of participation. With 384 GSHP installed, a sample size of 58 is needed to meet 90% confidence and 10% precision. Table 4-30 shows the target and achieved sample sizes for the various data verification activities.

Table 4-30: Summary of Data Collection Activities for GSHPs

Data Collection Activity	Target	Measures Verified Achieved	Achieved Confidence/Precision
Site Visits	60	56	Nearly 90/10
Records Verification	10	61	90/10
Participant Surveys	64	63	90/10

4.6.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. Additional data collected from surveys and site visits will be available in future reports.

4.6.5 Program Partners and Trade Allies

PPL Electric's customer programs specialist provides: general program management and oversight; develops the program communications plan; initiates program marketing to trade allies; monitors the program; reviews large project and institutional applications; responds to customers' interconnection questions; grants final eligibility approval for all projects; resolves program issues; and approves project installations, invoices, program data, and reports.

PPL Electric's administrative CSP, Helgeson Enterprises, also plays a vitally important role in the Renewable Energy Program's operation. Their responsibilities include marketing the program to PPL Electric customers and trade allies; disseminating interconnection agreement and associated information; responding to customer and trade ally questions; reviewing rebate reservation forms, project documentation, and project completion reports; making initial determinations on project eligibility; issuing rebate payments; and tracking and reporting program data.

Trade allies, primarily renewable energy system installers, provide technical assessments at customer sites and install the PV systems and GSHPs.

4.6.6 Program Finances

A summary of the project finances are presented in Table 4-31.

Table 4-31: Summary of Program Finances: TRC Test¹⁸

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	\$287,230	\$287,230	\$287,230
A.2	EDC Incentives to Trade Allies	\$0	\$0	\$0
A	Subtotal EDC Incentive Costs	\$287,230	\$287,230	\$287,230
B.1	Design & Development	\$0	\$0	\$0

¹⁸ Definitions for terms in the following table are subject to TRC Order.

B.2	Administration	\$0	\$0	\$0
B.3	Management ^[a]	\$38,402	\$69,242	\$69,242
B.4	Marketing	\$0	\$0	\$0
B.5	Technical Assistance	\$0	\$0	\$0
B	Subtotal EDC Implementation Costs	\$38,402	\$69,242	\$69,242
C	EDC Evaluation Costs^[b]	\$0	\$0	\$0
D	SWE Audit Costs	\$0	\$0	\$0
E	Participant Costs^[c]	\$864,770	\$864,770	\$864,770
	Total Costs	\$1,190,402	\$1,221,242	\$1,221,242
F.1	Annualized Avoided Supply Costs – Residential^[d]		\$75.79	\$75.79
F.2	Annualized Avoided Supply Costs – Small C&I		\$61.10	\$61.10
F.3	Annualized Avoided Supply Costs – Large C&I			
G	Lifetime Avoided Supply Costs		\$3,684,807	\$3,684,807
	Total Lifetime Economic Benefits		\$3,684,807	\$3,684,807
	Program Benefit-to-Cost Ratio		3:02	3.02
NOTES:				
[a] Includes PPL Electric's implementation, management and oversight of this program.				
[b] EDC Evaluation, SWE Audit, and a majority of EDC implementation costs are common costs and are not, therefore, attributable to individual programs. Common costs are distributed to sector portfolios for cost-recovery purposes. In this report, all common costs are accounted for in the portfolio.				
[c] The participant costs reported are net incentives paid by PPL Electric. The incremental cost is equal to the sum of the incentives and the participant costs.				
[d] The annualized avoided supply costs represent the average annual avoided cost for the sector in PY1.				

Appendix A: Free-ridership Analyses

Free-ridership quantifies the percentage of participants who report they would have installed a measure in the absence of the program. According to the Audit Plan, until a Commission order is issued, only gross savings will be reported and verified.¹⁹ That is, there will be no adjustment of gross savings by the NTG ratio.

