POST & SCHELL PC
ATTORNEYS AT LAW

17 North Second Street
12th Floor
Harrisburg, PA 17101-1601
717-731-1970 Main
717-731-1985 Fax
www.postschell.com

Andrew S. Tubbs

atubbs@postschell.com
717-612-6057 Direct
717-731-1985 Fax
File #: 2507/140069

January 17, 2012

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
P.O. Box 3265
Harrisburg, PA 17105-3265

M-2009-2093216

RE: Quarterly Report for the Period September 1, 2011 to November 30, 2011
Program Year 3 of PPL Electric Utilities Corporation's Act 129 Plan

Dear Secretary Chiavetta:

Pursuant to the Pennsylvania Public Utility Commission's May 25, 2011 Secretarial Letter issued at Docket No. M-2008-2069887, PPL Electric Utilities Corporation ("PPL Electric") hereby files its Quarterly Report for the Period September 1, 2011 to November 30, 2011 – Program Year 3 of PPL Electric's Act 129 Plan of 2008.

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

Quarterly Report to the Pennsylvania Public Utility Commission

For the period September 1, 2011 to November 30, 2011
Program Year 3

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

Prepared by PPL Electric and The Cadmus Group, Inc.
January 15, 2012

Table of Contents

Abbreviations (see Appendix A: Glossary of Terms for definitions)

AHRI	Air-Conditioning, Heating, and Refrigeration Institute
ARP	Appliance Recycling Program
ASHP	Air-source heat pump
BPI	Building Performance Institute
CAC	Central air conditioner
CBO	Community-based organization
CEC	California Energy Commission
CF	Coincidence factor
CFL	Compact fluorescent lighting
C&I	Commercial and industrial
CMP	Custom measure protocol
COP	Coefficient of performance
CPITD	Cumulative program/portfolio inception-to-date
CSP	Conservation services provider
ECM	Electronically commutated motor
EDC	Electric distribution companies
EE&C	Energy efficiency and conservation
EEMIS	Energy Efficiency Management Information System
EER	Energy efficiency ratio
EFLH	Equivalent full load hours
EIC	Eic | Comfort Home
EMS	Energy management system
EM&V	Evaluation, measurement, and verification
EPS	E-Power Solutions
FDSI	Field Diagnostic Services, Inc.
GNI	Government, non-profit, and institutional
GSHP	Ground-source heat pump
HOU	Hours-of-use
HSPF	Heating seasonal performance factor
IQ	Incremental quarter
ISR	In-service rate
JACO	JACO Environmental Inc.
KAMs	Key Account Managers
kW	Kilowatt
kWh	Kilowatt hour
M&V	Measurement and verification
MW	Megawatt
MWh	Megawatt hour
NTG	Net-to-gross
PUC	Public Utility Commission
PV	Photovoltaic
PYTD	Program/portfolio year-to-date
QA/QC	Quality assurance/quality control
RAP	Resource Action Program Inc.
RCT	Randomized control trial

RTF	Regional Technical Forum
SEER	Seasonal energy efficiency ratio
SSEMVP	Site specific evaluation, measurement, and verification plan
SVG	Savings factor (typically used to estimate savings for lighting controls)
SWE	Statewide Evaluator
TOU	Time-of-use
TRC	Total Resource Cost
TRM	Technical Reference Manual
USP	Universal Services Program
VSD	Variable speed drive
WRAP	Winter Relief Assistance Program

1 Overview of Portfolio

Act 129, signed October 15, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania. Pursuant to those 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 3, Quarter 2 (PY3 Q2, ending November 30, 2011), with the last verification activity occurring in PY3 Q1.

The following outlines the compliance goal progress as of the end of the reporting period:[1]

Cumulative Portfolio Energy Impacts[2]

- The cumulative program/portfolio inception-to-date (CPITD) verified savings through PY2 plus reported savings in PY3 are 742,481 MWh/yr.
- The CPITD reported gross energy savings are 767,225 MWh/yr.[3]
- Reported energy savings to date are approximately 67% of the May 31, 2013 compliance target (1,146,000 MWh/yr). The compliance targets are based on verified savings. Therefore, approximately 1,207,000 MWh/yr of reported savings are required to achieve 1,146,000 MWH/yr of verified savings at an estimated realization rate of 95%.
- The CPITD preliminary verified energy savings[4] are 542,011 MWh/yr.
- The CPITD preliminary verified savings are 47% of the 1,146,000 MWh/yr, May 31, 2013 energy savings compliance target.[3]
- The CPITD reported participation is 301,387 participants[5] excluding the Residential Lighting Program (formerly Compact Fluorescent Lighting (CFL) Campaign), and approximately 1,113,138 participants[6] including the Residential Lighting Program.

[1] The percentage of compliance target achieved was calculated using verified cumulative program/portfolio inception-to-date (CPITD) values (or, if not available, preliminary verified values) divided by the compliance target value.

[2] The CPITD is the most meaningful performance metric to compare to compliance targets.

[3] This total excludes MWh savings in the Energy Efficiency Behavior & Education Program that occurred prior to the current program year. Annual savings in that program are not considered to be cumulative.

[4] PPL Electric does not think that preliminary verified savings (or likewise, preliminary verified demand reduction) is a meaningful metric, because it does not distinguish between transactions that were verified and those where no verification has yet taken place. For example, preliminary verified savings could be 50% of reported savings if all transactions were verified and there is a 50% realization rate (an obviously bad result), or preliminary verified savings could be 50% of reported savings if only half of the transactions were verified to date and have a 100% realization rate (an obviously good result).

[5] This is based on the number of transactions (rebate forms). Note that a customer transaction may include multiple measures. Also, a customer may submit multiple transactions and, by definition, could be counted as a participant more than once.

[6] See Table 1-3 for an estimate of Residential Lighting Program participants.

Portfolio Demand Reduction

- The CPITD reported gross demand reduction is 107.85 MW,[7] which is approximately 36% of the September 30, 2012 compliance target (297 MW).
- The CPITD preliminary verified demand reduction is 69.64 MW.[3]
- The CPITD preliminary verified demand reduction is 23% of the 297 MW May 31, 2013 demand reduction compliance target.[3]

Low-Income Sector[8]

- There are 102 measures offered to the low-income sector, comprising 50% of the total measures offered. That percentage significantly exceeds the compliance requirement of 8.64%.
- The CPITD reported gross energy savings for low-income sector programs (excluding low-income participants in non-low-income programs) are 10,546 MWh/yr.
- The CPITD preliminary verified energy savings for low-income sector programs (excluding low-income participants in non-low-income programs) are 8,577 MWh/yr.[3]

Government, School, and Non-Profit Sector (Institutional Sector)

- CPITD reported energy savings to date for government, school, and non-profit sector programs are 72,844 MWh/yr, which is approximately 64% of the May 31, 2013 compliance target (114,600 MWh/yr). The compliance targets are based on verified savings. Approximately 136,500 MWh/yr of reported savings are required to achieve 116,000 MWH/yr of verified savings at an estimated realization rate of 85%.
- The CPITD preliminary verified energy savings for government, school, and non-profit sector programs are 41,461 MWh/yr.[3]
- The CPITD preliminary verified savings are 36% of the 114,600 MWh/yr May 31, 2013 energy savings compliance target.[3]
- The CPITD preliminary verified savings are 32% of the 29.7 MW May 31, 2013 demand reduction compliance target.[3]

The following outlines the program year portfolio highlights as of the end of the reporting period:

- The program/portfolio year-to-date (PYTD) reported gross energy savings are 246,428 MWh/yr.
- The PYTD preliminary verified energy savings are only 45,958 MWh/yr, because all verification activities have not been completed for PY3 savings.[3]
- The PYTD reported gross demand reduction is 43.51 MW.[6]
- The PYTD preliminary verified demand reduction is only 3.92 MW, because all verification activities have not been completed for PY3 savings.[3]

[7] This number only includes *constant* peak load reductions from energy efficiency measures. Peak load reductions from demand response measures (for the Direct Load Control Program and the Load Curtailment Program) will only apply during the summer of 2012.

[8] The Final Annual Report, issued in November each year, will include estimates of gross and verified savings attributable to low-income participants in non-low-income programs.

- The PYTD reported participation is 129,810 participants in all programs (excluding the Residential Lighting Program).

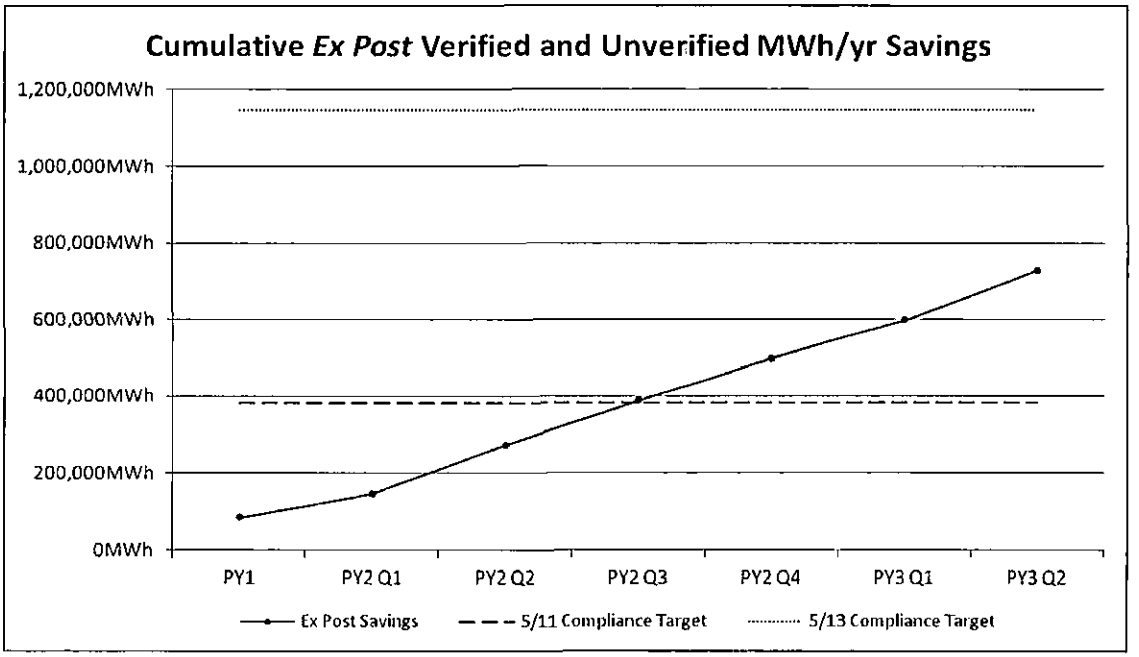
There are 14 programs in PPL Electric's portfolio that were approved in the EE&C Plan. All programs except the New Home Program have been launched. Time-of-Use (TOU) Program rates were launched, but the associated savings will not count toward Act 129 EE&C compliance targets. PPL Electric will file a Petition to drop the TOU Program and the New Home Program from the EE&C Plan. The following 10 programs claimed savings in the first quarter of PY3:

- The Appliance Recycling Program (ARP) offers customers incentives to have their outdated refrigerators, freezers, and air conditioners recycled.
- The Efficient Equipment Incentive Program offers prescriptive rebates to residential and non-residential customers.
- The Custom Incentive Program offers custom incentives to non-residential customers per kilowatt hour (kWh) saved in the first year of participation.
- The Residential Lighting Program (formerly CFL Campaign) is an upstream program offering incentives to manufacturers to buy down the cost of CFLs; manufacturers and retailers then lower the cost of CFLs to consumers.
- The Renewable Energy Program encourages PPL Electric customers to install a solar photovoltaic (PV) array or ground-source heat pump (GSHP) through financial incentives that reduce the upfront system costs.
- The Low-Income Winter Relief Assistance Program (WRAP) provides weatherization to low-income customers, with Act 129 funding used to expand the existing Low-Income Usage Reduction Program.
- The E-Power Wise Program provides low-income customers with information about energy use, as well as with home energy kits.
- The HVAC Tune-Up Program offers services to all commercial and small industrial customers with an existing split or packaged HVAC rooftop unit(s).
- The Residential Energy Assessment & Weatherization Program provides residential customers with information about their homes' energy performance and gives recommendations on the most effective, highest priority energy efficiency actions they can take to save energy in their homes.
- The Energy Efficiency Behavior & Education Program encourages customers to take energy-saving actions by sending periodic reports with energy saving tips and usage comparisons to other peer customers.

The Direct Load Control Program and Load Curtailment Program will only claim savings from June 1 through September 30, 2012, since that is the only period when peak load reductions apply. PPL Electric began recruiting participants for the Direct Load Control Program in PY2 Q4 and began recruiting participants for the Load Curtailment Program in PY3 Q1.

Figure 1-1 shows the quarterly progress of PPL Electric's suite of energy efficiency programs. This figure provides a rough benchmark comparing progress to targets. For years prior to PY3, the savings displayed below are *ex post* verified. As all verification activities have not been complete, all *ex post* savings (verified and unverified) are shown for PY3.

Figure 1-1: CPITD Reported Gross Energy Savings by Quarter, Relative to May 2011 and May 2013 Compliance Targets



1.1 Summary of Portfolio Impacts

A summary of the portfolio reported impacts is presented in Table 1-1. The reported gross impacts reflect savings reported in PPL Electric's tracking database. Those reported *ex ante* savings from the tracking database were adjusted by PPL Electric's independent evaluator, where necessary, to reflect differences between the methods used to determine savings in the tracking database and the methods in the Technical Reference Manual (TRM), or to reflect data capture errors. Where applied, these adjusted *ex ante* savings are explained in more detail in the program chapters.

The adjusted *ex ante* savings were used to calculate verified savings. In this report, verified *ex post* savings include only those measures that meet the following criteria: (1) a TRM or custom measure protocol (CMP), or site specific evaluation, measurement, and verification plan (SSEMVP) was approved for the measure, and (2) *ex post* verification activities are complete.

Table 1-1: EDC Reported Portfolio Impacts Through the End of the Reporting Period[a]

Impact Type	Total Energy Savings (MWh/yr)	Total Demand Reduction[b] (MW)
Reported Gross Impact: Incremental Quarterly	138,500	25.59
Reported Gross Impact: PYTD	246,428	43.51
Reported Gross Impact: CPITD	767,255	107.85

Impact Type	Total Energy Savings (MWh/yr)	Total Demand Reduction[b] (MW)
Adjusted *Ex Ante* Impact: Incremental Quarterly[c]	138,957	27.41
Adjusted *Ex Ante* Impact: PYTD	245,206	46.20
Adjusted *Ex Ante* Impact: CPITD	762,888	119.26
PYTD Unverified *Ex Post* Savings[d]	187,127	36.00
Estimated Impact: Projects in Progress[e]	91,199	10.00
Estimated Impact: PYTD Total Committed	337,626	53.51
Preliminary PYTD Verified Impact[f], [g]	45,958	3.92
Preliminary CPITD Verified Impact[f]	542,011	69.64
Preliminary PYTD Net Impact[f], [h]	26,656	2.10
Preliminary CPITD Net Impact[f]	392,325	50.16

NOTES:
[a] The CPITD is the most meaningful performance metric to compare to compliance targets.
[b] These numbers only include *constant* peak load reductions from energy efficiency measures. Peak load reductions from demand response measures (for the Direct Load Control Program and the Load Curtailment Program) will only apply during the summer of 2012.
[c] Adjusted *ex ante* reflect savings adjustments that account for data errors (such as duplicate records), information about the systems installed through the programs (tonnage, efficiency, and geographic location), or to reflect differences between the method used to determine savings in the tracking system and the method in the TRM. At this time, the evaluation, measurement, and verification (EM&V) conservation services provider (CSP) made adjustments based on PY3 Q1 and PY2 Annual Report evaluation results, as the evaluation efforts for PY3 Q2 are in progress.
[d] Unverified *ex post* savings are pending approval of a TRM Protocol or CMP by the PUC. In addition, unverified savings are those with an approved protocol but which have not yet been verified. Verification activities for PY3 are in progress, affecting the results for a majority of the *ex post* unverified savings in the PY3 Q2 report.
[e] Projects in progress are defined as projects where the measure has not been installed, the measure has been installed but is not yet operable, or the rebate check has not yet been issued. For purposes of this report, only projects under the Custom Incentive Program are included in this summary.
[f] This total excludes MWh savings in the Energy Efficiency Behavior & Education Program that occurred prior to the current program year. Annual savings in that program are not considered to be cumulative.
[g] This is the portfolio verified impact, which is calculated by aggregating PYTD verified impacts. The EM&V CSP calculated PYTD verified impacts by multiplying PYTD reported gross impacts by program realization rates. As verification activities for PY3 are in progress, there are few PYTD verified *ex post* savings to report.
[h] This is the portfolio net impact, which is calculated by aggregating program net impacts. The net-to-gross (NTG) ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY3 Annual Report, which will be filed in November 2012. NTG ratios from the PY2 Annual Report, filed November 15, 2011, will be used as placeholders for PY3 until PY3 surveys are completed and analyzed. The NTG information is only used to improve program design. NTG is not used for compliance purposes.

Per instruction from the Statewide Evaluator (SWE), the Total Resource Cost (TRC) benefits, costs, and ratios are not calculated for quarterly reports. The TRC will be calculated for final annual reports only, at which time Table 1-2 will be updated.

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

TRC Category	IQ[a]	PYTD[a]	CPITD
TRC Benefits ($)	Not Required	Not Required	Not Required
TRC Costs ($)	Not Required	Not Required	Not Required
TRC Benefit-Cost Ratio		Not Required	Not Required

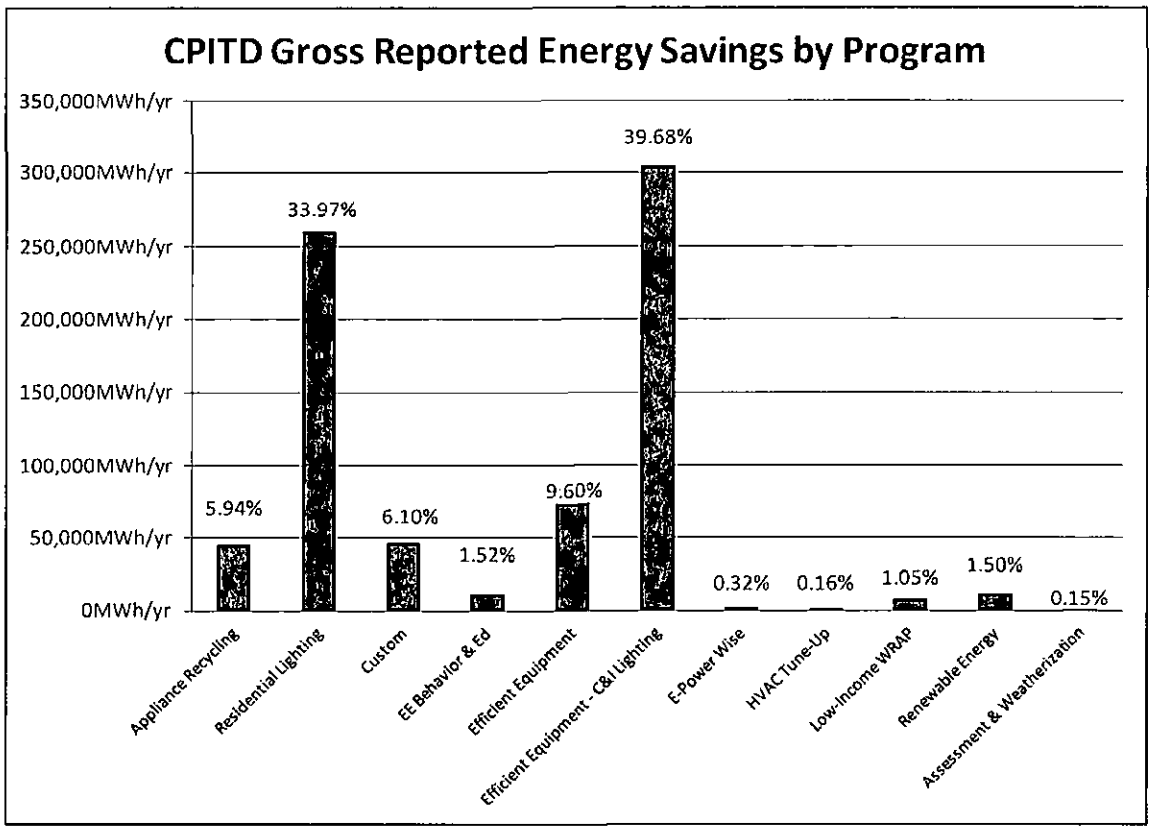
NOTES:
[a] Based on reported gross savings.

A summary of portfolio finances is available in Section 1.5.

1.2 Summary of Energy Impacts by Program

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

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



A summary of the energy impacts by program through PY3 Q1 is presented in Table 1-3 and Table 1-4.

Table 1-3: EDC Reported Participation and Gross Energy Savings by Program Through the End of the Reporting Period

Program	Participants			Reported Gross Impact (MWh/yr)[a]			*Ex Post* Verified through PY2 + PY3 Reported (MWh/yr)
	IQ	PYTD	CPITD	IQ	PYTD	CPITD	
Appliance Recycling Program	3,702	6,823	24,646	6,343	11,644	45,579	45,814
Residential Lighting Program[b]	92,701	164,185	811,751	29,853	52,786	260,624	260,624
Custom Incentive Program	33	53	108	18,625	30,644	46,822	47,375
Energy Efficiency Behavior &	101,470	101,470	101,470	11,667	11,667	11,667	11,667

Program	Participants			Reported Gross Impact (MWh/yr)[a]			*Ex Post* Verified through PY2 + PY3 Reported (MWh/yr)
	IQ	PYTD	CPITD	IQ	PYTD	CPITD	
Education Program[c]							
Efficient Equipment Incentive Program (non-lighting measures)	750	15,962	154,796	3,655	6,623	73,665	64,394
Efficient Equipment Incentive Program (commercial and industrial lighting)	950	1,830	3,826	65,952	129,153	304,482	284,668
E-Power Wise Program	644	1,243	5,293	408	741	2,479	2,843
Low-Income WRAP	744	1,292	6,396	1,159	1,842	8,067	8,030
Renewable Energy Program	1	1	1,714	279	279	11,497	14,857
HVAC Tune-Up Program	250	712	1,423	408	780	1,247	1,247
Residential Energy Assessment & Weatherization Program	228	424	1,715	151	269	1,125	961
TOTAL PORTFOLIO	201,473	293,995	1,113,138	138,500	246,428	767,255	742,481

NOTES:
[a] Reported gross impacts reflect savings directly from PPL Electric's Energy Efficiency Management Information System (EEMIS) reporting database.
[b] As an upstream program, exact participation in the Residential Lighting Program is not known. The EM&V CSP estimated the number of program participants by dividing the total number of bulbs discounted (622,957 in PY3 Q2; 480,379 in PY3 Q1; 3,056,236 in PY2; and 1,342,595 in PY1) by a CFL-per-participant value derived from the customer telephone survey data (6.7 bulbs in both PY2 and PY3 and 7.0 bulbs in PY1). The CFL count reflects the total number of program bulbs, including discounted bulbs sold at retail stores and bulbs distributed at give-away events.
[c] Values reported here exclude savings that occurred prior to the current program year. Annual savings in this program are not considered to be cumulative.

Table 1-4: EDC Reported Gross Unverified Energy Savings and Projects in Progress by Program: PYTD Through the End of the Reporting Period

Program	Unverified *Ex Post* Savings (MWh/yr)[a]	Projects in Progress (MWh/yr)[b]	PYTD Total Committed (MWh/yr)[c]	EE&C Plan Estimate for Program Year (MWh/yr)	Estimate Committed (%)
Appliance Recycling Program	6,321	-	11,644	35,311	33%
Residential Lighting Program	29,853	-	52,786	92,742	57%
Custom Incentive Program	13,337	91,199	121,842	39,331	310%
Energy Efficiency Behavior & Education Program	11,667	-	11,667	4,525	258%
Efficient Equipment Incentive Program (non-lighting measures)	8,078	-	6,623	228,229	59%
Efficient Equipment Incentive Program (commercial and industrial lighting)	114,413	-	129,153		
E-Power Wise Program	310	-	741	338	220%
Low-Income WRAP	2,219	-	1,842	4,829	38%
Renewable Energy Program	0	-	279	6,163	5%
HVAC Tune-Up Program	780	-	780	7,054	11%
Residential Energy Assessment &	148	-	269	1,721	16%

Program	Unverified *Ex Post* Savings (MWh/yr)[a]	Projects In Progress (MWh/yr)[b]	PYTD Total Committed (MWh/yr)[c]	EE&C Plan Estimate for Program Year (MWh/yr)	Estimate Committed (%)
Weatherization Program					
TOTAL PORTFOLIO	187,127	91,199	337,626	420,244	80%

NOTES:
[a] Unverified *ex post* savings are pending approval of a TRM Protocol or EMP by the PUC. In addition, unverified savings are those with an approved protocol but which have not yet been verified.
[b] This column reflects energy efficiency projects currently being processed and tracked by PPL Electric, but that were not complete by the time of this report. A complete project is defined as a one in which: (1) the electronically commutated motor (ECM) has been installed, (2) the ECM is commercially operable, and (3) a rebate check has been issued. Not all projects that are in progress will be completed.
[c] This reflects the estimated gross impacts, including reported impacts and in-progress impacts, through the end of the current quarter.

A summary of evaluation verified energy impacts by program is presented in Table 1-5 and Table 1-6.

Table 1-5: Preliminary PYTD Energy Savings by Program Through the End of the Reporting Period

Program	PYTD Reported Gross Impact (MWh/yr)[a]	PYTD Adjusted *Ex Ante* Impact (MWh/yr)[b]	PYTD Preliminary Realization Rate	Preliminary PYTD Verified Impact[c] (MWh/yr)	PYTD Preliminary NTG Ratio[d]	PYTD Net Impact (MWh)
Appliance Recycling Program	11,644	11,605	100%	5,278	61%	3,206
Residential Lighting Program	52,786	52,786	100%	22,933	77%	17,659
Custom Incentive Program	30,644	30,644	100%	17,329	31%	5,372
Energy Efficiency Behavior & Education Program	11,667	11,667	100%	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	6,623	10,158	80%	-	N/A	-
Efficient Equipment Incentive Program (commercial and industrial lighting)	129,153	124,413	92%	-	N/A	-
E-Power Wise Program	741	686	87%	288	100%	288
Low-Income WRAP	1,842	2,221	100%	-	N/A	-
Renewable Energy Program	279	0	112%	-	N/A	-
HVAC Tune-Up Program	780	780	100%	-	N/A	-
Residential Energy Assessment & Weatherization Program	269	245	113%	129	102%	131
TOTAL PORTFOLIO	246,428	245,206	95%	45,958	58%	26,656

Program	PYTD Reported Gross Impact (MWh/yr)[a]	PYTD Adjusted *Ex Ante* Impact (MWh/yr)[b]	PYTD Preliminary Realization Rate	Preliminary PYTD Verified Impact[c] (MWh/yr)	PYTD Preliminary NTG Ratio[d]	PYTD Net Impact (MWh)
NOTES: [a] Reported gross impacts reflect savings directly from PPL Electric's EEMIS reporting database. Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses. [b] At the time of this report, no adjustments had been made for PY3 Q2 reported savings. [c] This total excludes MWh savings in the Energy Efficiency Behavior & Education Program that occurred prior to the current program year. Annual savings in that program are not considered to be cumulative. [d] The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY3 Annual Report, which will be filed in November 2012. NTG ratios from the PY2 Annual Report, filed November 15, 2011, will be used as placeholders for PY3 until PY3 surveys are completed and analyzed.						