Efficient Equipment and Renewables Programs

Free-ridership survey data was collected and analyzed for three of PPL Electric's Energy Efficiency programs in PY1 using the scoring matrix approach. The programs included Efficient Equipment (with different surveys for Commercial and Residential sectors), Renewables, and CFL Distribution. This self-report approach for calculating free-ridership is an industry-standard methodology. Questions were designed to understand why customers installed a given measure, and the influence the program had over those decisions. The survey goal was to determine what the decision maker might have done in the program's absence.

In conducting surveys with the battery of questions, the EM&V CSP randomly selected customers participating in PPL Electric's energy efficiency programs. Results of the survey questions were used in a scoring matrix to determine each participant's free-ridership score between 0 and 100%. Scores were then weighted by savings free-ridership to account for the differences in energy savings of different measures and projects. Scores of the Efficient Equipment participants were weighted by the estimated savings of the equipment installed by the respondent.

There are five core questions asked in the survey that are used in the free-ridership scoring matrix:

- Would the participant have installed the measure without the program?
- Had the participant already ordered or installed the measure before learning about the program?
- Would the participant have installed the measure to the same level efficiency without the program incentive?
- Would the participant have installed the same quantity of measures without the program?
- In absence of the program, when would the respondent have installed the measures?

Commercial Efficient Equipment has an additional sixth question included in its scoring matrix. That question asks the participants if the purchase and installation of the measure was included in their most recent capital budget. This question is asked of commercial participants since their budgeting and planning horizon can be quite long, spanning several years. The budget question is not included in the matrix for Residential Efficient Equipment and Renewables programs for residential customers. Residential home owners rarely budget for equipment purchases.

The scoring matrix shown below illustrates various response permutations and the respective free-ridership score. For example, if the customer did not know about the measure before hearing about the program and had no plans to install the measure, they were not free riders. Likewise, if they knew about

¹⁹ Statewide Evaluation Team, Audit Plan and Evaluation Framework for Pennsylvania Act 129 Energy Efficiency and Conservation Programs, Dec. 2009. Pages 25, 93, 95

the program, but had no plans to install the measure, they were not free riders. Participants who were 100% free riders responded with various combinations of knowing about the measure, having plans to install the measure, having already ordered or purchased the measure before they heard about the program, and would have installed the measure without the rebate at a future time.

Table A-1. Free-ridership Matrix Example

Would have Installed without Program	Already Ordered or Installed	Same Efficiency	Would have Installed all of the Measures	Planning to Install Soon	Already in Budget	free-ridership Score
Yes	Yes	x	x	x	x	100%
No	x	x	x	x	x	0%
Yes	No	No	x	x	x	0%
Yes	No	Yes	Yes	Yes	Yes	50%
Yes	No	Yes	Yes	No	Yes	25%
Yes	No	Yes	Yes	Yes	No	25%
Yes	No	Yes	Yes	No	No	0%
Yes	No	Yes	No	Yes	Yes	25%
Yes	No	Yes	No	No	Yes	12.50%
Yes	No	Yes	No	Yes	No	12.50%
Yes	No	Yes	No	No	No	0%

Customers can also be partial free riders. Partial scores were assigned to customers who had plans to install the measure, and the program exerted some influence over that decision. Where the program had less influence over the decision, and the customer was highly likely to install the measure, the customer received a higher free-ridership score.

CFL Campaign

CFL Customer Survey Free-ridership Analysis

The EM&V CSP conducted a telephone survey with a random sample of residential PPL Electric customers as the primary means of assessing the CFL Campaign's PY1 NTG ratio. The survey began with a battery of questions to identify respondents who were aware of CFLs prior to the survey. Responses from the 278 respondents who were aware of CFLs (out of 352 total respondents) were used in the NTG analysis.

CFL Customer Survey Methodology

Through their answers to the customer survey, respondents were grouped into four categories including:

1. Recent CFL purchasers who bought or received free-of-charge a CFL within the last three months and were aware of PPL Electric's CFL program before they participated in the survey.
2. Recent CFL purchasers who were unaware of PPL Electric's CFL program.
3. Respondents who were aware of CFLs but had not recently purchased one.

4. Respondents who were unaware of CFLs prior to answering the survey questions.

The NTG analysis incorporated respondents from the first three categories above. Based on their responses to a battery of free-ridership questions, all of the respondents in the first category were found to be free riders.

Two scenarios were developed for the respondents in category 2 above (recent CFL purchasers unaware of the program): in the first, half were assumed to be free riders; in the second scenario 100% were assumed to be free riders (the same free-ridership percentage as the category 1 respondents, i.e., recent CFL purchasers aware of the program). The respondents in category 3 (aware of CFL but not a recent purchaser) were assigned a free-ridership value of 0%.

Free-ridership rates for scenarios 1 and 2 are 19% and 31%, respectively. Because it is highly unlikely that all recent CFL purchasers who were unaware of the CFL Campaign would have purchased the same quantity of CFLs without the program discount, the free-ridership value is likely toward the lower end of the 19%-31% range.

Furthermore, as mentioned above, previous studies have found spillover to substantially increase upstream CFL program NTG ratios. However, since spillover generally occurs a fair amount of time after the initial purchase is made—longer than the recent three month period of interest in the customer survey—the customer survey did not include questions about spillover from the CFL Campaign. Since the NTG ratio derived from customer survey includes free-ridership but not spillover, the EM&V CSP considers the 69-81% NTG range (where NTG is computed as $1 - \text{free-ridership}$) to be a conservative (low end) estimate.

Customer Survey Results

The survey determined that 85 of the 278 respondents had recently (within the last three months) purchased or received free-of-charge one or more CFLs. This respondent group was categorized as “recent CFL purchasers.”

Of the 85 recent CFL purchasers, 19 were aware that PPL Electric sponsors a program enabling customers to buy CFLs at discounted prices. The respondents who were aware of the CFL Campaign were asked a series of questions to determine whether they were free riders. Specifically, they were asked if they would have purchased the same CFLs at the same time in the absence of the program. Additional questions queried the respondents about whether they would have purchased the same total quantity and the same wattages of CFLs in the absence of the program. Based on their answers, all 19 respondents were found to be free riders; the free-ridership score for this group was 100%.

The EM&V CSP next considered a second group—the recent CFL purchasers who were unaware of PPL Electric’s program. Since these respondents were not aware of the CFL Campaign’s existence, the free-ridership battery of questions did not apply to them. As a result, the EM&V CSP was unable to determine their free-ridership status directly through the customer survey.

Therefore, to establish a range for the overall program’s free-ridership, the EM&V CSP defined two scenarios. In the first, free-ridership for recent CFL purchasers who were unaware of the program is assumed to be 100%—the same as for the recent CFL purchasers who were aware of the program. In the second scenario, free-ridership for recent CFL purchasers who were unaware of the program is assumed

to be considerably less than for the aware customers; the value of 50% was assigned for this scenario. Respondents who were aware of CFLs but did not purchase or receive any within the last three months were assigned a free-ridership value of 0%. The two scenarios are presented in the Table below. free-ridership rates for scenarios 1 and 2 are 19% and 31%, respectively.

Table A-2: Free-ridership Analysis Summary

Survey Segment	N _i Customers Surveyed	Scenario 1: Low free-ridership	Scenario 2: High free-ridership
		FR = 50% for Recent CFL Purchasers Unaware of Program	FR = 100% for Recent CFL Purchasers Unaware of Program
Recent CFL Purchasers			
Aware of PPL Electric's Program	19	100%	100%
Unaware of PPL Electric's Program	66	50%	100%
All Others Aware of CFLs Prior to the Survey	193	0%	0%
Total	278	19%	31%

Because it is highly unlikely that all recent CFL purchasers who were unaware of the CFL Campaign would have purchased the same quantity of CFLs without the program discount, the free-ridership value is likely toward the lower end of the 19-31% range.