Table 1-6: Preliminary CPITD Energy Savings by Program Through the End of the Reporting Period

Program	CPITD Reported Gross Impact (MWh/yr)[a]	CPITD Adjusted *Ex Ante* Impact (MWh/yr)[b]	CPITD Preliminary Realization Rate	Preliminary CPITD Verified Impact[c] (MWh/yr)	CPITD Preliminary NTG Ratio[d]	CPITD Net Impact (MWh)
Appliance Recycling Program	45,579	45,776	100%	39,448	60%	23,615
Residential Lighting Program	260,624	260,624	100%	230,771	78%	179,549
Custom Incentive Program	46,822	46,822	101%	34,061	31%	10,559
Energy Efficiency Behavior & Education Program	11,667	11,667	100%	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	73,665	77,342	85%	57,771	54%	31,222
Efficient Equipment Incentive Program (commercial and industrial lighting)	304,482	293,521	92%	155,515	85%	132,359
E-Power Wise Program	2,479	3,275	82%	2,390	100%	2,390
Low-Income WRAP	8,067	8,446	100%	6,187	100%	6,187
Renewable Energy Program	11,497	13,058	112%	14,578	35%	5,140
HVAC Tune-Up Program	1,247	1,247	100%	468	100%	469
Residential Energy Assessment & Weatherization Program	1,125	1,111	87%	822	102%	835
TOTAL PORTFOLIO	767,255	762,888	96%	542,011	72%	392,325

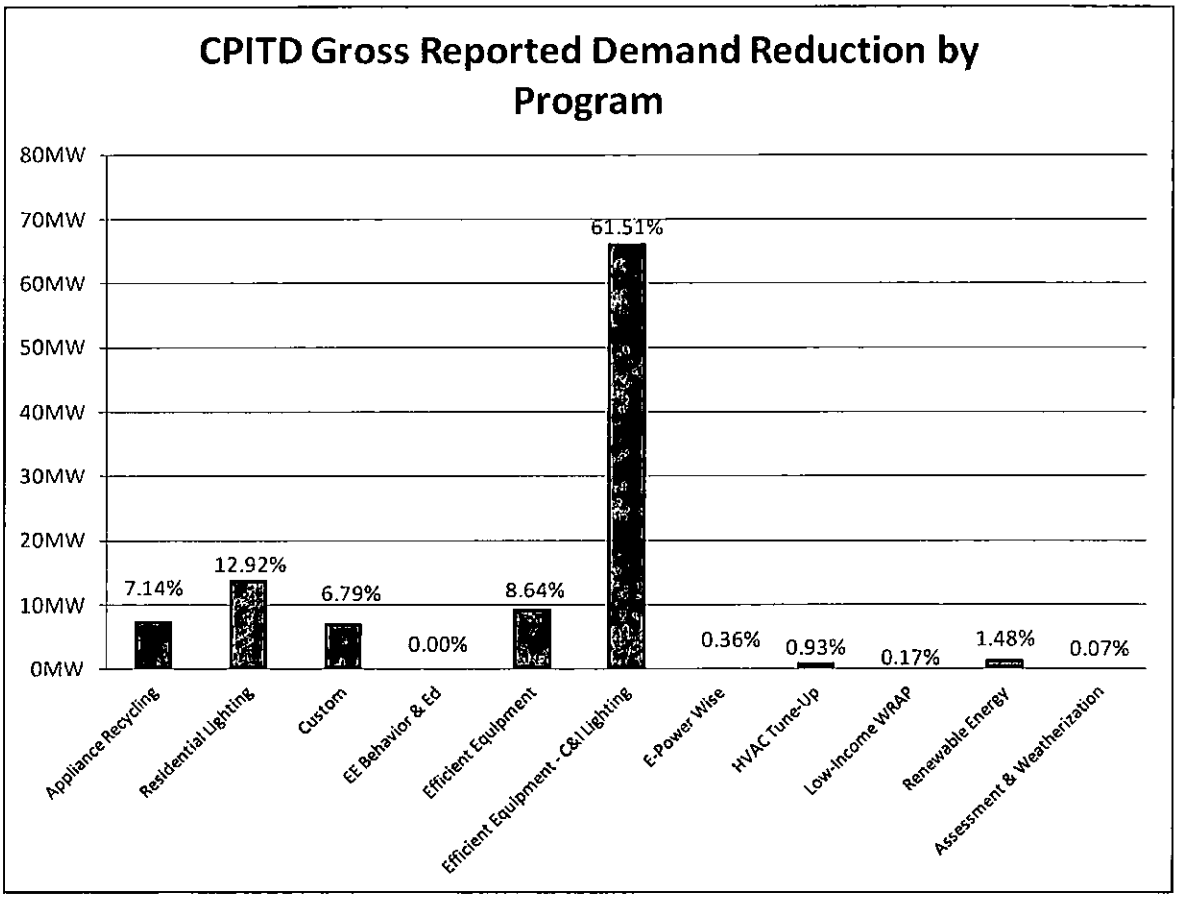
Program	CPITD Reported Gross Impact (MWh/yr)[a]	CPITD Adjusted *Ex Ante* Impact (MWh/yr)[b]	CPITD Preliminary Realization Rate	Preliminary CPITD Verified Impact[c] (MWh/yr)	CPITD Preliminary NTG Ratio[d]	CPITD Net Impact (MWh)

NOTES:
[a] Reported gross impacts reflect savings directly from PPL Electric's EEMIS reporting database. Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.
[b] At the time of this report, no adjustments had been made for PY3 reported savings.
[c] This total excludes MWh savings in the Energy Efficiency Behavior & Education Program that occurred prior to the current program year. Annual savings in that program are not considered to be cumulative.
[d] The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY3 Annual Report, which will be filed in November 2012. NTG ratios from the PY2 Annual Report, filed November 15, 2011, will be used as placeholders for PY3 until PY3 surveys are completed and analyzed.

1.3 Summary of Demand Impacts by Program

A summary of the reported demand reduction by program is presented in Figure 1-3. Results include only the *constant* peak load reductions from energy efficiency measures. Peak load reductions from demand response measures (for the Direct Load Control Program and the *Load Curtailment* Program) will only apply during the summer of 2012.

Figure 1-3: Reported Demand Reduction by Program Through the End of the Reporting Period



A summary of reported demand reduction impacts by program through PY3 Q2 is presented in Table 1-7 and Table 1-8.

Table 1-7: Participation and Reported Gross Demand Reduction by Program Through the End of the Reporting Period

Program	Participants			Reported Gross Impact (MW)[a]			*Ex Post* Verified through PY2 + PY3 Reported (MWh/yr)
	IQ	PYTD	CPITD	IQ	PYTD	CPITD	
Appliance Recycling Program	3,702	6,823	24,646	1.01	1.89	7.70	9.00
Residential Lighting Program[b]	92,701	164,185	811,751	1.37	2.50	13.94	14.89
Custom Incentive Program	33	53	108	1.86	4.50	7.32	6.54
Energy Efficiency Behavior & Education Program[c]	101,470	101,470	101,470	-	-	-	0.00
Efficient Equipment Incentive Program (non-lighting measures)	750	15,962	154,796	0.64	1.05	9.31	10.34
Efficient Equipment Incentive	950	1,830	3,826	20.27	32.65	66.34	63.04

Program	Participants			Reported Gross Impact (MW)[a]			*Ex Post* Verified through PY2 + PY3 Reported (MWh/yr)
	IQ	PYTD	CPITD	IQ	PYTD	CPITD	
Program (commercial and industrial lighting)							
E-Power Wise Program	644	1,243	5,293	0.09	0.17	0.39	0.36
Low-Income WRAP	744	1,292	6,396	-	-	0.18	0.83
Renewable Energy Program	1	1	1,714	0.16	0.16	1.60	3.06
HVAC Tune-Up Program	250	712	1,423	0.17	0.56	1.00	1.04
Residential Energy Assessment & Weatherization Program	228	424	1,715	0.03	0.03	0.07	0.13
TOTAL PORTFOLIO	201,473	293,995	1,113,138	25.59	43.51	107.85	109.23

NOTES:
[a] Reported gross impacts reflect savings directly from PPL Electric's EEMIS reporting database. 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 in the Residential Lighting Program is not known. The EM&V CSP estimated the number of program participants by dividing the total number of bulbs discounted (622,957 in PY3 Q2; 480,379 in PY3 Q1; 3,056,236 in PY2; and 1,342,595 in PY1) by a CFL-per-participant value derived from the customer telephone survey data (6.7 bulbs in both PY2 and PY3 and 7.0 bulbs in PY1). The CFL count reflects the total number of program bulbs, including discounted bulbs sold at retail stores and bulbs distributed at give-away events.
[c] Values reported here exclude savings that occurred prior to the current program year. Annual savings in this program are not considered to be cumulative.

Table 1-8: Reported Gross Demand Reduction by Program Through the End of the Reporting Period

Program	Unverified *Ex Post* Savings (MW)[a]	Projects In Progress (MW)[b]	PYTD Total Committed (MW)[c]	EE&C Plan Estimate for Program Year (MW)	Estimate Committed (%)
Appliance Recycling Program	1.09	-	1.89	4.05	47%
Residential Lighting Program	1.48	-	2.50	14.49	17%
Custom Incentive Program	1.67	10.00	14.50	7.80	186%
Energy Efficiency Behavior & Education Program	-	-	-	0.51	0%
Efficient Equipment Incentive Program (non-lighting measures)	1.06	-	1.05	40.64	83%
Efficient Equipment Incentive Program (commercial and industrial lighting)	29.74	-	32.65		
E-Power Wise Program	0.03	-	0.17	0.05	368%
Low-Income WRAP	0.30	-	-	0.78	0%
Renewable Energy Program	0.00	-	0.16	0.67	24%
HVAC Tune-Up Program	0.60	-	0.56	3.66	15%
Residential Energy Assessment & Weatherization Program	0.03	-	0.03	0.17	19%
TOTAL PORTFOLIO	36.00	10.00	53.51	72.81	73%

Program	Unverified *Ex Post* Savings (MW)[a]	Projects In Progress (MW)[b]	PYTD Total Committed (MW)[c]	EE&C Plan Estimate for Program Year (MW)	Estimate Committed (%)

NOTES:
[a] Unverified *ex post* savings are pending approval of a TRM Protocol or CMP by the PUC.
[b] Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.
[c] This reflects the estimated gross impacts, including reported impacts and in-progress impacts, through the end of the current quarter.

A summary of evaluation adjusted demand impacts by program is presented in Table 1-9 and Table 1-10. The adjusted *ex ante*, realization rate, and NTG ratio in the tables reflect results reported in the PY2 Annual Report.

Table 1-9: Verified PYTD Demand Reduction by Program Through the End of the Reporting Period

Program	PYTD Reported Gross Impact (MW)[a]	PYTD Adjusted *Ex Ante* Impact (MW)[b]	PYTD Preliminary Realization Rate	Preliminary PYTD Verified Impact[c] (MW)	PYTD Preliminary NTG Ratio[d]	PYTD Net Impact (MW)
Appliance Recycling Program	1.89	2.05	100%	0.96	61%	0.58
Residential Lighting Program	2.50	2.71	100%	1.23	77%	0.94
Custom Incentive Program	4.50	4.71	71%	1.68	31%	0.52
Energy Efficiency Behavior & Education Program	-	-	-	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	1.05	1.54	69%	-	N/A	-
Efficient Equipment Incentive Program (commercial and industrial lighting)	32.65	34.21	87%	-	N/A	-
E-Power Wise Program	0.17	0.06	84%	0.03	100%	0.03
Low-Income WRAP	-	0.30	100%	-	N/A	-
Renewable Energy Program	0.16	0.00	112%	-	N/A	-
HVAC Tune-Up Program	0.56	0.60	100%	-	N/A	-
Residential Energy Assessment & Weatherization Program	0.03	0.02	230%	0.02	102%	0.02
TOTAL PORTFOLIO	43.51	46.20	86%	3.92	54%	2.10

NOTES:
[a] Reported gross impacts reflect savings directly from PPL Electric's EEMIS reporting database. Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.
[b] At the time of this report, no adjustments had been made for PY3 Q2 reported savings.
[c] This total excludes MWh savings in the Energy Efficiency Behavior & Education Program that occurred prior to the current program year. Annual savings in that program are not considered to be cumulative.
[d] The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY3 Annual Report, which will be filed in November 2012. NTG ratios from the PY2 Annual Report, filed November 15, 2011, will be used as placeholders for PY3 until PY3 surveys are completed and analyzed.

Table 1-10: Verified CPITD Demand Reduction by Program Through the End of the Reporting Period

Program	CPITD Reported Gross Impact (MW)[a]	CPITD Adjusted *Ex Ante* Impact (MW)[b]	CPITD Preliminary Realization Rate	Preliminary CPITD Verified Impact[c] (MW)	CPITD Preliminary NTG Ratio[d]	CPITD Net Impact (MW)
Appliance Recycling Program	7.70	9.16	100%	8.07	60%	4.83
Residential Lighting Program	13.94	15.10	100%	13.61	78%	10.59
Custom Incentive Program	7.32	7.71	70%	3.72	31%	1.15
Energy Efficiency Behavior & Education Program	-	-	-	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	9.31	12.57	82%	9.30	54%	5.04
Efficient Equipment Incentive Program (commercial and industrial lighting)	66.34	69.17	87%	30.39	85%	25.86
E-Power Wise Program	0.39	0.31	80%	0.22	100%	0.22
Low-Income WRAP	0.18	1.13	100%	0.83	100%	0.83
Renewable Energy Program	1.60	2.90	100%	2.90	36%	1.03
HVAC Tune-Up Program	1.00	1.08	100%	0.48	100%	0.48
Residential Energy Assessment & Weatherization Program	0.07	0.13	114%	0.12	102%	0.12
TOTAL PORTFOLIO	107.85	119.26	89%	69.64	72%	50.16

NOTES:
[a] Reported gross impacts reflect savings directly from PPL Electric's EEMIS reporting database. Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.
[b] At the time of this report, no adjustments had been made for PY3 Q2 reported savings. Adjusted *ex ante* reflect savings adjustments that account for data errors (such as duplicate records) or information about the systems installed through the program (tonnage, efficiency, and geographic location).
[c] This total excludes MWh savings in the Energy Efficiency Behavior & Education Program that occurred prior to the current program year. Annual savings in that program are not considered to be cumulative.
[d] The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY3 Annual Report, which will be filed in November 2012. NTG ratios from the PY2 Annual Report, filed November 15, 2011, will be used as placeholders for PY3 until PY3 surveys are completed and analyzed.

1.4 Summary of Evaluation

The realization rate is defined as the percentage of *ex ante* adjusted savings (gross) achieved, determined by independent evaluation review. A realization rate of 1 (or 100%) indicates there is no difference between the *ex ante* adjusted savings and verified savings, as measured by independent evaluators. Realization rates were determined by certain attributes relative to one of three protocol types:

1. Fully deemed TRM measure realization rates are driven by differences in the number of installed measures.
2. Partially deemed TRM measure[9] realization rates are driven by: (1) differences in the number of installed measures and (2) differences between the assumed and actual values of the open variables.
3. Custom measure realization rates are driven by differences in the energy savings determined by approved protocols. The protocol type determines which data are sampled.

1.4.1 Impact Evaluation

A summary of realization rates and confidence intervals for the PY3 participant sample will be updated in the PY3 Annual Report.

1.4.2 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* was submitted on November 30, 2011.

1.5 Summary of Finances

The TRC test demonstrates the cost-effectiveness of a program by comparing its total economic benefits to its total cost. The SWE has directed EDCs not to calculate TRC results until the final annual report (due in November each year). A breakdown of PPL Electric's portfolio finances is presented in Table 1-11 and Table 1-12.

Table 1-11: Summary of Portfolio Finances: TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$9,986,723	$18,387,613	$65,397,074
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$9,986,723	$18,387,613	$65,397,074
B.1	Design & Development	$78,267	$153,783	$2,844,088
B.2	Administration[b]	$737,338	$1,300,608	$6,645,376
B.3	Management[c]	$7,486,184	$16,221,307	$28,378,962
B.4	Marketing	$1,091,658	$1,670,832	$8,938,032
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$9,393,447	$19,346,530	$46,806,458
C	**EDC Evaluation Costs**	$826,741	$1,329,672	$6,772,648
D	**SWE Audit Costs**	$449,681	$950,113	$1,041,992

[9] These are TRM measures with stipulated values and variables.

	Category	IQ	PYTD	CPITD
	Total EDC Costs (A + B + C + D)	$20,656,591	$40,013,927	$120,018,171
E	**Participant Costs**	Not required	Not required	Not required
	Total EDC & Participant Costs	$20,656,591	$40,013,927	$120,018,171
F.1	**Annualized Avoided Supply Costs – Residential**	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Portfolio Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order. Various cost and benefit categories are subject to change pending the outcome of TRC Technical Working Group discussions.
[a] This number includes charges to develop and update the EE&C Plan from December 2008 through the current period.
[b] These numbers include 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 and common costs associated with overall portfolio management.

Table 1-12: Summary of Portfolio Budget by Program

Program	TRC Benefits ($)	TRC Costs ($)	TRC Benefit-Cost Ratio
Appliance Recycling Program	Not required	Not required	Not required
Residential Lighting Program	Not required	Not required	Not required
Custom Incentive Program	Not required	Not required	Not required
Energy Efficiency Behavior & Education Program	Not required	Not required	Not required
Efficient Equipment Incentive Program (non-lighting measures)	Not required	Not required	Not required
Efficient Equipment Incentive Program (commercial and industrial lighting)	Not required	Not required	Not required
E-Power Wise Program	Not required	Not required	Not required
Low-Income WRAP	Not required	Not required	Not required
Renewable Energy Program	Not required	Not required	Not required
HVAC Tune-Up Program	Not required	Not required	Not required
Residential Energy Assessment & Weatherization Program	Not required	Not required	Not required
Common Costs	Not required	Not required	Not required
Portfolio	Not required	Not required	Not required

NOTES:

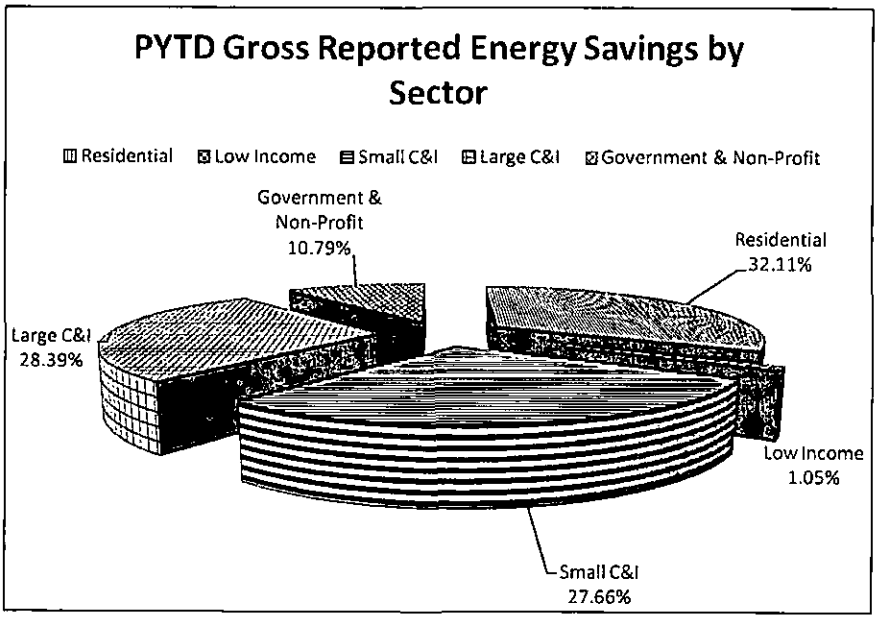
2 Energy Efficiency Portfolio Results by Sector

The EE&C Implementation Order issued on January 15, 2009 states reporting 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 Energy Efficiency (EE; excluding Low-Income)
2. Residential Low-Income EE
3. Small Commercial & Industrial EE
4. Large Commercial & Industrial EE
5. Government & Non-Profit EE

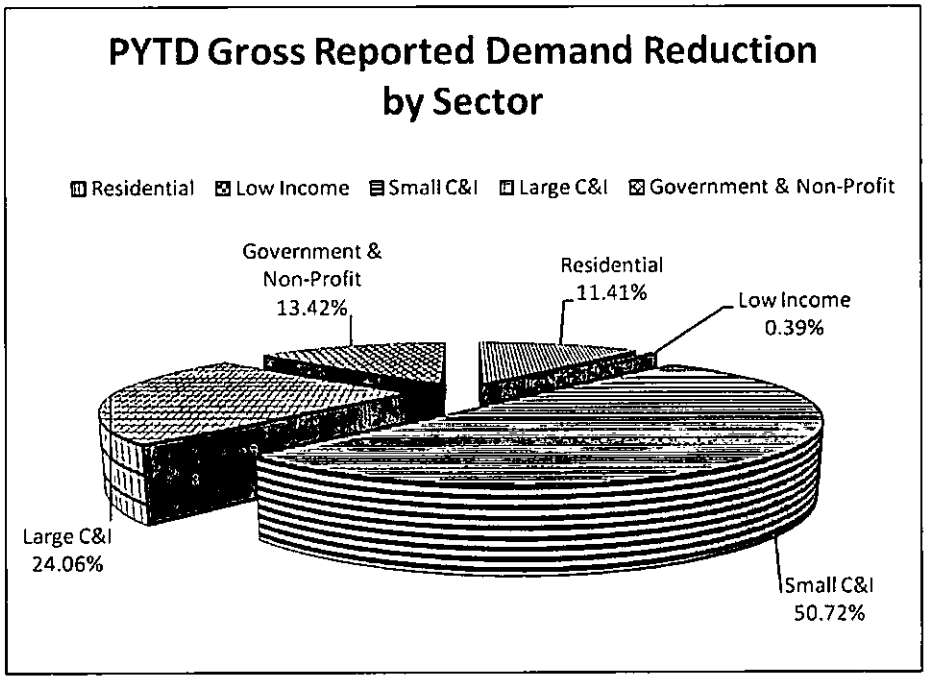
A summary of portfolio gross energy savings and gross demand reduction by sector is presented in Figure 2-1 and Figure 2-2. A summary of CPITD gross energy savings and gross demand reduction by sector is presented in Figure 2-3 and Figure 2-4, as well as in Table 2-1 and Table 2-2.

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



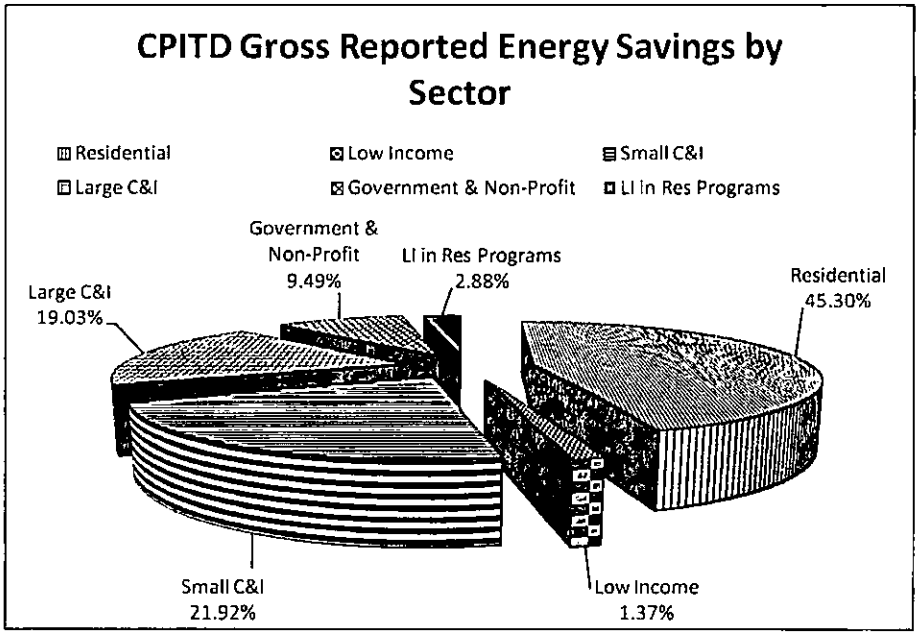
In the PY3 Annual Report, which will be filed in November 2012, this figure will be amended to account for PY3 low-income savings attributable to low-income participants in non-low-income programs.

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



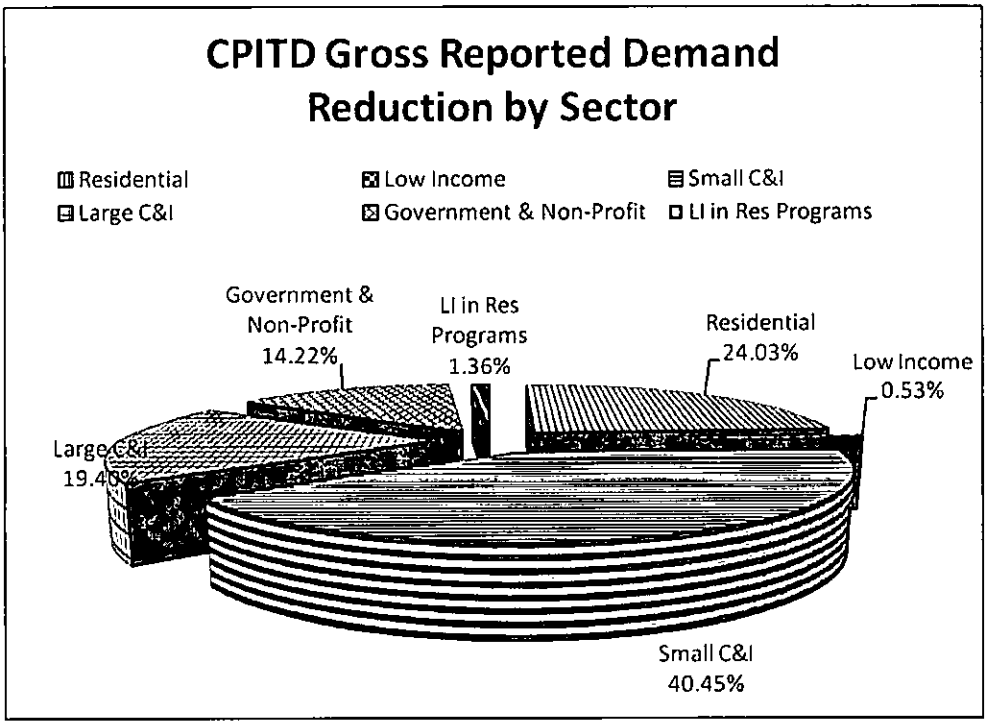
In the PY3 Annual Report, which will be filed in November 2012, this figure will be amended to account for PY3 low-income savings attributable to low-income participants in non-low-income programs.

Figure 2-3: CPITD Reported Gross Energy Savings by Sector



In the PY3 Annual Report, which will be filed in November 2012, this figure will be amended to account for PY3 low-income savings attributable to low-income participants in non-low-income programs. The figure does include CPITD low-income participation in non-low-income programs through PY2.

Figure 2-4: CPITD Reported Gross Demand Reduction by Sector



In the PY3 Annual Report, which will be filed in November 2012, this figure will be amended to account for PY3 low-income savings attributable to low-income participants in non-low-income programs. The figure does include CPITD low-income participation in non-low-income programs through PY2.

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

Market Sector	Reported Gross Impact (MWh/yr)			Projects in Progress (MWh/yr)	Total Committed (MWh/yr)[a]	PYTD Unverified *Ex Post* Savings (MWh/yr)
	IQ	PYTD	CPITD			
Residential EE	48,022	79,136	347,544	-	325,448	51,435
Residential Low-Income EE	1,566	2,584	10,546	-	10,546	2,529
Low-Income Participation in Non-Low-Income Programs[b]	-	-	22,096	-	22,096	-
Small Commercial & Industrial EE	34,232	68,151	168,192	4,902	173,094	61,321
Large Commercial & Industrial EE	37,770	69,965	146,034	47,680	193,713	46,590
Government & Non-Profit EE	16,910	26,592	72,844	38,617	111,461	25,252
TOTAL PORTFOLIO	138,500	246,428	767,255	91,199	858,453	187,127

NOTES:
[a] Total committed uses CPITD gross impact values.
[b] In the PY3 Annual Report, which will be filed in November 2012, this table will be amended to account for non-low-income savings attributable to low-income customers.

Table 2-2: Reported Gross Demand Reduction by Sector Through the End of the Reporting Period[a]

Market Sector	Reported Gross Impact (MW)			Projects in Progress (MW)	Total Committed (MW)[b]	PYTD Unverified *Ex Post* Savings (MW)
	IQ	PYTD	CPITD			
Residential EE	2.43	4.97	25.92	-	24.44	3.07
Residential Low-Income EE	0.09	0.17	0.57	-	0.57	0.32
Low-Income Participation in Non-Low-Income Programs[c]	-	-	1.47	-	1.47	-
Small Commercial & Industrial EE	14.64	22.07	43.63	0.30	43.93	20.36
Large Commercial & Industrial EE	4.76	10.47	20.93	3.94	24.87	6.64
Government & Non-Profit EE	3.67	5.84	15.34	5.77	21.10	5.60
TOTAL PORTFOLIO	25.59	43.51	107.85	10.00	117.86	36.00

NOTES:
[a] Results include only the constant peak load reductions from energy efficiency measures. Peak load reductions from demand response measures (for the Direct Load Control Program and the Load Curtailment Program) will only apply during the summer of 2012.
[b] Total committed uses CPITD gross impact values.
[c] In the PY3 Annual Report, this table will be amended to distinguish low-income program savings from savings attributable to low-income customers in non-low-income programs.

2.1 Residential EE Sector

The Residential EE sector target for annual energy savings in PY3 is 146,349 MWh/yr and the sector target for annual peak demand reduction is 21.10 MW. The Residential EE sector target for CPITD annual energy savings is 322,753 MWh/yr and the CPITD target for peak demand reduction is 46.21 MW.

A sector summary of results by program is presented in Table 2-3 and Table 2-4.

Table 2-3: Summary of Residential EE Sector Incremental Impacts by Program Through the End of the Reporting Period

Residential EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Appliance Recycling	3,604	6,160	0.97
Residential Lighting[a]	92,701	29,853	1.37
Energy Efficiency Behavior & Education	101,470	11,667	-
Efficient Equipment Incentive (non-lighting measures)	457	97	0.03
Efficient Equipment Incentive –(commercial and industrial lighting)	18	93	0.03
Residential Energy Assessment & Weatherization	228	151	0.03
Sector Total	198,478	48,022	2.43

Residential EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)

NOTES:
[a] As an upstream program, exact participation in the Residential Lighting Program is not known. The EM&V CSP estimated the number of program participants by dividing the total number of bulbs discounted (622,957 in PY3 Q2; 480,379 in PY3 Q1; 3,056,236 in PY2; and 1,342,595 in PY1) by a CFL-per-participant value derived from the customer telephone survey data (6.7 bulbs in both PY2 and PY3 and 7.0 bulbs in PY1). The CFL count reflects the total number of program bulbs, including discounted bulbs sold at retail stores and bulbs distributed at give-away events.