Furthermore, as mentioned above, previous studies have found spillover to substantially increase upstream CFL program NTG ratios. However, since spillover generally occurs a fair amount of time after the initial purchase is made—longer than the recent three month period of interest in the customer survey—the customer survey did not include questions about spillover from the CFL Campaign. Since the NTG ratio derived from customer survey includes free-ridership but not spillover, the EM&V CSP considers the 69%-81% NTG range (where NTG is computed as $1 - \text{free-ridership}$) to be a conservative (low end) estimate.

The targeted and actual sample sizes for the CFL customer survey are show in Table A-3.

Table A-3. CFL Campaign Customer Survey Actual and Targeted Sample Sizes

Respondent Type	Description	Actual Sample Size (Annual)	Target Sample Size and Type ²
Recent CFL Purchaser ^{1,3}	Respondents who purchased CFLs within the last 3 months	85	100 Min
Recent Purchaser ³	Respondents who purchased CFLs or incandescents within the last 3 months	159	100 Max
Earlier CFL Purchaser	Respondents who purchased CFLs more than 3 months ago	160	100 Max
Unaware	Respondents who are unaware of CFLs, even after prompting	24	100 Max
Non-Purchasers (CFLs)	Respondents who have never purchased any CFLs	58	100 Max
Non-Users (CFLs)	Respondents who are currently not using or storing CFLs at their home	27	100 Max

Respondent Type	Description	Actual Sample Size (Annual)	Target Sample Size and Type2
<p>NOTES: The most critical respondent type was Recent CFL Purchasers, with a minimum target of 100 respondents per year. The above sampling plan has two target types: Min and Max. Once the target sample size was reached for a respondent type with a specified maximum, there was no need to complete surveys with additional respondents in that category. If an additional respondent was identified once a maximum target was reached, the surveyor ended the call, i.e., "thank and terminate". Earlier studies have shown the accuracy of respondents' recall about small purchases (such as CFLs) drops off significantly as time passes. Therefore, all Recent Purchasers were limited to those who bought light bulbs within the past three months. While respondents who fall into the Non-Purchasers category also fall into the Non-Users category, these categories were tracked separately since different questions about CFL awareness, purchases, and use apply to each.</p>			

Note that in some cases a single respondent may have fallen into more than one of these respondent groups. For example, a respondent who was completely unaware of CFLs and never purchased any was counted in each of the last three respondent groups. Similarly, a respondent who purchased a CFL within the past three months was counted in both the Recent CFL Purchaser and Recent Purchaser groups.

Corporate-Level CFL Retailer Interviews

The CFL CSP regards its participating lighting manufacturer and retailer contact information as proprietary. The lack of readily available trade ally contact information rendered the task of conducting trade ally interviews more challenging than anticipated for the EM&V CSP. As a result, the EM&V CSP completed five interviews with participating corporate-level retailers, rather than the 12 interviews anticipated in the CFL EM&V and QA/QC Plan.

Retailer respondents were asked if they thought their sales of ENERGY STAR® CFLs in central and eastern Pennsylvania during 2010 would be the same, higher, lower—and by how much—if PPL Electric's upstream incentives had not been available. All of the respondents replied that their sales would have been lower in the absence of the CFL Campaign. Their estimates were that sales of standard ENERGY STAR® CFLs would have been 50% to 95% lower (sales of specialty CFLs, a small fraction of total CFL sales, would have been 45% to 83% lower).

The retailer respondents were also asked to estimate the percentage of their total CFL sales in central and eastern Pennsylvania they could attribute to PPL Electric's CFL Campaign. While one respondent was unable to provide an estimate, the other respondents gave answers ranging from 70% to 95%.

For each retailer, the EM&V CSP divided the respondent's first estimate (the drop in CFL sales the retailer would expect in the absence of the program) by their second estimate (the percentage of total CFL sales attributable to the program). This ratio provides an approximation for the program's NTG ratio. The NTG ratios derived in this way ranged from 53% to 100%, with an average of 78%.

While the retailer sample size was not large enough to provide statistically valid results, and the individual retailers' responses were based on "back-of-the-envelope" estimates, the retailer survey nevertheless provides a ballpark estimate for the CFL Campaign's NTG ratio.