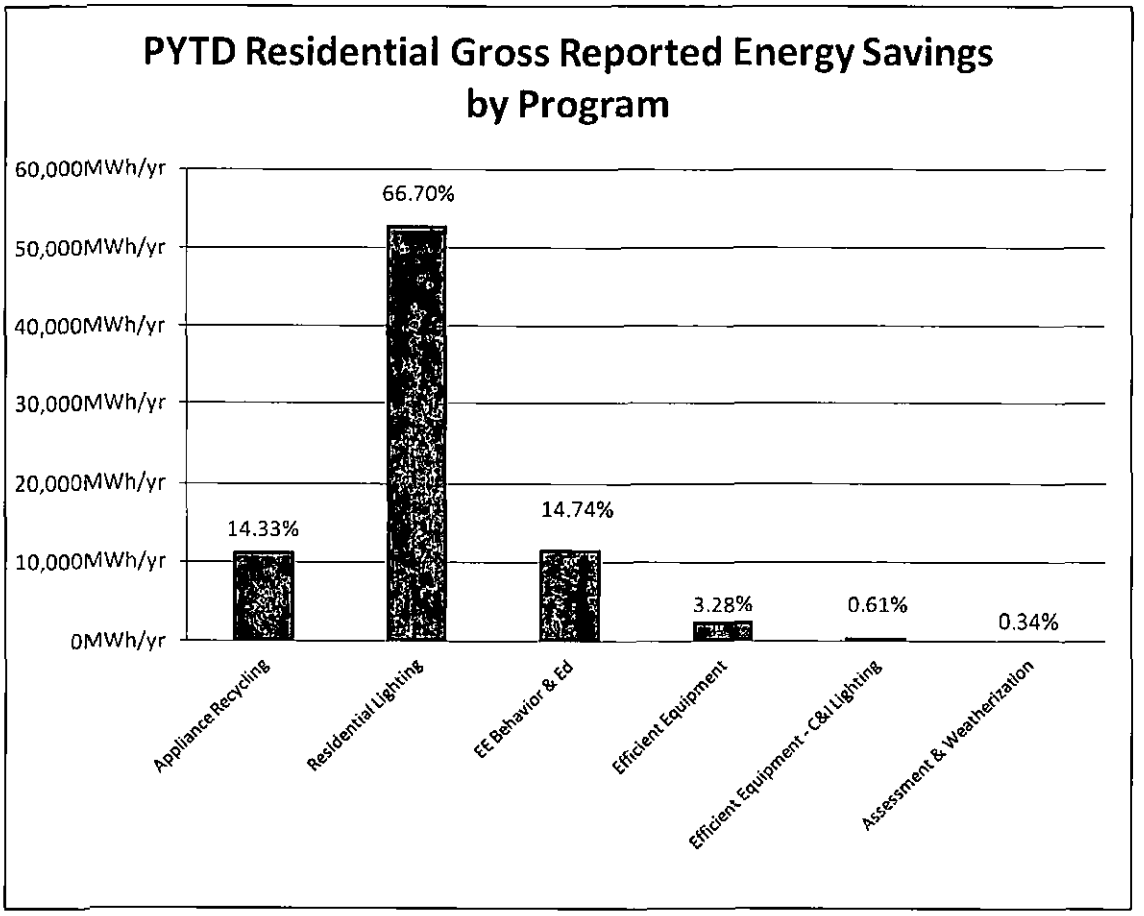
Table 2-4: Summary of Residential EE Sector PYTD Impacts by Program Through the End of the Reporting Period

Residential EE Sector Program	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Appliance Recycling	6,653	11,338	1.84
Residential Lighting[a]	164,185	52,786	2.50
Energy Efficiency Behavior & Education	101,470	11,667	-
Efficient Equipment Incentive (non-lighting measures)	14,346	2,596	0.39
Efficient Equipment Incentive –(commercial and industrial lighting)	40	480	0.20
Residential Energy Assessment & Weatherization	424	269	0.03
Sector Total	287,118	79,136	4.97

NOTES:
[a] As an upstream program, exact participation in the Residential Lighting Program is not known. The EM&V CSP estimated the number of program participants by dividing the total number of bulbs discounted (622,957 in PY3 Q2; 480,379 in PY3 Q1; 3,056,236 in PY2; and 1,342,595 in PY1) by a CFL-per-participant value derived from the customer telephone survey data (6.7 bulbs in both PY2 and PY3 and 7.0 bulbs in PY1). The CFL count reflects the total number of program bulbs, including discounted bulbs sold at retail stores and bulbs distributed at give-away events.

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

Figure 2-5: Summary of Residential EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 2-6. A summary of the sector CPITD gross energy savings and gross demand reduction by program is presented in Figure 2-7 and Figure 2-8.

Figure 2-6: Summary of Residential EE Sector PYTD Reported Demand Reduction by Program

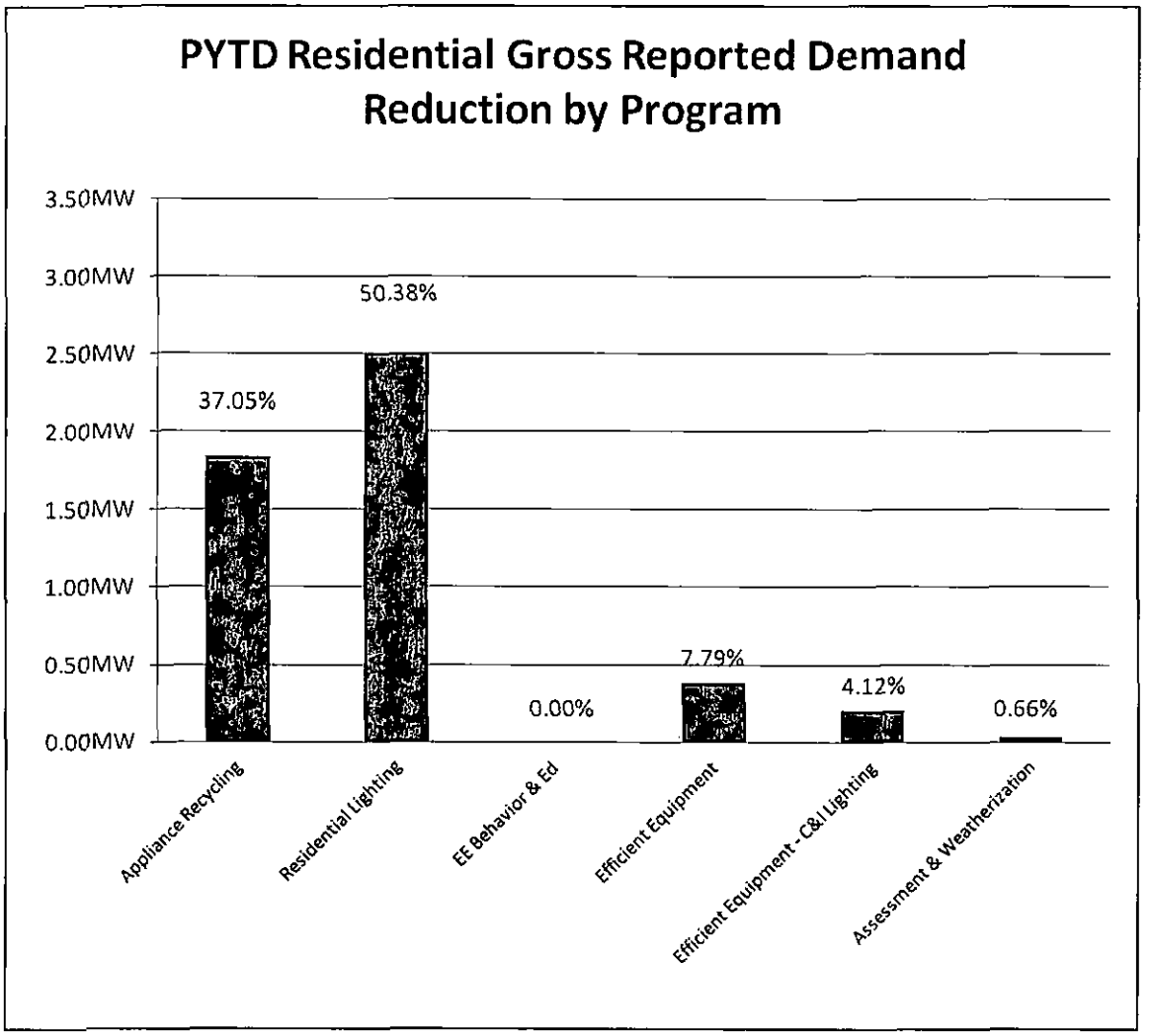


Figure 2-7: Summary of Residential EE Sector CPITD Reported Gross Energy Savings by Program

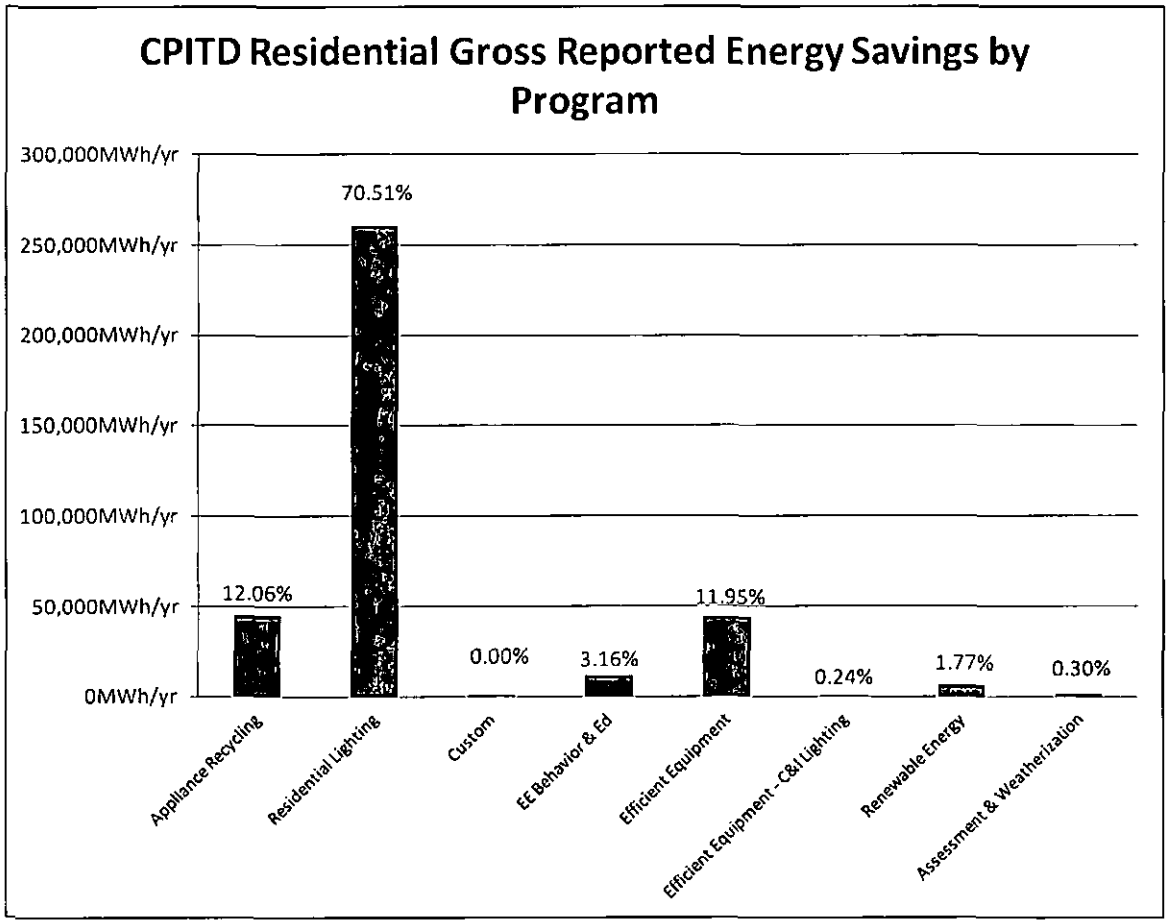
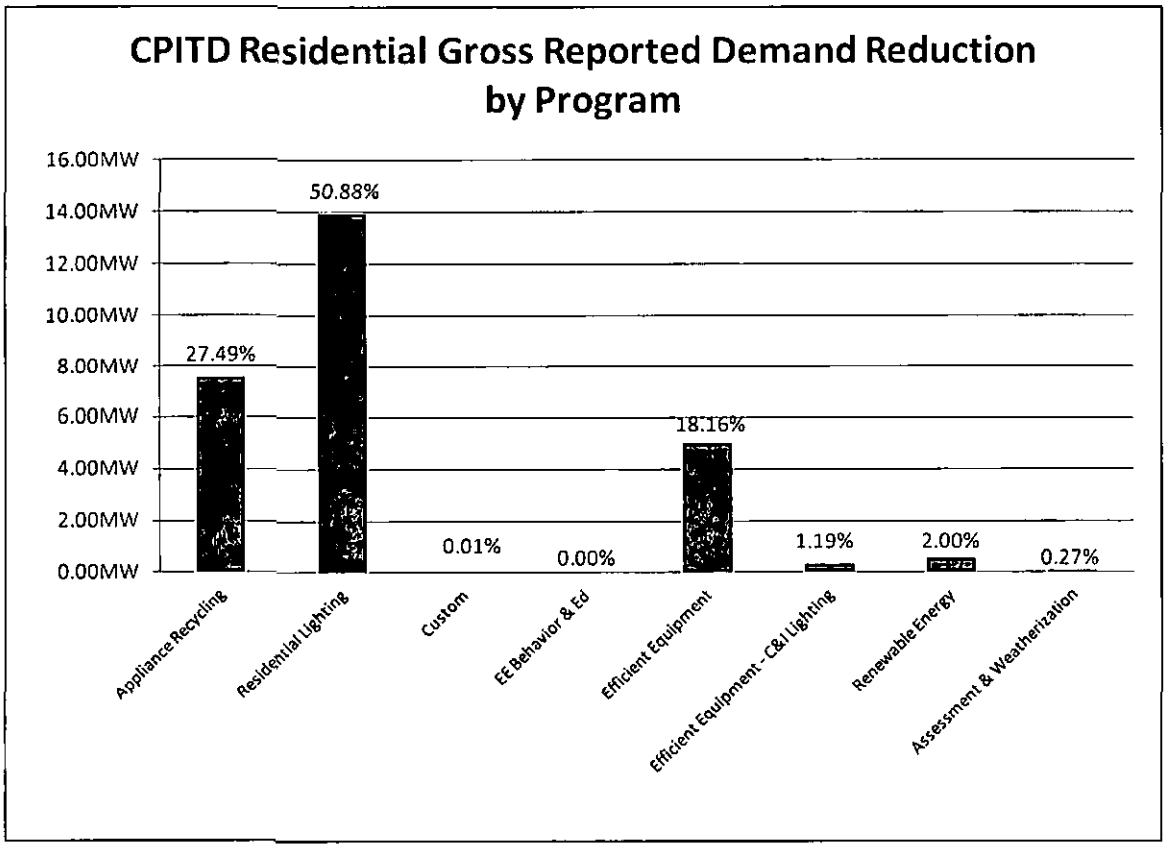


Figure 2-8: Summary of Residential EE Sector CPITD Reported Demand Reduction by Program



2.2 Residential Low-Income EE Sector

The Residential Low-Income EE sector target for annual energy savings in PY3 is 5,166 MWh/yr and the sector target for annual peak demand reduction is 0.83 MW. These values were reported in the EE&C Plan. The Residential Low-Income EE sector target for CPITD annual energy savings is 13,998 MWh/yr and the CPITD target for peak demand reduction is 2.15 MW.

In keeping with the PUC Order on May 5, 2011, directing PPL Electric to generate estimates of low-income participation across all relevant EE&C programs, the PA PUC representatives met with PPL Electric and their EM&V CSP to determine how to estimate low-income customer participation in non-low-income residential programs. The PA PUC approved using Act 129 survey data to determine which participants are low-income customers (defined as those who have a household income at or below 150% of the federal poverty level). Results will be provided in the final annual report (due in November each year) and will reflect the final low-income participation estimates for the year. Results will be available for each program and for the entire portfolio. Results should be statistically valid within 90/10 at the program level and 95/5 at the sector level.

A sector summary of the designated low-income programs' results are presented in Table 2-5 and Table 2-6. Final results summarizing low-income customer participation in non-low-income residential programs will be provided in the final annual report.

Table 2-5: Summary of Residential Low-Income EE Sector Incremental Impacts by Program Through the End of the Reporting Period[a]

Residential Low-Income EE Sector Programs[b]	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
E-Power Wise Program	644	408	0.09
Low-Income WRAP	744	1,159	-
Sector Total	1,388	1,566	0.09

NOTES:
[a] In the PY3 Annual Report, this table will be amended to distinguish low-income program savings from savings attributable to low-income customers in non-low-income programs.
[b] Raw data records include residential low-income participants in the ARP. The low-income status was unconfirmed, and the records were allocated to the Residential EE sector.

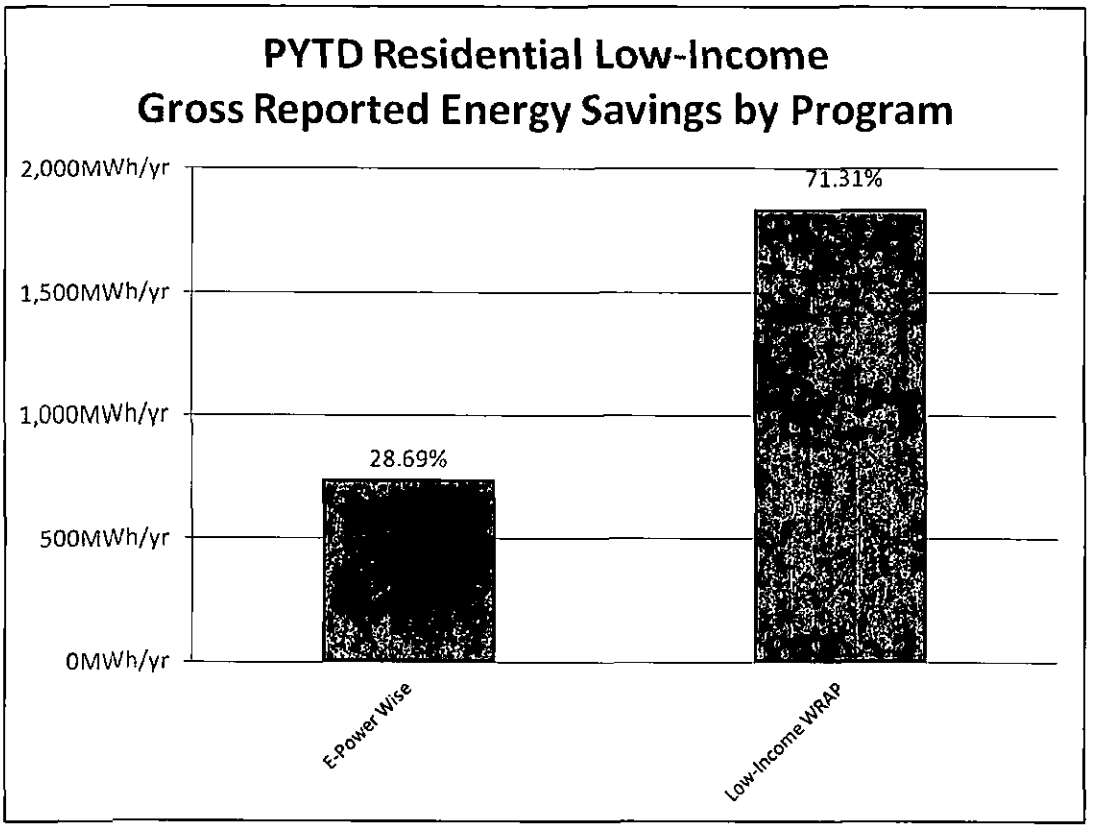
Table 2-6: Summary of Residential Low-Income EE Sector PYTD Impacts by Program Through the End of the Reporting Period[a]

Residential Low-Income EE Sector Program[b]	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
E-Power Wise Program	1,243	741	0.17
Low-Income WRAP	1,292	1,842	-
Sector Total	2,535	2,584	0.17

NOTES:
[a] In the PY3 Annual Report, this table will be amended to distinguish low-income program savings from savings attributable to low-income customers in non-low-income programs.
[b] Raw data records include residential low-income participants in the ARP. The low-income status was unconfirmed, and the records were allocated to the Residential EE sector.

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

Figure 2-9: Summary of Residential Low-Income EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 2-10. A summary of the sector CPITD gross energy savings and gross demand reduction by program is presented in Figure 2-11 and Figure 2-12.

Figure 2-10: Summary of Residential Low-Income EE Sector PYTD Reported Demand Reduction by Program

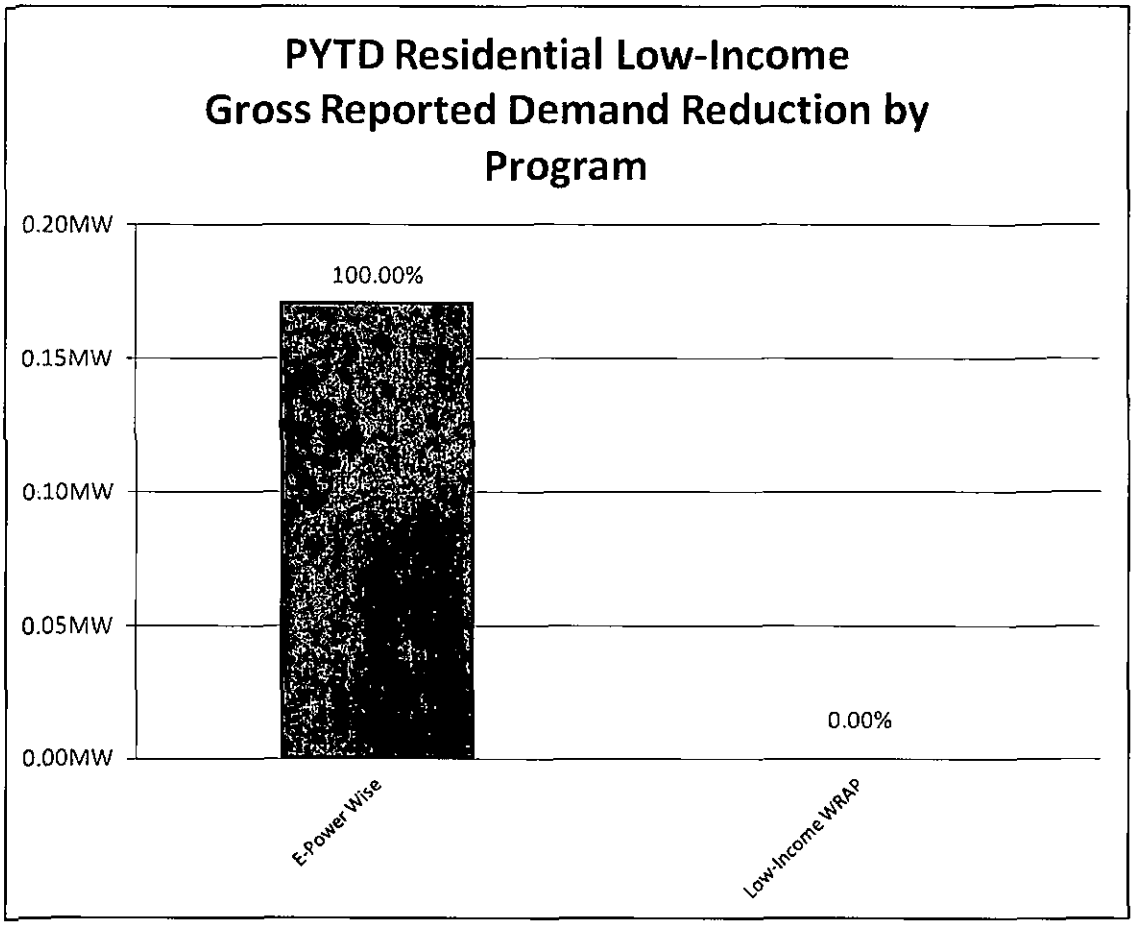


Figure 2-11: Summary of Residential Low-Income EE Sector CPITD Reported Gross Energy Savings by Program

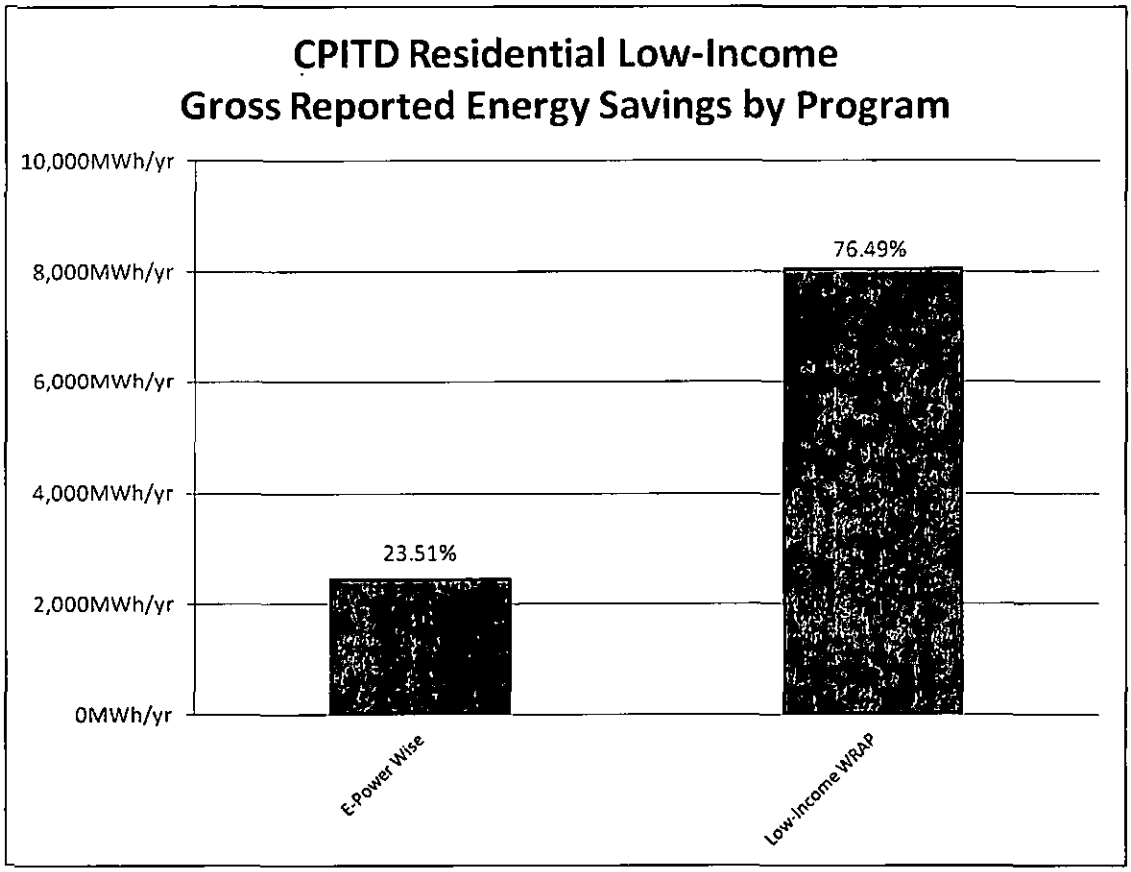
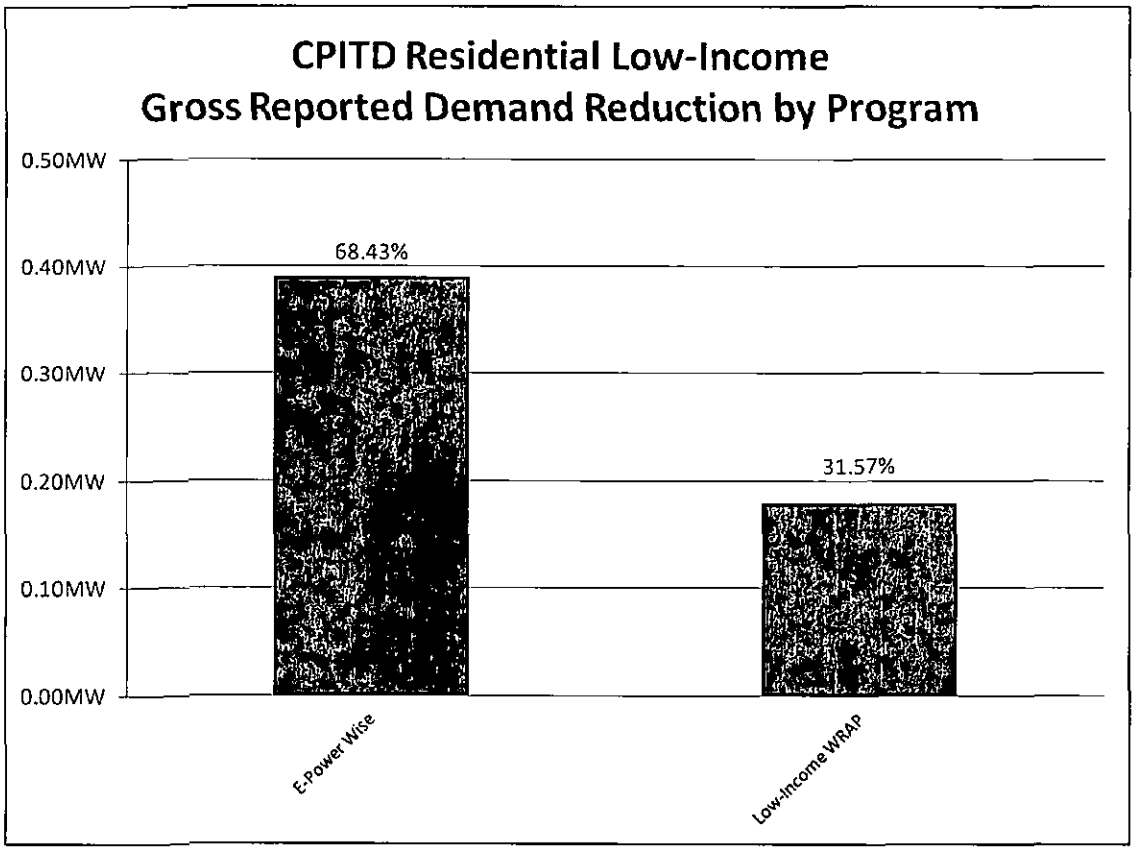


Figure 2-12: Summary of Residential Low-Income EE Sector CPITD Reported Demand Reduction by Program



2.3 Small Commercial & Industrial EE Sector

The Small Commercial & Industrial (C&I) EE sector target for annual energy savings in PY3 is 188,207 MWh/yr and the sector target for annual peak demand reduction is 36.69 MW. The Small C&I EE sector target for CPITD annual energy savings is 351,728 MWh/yr and the CPITD target for peak demand reduction is 12.37 MW.

A sector summary of results by program is presented in Table 2-7 and Table 2-8.

Table 2-7: Summary of Small C&I EE Sector Incremental Impacts by Program Through the End of the Reporting Period

Small C&I EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Appliance Recycling	98	183	0.03
Custom Incentive	17	1,704	0.25
Efficient Equipment Incentive (non-lighting	208	1,067	0.23

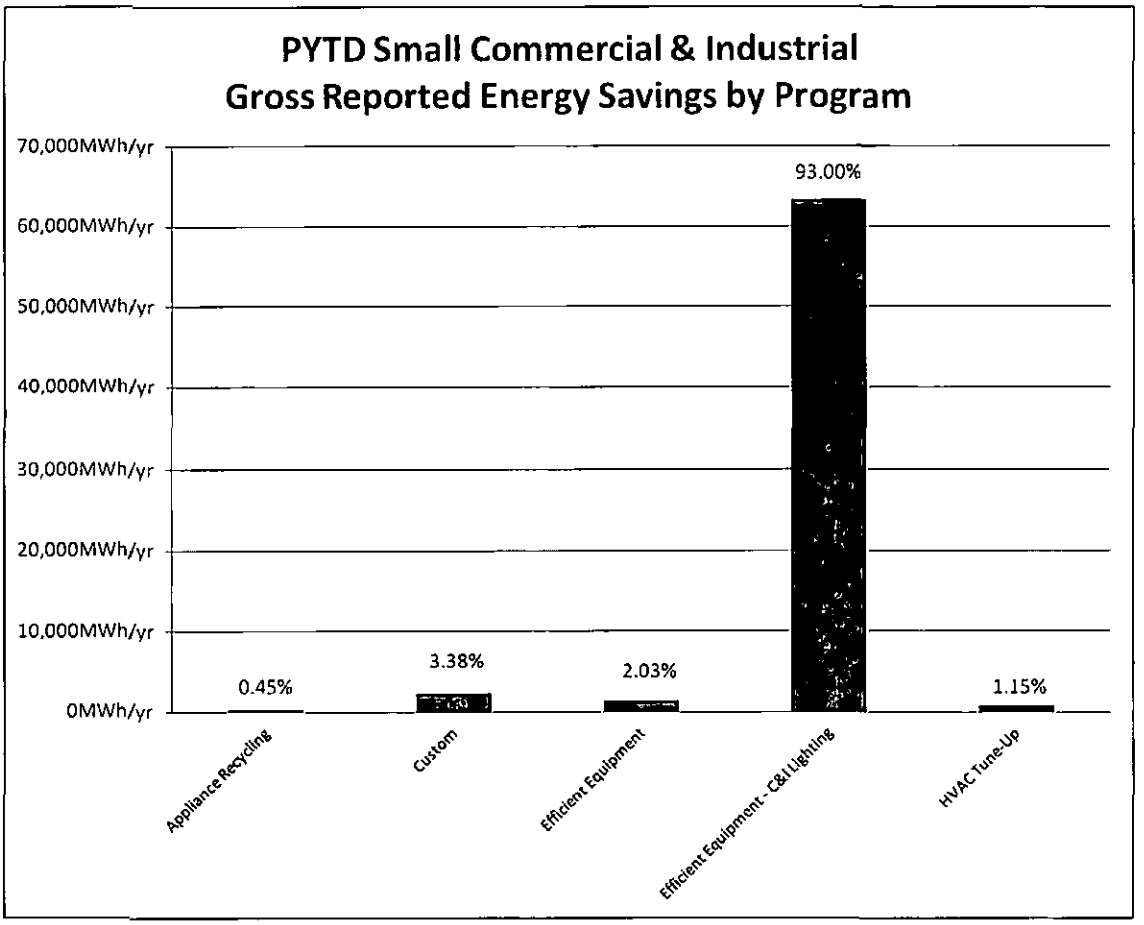
Small C&I EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
measures)			
Efficient Equipment Incentive (C&I lighting)	586	30,869	13.95
HVAC Tune-Up	246	408	0.17
Sector Total	1,155	34,232	14.64
NOTES:			

Table 2-8: Summary of Small C&I EE Sector PYTD Impacts by Program Through the End of the Reporting Period

Small C&I EE Sector Program	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Appliance Recycling	170	306	0.05
Custom Incentive	22	2,302	0.33
Efficient Equipment Incentive (non-lighting measures)	919	1,382	0.26
Efficient Equipment Incentive (C&I lighting)	1,186	63,378	20.88
HVAC Tune-Up	693	783	0.55
Sector Total	2,990	68,151	22.07
NOTES:			

A summary of the sector energy savings by program is presented in Figure 2-13.

Figure 2-13: Summary of Small C&I EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 2-14. A summary of the sector CPITD gross energy savings and gross demand reduction by program is presented in Figure 2-15 and Figure 2-16.

Figure 2-14: Summary of Small C&I EE Sector PYTD Reported Demand Reduction by Program

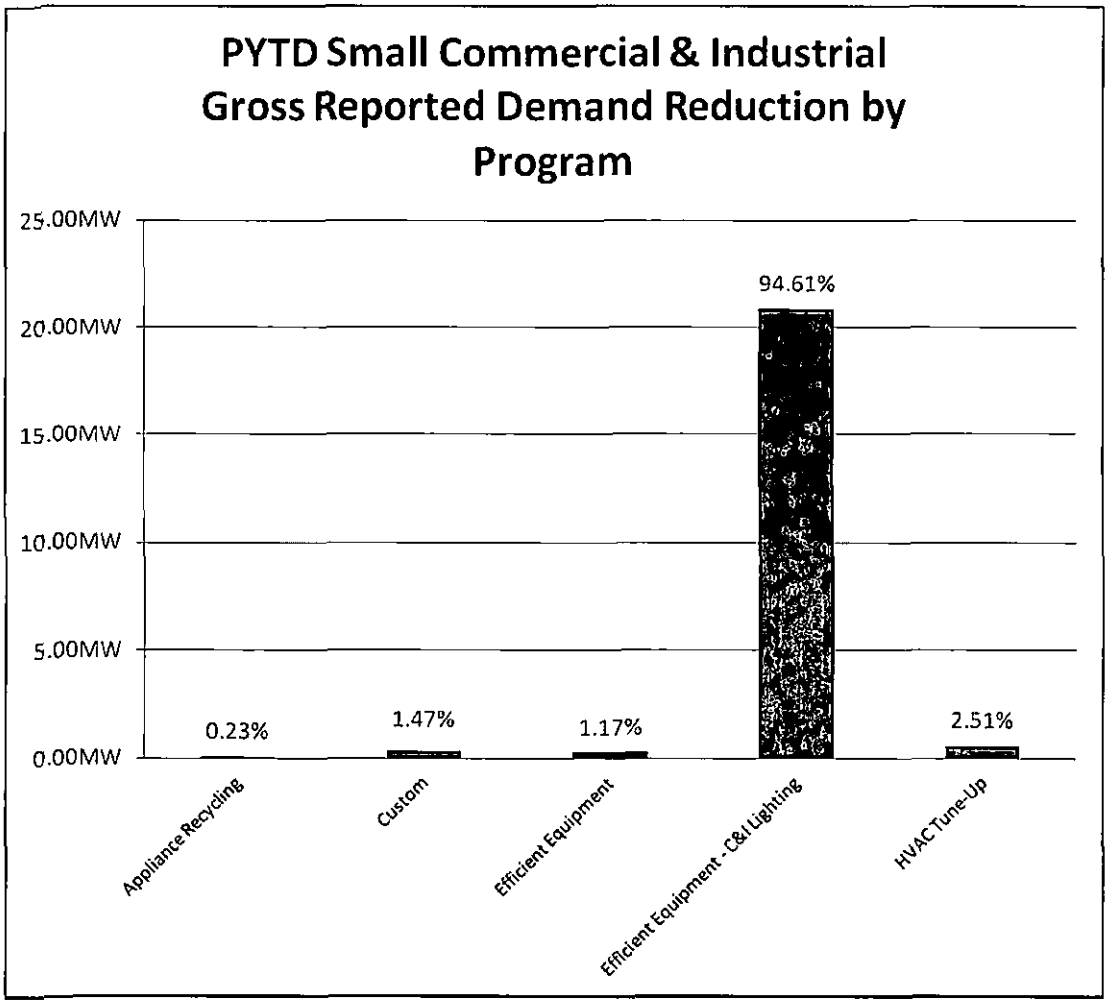


Figure 2-15: Summary of Small C&I EE Sector CPITD Reported Gross Energy Savings by Program

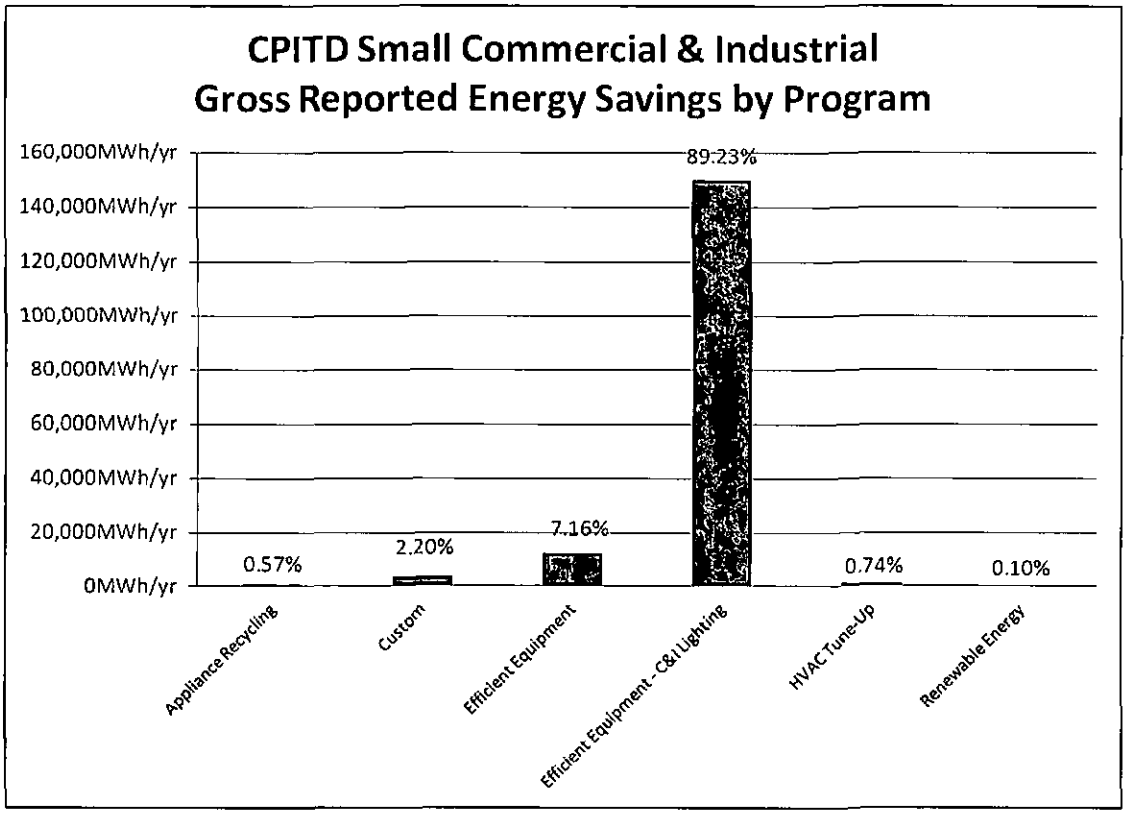
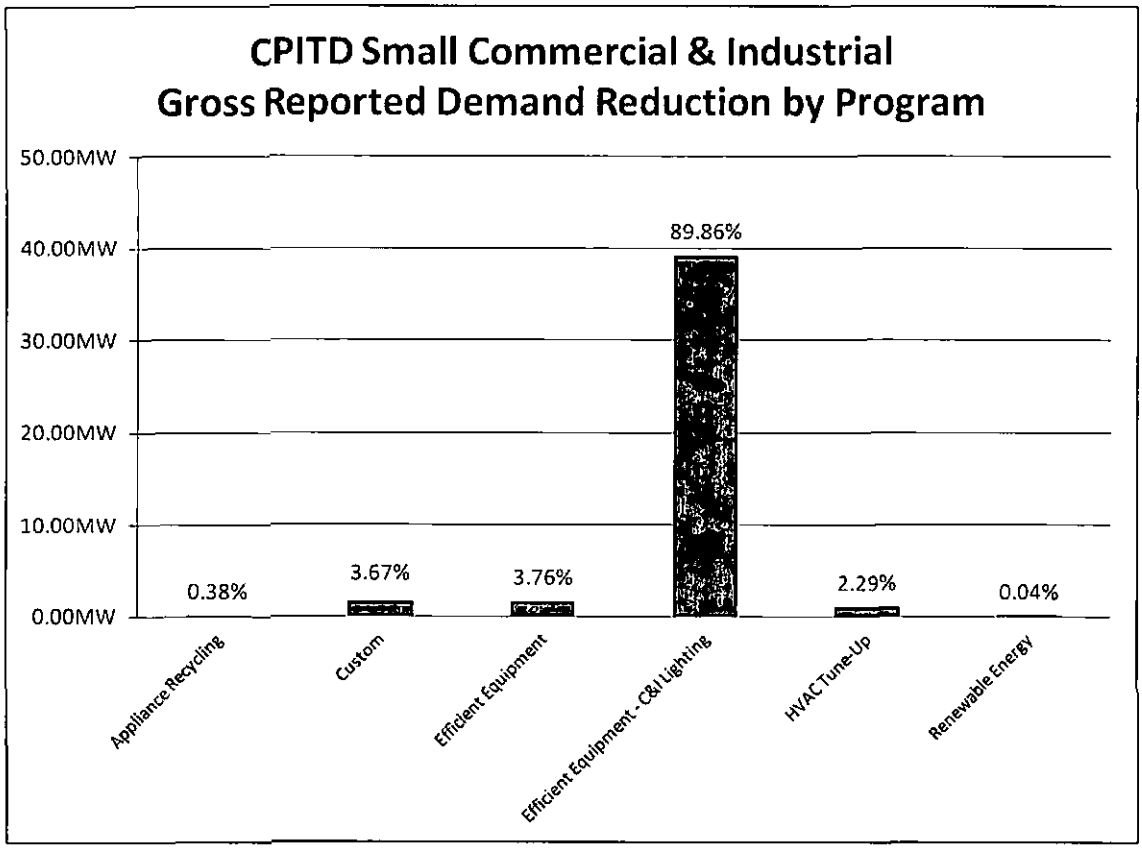


Figure 2-16: Summary of Small C&I EE Sector CPITD Reported Demand Reduction by Program



2.4 Large Commercial & Industrial EE Sector

The Large C&I EE sector target for annual energy savings in PY3 is 40,376 MWh/yr and the sector target for annual peak demand reduction is 6.93 MW. The Large C&I EE sector target for CPITD annual energy savings is 71,876 MWh/yr and the CPITD target for peak demand reduction is 12.37 MW.

A sector summary of results by program is presented in Table 2-9 and Table 2-10.

Table 2-9: Summary of Large C&I EE Sector Incremental Impacts by Program Through the End of the Reporting Period

Large C&I EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Custom Incentive	12	15,322	1.45
Efficient Equipment Incentive (non-lighting measures)	10	701	0.16
Efficient Equipment Incentive (C&I lighting)	74	21,747	3.15

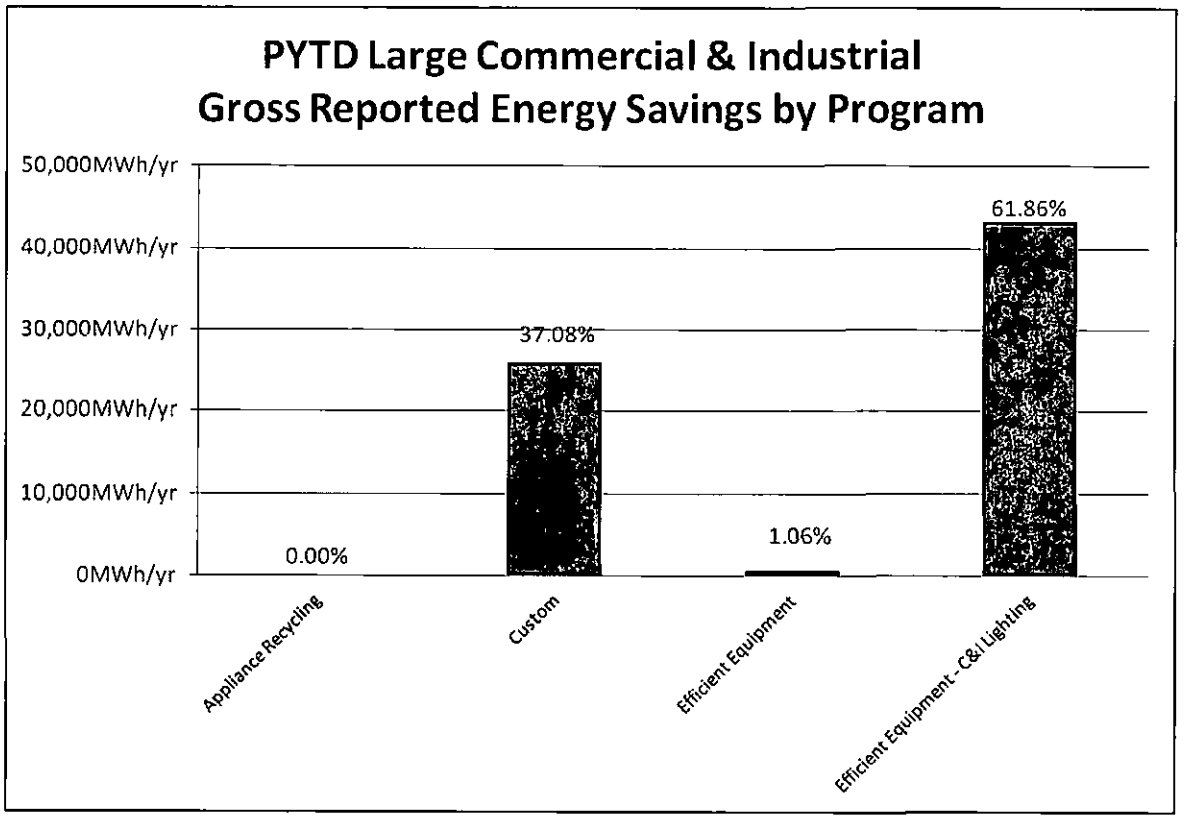
Large C&I EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
HVAC Tune-Up	4	0	0.00
Sector Total	100	37,770	4.76
NOTES:			

Table 2-10: Summary of Large C&I EE Sector PYTD Impacts by Program Through the End of the Reporting Period

Large C&I EE Sector Program	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Custom Incentive	22	25,941	3.92
Efficient Equipment Incentive (non-lighting measures)	68	743	0.16
Efficient Equipment Incentive (C&I lighting)	128	43,285	6.39
HVAC Tune-Up	19	(3)	0.00
Sector Total	237	69,965	10.47
NOTES:			

A summary of the sector energy savings by program is presented in Figure 2-17.

Figure 2-17: Summary of Large C&I EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 2-18. A summary of the sector CPITD gross energy savings and gross demand reduction by program is presented in Figure 2-19 and Figure 2-20.

Figure 2-18: Summary of Large C&I EE Sector PYTD Reported Demand Reduction by Program

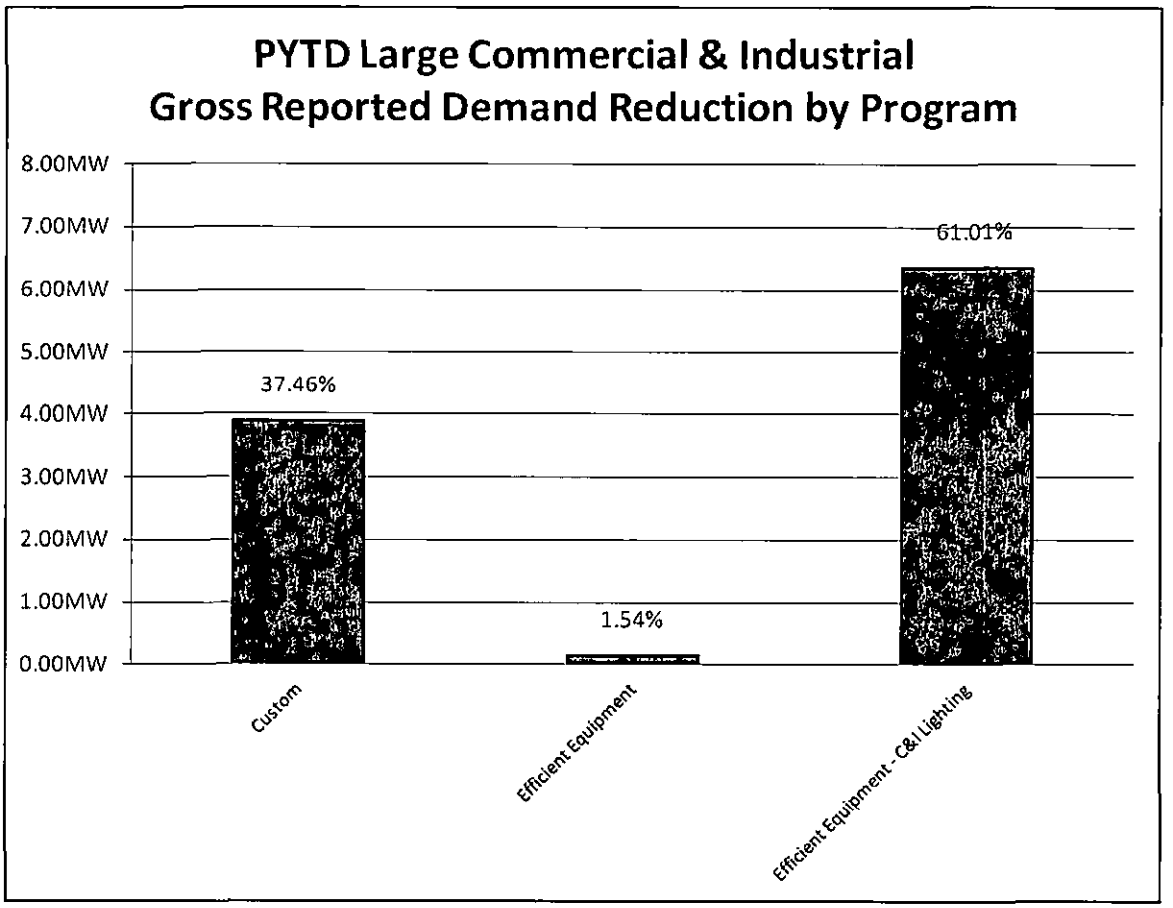


Figure 2-19: Summary of Large C&I EE Sector CPITD Reported Gross Energy Savings by Program

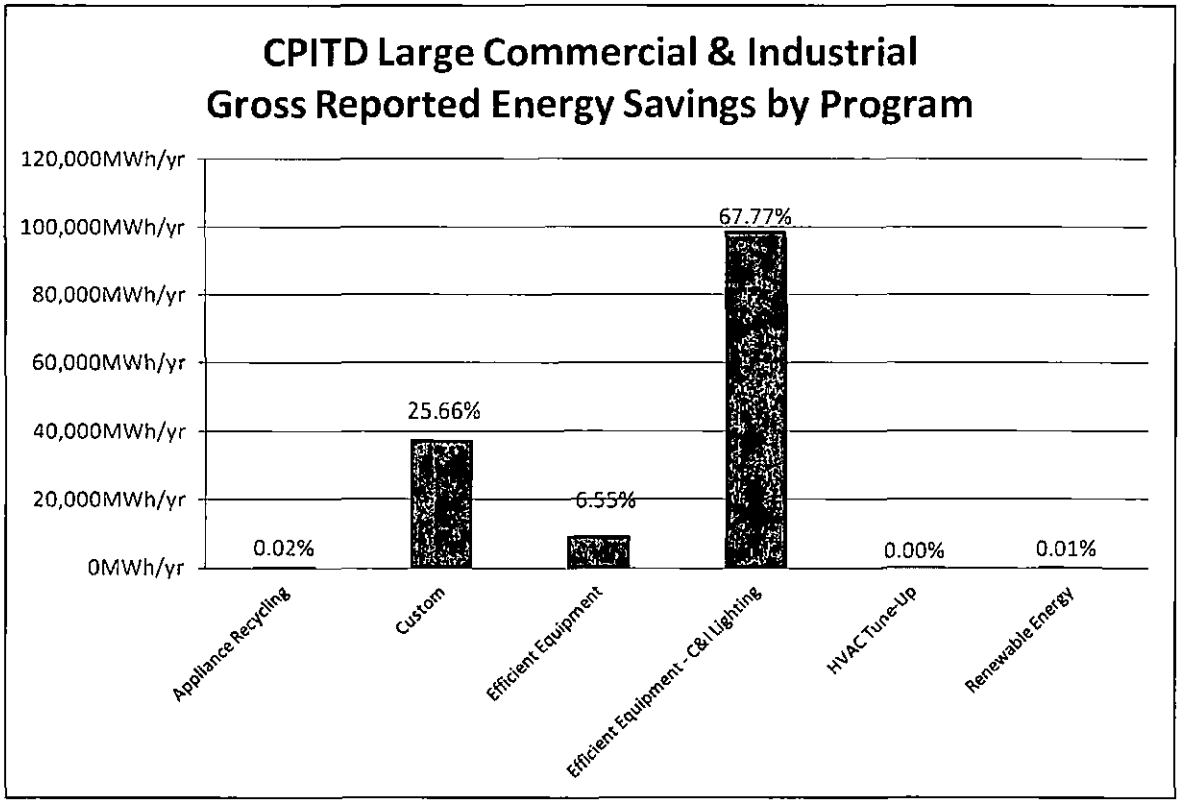
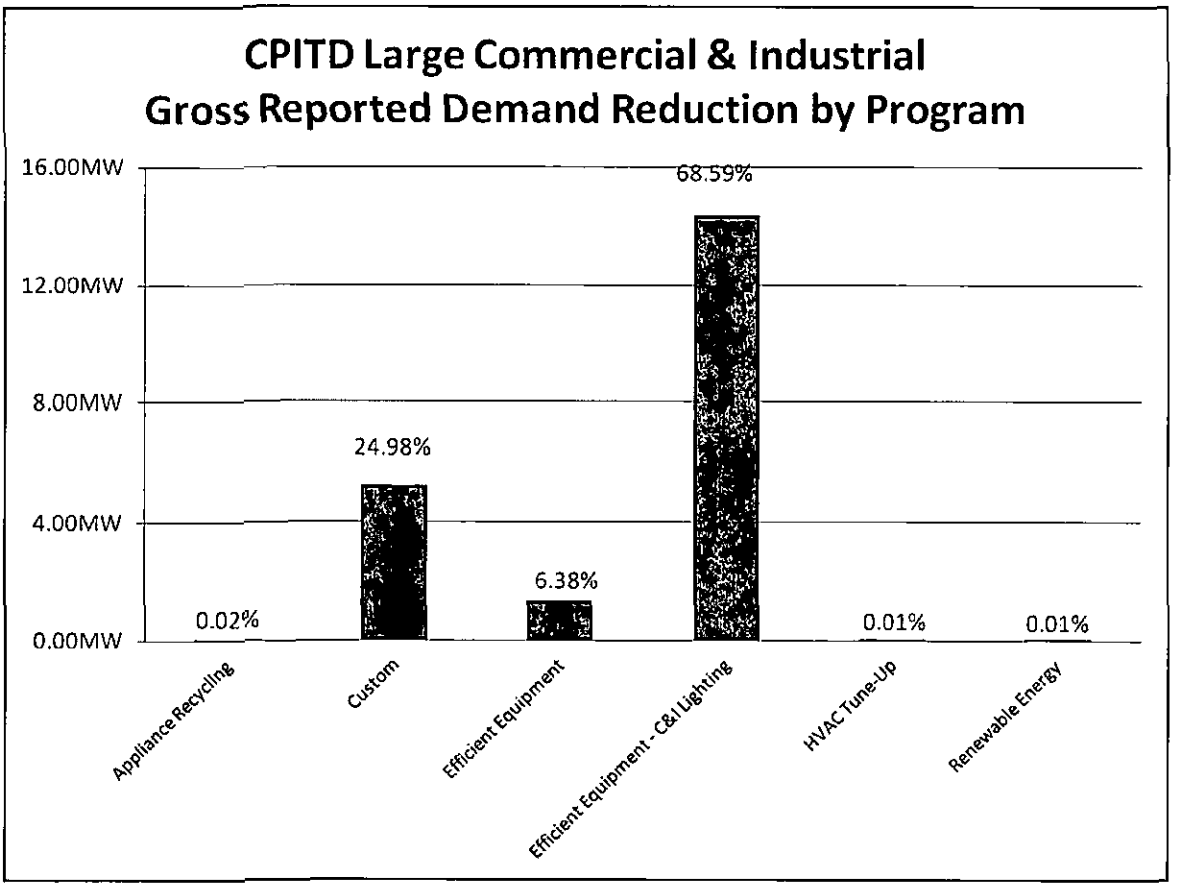


Figure 2-20: Summary of Large C&I EE Sector CPITD Reported Demand Reduction by Program



2.5 Government & Non-Profit EE Sector

The Government & Non-Profit EE sector target for annual energy savings in PY3 is 42,035 MWh/yr and the sector target for annual peak demand reduction is 6.93 MW. The Government & Non-Profit EE sector target for CPITD annual energy savings is 79.086 MWh/yr and the CPITD target for peak demand reduction is 14.02 MW.

A sector summary of results by program is presented in Table 2-11 and Table 2-12.

Table 2-11: Summary of Government & Non-Profit EE Sector Incremental Impacts by Program Through the End of the Reporting Period

Government & Non-Profit EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Custom Incentive	4	1,599	0.15

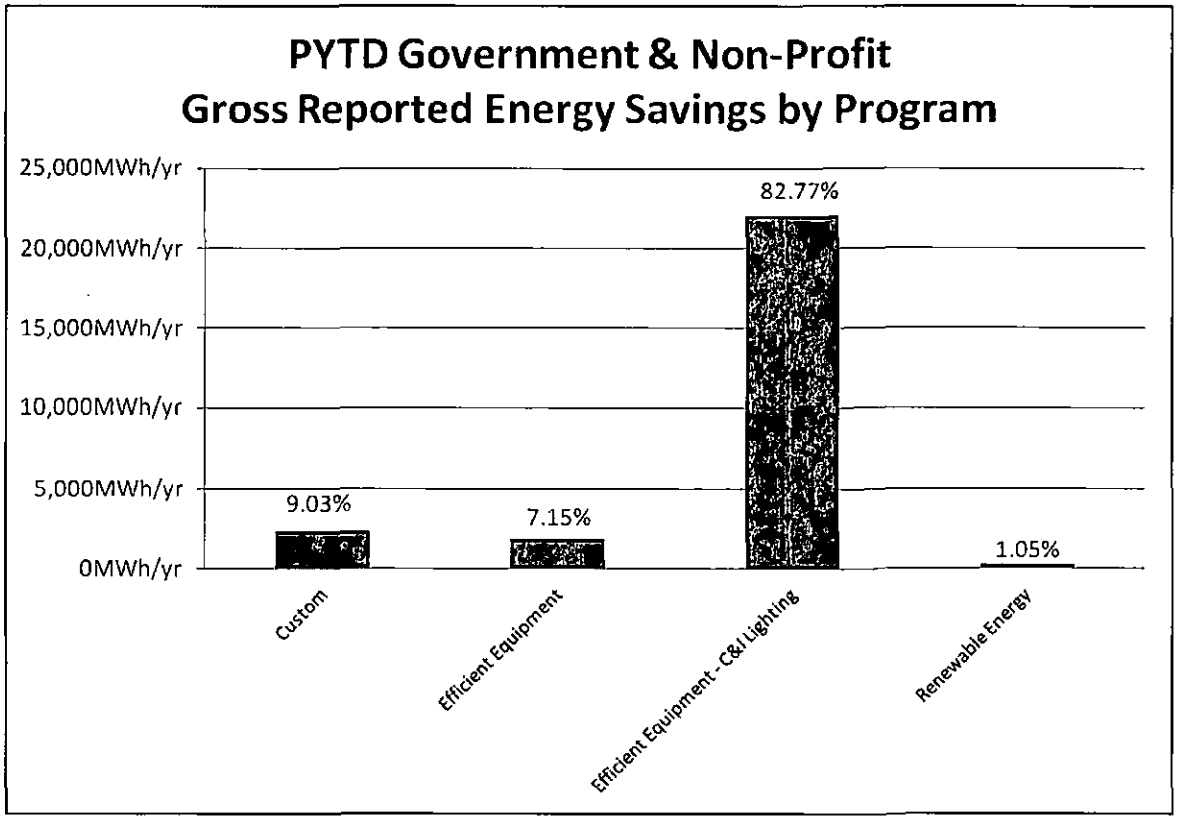
Government & Non-Profit EE Sector Program	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Efficient Equipment Incentive (non-lighting measures)	75	1,790	0.22
Efficient Equipment Incentive (C&I lighting)	272	13,243	3.14
Renewable Energy	1	279	0.16
Sector Total	352	16,910	3.67
NOTES:			

Table 2-12: Summary of Government & Non-Profit EE Sector PYTD Impacts by Program Through the End of the Reporting Period

Government & Non-Profit EE Sector Program	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Custom Incentive	9	2,401	0.25
Efficient Equipment Incentive (non-lighting measures)	629	1,902	0.24
Efficient Equipment Incentive (C&I lighting)	476	22,011	5.19
Renewable Energy	1	279	0.16
Sector Total	1,115	26,592	5.84
NOTES:			

A summary of the sector energy savings by program is presented in Figure 2-21.

Figure 2-21: Summary of Government & Non-Profit EE Sector PYTD Reported Gross Energy Savings by Program



A summary of the sector demand reduction by program is presented in Figure 2-22. A summary of the sector CPITD gross energy savings and gross demand reduction by program is presented in Figure 2-23 and Figure 2-24.

Figure 2-22: Summary of Government & Non-Profit EE Sector PYTD Reported Demand Reduction by Program

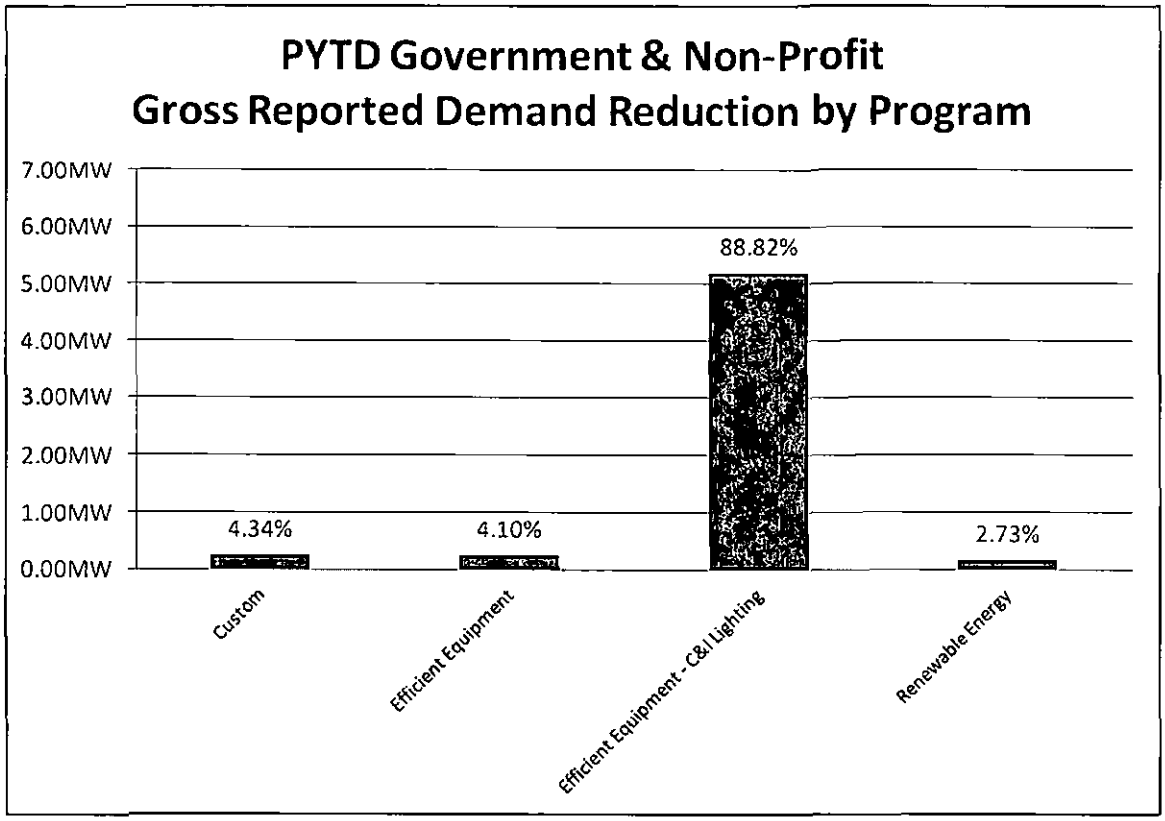


Figure 2-23: Summary of Government & Non-Profit EE Sector CPITD Reported Gross Energy Savings by Program

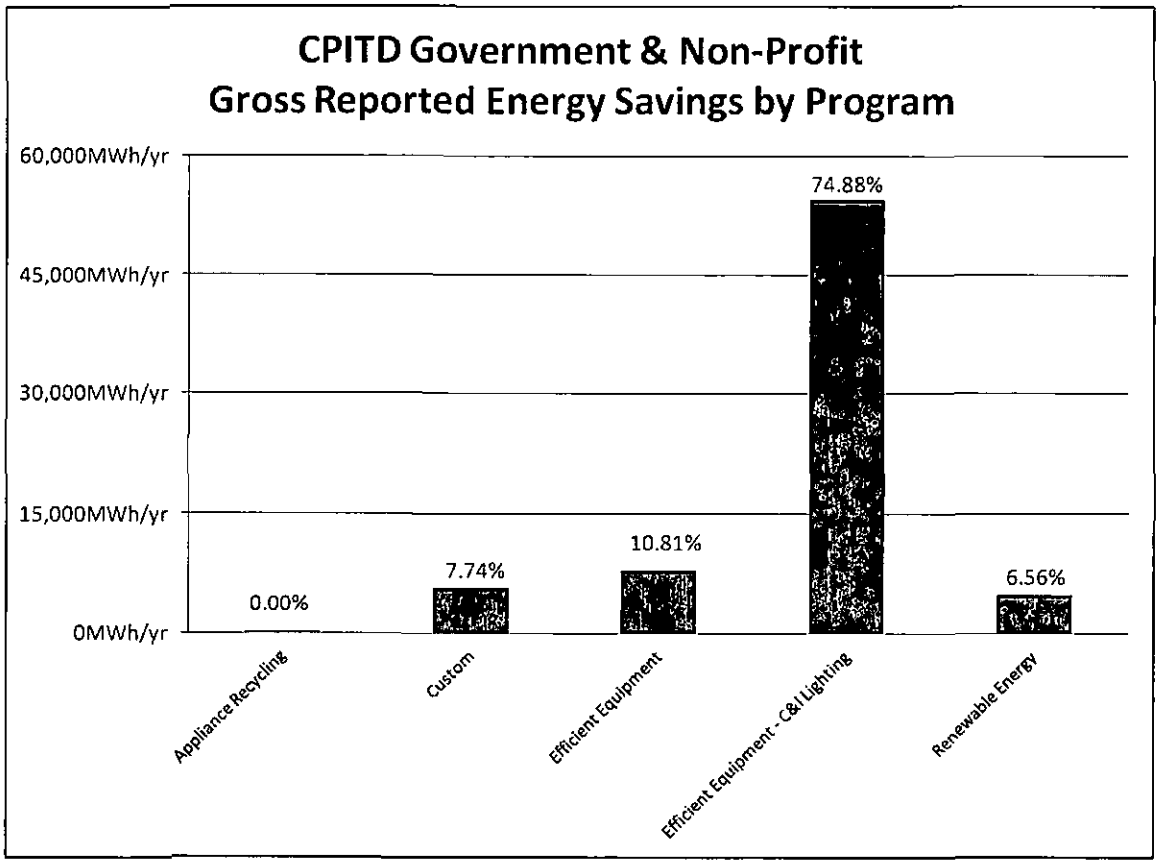
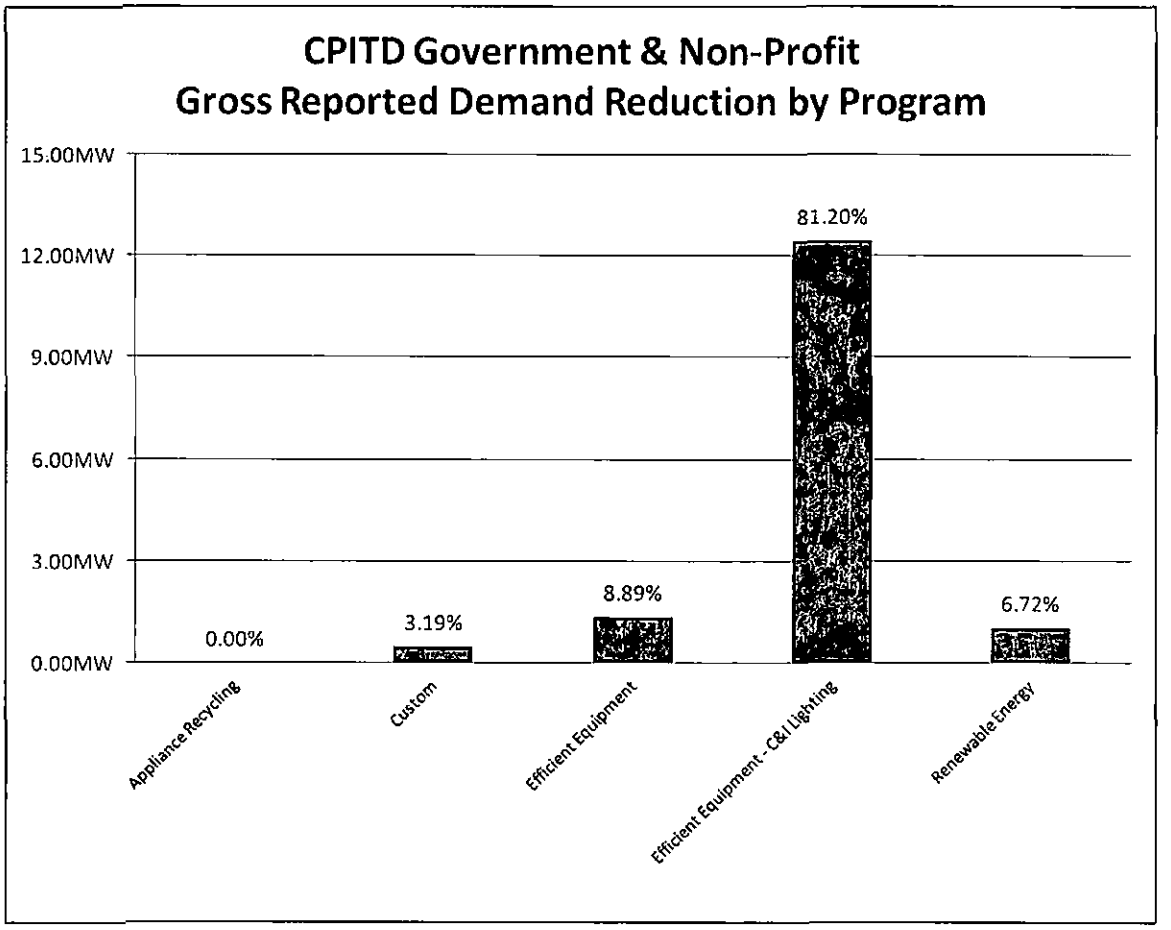


Figure 2-24: Summary of Government & Non-Profit EE Sector CPITD Reported Demand Reduction by Program



3 Portfolio Results by Program

3.1 Appliance Recycling Program

The ARP offers free pick up and recycling of operating but inefficient refrigerators, freezers, and room air conditioners. ARP's overarching goal is to prevent the continued operation of older, inefficient appliances by offering an incentive and free pick-up service to customers. The 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 energy reduction of 114,760 MWh/yr and 13,150 kW.

3.1.1 Program Logic

The theory for ARP 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 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 allows PPL Electric to maintain an efficient appliance stock.

The program's logic model, shown in Figure 1.3-1 of 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.

The logic model's elements are:

- **Program inputs:** The program inputs are PPL Electric customers with a working, residential-grade refrigerator, freezer, or air conditioner; PPL Electric staff (including management, coordination, and marketing); the appliance recycling CSP; vehicles for appliance transport; the recycling facility; applications and forms; incentive funding; and recycling expertise and technology.

- **Program activities:** The program's primary activities include marketing and outreach (including cross-program referrals), processing applications, verifying customer eligibility, picking up and recycling inefficient appliances, and processing incentive payments.
- **Program outputs:** Outputs include marketing materials produced; applications processed; number of appliances scheduled, picked-up, and subsequently recycled; and incentives paid.
- **Short-term outcomes** (one year): Outcomes resulting from customers participating in the program are 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): Outcomes consist of increased participation due to customer familiarity with the program, the reduced number of operating secondary and inefficient appliances, and waste materials from recycled appliances being disposed of in an environmentally responsible manner.
- **Long-term outcomes** (four to seven years): Outcomes include fewer old and inefficient appliances in existence and achieved energy and demand savings targets of 114,760 MWh/yr and 13 MW, respectively.

3.1.2 Program Measurement and Verification Methodology

A complete discussion of the measurement and verification (M&V) methodology can be found in Chapters 3, 4, and 5 of the Appliance Recycling Program quality assurance/quality control (QA/QC) and EM&V Plan.

***Ex Ante* Adjustment Methodology**

Two adjustments are made to savings to determine *ex post* evaluated savings. The first adjustment calculates adjusted *ex ante* savings to account for equivalent full load hours (EFLH) of operation, which vary by city, for room air conditioners. This results in the adjusted *ex ante* value and aligns the reported savings with the 2011 TRM.

***Ex ante* Adjustment Findings**

Based on the 2011 TRM *ex ante* adjustment, savings for recycled room air conditioners vary according to the city in which the unit was removed. The updated savings for each location from participation through PY3 Q1 are shown in Table 3-1.

Table 3-1: Room Air Conditioner Retirement – Savings Assumptions and Frequency of Units by City

Measure	City	EFLH	Capacity	EER	Energy Impact (kWh/yr)	CF[a]	Demand Impact (kW)	Effective Useful Life	Frequency of PY3 Q1 Units
Room Air Conditioner Retirement	Allentown	243	10,000	9.07	268	0.58	0.64	4	120
	Harrisburg	288	10,000	9.07	318	0.58	0.64	4	123
	Scranton	193	10,000	9.07	213	0.58	0.64	4	80
	Williamsport	204	10,000	9.07	225	0.58	0.64	4	55

NOTES:
[a] CF stands for coincidence factor.

Savings Realization Rate Methodology

Once adjusted *ex ante* savings are calculated, a realization rate is determined through records inspections and participant surveys (to calculate installation rates).[10] This adjustment reflects the results of M&V activities and is included in the *ex post* evaluated savings. The realization rate is the ratio of the adjusted *ex ante* savings to the evaluated *ex post* savings.

The realization rates reported for PY3 Q2 rely on data used to determine the PY3 Q1 realization rates. The realization rates are calculated in three steps:

1. First, a census of records from EEMIS is compared to a census of application records from the ARP CSP (JACO Environmental Inc.) database. The quantity of units collected and the size of each unit are compared to verify whether all units reported as recycled were actually picked up by the ARP CSP. The records review for PY3 is planned to take place during PY3 Q3, and results will be presented in the Q3 quarterly report. The records review in this report reflects PY2 results.
2. Second, a random sample of program participants is selected from EEMIS for participant surveys. This survey effort is planned for PY3 Q4, and results will be presented in the PY3 Annual Report. This report reflects PY2 results, which are used as a placeholder. The sample for PY3 will be stratified by measure type. Sampling will be statistically valid within 85/15 for the program. The quantity of units recycled, the quantity of units replaced with ENERGY STAR® versus standard efficiency units, and the operational condition of units collected will be verified to adjust reported energy savings.
3. Lastly, using methodologies from the 2012 TRM,[11] savings for the refrigerator/freezer-with-replacement measures are adjusted for the portion of participants that replaced their unit with a new appliance. The efficiency of the replacement unit is determined through surveys conducted with a random sample of program participants. Since PY3 participant surveys will not be fielded until PY3 Q4, this report reflects replacement efficiency data from PY1 surveys (replacement questions were not included in PY2 surveys). Only respondents who replaced their recycled unit with a new unit were considered in the analysis.

PY1 survey data shows that 96% of survey respondents who replaced their unit reported having an ENERGY STAR replacement. For this portion of units in PY3, savings of 1,205 kWh and 0.149 kW were applied. For the remaining 4% of PY1 survey respondents who installed a new standard efficiency (non-ENERGY STAR) unit replacement, *ex post* savings were adjusted using the algorithm provided in the 2012 TRM, resulting in 1,091 kWh and 0.1353 kW:

Savings Realization Rate Findings

Savings realization rates are shown in Table 3-2 for each measure type. These realization rates were calculated using the PY2 annual records review, PY2 participant surveys, and PY3 Q1 replacement adjustments, and were applied to all reported savings for PY3 Q2.

[10] Participant surveys for PY3 are planned for fielding in PY3 Q4. Results from those surveys will be presented in the PY3 Annual Report. Records inspection activities for PY3 will commence during PY3 Q3. Results from records inspection will be included in the PY3 Q3 quarterly report.

[11] PA 2012 TRM approved by the PUC on December 15, 2011.

Table 3-2: PY3 Q1 ARP Realization Rates and *Ex Post* per Unit Savings by Measure Type

Measure Type	2011 TRM Adjusted *Ex Ante* Savings (kWh/yr)	2011 TRM Adjusted *Ex Ante* Savings (kW)	Realization Rate (kWh)	Realization Rate (kW)	*Ex Post* kWh/yr Savings per Unit	*Ex Post* kW Savings per Unit
Refrigerator/Freezer Recycling	1,659	0.21	100%	100%	1,659	0.21
Refrigerator/Freezer Replacement	1,205	0.15	100%	100%	1,205	0.15
Room Air Conditioner	266	0.64	100%	100%	266	0.64
NOTES:						

Net-to-Gross Ratio Methodology

For PY1 and PY2, the EM&V CSP followed 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. NTG is 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.

A more complete discussion of the NTG methodology can be found in Chapter 5 of the Appliance Recycling Program QA/QC and EM&V Plan, and will also be available in PPL Electric annual reports, which are filed every November. The results in this report reflect PY2 results, used as a placeholder. The NTG analysis will be updated and reported in the PY3 Annual Report.

3.1.3 Program Sampling

The records review includes a census of participants in the EEMIS database, verified by unique CSP job numbers (i.e., unique rebates). The CSP job numbers are tied to the rebate applications; a rebate can include more than one appliance. Participant surveys will be fielded once, with a target sample of 70 respondents, meeting statistical validity within 90/10. PY1 and PY2 non-participant survey data will be used in PY3; no additional ARP non-participant surveys will be conducted in PY3. Non-participant surveys will be used to determine the net savings. Sample sizes meet or exceed the SWE's requirements of statistical validity within 85/15 by program.

3.1.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.1.5 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, provides turnkey 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, scheduling services, and 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 in PPL Electric's service territory, such as Best Buy and Sears.

3.1.6 Program Finances

A summary of the project finances is presented in Table 3-3. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-3: Summary of Appliance Recycling Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$0	$0	$0
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$0	$0	$0
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$784,458	$1,370,910	$3,617,940
B.4	Marketing[a]	$135,204	$267,079	$692,054
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$919,662	$1,637,989	$4,309,993
C	**EDC Evaluation Costs**[a]	$0	$0	$0
D	**SWE Audit Costs**[a]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$919,662	$1,637,989	$4,309,993
E	**Participant Costs**[c]	Not required	Not required	Not required
	Total EDC & Participant Costs	$919,662	$1,637,989	$4,309,993
F.1	**Annualized Avoided Supply Costs –Residential**[d]	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

	Category	IQ	PYTD	CPITD
NOTES:				
Definitions for terms in this table are subject to TRC Order.				
[a] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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.				
[b] Includes PPL Electric and the program CSP's implementation, management, and oversight of this program. Includes the CSP's cost to pick up, decommission, and recycle appliances.				
[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 costs for the sector in PY2.				

3.2 Residential Lighting Program (formerly Compact Fluorescent Lighting Campaign)

The Residential Lighting Program has two components:

- An upstream retail lighting component provides incentives to CFL and LED manufacturers, which effectively buy down the retail price of ENERGY STAR CFLs and LED bulbs. The majority of program-discounted energy efficient bulbs are sold in retail brick-and-mortar stores, although PPL Electric also offers program-discounted CFLs and LEDs through an online retail store.
- A give-away component provides customers with ENERGY STAR CFLs free-of-charge at events sponsored by PPL Electric.[12]

The objectives of the Residential Lighting Program include:

- Developing and executing strategies aimed at transforming the market for ENERGY STAR-qualified light bulbs with a goal of increasing the number of qualified products purchased and installed in PPL Electric's service territory.
- Providing a mechanism for customers to easily obtain discounted ENERGY STAR-qualified CFLs and LEDs in the retail market.
- Providing opportunities that encourage customers to obtain and try CFLs free-of-charge through PPL Electric-sponsored give-away events and activities.
- Increasing consumer awareness and understanding of energy efficient lighting and use in various lighting applications.
- Promoting consumer awareness and understanding of the ENERGY STAR label.
- Promoting other PPL Electric EE&C programs to customers.

3.2.1 Program Logic

Logic models for upstream and give-away program components are shown in the Compact Fluorescent Lighting Campaign EM&V Plan, Figure 1.2-1 and Figure 1.2-2. The program theory, which was developed

[12] Note that while the Residential Lighting Program's upstream component began including LEDs in PY3, the program's give-away component still only includes CFLs.

when the program promoted only CFLs and was called the CFL Campaign, was readily modified to include LEDs and is summarized as follows:

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

The Residential Lighting Program logic models highlight key program features and indicate logical linkages between activities, outputs, and outcomes.

The logic models' elements include:

- **Program inputs:** Inputs to the program include PPL Electric staff and customers; PPL Electric's strategic direction, program management, and other support; the CFL and LED technologies; trade allies (energy efficient light bulb manufacturers, retailers, and community groups); incentive funding; and the CSP's program implementation expertise.
- **Program activities:** Primary program activities include trade ally recruitment and coordination; marketing and outreach to customers; program material dissemination; and distribution of low- and no-cost CFLs and LEDs to customers.
- **Program outputs:** Outputs include informed and active trade allies and community organizations; marketing materials; promotional campaigns and bulb give-away events; and program-discounted CFLs and LEDs.
- **Short-term outcomes** (one year): Outcomes include promotional campaigns to educate customers about CFLs and LEDs; increased CFL and LED availability; increased customer demand for CFLs and LEDs; and reduced retail prices for program-discounted CFLs and LEDs. These outcomes lead to immediate energy and demand savings.
- **Intermediate outcomes** (two to three years): Outcomes include increased customer familiarity and comfort with CFLs and LEDs, leading to more CFL and LED 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 and LED manufacturing costs due to economies of scale and technological improvements; and more efficient and effective program implementation resulting from the continuous evaluation and QA/QC feedback loops.
- **Long-term outcomes** (four to seven years): Outcomes include customers thinking of CFLs and LEDs 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, respectively, planned through 2013.

3.2.2 Program Measurement and Verification Methodology

A 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.

The first step in verifying program savings is to examine a census of program records to ensure that the algorithms used by the program CSP to compute program savings (which are recorded in EEMIS) are the same as the algorithms specified in the TRM. From this, the EM&V CSP derives the program's TRM-

adjusted *ex ante* savings. Next, the EM&V CSP calculates *ex post* savings based on the findings from a more detailed records review. The EM&V CSP then applies the realization rate from the records review to the program's TRM-adjusted *ex ante* energy and demand savings to derive *ex post* verified energy and demand savings.

In PY3, the SWE continued to request that the EM&V CSP explore several parameters related to CFL savings estimation, but that no adjustments for these parameters be made to the program savings. These parameters included CFL installation rates, hours-of-use (HOU), delta wattage, and NTG. The EM&V CSP assessed these parameters through customer surveys and trade ally interviews conducted in PY2. These parameters may or may not be explored in the PY3 surveys; this has yet to be determined.

***Ex Ante* Adjustment Methodology**
For the Residential Lighting Program, the EM&V CSP reviewed a census of program records to ensure the gross energy and demand savings in EEMIS were computed using the algorithms specified in the 2011 TRM. The *ex ante* adjustments reflect corrections made to gross savings values that were derived using incorrect TRM algorithms.

***Ex Ante* Adjustment Findings**
The EM&V CSP found that, for LEDs only, the gross energy and demand savings in EEMIS were not computed using the algorithms specified in the 2011 TRM. Specifically, the values in EEMIS were derived using incorrect in-service rate (ISR) factors. EEMIS under-reported the energy savings because it used the same ISR for LEDs as for CFLs (84%), instead of 95% for LEDs as stated in the TRM. EEMIS over-reported the demand savings because it used a 100% ISR instead of 95% for LEDs as stated in the TRM. The *ex ante* adjustments therefore corrected for these discrepancies in the ISR. However, since very few program LEDs were sold during PY3 Q1, the *ex ante* savings adjustments were negligible.

Savings Realization Rate Methodology
The EM&V CSP derived the realization rate for the Residential Lighting Program by conducting a thorough review of the program records. The Residential Lighting Program CSP works directly with CFL and LED 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 and LED sales data on the approved, program-discounted energy efficient bulbs from participating retailers. The manufacturers then send their sales data to the program CSP, who reformats and uploads these disparate datasets to their own internal program database. Finally, the program CSP uploads the monthly (participation) sales data from its database to EEMIS. EEMIS also maintains a separate measures table with descriptive details about discounted CFLs and LEDs. Only data from the Residential Lighting Program CSP's database and from EEMIS are available for the EM&V CSP to review.

Due to the upstream nature of the Residential Lighting Program, there is no way to know which PPL Electric customers purchased CFLs or LEDs discounted through the program. For the Residential Lighting Program, EEMIS (and the program CSP's database) was therefore designed to capture information about the program-discounted CFLs and LEDs themselves; no data is collected about participating Residential Lighting Program customers. Each record in EEMIS is a unique combination of:

- CFL/LED SKU,

- Retailer name and store identifier where each CFL/LED was sold,
- Date each CFL/LED was sold to retail customers,
- CFL/LED manufacturer,
- CFL/LED wattage,
- Wattage of an equivalent incandescent light bulb, and
- Additional CFL/LED characteristics.

Both EEMIS and the Residential Lighting Program CSP produce quarterly reports in standardized formats. The EM&V CSP used these standardized reports to develop a mostly automated system for conducting Residential Lighting Program record reviews and analyzing the associated realization rate.

Following the process described above, the EM&V CSP completed a review of the census of PY3 Q1 Residential Lighting Program records from EEMIS, rather than reviewing a sample of randomly selected records (as was described in the CFL Campaign QA/QC and EM&V Plan). The EM&V CSP then compared these records to records in the program CSP's participation database, matching records by CFL SKU, retailer, store identifier, and date the CFL was sold. The EM&V CSP also compared the energy and demand savings calculated for each record in EEMIS to the energy and demand savings calculated in the program CSP's measures table.

Savings Realization Rate Findings
The EM&V CSP's energy and demand savings calculations, based on inputs from the program CSP's participation database, matched EEMIS recorded energy (kWh) and demand (kW) savings values for 526,086 out of the total 526,296 PY3 Q1 records (i.e., values for variables matched for 99.9% of the records). Upon further investigation, the EM&V CSP found that the mismatches were due to small errors in the program CSP's database. However, because so few records were affected, the Residential Lighting Program's PY3 Q1 realization rate is 100% for both energy and demand savings.

Additional CFL Savings Parameters
In PY1 and PY2, the SWE requested that PPL Electric collect self-reported survey data on installation rates, HOU, and delta watts. The EM&V CSP gathered data and computed these parameters to meet SWE requirements; the parameters were not used to adjust the TRM assumptions or *ex post* evaluated savings.

Assuming the SWE is interested in obtaining updated installation rates, HOU, and delta watts in PY3, the EM&V CSP will use the same approach in PY3 Q3 as was employed in earlier program years. Namely, survey respondents who recently purchased CFLs or LEDs will be asked about the number and locations (i.e., which rooms) of CFLs/LEDs installed in their homes and the number of CFLs/LEDs in storage. The EM&V CSP will then calculate the installation rate as the number of CFLs/LEDs installed divided by the sum of the total number of CFLs/LEDs installed and in storage.

Survey respondents who have one or more CFLs/LEDs installed in their home will be asked how many CFLs/LEDs are installed in specific rooms of their home. The EM&V CSP will use respondents' survey

answers, in combination with secondary research published by the Regional Technical Forum (RTF),[13] to estimate the average HOU per day per CFL/LED for PPL Electric customers.

Assessment of the customer surveys implemented in PY1 reveals that customers are generally unable to accurately report the wattages of CFLs they installed and of incandescents they replaced. Because the wattage questions proved very difficult for respondents to answer, and in an effort to simplify and shorten the Residential Lighting Program customer survey, these questions were not included in the PY2 customer survey, nor will they be included in the PY3 customer survey.

Net-to-Gross Ratio Methodology

Upstream energy efficiency programs, such as PPL Electric's Residential Lighting Program, present challenges in evaluating program net impacts for the following reasons:

- CFLs are generally inexpensive and are purchased on a fairly regular basis, so customers are only able to accurately recall details about buying light bulbs for a short time after the purchase takes place (e.g., how many individual light bulbs and how many packages were purchased, when the purchase occurred). This is especially true after customers become somewhat familiar with CFLs and no longer view them as novelty items. However, this may not be true for LEDs, which are very expensive compared to CFLs and incandescents.
- As described in Section 4.1 of the EM&V Plan, the upstream Residential Lighting Program (then called the CFL Campaign) is largely invisible to PPL Electric customers. Many end-use customer participants are unaware they are taking part in the program. Evaluations of upstream programs implemented elsewhere have found that the majority of customer participants are unaware of their participation status.
- The program marketing and outreach components are expected to lead not only to sales of program-discounted CFLs and LEDs, but also potentially to sales of larger numbers of non-program CFLs and LEDs (spillover). Non-program energy efficient bulb sales can occur at participating retailers (sales of non-discounted efficient bulbs during program promotions and efficient bulb 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 program-discounted bulbs 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 Massachusetts, Vermont, and Wisconsin in 2005 and 2006 found NTG values exceeding 100% due to the influence these types of programs exerted on the overall energy efficient light bulb market.

With the above challenges in mind, the EM&V CSP conducted a NTG analysis based on findings from customer telephone surveys conducted in PY2. The analysis incorporated all respondents who had purchased one or more CFLs in the past three months (the program did not begin promoting LEDs until PY3 Q1), including those who were aware of the Residential Lighting Program and those who were not. The EM&V CSP is planning to field a similar customer telephone survey in PY3 Q3 or PY3 Q4. The

[13] The RTF, an organization chartered by the Northwest Power and Conservation Council, researched and published the average lighting HOU per day by room type.

Residential Lighting Program NTG analysis will be repeated once results from the PY3 customer surveys are calculated.

Some of the PY2 CFL purchasers who were unaware of the Residential Lighting Program were nevertheless likely influenced by it, while others were not. Respondents who bought CFLs and were unknowingly influenced by the program are considered spillover, while those unaware respondents who bought program CFLs but were not influenced by the program are free-riders.

Once the PY3 surveys are completed, free-ridership and spillover rates for recent purchasers who were and who were not aware of the program will be combined to derive an overall NTG ratio. The Residential Lighting Program NTG will be compared to the results from recently published upstream CFL program evaluations conducted in other areas of the country.

Net-to-Gross Ratio Findings

Based on the PY2 free-ridership estimates derived from customer surveys, the Residential Lighting Program NTG ratio ranges between 71% and 94%. Since it is highly unlikely that all recent CFL purchasers who were unaware of the Residential Lighting Program before they participated in the customer survey would have purchased the same quantity of CFLs without the program discount, the actual NTG ratio is likely at the higher end of the 71% to 94% range. The EM&V CSP therefore estimated NTG for the Residential Lighting Program as 85% in PY2. This value will be used as a placeholder until the PY3 surveys are conducted.

Recent evaluations have found that other relatively new upstream lighting programs have similar NTG ratios. As shown in Table 3-4, NTG ratios for these other utilities ranged from 62% to 96%.

Table 3-4: NTG Values from Other Recent Upstream CFL Evaluations

Program	Program Year			
	2007	2008	2009	2010
Ameren Illinois Utilities				83%
Ameren Missouri				96%
APS	78%			
Rocky Mountain Power, Utah	82%	87%		
Rocky Mountain Power, Washington	89%	81%		
Southwestern Public Service Company			81%	
<Unnamed> Mid-Atlantic Utility				80%
<Unnamed> Southwest Utility			75%	79%
Wisconsin Focus on Energy	75%		67%	62%
NOTES:				

Although the NTG ratio was computed for the Residential Lighting Program, no NTG adjustments were applied to the program's gross savings. NTG adjustments will not be applied to the program savings until required by the PUC and specified in the TRM.

3.2.3 Program Sampling

The EM&V CSP conducted a records review for a random sample target designed to achieve statistical validity within 90/10. The customer telephone survey for the Residential Lighting Program evaluation sample frame was developed from PPL Electric's customer database and, to ensure the telephone survey will provide useful results for both CFL/LED purchasers and non-purchasers while staying within a reasonable budget, the survey was conducted using the maximum and minimum target number of completed interviews.

3.2.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.2.5 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, resolves program issues, and manages the third-party implementer. A third-party implementation program CSP, ECOVA (formerly Ecos), works on both the upstream and give-away Residential Lighting Program components.

For the program's upstream component, the Residential Lighting Program CSP recruits manufacturer and retailer participants; negotiates memorandum of understanding agreements with participant manufacturers; coordinates CFL and LED shipment and transportation logistics; coordinates CFL and LED marketing and outreach with participating retailers; tracks program data; and provides program reports to PPL Electric. The program CSP uses a broad range of retailers, including chain stores (e.g., national big box and mass merchandise retailers) and smaller local and independent stores throughout PPL Electric's service territory. The Residential Lighting Program CSP is also responsible for establishing convenient drop-off locations for CFL and LED recycling in PPL Electric's service territory.

For the give-away program component, the program CSP and PPL Electric recruit community-based organizations (CBOs), retailers, home show coordinators, and other local organizations to participate in CFL/LED give-away events. These events are used as a forum for education and outreach to increase customer awareness of (1) CFL/LED benefits, (2) appropriate CFL/LED use and installation, (3) CFL/LED safe handling and recycling, and (4) the range of EE&C programs that PPL Electric offers. The Residential Lighting Program CSP negotiates with CFL/LED manufacturers to distribute bulbs at these events, and provides point-of-purchase displays and educational materials for use at the events.

The program CSP maintains a call center to respond to all end-use customer questions about the Residential Lighting Program. While the program CSP handles the majority of marketing for the program, the marketing CSP oversees the general branding of the program marketing materials. Retailer trade allies sell qualifying CFLs and LEDs to end-use customers.

Typical delivery processes for the upstream buy-down and give-away components of the Residential Lighting Program are shown in Appendix C of the EM&V Plan. Trade allies include participating and non-participating manufacturers and retailers. Participating manufacturers and retailers were identified through the program CSP's monthly reports. Non-participating trade allies include manufacturers and retailers who were approached by the program CSP and declined to participate, or who participated for a time and then dropped out of the program. Additional non-participating trade allies were identified through secondary research.

3.2.6 Program Finances

A summary of the program finances is presented in Table 3-5. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-5: Summary of Residential Lighting Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$572,194	$1,001,583	$5,884,651
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$572,194	$1,001,583	$5,884,651
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$530,097	$930,293	$3,054,267
B.4	Marketing[a]	$4,611	$8,907	$154,867
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$534,708	$939,200	$3,209,133
C	**EDC Evaluation Costs**[a]	$0	$0	$0
D	**SWE Audit Costs**[a]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$1,106,902	$1,940,783	$9,093,784
E	**Participant Costs**[c]	Not required	Not required	Not required
	Total EDC & Participant Costs	$1,106,902	$1,940,783	$9,093,784
F.1	**Annualized Avoided Supply Costs –Residential**[d]	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

	Category	IQ	PYTD	CPITD
NOTES:				
Definitions for terms in this table are subject to TRC Order.				
[a] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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.				
[b] Includes PPL Electric and the program CSP's implementation, management, and oversight of this program.				
[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 PY2.				

3.3 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 kWh for implemented, cost-effective measures. Incentives are limited to 50% of project costs, with a specific annual cap per customer and per parent company.
- PPL Electric will reimburse customers for up to 50% of the cost for a technical study of measures eligible for Custom Incentive Program incentives, and may provide additional study cost reimbursement following successful implementation of a cost-effective 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, compressed air, and other measures or processes.
- Promoting strategies that encourage and support market transformation for energy efficient products and services in non-residential sectors.
- Identifying new measures or technologies that no longer need to be treated as custom and should be added to the Efficient Equipment Incentive Program or other programs.
- Promoting other PPL Electric EE&C programs.
- Achieving energy savings of 140,459 MWh/yr and peak demand savings of 27 MW with roughly 400 custom projects (anticipated to include over 1,500 measures) over the initial four-year program term.
- Reducing the upfront cost barrier and making high-efficiency equipment a more viable option for customers through incentives that 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.

3.3.1 Program Logic

The Custom Incentive Program theory 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, leading to additional energy and demand savings.

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

- **Program inputs:** The program inputs include the targeted customers; support from PPL Electric staff, CSPs, and trade allies; rebates for technical studies and energy efficiency measures; the efficient equipment; applications and forms; and program staff 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 reports 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.
- **Program outputs:** 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's, the number of projects completed, the number of projects field verified, and the number of rebates processed.
- **Short-term outcomes** (one year): Outcomes include more energy efficiency assessments occurring than would have happened in the absence of the program, installations of high-efficiency equipment, repairs, and optimization or process changes that reduce electricity consumption and peak demand in higher numbers than would have occurred without the program.
- **Intermediate outcomes** (two to three years): Outcomes include participating structures using less energy than they would have without the program.
- **Long-term outcomes** (four to seven years): Outcomes 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.

3.3.2 Program Measurement and Verification Methodology

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

Savings Realization Rate Methodology
Each custom project is defined as being large or small. Large projects are identified in real time and were all included in the impact evaluation sample. These projects generally have a large amount of savings (currently defined as reserved (*ex ante*) savings greater than 500,000 kWh/yr). However, projects with savings below this threshold can also be included in the large stratum. The entire population of projects in this stratum will be verified, but the results will not be extrapolated to other sites through a realization rate.

A sample of small projects is selected for impact evaluation following the close of each program quarter. Savings for this sample are verified and used to determine a realization rate, which is applied to the population of projects in the small stratum.

Verified savings for all projects in the large stratum and a sample of projects in the small stratum will be determined by following site specific evaluation, measurement, and verification plans (SSEMVPs). In some cases, PPL Electric delays full or partial payment until the verified (evaluated) savings are known, and will pay customer incentives based on these evaluated savings. In other cases, PPL Electric pays incentives based on *ex ante* savings estimates or interim *ex post* results.

Net-to-Gross Ratio Methodology
The NTG ratio is determined from participants' self-reported data. The PY2 Annual Report, which was filed November 15, 2011, also provided additional information about NTG. Information obtained from computing the NTG ratio will be used to refine and improve program delivery.

3.3.3 Program Sampling

The EM&V CSP categorized each custom project as being either large or small. Large projects are currently defined as having reserved (*ex ante*) savings greater than 500,000 kWh/yr, and are all included in the impact evaluation sample. A random sample of small projects gets selected for savings verification following the close of each program quarter.

The EM&V CSP will conduct EM&V reviews for the stratum of all large projects. The small projects will be divided into two strata, one populated with projects that have anticipated savings less than or equal to 500,000 kWh/year but greater than 250,000 kWh/year (stratum one), and one populated with projects that have anticipated savings equal to or less than 250,000 kWh/year (stratum two; see Table 3-6). This approach further weights the EM&V research towards the larger projects.

Table 3-6: PY3 Q2 Custom Projects Impact Evaluation Sampling Strata

	Project Category	Total Savings	PY2 Completed	PY3 Estimated
1	Large Stratum	500,000 kWh/yr and greater	10	28
1	Large Stratum	Less than 250,000 kWh/yr[a]	32	0
2	Small – (1)	Between 250,000 and 500,000 kWh/yr	0	8
3	Small – (2)	Less than 250,000 kWh/yr	12	66

NOTES:
[a] These projects were included in the large stratum even though their savings were less than the threshold.

Table 3-7 outlines the sampling plan. Additional detail can be found in the Custom Incentive Program EM&V Plan. Savings thresholds will be periodically re-evaluated based on the distribution of projects.

Table 3-7: PY3 Q2 Custom Projects Impact Evaluation Sampling

Project #	PPL Electric Reported Savings (kWh)	Strata	In Sample
5	1,028,436	Large	Yes
25	2,185,939	Large	Yes
54	3,946,293	Large	Yes
143	199,193	Small	TBD
144	63,710	Small	TBD
145	426,966	Large	Yes
160	30,685	Small	TBD
178	165,820	Small	TBD
179	7,656	Small	TBD
191	1,335,588	Large	Yes
193	898,897	Large	Yes
196	3,330,344	Large	Yes
197	296,764	Small	TBD
206	155,187	Large	Yes
210	2,330,661	Large	Yes
220	157,911	Small	TBD
221	24,158	Small	TBD
230	876,169	Large	Yes
244	41,251	Small	TBD
245	25,570	Small	TBD
250	80,197	Small	TBD
253	35,802	Small	TBD
254	18,558	Small	TBD
262	49,313	Small	TBD
265	280,320	Small	TBD
266	5,663	Small	TBD
268	1,208	Small	TBD
273	49,016	Small	TBD
275	4,144	Small	TBD
278	249,061	Small	TBD
305	29,596	Small	TBD
320	40,884	Small	TBD
Total	**18,370,960**		**32**
Small	**1,856,480**	**10%**	**TBD of 22**

Project #	PPL Electric Reported Savings (kWh)	Strata	In Sample
Large	16,514,480	90%	10 of 10
NOTES:			

In addition, during PY3 Q2, verification activities continued for PY3 Q1 projects and for a small number of PY2 projects. Several PY2 projects that were classified as large but actually have low savings (total reported savings of 122,622 kWh) had not been verified by the time the PY2 report was issued. These projects will be verified during PY3. As will be the case in most quarters, only a minority of PY3 Q1 projects were verified at the time the PY3 Q1 report was issued. Verification of these projects will be performed throughout PY3.

3.3.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.3.5 Program Partners and Trade Allies

For the Custom Incentive Program, key staff members include the PPL Electric EE&C programs director and staff, the EM&V program manager and staff, and the CSP who developed the EEMIS system (CGI). In January 2011, PPL Electric hired a new third-party implementer, KEMA (referred to as E-Power Solutions or EPS), to act as the C&I CSP and work with customers in this program. PPL Electric staff and the C&I CSP will provide the participant and non-participant customer information to the EM&V CSP, including name, address, telephone number, and account number.

Trade allies are entities that provide services for Custom Incentive Program participants. 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 with the program. Trade allies can be identified through customer rebate applications and from records kept by the PPL Electric Custom Incentive Program managers, the QA/QC CSP, or the Key Account Managers (KAMs).

3.3.6 Program Finances

A summary of the project finances is presented in Table 3-8. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-8: Summary of Custom Incentive Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$0	$0	$0
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$0	$0	$0
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$388,189	$1,556,761	$2,109,884
B.4	Marketing[a]	$0	$6,085	$6,085
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$388,189	$1,562,846	$2,115,969
C	**EDC Evaluation Costs**[a]	$0	$0	$0
D	**SWE Audit Costs**[a]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$388,189	$1,562,846	$2,115,969
E	**Participant Costs**[c]	Not required	Not required	Not required
	Total EDC & Participant Costs	$388,189	$1,562,846	$2,115,969
F.1	**Annualized Avoided Supply Costs –Residential**[d]	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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.
[b] Includes PPL Electric's implementation, management, and oversight of this program.
[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 program in PY2.

3.4 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 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:

- Providing customers with opportunities to reduce their energy costs and increase the energy efficiency of their buildings.
- Encouraging customers to install high-efficiency HVAC, lighting equipment, and electric appliances.
- Supporting the use of high-efficiency and ENERGY STAR-rated equipment.
- Encouraging and supporting market transformation of high-efficiency appliances and equipment.
- Promoting other PPL Electric EE&C programs.
- Achieving energy and demand savings.

3.4.1 Program Logic

The Efficient Equipment Incentive Program theory can be summarized as follows:

> By providing rebates 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 about 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, leading to additional energy and demand savings.

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

- **Program inputs:** The program inputs include the targeted customers; support from PPL Electric staff, CSPs, and trade allies; and the efficient equipment.
- **Program activities:** The primary program activities include management and strategic direction, the trade allies' support, marketing, rebate form submission, eligibility verification, education, equipment installation by the customer or by a contractor, and rebate processing and payment.
- **Program outputs:** 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): Outcomes include increased awareness of the program, increased customer and trade ally awareness of energy efficient equipment, and increased 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): Outcomes include a reduction in annual energy consumption and peak load, and lower electric bills for program participants.

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

3.4.2 Program Measurement and Verification Methodology

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

Program savings are verified using various methods to determine the savings attributable to the measure and the realization rate of the measures installed. These methods include verification through surveys and a comparison of rebate records and documentation to EEMIS reported values. Non-residential measures are also verified through site visits conducted for a sample of projects.

***Ex Ante* Adjustment Methodology**
The first adjustment to *ex ante* reported gross savings is based on information about the systems installed through the program (tonnage, efficiency, and geographic location). This adjustment accounts for differences between how savings are calculated in the tracking system and how savings are specified in the 2011 TRM, and for data recording issues. These adjustments result in the adjusted *ex ante*, bringing the reported savings into alignment with the 2011 TRM. This adjustment applies to most measures in the program, however, there are some measures, including those for commercial lighting projects, for which there is not enough tracking database information to make adjustments. For those measures, a single adjustment is made using the savings realization rate.

***Ex Ante* Adjustments Findings**
Ex ante adjustments in this report reflect PY2 findings. The EM&V CSP is currently obtaining samples and reviewing data for PY3. Findings will be presented in the PY3 Q3 report.

Savings Realization Rate Methodology
The savings realization rate captures adjustments made for installation rates and qualifying equipment using survey data, site visits, and records review. These adjustments reflect the results of M&V activities and are included in the *ex post* evaluated savings. The realization rate is the ratio of the adjusted *ex ante* savings to the evaluated *ex post* savings.

Realization Rate Findings – Commercial Lighting
In PY3 Q1 and PY3 Q2, a sampling plan for PY3 measures was designed and a sample of PY3 Q1 commercial lighting projects was drawn. The sample size of 92 for commercial lighting projects is based on the PY2 0.55 coefficient of variation, and was designed to achieve estimates that are statistically valid within 90/10.

To adjust for anticipated non-respondents and program drop outs, an additional 13 projects were included in the sample. The sampling plan also includes a strategy to focus on larger projects while reserving resources for smaller projects. Large projects are defined as the largest projects that account for 50% of a quarter's savings. In the PY3 Q1 review, 3% of reported projects were included in the sample, but accounted for 12% of *ex ante* savings.

The following tables summarize the PY3 Q1 *ex ante* population and the verification sample. Table 3-9 summarizes the distribution of large, medium, and small projects in PY3 Q1; Table 3-10 summarizes the distribution of projects by sector; and Table 3-11 summarizes the distribution of large, medium, and small projects in the PY3 Q1 sample.

Sampling procedures in PY3 Q2 followed those described for PY3 Q1. PY3 Q1 and Q2 site visits and verification activities will be conducted in PY3 Q2 and Q3. Each quarter, the sample will be defined and selected from the participants reported in EEMIS.

Table 3-9: Characteristics of PY3 Q1 Commercial Lighting Projects for the Efficient Equipment Incentive Program

Stratum	Number of Projects	Percent of Total Projects	Percent of Total kWh/yr	Project Savings by Stratum (kWh/yr)
Large	43	5%	50%	Greater than 298,081
Medium	269	13%	30%	Less than 298,082 and greater than 80,697
Small	707	82%	20%	Less than 80,697
Total	867	100%	100%	
NOTES:				

Table 3-10: Distribution by Sector of PY3 Q1 Commercial Lighting Projects for the Efficient Equipment Incentive Program Characterization

Sector	kWh/yr	Percent of Total kWh	Incentive	Percent of Total Incentive Payments	Number of Projects	Percent of Total Projects
Government & Non-Profit EE	7,807,209	13%	$988,053	16%	195	22%
Large C&I EE	21,526,797	35%	$1,390,308	23%	51	6%
Residential EE	386,512	1%	$59,560	1%	22	3%
Small C&I EE	32,435,819	52%	$3,596,637	60%	599	69%
Total	62,156,337	100%	$6,034,557	100%	867	100%
NOTES:						

Table 3-11: Sample Characteristics of PY3 Q1 Commercial Lighting Projects for the Efficient Equipment Incentive Program

Stratum	Site Visits	Record Review	Percent of Total Reported kWh
Large	12	12	10%
Medium	7	7	2%
Small	5	5	0%
Total	24	24	12%
NOTES:			

Net-to-Gross Ratio Methodology
The NTG ratio is determined through self-report surveys with a sample of participants. The survey includes spillover and free-ridership questions. The free-ridership battery of survey questions is tailored based on the measures installed by participants of the Efficient Equipment Incentive Program. More detail about the free-ridership analysis and the scoring matrix are included in the PPL Electric PY2 Annual Report, which was filed November 15, 2011. The information obtained by computing the NTG ratio will be used to refine and improve program delivery.

3.4.3 Program Sampling

In March 2011, the SWE issued a sampling Guidance Memo, updating discussions held in November 2010. The EM&V CSP revised the sampling plan according to the SWE's November instructions. Subsequent conversations with the SWE team and the Guidance Memo provide direction for the sample plans. The updated PY3 sampling plan was used for the final PY3 samples. Sampling details are provided in Appendix B.

3.4.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.4.5 Program Partners and Trade Allies

PPL Electric has internal customer programs specialists who oversee implementation of the Efficient Equipment Incentive Program for the residential sector. Rebates for the residential sector are processed by the administrative CSP (Helgeson Enterprises). PPL Electric has contracted with ECOVA for one field representative to promote the program working with independent retailers. This field representative delivers rebates and signs to the 200 independent retailers in the PPL Electric service territory, and informs these retailers about changes to residential rebates.

In January 2011, PPL Electric hired a third-party implementer, EPS, to act as the C&I CSP. EPS began working with commercial customers in this program in PY2 Q4. EPS reviews C&I customer's project applications and assists as needed. EPS reviews rebates for all C&I customers, except those having residential-sized appliances installed (clothes washers, room air conditioners, etc.), works closely with trade allies, and assisted in the redesign of rebate applications in preparation for PY3.

PPL Electric's KAMs promote the program and provide program support to PPL Electric's large C&I customers. PPL Electric implementation staff manage, oversee, and monitor program performance; ensure program information is available on PPL Electric's ePower Website; provide trade ally outreach; and train and manage the marketing and administrative CSPs.

U Marketing serves as the marketing CSP for the Residential EE and Small C&I EE sectors. 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 program benefits 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 with submitting program documentation.

Helgeson, the administrative CSP, responds to customer questions through its call center and is also responsible for processing residential rebates, entering all program data into internal tracking systems, and uploading program data to EEMIS. Helgeson transferred the responsibilities of working with non-residential customers to EPS. The call center phone number is the same, but calls from non-residential customers are transferred to EPS.

Trade allies provide services for participants of the Efficient Equipment Incentive Program. Trade allies include HVAC and lighting contractors installing qualifying equipment 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 Incentive Program managers.

Customer rebate forms include contractor information, as appropriate for the technology. The administrative CSP records the contractor information in their database, which is uploaded to EEMIS.

3.4.6 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-12. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-12: Summary of Efficient Equipment Incentive Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$7,276,831	$14,183,744	$40,658,232
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$7,276,831	$14,183,744	$40,658,232
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$1,588,364	$3,670,414	$4,509,568
B.4	Marketing[a]	($21,947)	($14,128)	$15,983
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$1,566,416	$3,656,287	$4,525,551
C	**EDC Evaluation Costs**[a]	$0	$0	$0
D	**SWE Audit Costs**[a]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$8,843,247	$17,840,031	$45,183,783
E	**Participant Costs**[c]	Not required	Not required	Not required
	Total EDC & Participant Costs	$8,843,247	$17,840,031	$45,183,783

	Category	IQ	PYTD	CPITD
F.1	Annualized Avoided Supply Costs –Residential[d]	Not required	Not required	Not required
F.2	Annualized Avoided Supply Costs – Small C&I	Not required	Not required	Not required
F.3	Annualized Avoided Supply Costs – Large C&I	Not required	Not required	Not required
G	Lifetime Avoided Supply Costs	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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.
[b] Includes PPL Electric's implementation, management, and oversight of this program.
[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 costs for the sector in PY2.

3.5 E-Power Wise Program

The E-Power Wise Program serves PPL Electric customers with household incomes at or below 150% of the federal poverty level. The program is available to customers in single family housing and in multifamily housing where 50% or more of the tenants qualify as being low-income. The E-Power Wise Program claimed savings for the first time in PY2 Q3.

The program uses a train-the-trainer model, where the program CSP (Resource Action Program Inc., or RAP) trains CBO staff and/or others they identify to provide energy workshops at locations convenient to the targeted customer segment. Workshops have been held during days, evenings, and on weekends, making the sessions accessible to as many low-income customers as possible. CBOs also conduct one-on-one energy education sessions with customers. Program outreach focuses on (but is not limited to) attracting low-income seniors to participate. Customers attending each session were asked to complete a survey, and these survey results were used to evaluate various program metrics.

The objectives of the E-Power Wise Program include:

- Providing quality energy conservation and efficiency education to low-income customers, so they can make informed choices about their energy use.
- Providing information about low-cost/no-cost energy efficiency strategies that low-income customers can use in their homes.
- Providing low-income customers with energy efficiency measures in free home energy kits, including CFLs, electroluminescent nightlights, showerheads, and faucet aerators.
- Obtaining participation of no fewer than 7,200 customers through 2013 with a total reduction of 1,080 MWh and 150 kW.

3.5.1 Program Logic

The E-Power Wise Program theory can be summarized as follows:

> By providing low-income customers with information about the steps they can take to reduce their power consumption, PPL Electric enables them to make wiser choices about their power usage. Providing customers with a sample of low-cost, energy efficiency tools increases their familiarity with those tools, promotes acceptance of energy efficient technologies, and encourages low-income customers to seek out similar technologies. As a result, the program helps low-income consumers save on their utility bills, reduces the energy burden on low-income households, and lessens the utility's baseload demand.

The E-Power Wise Program logic model can be found in Section 1 of the E-Power Wise Program EM&V Plan. 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.
- **Program outputs:** Outputs include free home energy kits produced and disseminated to customers, workshops conducted, trainers trained, and low-income consumers educated. Quality control and measurement and evaluation procedures are activated.
- **Short-term outcomes** (one year): Outcomes include training/workshops and free home energy kits that educate low-income customers about energy efficiency and help them reduce their energy consumption and energy costs.
- **Intermediate outcomes** (two to three years): Outcome is a more knowledgeable low-income customer base. As this occurs, low-income customers will continue to make informed and effective decisions about their energy use. This will result in additional energy savings, customer satisfaction, environmental benefits, and PPL Electric's customer base becoming more sensitive to energy efficiency.
- **Long-term outcomes** (four to seven years): Outcome is low-income customer participation in energy efficiency and cost savings, helping to improve their quality of life. Low-income customers will continue to seek out energy saving improvements.

3.5.2 Program Measurement and Verification Methodology

A complete discussion of the M&V methodology can be found in Sections 3, 4, and 5 of the E-Power Wise Program QA/QC and EM&V Plan.

Two savings adjustments are necessary to calculate the E-Power Wise Program realization rate. The first adjusts the program plan savings to the savings specified in the TRM, resulting in TRM-adjusted *ex ante* savings. The second adjustment incorporates the results of the program QA/QC records review and the measure installation and behavior change findings from the customer telephone survey (as reported in the PY2 Annual Report). Both adjustments are performed on program records from the previous quarter. Methodologies for each adjustment are explained in more detail below; results from each adjustment are reported separately.

Ex Ante Adjustment Methodology

The first adjustment modified the savings reported in EEMIS (*ex ante* reported gross savings) for PY3 Q1 based on actual kit measure characteristics. This adjustment accounts for differences between how savings are calculated in the tracking system and how savings are specified in the 2011 TRM, and for data recording errors. The results of this adjustment are the TRM-adjusted *ex ante* savings.

Ex Ante Adjustment Findings

Table 3-13 shows the results of the TRM-adjusted *ex ante* calculations for the eight measures included in each home energy kit.

Table 3-13: Reported and Adjusted *Ex Ante* Savings per Home Energy Kit Measure

Sector	Measure	Reported *Ex Ante* Savings (kWh/yr)	*TRM-Adjusted Ex Ante* Savings (kWh/yr)	Reported *Ex Ante* Savings (kW)	TRM-Adjusted *Ex Ante* Savings (kW)	Factors
Low-Income	Energy Education	181[a]	181	0.020	0.020	Behavior-based CMP approved by the SWE. No savings were included in the EE&C Plan for behavioral changes.
	Faucet Aerator - Bath	45	61	0.010	0.006	Interim TRM-adjusted value (1.5 gpm)[b]
	Faucet Aerator - Kitchen	45	61	0.010	0.006	Interim TRM-adjusted value (1.5 gpm)[b]
	Low-Flow Showerhead	47	231	0.010	0.042	Interim TRM-adjusted value (2 gpm)[c]
	CFL 15W	41	40	0.002	0.002	TRM-adjusted value (15W CFL)
	CFL 20W	50	49	0.002	0.002	TRM-adjusted value (20W CFL)
	Electroluminescent Nightlight	20	26	0	0	Interim TRM value of 26 kWh/unit

NOTES:

[a] The savings from energy education and related behavioral activities were reported in the PY2 Annual Report, and were derived from survey data.

[b] The kitchen and bath aerators have rated gpm's (kitchen = 2.0 gpm, bath = 1.0 gpm) that differ from the gpm's provided in the TRM. To maintain consistency with the TRM and reduce confusion between the aerator types, savings for both will be based on the rated gpm provided in the TRM (1.5 gpm).

[c] An adjustment was made to the 'GPMlow' variable of the calculation provided in the TRM for calculating low-flow showerhead energy savings. The TRM assumed a GPMlow value of 1.5, whereas the low-flow showerhead included in the E-Power Wise Program home energy kit was rated at 2.0 gpm. The calculation for savings attributed to this measure in the E-Power Wise Program home energy kit used 2.0 gpm.

Savings Realization Rate Methodology

The second adjustment used to compute the program realization rate involved two components: the PY3 Q1 QA/QC records review findings, and the installation rate and behavior change findings from the customer surveys conducted in PY2 and reported in the PY2 Annual Report. Surveys conducted in PY2 were used to verify the per-unit savings of measures included in the home energy kits, as well as to verify energy savings that resulted from energy efficient behaviors reported by the participants. These updated values, shown in Table 3-15, will be used to adjust savings for future participants.

Table 3-14: E-Power Wise Program Savings Per Unit by Home Energy Kit Measure

Measure Installed	PY2 Verified Per-unit Savings (kWh/yr)	PY2 Verified Per-unit Savings (kW)
Energy Education	146	0.020
Bath Aerator	44	0.003
Kitchen Aerator	52	0.004
Showerhead	199	0.016
20W CFL	54	0.003
15W CFL	46	0.002
Nightlight	25	0.000

Savings Realization Rate Findings

In PY3 Q1, the records review identified issues with 104 EEMIS records. Of these, 71 were duplicate records from previous program years and could not be counted toward PY3. Of the 31 duplicate/triplicate records in PY3 Q1, most had both duplicate account and kit information, indicating that the duplication took place at an accounting level, and multiple kits were not distributed to participants.

However, the review indicated that multiple kits were distributed to four participants; two kits each were given to three different participants, and in one case three kits were given to a single participant. There were two records in EEMIS that could not be located in the program CSP data. Table 3-15 presents the findings of the QA/QC review conducted on PY3 Q1 records, as well as the final count after removing duplicate and unverified records.

Table 3-15: PY3 Q1 Records Review Findings

PY3 Q1	Total Records Before QA/QC Review	Total Records After QA/QC Review	QA/QC Realization Rate
Participant count from EEMIS	599	510	85%
Duplicate kit and/or account from previous program year	71	0	
Duplicate account and kit	22	11	
Duplicate/triplicate account and unique kit	9	4	
Reported in EEMIS, but not found in program CSP database	2	0	
NOTES:			

The total number of kits contained in the EEMIS database for PY3 Q1 was multiplied by the QA/QC realization rate calculated from the PY3 Q1 records review, and then by the survey-verified per-unit savings to derive *ex post* savings, as shown in Table 3-16. A review of PY3 Q2 records will be conducted in PY3 Q3. The total program energy realization rate will be provided in the PY3 Annual Report.

Table 3-16: Program Savings for PY3 Q1

Sector	Measure	Kits in EEMIS	QA/QC Realization Rate	Survey Verified Savings Per Unit (kWh/yr)	Survey Verified Savings Per Unit (kW)	Total *Ex Post* Savings (kWh)	Total *Ex Post* Savings (kW)
Low-Income	Energy Education	599	85%	146[a]	0.020	74,460	10
	Faucet Aerator - Bath	599	85%	52	0.004	26,520	2
	Faucet Aerator – Kitchen	599	85%	44	0.003	22,440	2
	Low-flow Showerhead	599	85%	199	0.016	101,490	8
	CFL 15W	599	85%	40	0.002	20,400	1
	CFL 20W	599	85%	49	0.003	24,990	2
	Electroluminescent Nightlight	599	85%	25	NA	12,750	NA

NOTES:
[a] This survey-verified value includes the sum of behaviors for which the program is claiming energy savings: water heater usage and home temperature energy savings.

Net-to-Gross Ratio Methodology
This program targets the low-income community, and no free-riders are anticipated among the population receiving the kits. The EM&V CSP does not expect the participating low-income population to install energy efficiency kit measures or seek out this program's approach to energy education from other avenues in the absence of the program.

Similarly, there is no spillover assumed for this program. The EM&V CSP does not expect the participant low-income population to install additional energy efficiency measures or seek out this program's approach to energy education from other avenues, beyond what is provided through the program. The E-Power Wise Program is assumed to have a NTG ratio of 1.0.

3.5.3 Program Sampling

The EM&V CSP will conduct a QA/QC review of a random sample of 70 participant enrollment forms in PY3 Q3, sampling across the first three program quarters. The EM&V CSP will also conduct quarterly records reviews comparing the census of the CSP's electronic database with the census of EEMIS E-Power Wise Program records, as described in the program EM&V methodology.

Using the information collected through surveys and records review, the EM&V CSP will calculate the measure-level realization rates to adjust savings for all participants.

3.5.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.5.5 Program Partners and Trade Allies

PPL Electric's customer program specialist oversees the program implementation. The customer program specialist reviews and approves all program marketing, educational materials, home energy kit content, and reports; manages the program CSP; monitors program progress; and reviews all program data and reports.

PPL Electric's CSP, RAP, manages the program operation. Their responsibilities include training CBO staff, designing and delivering the home energy kits, providing marketing and outreach support, maintaining and operating the customer service call center, and collecting participation data and survey responses.

CBOs recruit customers for workshops and one-on-one training, verify customer eligibility, deliver energy efficiency training, and report workshop attendance and kits delivered to the program CSP. Participating CBOs receive an incentive for each kit they distribute.

3.5.6 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-17. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-17: Summary of E-Power Wise Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants[a]	$14,299	$52,881	$402,342
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$14,299	$52,881	$402,342
B.1	Design & Development[b]	$0	$0	$0
B.2	Administration[b]	$0	$0	$0
B.3	Management[c]	$33,565	$45,347	$106,287
B.4	Marketing[b]	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$33,565	$45,347	$106,287
C	**EDC Evaluation Costs**[b]	$0	$0	$0
D	**SWE Audit Costs**[b]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$47,864	$98,228	$508,629
E	**Participant Costs**[d]	Not required	Not required	Not required
	Total EDC & Participant Costs	$47,864	$98,228	$508,629
F.1	**Annualized Avoided Supply Costs –Residential**[e]	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required

	Category	IQ	PYTD	CPITD
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] Beginning in PY3 Q2, the value of the free home energy kits and education will no longer be classified as an incentive, consistent with the PA PUC's August 2011 TRC Order. These will become direct program costs in the "Management" category.
[b] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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] Includes PPL Electric's implementation, management, and oversight of this program.
[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 costs for the sector in PY2.

3.6 Low-Income WRAP

The PPL Electric Universal Services Program (USP) Low-Income WRAP existed prior to Act 129 and has offered services since 1985. WRAP was designed to reduce electric consumption and improve living comfort for low-income customers. Eligible customers receive a free energy audit, in which 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. Implementing agencies either use 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 with household incomes at or below 150% of the federal poverty level. The program is available to customers in existing single family housing and existing multifamily housing with three or more dwelling units, where 50% or more of the tenants are low-income qualified. Act 129 WRAP seeks to reach new participants, as well as 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 in the past due to eligibility rules, such as requiring at least one year of pre-participation kWh usage data.

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

3.6.1 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 in order to help the household stabilize bill payment and provide a more comfortable and energy efficient home.

The program logic model highlights the key program features as understood by the EM&V CSP, indicating logical linkages between inputs, activities, outputs, and outcomes. 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 include qualifying participant eligibility, conducting energy audits and measuring eligibility assessments, installing energy efficient measures, energy education, and referrals to other organizations.
- **Program outputs:** Program outputs include all of the immediate results from the program activities, such as participant enrollment, income qualification of participants, audits completed, repairs completed, energy saving measures installed, and customers served. Typically, items that do not require verification or are not cost-effective to verify are included in the logic model as outputs, but are not addressed separately in the EM&V Plan.
- **Short-term outcomes** (one year): Outcomes include establishing participant eligibility for individual measures, improving the safety and health of participant homes, increasing the energy efficiency of equipment in participant homes, and increasing participant knowledge.
- **Intermediate outcomes** (two to three years): The outcome is installation of selected cost-effective measures, thereby reducing the energy use of participant households through efficient equipment and conservation. Participating customer energy usage becomes more stable, resulting in more energy conservation and better bill paying behaviors.
- **Long-term outcomes** (four to seven years): The outcomes are the desired final program impacts, including 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.

3.6.2 Program Measurement and Verification Methodology

PPL Electric and the EM&V CSP evaluate the existing USP Low-Income WRAP and report achieved energy savings to the PA PUC on an annual basis. The Act 129 PY3 savings are reported using stipulated savings by job type approved by the PA PUC for 2009 installations. This method is consistent with the approved EM&V Plan, in which 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 a billing analysis is completed for Act 129 WRAP projects.

The PY3 *ex ante* and *ex post* savings are based on the following three job types and associated savings:

- Baseload jobs = 1,693 kWh/yr
- Low cost jobs = 1,898 kWh/yr
- Full cost jobs = 1,652 kWh/yr

PY4 *ex ante* and *ex post* savings will be determined from a billing analysis of PY1 and PY2 Act 129 WRAP projects.

Savings Realization Rate Methodology

EM&V efforts include reviewing and verifying a random sample of contractor reports, WRAP V database records, and EEMIS data. During PY3 Q2, the EM&V CSP selected a stratified random sample of 11 PY3 Q1 accounts for the records review: three baseload jobs, four low cost jobs, and four full cost jobs. The EM&V CSP received copies of all supporting documents for each of the sampled participants, including contractor reports, invoices, and PPL Electric's WRAP summary reports. This information was compared with values recorded in the EEMIS tracking database. All 11 records in this review received job types and measures for which they were qualified, demonstrating that job types are being assigned according to protocol. No adjustments to individual job types were necessary.

The EM&V CSP also checked the PY3 Q1 tracking data for duplicate accounts, and for accounts with Act 129 WRAP job entries in a previous quarters' tracking data. The number of accounts with multiple entries is presented in Table 3-18.

Table 3-18. Act 129 Low-Income WRAP PY3 Q1 Tracking Data Accounts With Multiple Entries

Job Type	Number of PY3 Q1 Act 129 WRAP Jobs	Number of Accounts With Multiple Records in PY3 Q1	Number of Accounts with Records in Previous Quarters	Adjusted Number of PY3 Q1 Act 129 WRAP Jobs	PY3 Q1 QA/QC Realization Rate
Base Load	265	0	9	256	97%
Low Cost	135	1	1	133	
Full Cost	148	0	6	142	
Total	**548**	**1**	**16**	**531**	
NOTES:					

The EM&V CSP found one account in the PY3 Q1 tracking data with two entries: one was entered as a low cost job and one as a full cost job. The low cost job will be removed from the counts and savings calculations. Additionally, the EM&V CSP found 16 accounts in the PY3 Q1 tracking data with entries in the PY1 and PY2 tracking data. These accounts do not contain duplicate information for a single project, but rather document single projects with two stages or that received additional services or measures. Because these multiple entries cross program year boundaries and were already included in previous program years' reported counts and savings calculations, the jobs will be removed from the PY3 counts and subsequent savings calculations.

PPL Electric (via a third-party inspector) inspects 60% of the full cost jobs, and the SWE inspects or conducts a records review of a sample of Act 129 WRAP jobs. Given the small contribution of this program's savings to the overall portfolio, its limited budget, and to ensure a consistent level of rigor with the identical LIURP WRAP programs, the EM&V CSP will not conduct additional site visits. The EM&V CSP reviews a sample of records, comparing the contractors' records to the database, reviewing what measures were reported as being installed, and verifying that those measures were installed. Three of the 11 randomly selected records reviewed for PY3 Q1 received site visits. For these three sites, the EM&V CSP compared each measure recorded in EEMIS to measures documented in the site visit reports. Only one bathroom faucet aerator was unverified.

Going forward, each quarter PPL Electric will provide the EM&V CSP and the SWE with a list of all sites that have been visited. The SWE will select a sample of sites for review, and the EM&V CSP will request all supporting documentation from PPL Electric. The EM&V CSP will randomly select eight sites in each quarterly sample from those that received site visits, and will compare the information recorded in EEMIS to the site visit reports, along with the other supporting documentation. The remaining quarterly records review sample will be selected from sites which did not receive a site visit. The EM&V CSP will review all supporting documentation for these sites as well, including the *Exceptions Report*, which documents measures that were recommended but not installed. All discrepancies between the information recorded in EEMIS and the supporting documentation will be noted, and PPL Electric and the SWE will be notified of any systemic issues discovered. The records review will also identify any patterns or issues, such as measures recommended but not installed or missing measures that were reportedly installed.

Net-to-Gross Ratio Methodology
There is no free-ridership in this low-income weatherization program. Measures are installed at no cost to income-eligible customers. Similarly, there is no spillover assumed for the program.

3.6.3 Program Sampling

No participant surveys are planned for the evaluation of this program. A process evaluation is conducted for the USP WRAP program on a regular basis, according to PUC requirements.

During PY3, the EM&V CSP will conduct a desk review of 45 participant records, or approximately 11 records per quarter. The EM&V CSP will employ a stratified, random sampling technique in selecting records to review, ensuring that participants from each job type are represented. One sample point per stratum will be reserved for the participants with the greatest number of measures installed. The EM&V CSP will obtain copies of all supporting documents for each of the sampled participants, including contractor reports, invoices, and PPL Electric's WRAP summary reports. Information within the supporting documents will be compared to values recorded in the EEMIS tracking database.

Additionally, during PY3 Q4, the EM&V CSP will conduct a billing analysis of all PY1 and PY2 participants (with adequate post-participation consumption data) to estimate average annual kWh savings by job type. PPL Electric will use these estimates prospectively to deem savings in PY4 and to calculate savings attributed to the program.

3.6.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.6.5 Program Partners and Trade Allies

The PPL Electric customer relations specialist for the USP Low-Income WRAP oversees Act 129 WRAP activities. Act 129 WRAP uses the same delivery and tracking system as the USP WRAP program. The WRAP customer relations specialist oversees the development of the WRAP V data tracking system that captures Act 129 WRAP data. The WRAP specialist is responsible for ensuring that WRAP data are extracted and uploaded to EEMIS.

PPL Electric funds, administers, monitors, and recruits customers to participate in WRAP. The program is delivered by CBOs and private contractors, who conduct the energy audits and install the direct measures. Under direction for PPL Electric, CBOs also coordinate the installation of larger equipment measures (weatherization, heating system equipment, appliances, etc.), as well as conduct minor repairs and health 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 are encouraged to combine Act 129 funding with federal, state, or other human services funding to provide a whole-house energy efficiency solution.

3.6.6 Program Finances

A summary of the project finances is presented in Table 3-19. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-19: Summary of Low-Income WRAP Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants[a]	$1,598,019	$2,493,260	$13,899,877
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$1,598,019	$2,493,260	$13,899,877
B.1	Design & Development[b]	$0	$0	$0
B.2	Administration[b]	$0	$0	$0
B.3	Management[c]	$552,517	$2,825,619	$3,886,280
B.4	Marketing[b]	$0	$0	$1,324
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$552,517	$2,825,619	$3,887,604

	Category	IQ	PYTD	CPITD
C	EDC Evaluation Costs[b]	$0	$0	$0
D	SWE Audit Costs[b]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$2,150,536	$5,318,879	$17,787,481
E	Participant Costs[d]	Not required	Not required	Not required
	Total EDC & Participant Costs	$2,150,536	$5,318,879	$17,787,481
F.1	Annualized Avoided Supply Costs –Residential[e]	Not required	Not required	Not required
F.2	Annualized Avoided Supply Costs – Small C&I	Not required	Not required	Not required
F.3	Annualized Avoided Supply Costs – Large C&I	Not required	Not required	Not required
G	Lifetime Avoided Supply Costs	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] 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. Beginning in PY3 Q3, the cost of the weatherization measures (given to participants for free) will no longer be classified as an incentive, consistent with the PA PUC's August 2011 TRC Order. These will become direct program costs in the "Management" category.
[b] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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] Includes PPL Electric's implementation, management, and oversight of this program.
[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 PY2.

3.7 Renewable Energy Program

The Renewable Energy Program encourages PPL Electric customers to install a solar PV array or GSHP at their home or institutional 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 load by installing applicable energy efficiency measures prior to installing a renewable energy system.

The program was previously available to residential *and* institutional customers (government, non-profit, and schools); however, it is now only available for institutional GSHP rebates. For each of these institutional customer segments, the program uses a consistent delivery and administrative strategy; however, budgets, savings, and impacts are tracked and reported separately.

The objectives of the Renewable Energy Program include:

- Encouraging customers to install renewable energy equipment.
- Promoting other PPL Electric EE&C programs.

- Achieving energy and demand savings.

3.7.1 Program Logic

The Renewable Energy Program theory can be summarized as follows:

> By providing an incentive for the 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 will gain experience designing and installing this equipment, which will increase the knowledge base and further sales, leading to additional energy and demand savings.

The Renewable Energy Program logic model can be found in Section 1 of the Renewable Energy Program EM&V Plan. 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.
- **Program activities:** 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.
- **Program outputs:** Outputs include the number and types of marketing activities conducted, 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 paid.
- **Short-term outcomes** (one year): Outcomes include increased program awareness, increased customer interest in renewable technologies, increased customer knowledge of renewable technologies, and increased installations of renewable technologies.
- **Intermediate outcomes** (two to three years): Outcomes 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): Outcomes 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.

3.7.2 Program Measurement and Verification Methodology

PPL Electric is in the process of evaluating savings for PY3 Q2, and will report results in the next quarterly report. A complete discussion of the M&V methodology can be found in Sections 3, 4, and 5 of the Renewable Energy Program QA/QC and EM&V Plan.

The reported program savings are 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 comparing rebate records and documentation to EEMIS-reported values. Verification was also achieved through visits conducted at a sample of sites.

Ex Ante Adjustment Methodology
The reported and evaluated savings incorporate two levels of adjustments. First, reported savings are adjusted from those reported in EEMIS (*ex ante* reported gross savings) based on systems installed through the program (tonnage, efficiency, and EFLH determined through the number of heating and cooling degree days of cities stipulated in the 2011 TRM). This adjustment accounts for differences between how savings are calculated in the tracking system and how savings are specified in the 2011 TRM, and for data recording errors. These adjustments result in the adjusted *ex ante*, bringing the reported savings into alignment with the 2011 TRM.

Adjusted *Ex Ante* Findings
There were no renewable energy projects rebated in PY3 Q1 for review.

Savings Realization Rate Methodology
Second, adjustments are made for installation rates and qualifying equipment using survey data, site visits, and records review. These adjustments reflect the results of M&V activities and are included in the *ex post* evaluated savings. The realization rate is the ratio of the adjusted *ex ante* and evaluated *ex post* savings.

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

The evaluation of PY3 Q2 program savings is currently in progress and will be reflected in the PY3 Q3 report.

***Ex Post* Savings and Realization Rate Findings**
There were no renewable energy projects rebated in PY3 Q1 for review.

Net-to-Gross Ratio Methodology
The NTG ratio is determined through self report surveys with a sample of participants. The free-ridership battery of survey questions were tailored to participants of the Renewable Energy Program, and allow for determining a free-ridership score using a scoring matrix. More detail about the free-ridership analysis can be found in the PY2 Annual Report, which was filed in November 2011. No adjustments to the NTG ratio were applied to savings, as specified by the PA PUC. Information obtained by computing the NTG ratio will only be used to refine and improve program delivery. Surveys of PY3 participants will be conducted in PY3 Q3, with free-ridership results reported in the PY3 Annual Report.

3.7.3 Program Sampling

The EM&V CSP will conduct telephone surveys and post-installation site visits using sampling rates designed to be statistically valid within 85/15 at the program level and sector level (outlined in Table 3-20). A subset of the sites chosen for the records verification will make up the sample for site visits.

Table 3-20: Summary of Data Collection Activities for PV and GSHP Systems in PY3 Q1

Technology	Data Collection Activity	Target for PY3	Measures Achieved in PY3 Q1	Target Confidence/ Precision
GSHP[a]	Site Visits	5	0	90/10
	Records Verification	5	1	90/10
	Participant Surveys	5	0	90/10
NOTES: [a] The PV and residential GSHP portions of the program have closed.				

3.7.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.7.5 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 customer 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, reviews rebate reservation forms, project documentation, and project completion reports; makes initial determinations on project eligibility; issues rebate payments; and tracks and reports program data.

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

3.7.6 Program Finances

A summary of the project finances is presented in Table 3-21. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-21: Summary of Renewable Energy Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$500,000	$595,080	$4,375,566
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$500,000	$595,080	$4,375,566

	Category	IQ	PYTD	CPITD
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$15,295	$32,786	$201,966
B.4	Marketing[a]	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$15,295	$32,786	$201,966
C	**EDC Evaluation Costs**[a]	$0	$0	$0
D	**SWE Audit Costs**[a]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$515,295	$627,866	$4,577,532
E	**Participant Costs**[c]	Not required	Not required	Not required
	Total EDC & Participant Costs	$515,295	$627,866	$4,577,532
F.1	**Annualized Avoided Supply Costs –Residential**[d]	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] EDC evaluation, SWE audit, and a majority of EDC implementation costs are not 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.
[b] Includes PPL Electric's implementation, management, and oversight of this program.
[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 PY2.

3.8 HVAC Tune-Up Program

The HVAC Tune-Up Program is offered to all commercial and small industrial customers with an existing split or packaged HVAC rooftop unit. Owners or tenants occupying an existing building are the primary recipients of program services. The program offers financial incentives to contractors to help offset the cost to diagnose and make energy saving retrofits.

The HVAC Tune-Up Program is designed to increase the operating performance of small rooftop HVAC and split system units in light commercial buildings. The efficiency opportunities include three main areas:

1. Refrigeration measures
2. Economizer measures

3. Thermostat measures

The objectives of the HVAC Tune-up Program include:

- Optimizing HVAC unit performance.
- Assisting commercial customers in lowering their energy bills and operating costs.
- Obtaining participation of no less than 5,770 customers through 2013, with a total reduction of 22,180 MWh and 11 MW.[14]

A more detailed description of the HVAC Tune-Up Program objectives and theory are provided in the program QA/QC and EM&V Plan.

3.8.1 Program Logic

The HVAC Tune-Up Program theory can be summarized as follows:

> Servicing of HVAC units will optimize unit performance, reduce energy consumption, and decrease demand through the expected life of each measure. Diagnostic tools and technicians' experience will be used to determine the applicable service measures for each unit. Long-term energy savings are expected from units that operate optimally.

The program logic model highlights the key program features, as understood by the EM&V CSP, indicating logical linkages between activities, outputs, and outcomes.

The logic model's elements are:

- **Program inputs:** Program inputs include Act 129 and the SWE Audit Plan guidelines; funding and other support from PPL Electric; and the expertise of the program implementer and subcontractors.
- **Program activities:** The program's primary activities include marketing and outreach, providing customer incentives to HVAC service technicians, and developing measurement, evaluation, and quality control procedures.
- **Program outputs:** Outputs include marketing materials produced and disseminated to customers, customers subsequently enrolling in the programs, and quality control, measurement, and evaluation procedures being activated.
- **Short-term outcomes** (one year): Outcomes include marketing materials—both online and through other media—that generate participant interest, appointment scheduling, and rebate processing requests. Successful HVAC servicing will lead to a decrease in participants' utility bills, as well as provide energy and demand savings for PPL Electric.
- **Intermediate outcomes** (two to three years): The main outcome is more knowledgeable HVAC service technicians. As this occurs, technicians will be able to better service units to deliver optimal performance. This will result in energy savings, customer satisfaction, environmental

[14] Combined total for all target customer segments.

benefits, lower baseload demand, and PPL Electric's customer base becoming more sensitive to energy efficiency.

- **Long-term outcomes** (four to seven years): Outcomes include more customers being aware of the benefits of servicing their HVAC units, and seeking out and expecting energy saving improvements. In addition, more HVAC contractors will be trained to conduct diagnostic tune-ups and more will participate in the program, and the HVAC tune-ups will become standard practice, leading to increased energy savings and decreased service calls.

3.8.2 Program Measurement and Verification Methodology

Savings Realization Rate Methodology

The *ex post* evaluation empirically measures the savings from diagnostic tune-ups. The Evaluation Plan and a CMP approved by the SWE describe the EM&V methodology. The EM&V CSP commenced field work in PY2 Q4. Implementing the CMP for HVAC tune-ups requires following the steps described below:

1. Obtain unit information (e.g., nameplate data and unit condition before and after servicing).
2. Conduct on-site inspections for a stratified, random sample of HVAC units before and after servicing. The EM&V CSP will visit sites before and/or after servicing to verify data collected by the service technicians.
3. Calculate energy savings from an analysis of baseline and post-servicing site data and a review of implementers' calculation methodology.
4. Summarize results from on-site inspections and the calculation review.

Sample sizes and stratifications for on-site verification are discussed in the Program Sampling section below. The pre- and post-servicing on-site verification were conducted on different samples of units, as not all units tested by contractors needed service (and for that reason, the post-servicing population will was smaller than the pre-servicing population).

In PY2, the EM&V CSP conducted on-site inspections to verify baseline and post-installation conditions. The on-site inspections were conducted randomly and participating contractors did not have knowledge of the inspections. Key data was collected and used to evaluate system characteristics by conducting the following activities:

- Verification that reported unit data are correct and complete.
- Confirmation of unit manufacturer and model number, cooling capacity (tons), model age, and unit type.
- Verification that the unit is operating as expected.
- Recording system settings (thermostat setpoints and programming and economizer controls)

The EM&V CSP used data collected during the inspection to verify data submitted by the HVAC Tune-Up Program implementation CSP. The results of the verification were reported in November 2011. The results of the verification process confirmed data reported matched data verified. The savings methodology is complex and rigorous. The savings methodology was reviewed and compared to field spot measurements. Savings calculations were verified reasonable. The results of the verification effort will be applied PY3 reported savings as a placeholder, until the PY3 sample of measures is verified.

Net-to-Gross Ratio Methodology
For this program, the contractor receives the incentive for performing diagnostic tune-ups, so it is the contractors who may be free-riders. That is, contractors who conduct the HVAC diagnostics and advanced tune-ups as standard practice, but who take advantage of the program incentives, would normally be classified as free-riders. Surveys conducted with HVAC contractors established standard practices and will be used to determine the effect of the program on participating contractor's normal business practices. If the program delivery method changes, the NTG ratio will be re-evaluated. That is, if the end-use customers receive rebates (as opposed to contractors) participant surveys will be conducted.

3.8.3 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.8.4 Program Partners and Trade Allies

PPL Electric contracted with a third-party, Field Diagnostic Services, Inc. (FDSI), to implement the HVAC Tune-Up Program. FDSI manages and provides training for the service contractors who implement program measures, and FDSI reviews program data that is submitted electronically by service contractors. FDSI created a brochure describing the program to participating contractors and maintains a Website about the program that includes a list of participating contractors.

HVAC tune-up programs are typically designed to deliver diagnostic tune-ups. Trade allies (the service contractors) implement the measures offered through this program. The work is performed by service contractors, who use the Service Assistant™ diagnostic tool and associated software to identify opportunities to improve unit performance. This is an upstream program delivered by the service contractors, to whom incentives are paid.

HVAC contractors have different types of agreements with their customers. They may have a regularly-scheduled maintenance contract for a specific number of visits per year, or they may be called only for emergencies or upon equipment failure. The end-use customer rarely, if ever, requests the type of diagnostic service available through this program; the contractor provides the service as an added benefit for their customers or as a way to attract new customers.

PPL Electric's administrative CSP, Helgeson Enterprises, responds to customer questions through its call center and is also responsible for processing program rebates (as specified by FDSI). Service contractors are responsible for uploading measure data from their diagnostic tools to FDSI, and FDSI is responsible for sending program data to PPL Electric for uploading to EEMIS.

3.8.5 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-22. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-22: Summary of HVAC Tune-Up Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants[a]	$13,230	$33,665	$64,805
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$13,230	$33,665	$64,805
B.1	Design & Development[b]	$0	$0	$0
B.2	Administration[b]	$0	$0	$0
B.3	Management[c]	$5,411	$84,656	$720,129
B.4	Marketing[b]	$0	$2,566	$18,054
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$5,411	$87,222	$738,182
C	**EDC Evaluation Costs**[b]	$0	$0	$0
D	**SWE Audit Costs**[b]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$18,641	$120,887	$802,987
E	**Participant Costs**	Not required	Not required	Not required
	Total EDC & Participant Costs	$18,641	$120,887	$802,987
F.1	**Annualized Avoided Supply Costs –Residential**	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] Incentives are paid to participating HVAC Tune-Up Program contractors, who are considered to be the participant.
[b] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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] Includes PPL Electric's implementation, management, and oversight of this program.

3.9 Residential Energy Assessment & Weatherization Program

The Residential Energy Assessment & Weatherization Program was designed to provide PPL Electric residential customers with information on their home's energy performance and recommendations on the most effective, highest priority energy efficiency actions they can take in their homes. Eligible customers must live in single family residences and have electric heat or air conditioning. Recognizing the varying economic conditions and interest levels among PPL Electric residential customers, the program provides two tracks:

1. The customer pays $50 for a walk-through home energy survey.
2. A comprehensive energy audit is conducted and includes diagnostic testing (a blower door test to measure infiltration and a combustion efficiency test), supported by a rebate of $150 for customers with electric air conditioning only, or $250 for customers with electric cooling and heating.

The objectives of the Residential Energy Assessment & Weatherization Program include:

- Providing customers with the opportunity to participate in a walk-though survey or comprehensive energy audit.
- Providing customers with opportunities to reduce their energy costs and increase their energy efficiency.
- Encouraging customers to weatherize their homes by providing rebates.
- Installing low-cost energy saving measures as part of both the survey and the audit, which may result in immediate savings.
- Promoting other PPL Electric energy efficiency programs.
- Obtaining participation of no less than 5,940 customers through 2013, with a total reduction of 5,960 MWh and 590 kW based on planning estimates for the measures with claimable savings.

3.9.1 Program Logic

The Residential Energy Assessment & Weatherization Program offers customers two levels of energy audits and opportunities to engage in weatherization activities. The theory can be summarized as follows:

> By offering customers incentives and two levels of energy audits, customers will engage in audit activities and install low-cost energy saving measures. Customers will be educated on the long-term energy and cost-saving benefits of higher-efficiency equipment. Some customers will install additional weatherization measures. Energy and demand savings are expected from the installation of low-cost and larger energy efficiency measures.

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, the program applications and forms, market actor support and expertise, energy audits, and other technical equipment necessary for program implementation.

- **Program activities:** The primary program activities include marketing, providing educational materials, audits, installation of low-cost measures during initial audits, installation of major measures, and rebates sent to customers.
- **Program outputs:** Outputs include the number and types of marketing activities, the number of program participants, the number and types of measures installed, the quality of the installations, and the total amount of incentive money paid out.
- **Short-term outcomes** (one year): Outcomes include increased program awareness, established participant eligibility, established eligibility for individual measures, participant homes having energy saving items installed, homes having more efficient equipment and energy efficiency measures installed, and participants having increased knowledge of EE&C.
- **Intermediate outcomes** (two to three years): Outcomes include installation of cost-effective measures and reduced energy use by participating households through efficient equipment and conservation from residents.
- **Long-term outcomes** (four to seven years): Outcomes are the desired final program impacts, including cost-effective energy savings resulting from energy efficient upgrades and conservation behaviors.

3.9.2 Program Measurement and Verification Methodology

A complete discussion of the M&V methodology can be found in Chapters 3, 4, and 5 of the Residential Energy Assessment & Weatherization Program QA/QC and EM&V Plan.

***Ex Ante* Adjustment Methodology**

Savings for the low-cost, direct install measures are deemed on a per unit basis, in accordance with the TRM, for each unit installed. Savings are claimed and reported by PPL Electric via information captured in the EEMIS database. *Ex ante* adjustments account for differences between how savings are calculated in the tracking system and how savings are specified in the 2011 TRM, and for data recording errors.

***Ex Ante* Adjustment Findings**

The EM&V CSP reviewed the per unit kWh and demand savings recorded in the Q1 EEMIS tracking data. For the PY3 Q1 data in EEMIS, some records have installation dates occurring in PY2. For 20 Watt CFL mini-spirals installed during PY2, algorithms in the 2010 TRM were used to adjust the *ex ante* claimed savings. Because there were no algorithms for smart power strips, 1.5 GPM faucet aerators, or 3/4-inch water heater pipe insulation in the 2010 TRM, algorithms in the Interim TRM Protocols dated October 2010 were used to adjust the *ex ante* claimed savings for these measures installed during PY2. For measures installed during PY3, algorithms in the 2011 TRM were used to adjust the *ex ante* claimed savings. There were no savings calculation algorithms for water heater temperature setbacks in either version of the TRM or the Interim TRM, so there is no *ex ante* adjustment for this measure. Table 3-23 provides a summary of the *ex ante* savings values as well as the TRM-adjusted values.

Table 3-23. Summary of *Ex ante* Adjustments to Reported Per Unit Savings for Direct Install Measures in PY3 Q1

Measure	Number of Measures	*Ex ante* kWh/yr	TRM-Adjusted *Ex ante* kWh/yr	*Ex ante* kW	TRM-Adjusted *Ex ante* kW

Measure	Number of Measures	*Ex ante* kWh/yr	TRM-Adjusted *Ex ante* kWh/yr	*Ex ante* kW	TRM-Adjusted *Ex ante* kW
20 Watt CFL Mini Spiral	1120	50	50	0.002	0.002
Smart Power Strip – Installed PY2	105	244	184	0.003	0.013
Smart Power Strip – Installed PY3	86	184	184	0.013	0.013
Faucet Aerator, 1.5 GPM – Installed PY2	24	45	61	0.01	0.056
Faucet Aerator, 1.5 GPM – Installed PY3	32	61	61	0.056	0.056
Water Heater Pipe Insulation, 3/4-inch – Installed PY2	82	109	124	0.01	0.011
Water Heater Pipe Insulation, 3/4-inch – Installed PY3	67	124	124	0.011	0.011
Water Heater Temperature Setback to 120°	0	61	NA	0.01	NA
	NOTES: Records with install dates occurring prior to June 1, 2011 have recorded *ex ante* savings values from the 2010 TRM.				

No adjustment for in service rate (ISR) was made, because new ISR data will be developed using responses to the participant surveys slated to occur in PY3 Q4.

Savings Realization Rate Methodology

The realization rate will include adjustments for actual installation rates, failure rates, and corrections to baseline assumptions. In future quarters, the realization rate will be calculated based on the desk reviews and findings from the sample of projects chosen for telephone verification. The realization rate determined from the sample will be applied to the population. Claimed savings for PY3 will be adjusted using data collected during the telephone surveys and the desk reviews, and will be reported in the final Annual Report, which will be filed in November 2012.

Savings Realization Rate Findings

For PY3 Q1, the realization rate is calculated based on the findings from the records review. The EM&V CSP selected a stratified random sample of 22 survey and audit accounts from the 120 accounts posted in PY3 Q1 in EEMIS, and requested copies of the original survey or audit form. Measure quantities installed and measure recommendations in EEMIS were compared to those recorded on the forms and in the implementation CSP's tracking database. Any differences were noted. Additionally, because savings can only be claimed for the direct-install measures installed during one survey or audit per home, accounts in the PY3 Q1 tracking data were checked for multiple entries both in the PY3 Q1 tracking data, as well in previous quarters' tracking data. Only one account in the PY3 Q1 tracking data – a walk-through survey - was found with an entry in a previous quarter – a comprehensive audit in the PY2 Q4 tracking data. Because the multiple entries cross program year boundaries, and because the savings for the direct install measures installed during the PY2 Q4 comprehensive audit have already been claimed in PY2, the PY3 Q1 walk-through survey record and its associated measures will be removed from the counts and savings calculations for PY3. The EM&V CSP will conduct an additional records review in the remaining quarters of PY3 and calculate separate realization rates per quarter based on each quarter's records review.

The findings for the Q1 records review are presented in Table 3-24.

Table 3-24. QA/QC Adjustments for Duplicate Records in PY3 Q1

Measure	Number of Measures Claimed in EEMIS	Adjusted Number of Measures
20 Watt CFL Mini Spiral	1,120	1,114
Smart Power Strip	191	190
Faucet Aerator - Kitchen, 1.5 GPM	53	53
Faucet Aerator – Bathroom, 1.5 GPM	3	3
Hot Water Pipe Insulation	149	148
Home Audit – Central AC	69	69
Home Audit – Electric Heat	7	7
Home Survey	120	119
NOTES:		

For CFLs, smart power strips, kitchen aerators and pipe insulation, the EM&V CSP found that records posted in EEMIS matched the data on the survey or audit form as well as in the implementation CSP's tracking database. For bathroom aerators, the EM&V CSP noted measure quantities of zero in EEMIS, while the audit form indicated measures had been installed, resulting in under-reporting of savings.

Additionally, in EEMIS, no PY3 Q1 accounts record savings for electric water heater temperature setbacks, yet the EM&V CSP noted five accounts in the records review sample where this measure was recorded on the survey or audit form. Upon further comparison of all PY3 Q1 records in EEMIS with the implementation CSP's tracking data, the EM&V CSP found 34 PY3 Q1 accounts in the implementation CSP's tracking data indicating an electric water heater temperature setback had been performed. None of these accounts have a record for this measure in EEMIS. The EM&V CSP adjusted the measure counts and savings calculations to include the 34 electric water heater temperature setbacks.

Furthermore, the EM&V CSP noted five accounts in the record review sample with an audit type of "Audit – CAC" recorded in EEMIS, while the form filled out by the auditor indicated the house had electric heat, and the implementation CSP tracking database indicated the electric heat rebate of $250 was paid. The EM&V CSP noted 38 records in EEMIS where "Audit-CAC" records received rebates of $250 and 2 records where "Audit-All-Electric" audits received rebates of $150. These discrepancies are being investigated further. Until resolved, the incentive costs and audit counts will remain as reported, but unverified.

The final measure counts are provided in Table 3-25.

Table 3-25. QA/QC Final Measure Count in PY3 Q1

Measure	Final Measure Count
20 Watt CFL Mini Spiral	1,114
Smart Power Strip	190

Measure	Final Measure Count
Faucet Aerator - Kitchen, 1.5 GPM	53
Faucet Aerator – Bathroom, 1.5 GPM	3
Hot Water Pipe Insulation	148
Electric Water Heater Temperature Adjustment	34
Home Audit – Central AC	64
Home Audit – Electric Heat	12
Home Survey	119

The EM&V CSP developed realization rates that include adjustments made as a result of the records review. Table 3-26 shows the resulting realization rates for each direct install measure for PY3 Q1. Q2 records will be adjusted based on the records review of PY3 Q2 records.

Table 3-26. Realization Rates for Direct Installation Measures in PY3 Q1

Measure	*Ex ante* Adjusted Savings[a] (kWh/yr)	Energy Realization Rate (kWh/yr)	*Ex ante* Adjusted Savings[a] (kW)	Demand Realization Rate (kW)
20 Watt CFL Mini Spiral	50	100%	0.002	100%
Smart Power Strip	184	100%	0.013	100%
Faucet Aerator - Kitchen, 1.5 GPM	61	100%	0.056	100%
Faucet Aerator - Bathroom, 1.5 GPM	61	>100%	0.056	>100%
Pipe Insulation, 3/4-inch	124	100%	0.011	100%
Water Heater Setback	61	>100%	61	>100%

NOTES:
[a] These are per-unit energy and demand savings values.

The bathroom faucet aerators and water heater setback measures have realization rates greater than 100 percent because the number of verified measures installed is greater than the number recorded in EEMIS.

Because the sample was drawn at the customer level, the estimates above are not mutually independent. For example, the sampling error associated with faucet aerators is not independent of the sampling error associated with CFLs, because the same customers were reviewed for each measure's verification. This presents no problem when an individual measure's savings estimate is considered in isolation; each estimate in the table above is valid. Program-level precision estimates, cannot be determined by totaling individual measures without accounting for the dependencies between measures in the sampling error. Because of this, the EM&V CSP's final estimate of program-wide savings employed a single realization rate, calculated by first aggregating savings by customer (for TRM-adjusted *ex ante* and for *ex post*), and then calculating a single realization rate which applies to the program-wide TRM-adjusted *ex ante* total. As this approach employs a single realization rate, rather than a collection

of inter-dependent realization rates, standard variance calculations yield valid program-wide precision estimates. The results of this analysis are presented in Table 3-27.

Table 3-27. PY3 Q1 Summary of Savings and Realization Rates for Home Assessment & Weatherization Program in PY3 Q1

	Total Surveys and Audits	Total *Ex ante* Reported Savings	Total TRM-adjusted *Ex ante* Savings	Total *Ex post* Savings	Realization Rate	Precision (with 85% confidence)
kWh/yr	195	117,722	113,036	128,205	113%	4%
kW		7	9	22	230%	22%
NOTES:						

Table 3-27 contains precision calculations that are valid at the program level and were used for calculating final verified program savings in PY3 Q1. The measure-level calculations are also valid, and may be used to inform discussions which do not critically rely on precision estimates for program-wide savings. Program-level realization rates are greater than 100 percent due to the bathroom aerators and water heater setbacks that were not recorded in EEMIS. The EM&V CSP anticipates the realization rate will approach 100 percent when these measures are uploaded to EEMIS.

Net-to-Gross Ratio Methodology

The NTG ratio is determined through self-report participant surveys with a sample of participants. The survey includes spillover and free-ridership questions. The free-ridership battery of survey questions is tailored to fit the recommended measures installed by participants of the Residential Energy Assessment & Weatherization Program. Information obtained by computing the NTG ratio will only be used to refine and improve program delivery. NTG results will be reported in the Final PY 3 Annual Report in November 2012.

Free-ridership Methodology

Energy audits are not like some other measures where the customer may install them in the absence of the program, such as with high-efficiency HVAC or ENERGY STAR appliances. It is not very likely that a customer will pay for an audit and install major weatherization measures in the absence of the program. Participant surveys with customers installing recommended measures will be used to assess free-ridership.

Spillover Methodology

Spillover refers to reductions in energy consumption and/or demand caused by the presence of the energy-efficiency program. These are savings beyond those achieved by participants in the program. Participant spillover refers to the participant's installation of measures in addition to those incented by the program, where the program influenced the participant to install the additional measures.

To estimate spillover, participant surveys will include questions to determine whether customers took additional energy efficiency actions as a result of program participation.

Net-to-Gross Ratio Findings

Free-ridership Findings

No rebates for the installation of recommended measures were uploaded into EEMIS during PY3 Q1. The EM&V CSP will field surveys in PY3 with a sample (or census) of PY3 participants. No final adjustment for net savings will be made until required by the PA PUC.

3.9.3 Program Sampling

During PY3, the EM&V CSP will conduct telephone surveys with 68 randomly selected customers who participated in the Residential Energy Assessment & Weatherization Program. The surveys will assess participant satisfaction with the program and sources of program information, and will be used to verify the measures and measure quantities recorded in EEMIS. The target for completed telephone surveys will be split evenly between customers opting for walk-through surveys, customers opting for comprehensive audits, and customers receiving bonus rebates for follow-up measures. Telephone survey results will be included in the PY3 final Annual Report.

Additionally, the EM&V CSP will conduct a desk review of 60 records of PY3 participants. The purpose of the desk reviews will be to verify the accuracy of data entry, the measures installed, and the measure quantity recorded. The Residential Energy Assessment & Weatherization Program claims savings for each direct installation measure installed. The EM&V CSP will employ a stratified random sample when selecting participants for each quarter's desk review, with sample points split equally between each of the three strata: walk-through survey participants, comprehensive audit participants, and bonus rebate participants.

3.9.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year Two Process Evaluation* report contains an update to the PY1 baseline process evaluation. The PY2 process evaluation was delivered with the PY2 Annual Report in November 2011. The PY3 process evaluation will be delivered with the PY3 Annual Report in November 2012.

3.9.5 Program Partners and Trade Allies

Eic | Comfort Home (EIC) is the implementation CSP for the Residential Energy Assessment & Weatherization Program. EIC's responsibilities include coordinating training for the program administrative CSP and trade allies (Building Performance Institute (BPI) trained auditors), distributing marketing materials to trade allies, developing quality control standards and verifying trade ally qualifications, and uploading customer and assessment data into the PPL Electric tracking system. EIC also conducts walk-through home surveys, including a visual inspection of the home, evaluating major electric energy-using equipment (e.g., lighting systems, space conditioning and hot water heating equipment, and appliances), and evaluating building envelope characteristics to identify areas for cost-effective electric efficiency upgrades. EIC provides customers with an energy survey report that includes recommendations for appropriate follow-up activities.

Trade allies provide services for participants of the Residential Energy Assessment & Weatherization Program. Trade allies include weatherization contractors or HVAC contractors installing qualifying equipment. PPL Electric's network of BPI trained building analysts and certified energy auditor trade allies deliver comprehensive energy audits. The EM&V CSP will identify trade allies through the customer applications and from records kept by the PPL Electric Residential Energy Assessment & Weatherization Program managers and CSPs.

PPL Electric's administrative CSP, Helgeson Enterprises, responds to customer questions through its call center. Helgeson is also responsible for verifying customer eligibility, processing rebates, uploading customer and assessment report data into an internal tracking systems, and uploading data to EEMIS.

U Marketing develops marketing and communication plans and materials and informs trade allies and customers about the program through direct mailings and mass media.

PPL Electric's EM&V and QA/QC CSP conduct sample-based installation verifications, review participant data, and verify impacts and calculations.

3.9.6 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-28. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-28: Summary of Residential Energy Assessment and Weatherization Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$12,150	$27,400	$111,600
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$12,150	$27,400	$111,600
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$135,209	$256,969	$861,237
B.4	Marketing[a]	$28,510	$29,669	$29,669
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$163,719	$286,638	$890,906
C	**EDC Evaluation Costs**[a]	$0	$0	$0
D	**SWE Audit Costs**[a]	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$175,869	$314,038	$1,002,506
E	**Participant Costs**	Not required	Not required	Not required
	Total EDC & Participant Costs	$175,869	$314,038	$1,002,506
F.1	**Annualized Avoided Supply Costs –Residential**	Not required	Not required	Not required

	Category	IQ	PYTD	CPITD
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in this table are subject to TRC Order.
[a] EDC evaluation, SWE audit, and a majority of EDC implementation costs are common and are not 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.
[b] Includes PPL Electric's implementation, management, and oversight of this program.

3.10 Energy Efficiency Behavior & Education Program

The Energy Efficiency Behavior & Education Program encourages customers to implement free or low-cost measures and adopt energy use practices and behaviors that reduce energy consumption. PPL Electric implements the program under a contract with OPOWER.

The program's education and awareness initiatives are separate from the advertising and promotion of PPL Electric's specific energy efficiency and demand reduction programs. Particular measures in this program may include:

- Periodic reports to customers that compare their usage to other comparable customers in the same geographical area (Home Energy Reports).
- Tips included in the Home Energy Reports emphasizing the importance of peak load reduction during the peak load season and ways to shift energy use to off-peak periods.[15]
- General conservation tips such as turning down the thermostat, turning off lights, shortening showers, etc.
- Low-cost energy efficiency tips, such as replacing incandescent lights with CFLs, installing weather stripping, and using power strips.
- Information on tools and resources available through PPL Electric's Website.
- Information or promotion of other PPL Electric residential programs.

[15] In theory, there are two main channels through which the Home Energy Reports could lead to reductions in energy consumption. First, the energy savings tips in the Home Energy Reports could increase customers' knowledge about energy saving opportunities and spur them to implement measures. Second, the information about their neighbors' usage could serve a normative purpose: if customers internalize social norms about acceptable levels of energy consumption, knowledge of their neighbors' consumption might lead them to reduce their own usage.

No financial incentives are provided through this program. Rather, it is expected that by virtue of providing simple energy conservation education, information, and strategies, customers will take actions to gain energy cost savings on their monthly utility bills.

The objectives of the Energy Efficiency Behavior & Education Program include:

- Educating customers about free (no cost) or very low-cost measures and behaviors that can significantly reduce energy consumption or demand.
- Educating customers about PPL Electric's online resources and EE&C programs.
- Encouraging customers to adopt more energy efficient behaviors and to install energy efficiency measures in their homes. This will be accomplished by making customers more aware of how their behavior and practices impact their energy usage, by showing them comparisons of their electric usage with a group of similar customers with a similar usage pattern in the same geographical area, or by other methods.
- Obtaining participation of approximately 100,000 customers through 2013.

3.10.1 Program Logic

The program theory for the Energy Efficiency Behavior & Education Program can be summarized as follows:

> By using various communication channels to make customers more aware of the importance of energy efficiency and peak energy reduction and by giving them knowledge about how to reduce energy use and peak demand, customers will change their energy using behaviors. Energy and demand savings are expected from these behavior changes.

The Energy Efficiency Behavior & Education Program logic model can be found in Section 1 of the program Evaluation Plan. The program logic model highlights its key features as understood by the EM&V CSP, indicating logical linkages between activities, outputs, and outcomes. The logic model's elements are:

- **Program inputs:** Program inputs are PPL Electric customers; PPL Electric staff (including management, coordinators, and marketing); vendors providing Home Energy Reports; and the Home Energy Report and energy efficiency messaging.
- **Program activities:** The program's primary activities include developing messaging, advertising campaigns, and other public awareness activities and educational materials; and education of individuals and others targeted by activities.
- **Program outputs:** Outputs verifying activities include the number of activities developed and the number of marketing materials created.
- **Short-term outcomes** (one year): Outcomes resulting from designated customers participating in the program, including increased public awareness of the importance of energy efficiency and knowledge of ways to address it.
- **Intermediate outcomes** (two to three years): Outcomes consist of customers being influenced by program efforts to change their energy using behavior and to gain associated energy reduction from those behavioral changes and the no- or low-cost measures.

- **Long-term outcomes** (four to seven years): Outcome is the reduction of energy use and demand from the installation of low-cost measures.

3.10.2 Program Measurement and Verification Methodology

This EM&V methodology is based on Option C-Whole Facility of the International Performance Measurement & Verification Protocol (IPMVP) for annual energy savings[16] (Billing Regression Analysis per Section 3.3.3.3.6.2.3 of the SWE Audit Plan). Billing analysis—using data on energy use in participating and non-participating homes before and after the treatment—will be used to estimate savings attributable to this program.

A difference-in-differences regression analysis of billing data will result in an estimate of the energy savings impact of education and behavioral programs in the population of customers eligible to receive the information. The program impact savings estimates will be unbiased because the evaluation is set up as a randomized control trial (RCT) with treatment and control groups and the regression analysis uses consumption data from before and after treatment for both groups.

***Ex Ante* Adjustments Methodology**
Calculation of the *ex ante* savings estimates is the responsibility of the program CSP (OPOWER). *Ex ante* savings will be calculated based on data from OPOWER programs with estimates of program impacts or from a partial billing analysis for months in PY3 Q1 and Q2. The EM&V CSP will not make any *ex ante* adjustments.

Savings Realization Rate Methodology
The EM&V CSP will review the savings calculations assumptions, check the quality of PY3 Q1 and Q2 billing data used in the calculation, and verify that implementation is following the experimental design of the program. The PY3 savings realization rate will be estimated as the ratio of *ex post* verified savings to *ex ante* savings. This will be completed after the EM&V CSP verifies the program savings using a billing analysis at the end of PY3. The results will be reported in the PY3 final Annual Report.

Net-to-Gross Ratio Methodology
The difference-in-differences regression methodology controls for free-riders, who are treated customers who would have adopted energy efficiency behaviors or measures in absence of the Home Energy Reports. The inclusion of a randomly assigned control group of customers in the analysis accounts for free-riding behavior.

The regression methodology captures the impacts of any spillover in treated homes, which is the adoption of energy efficiency measures or behaviors that were not recommended in the Home Energy Report. The regression methodology will not accurately capture any spillover from treated to non-treated homes. Such spillover would lower the consumption of non-treated homes (the baseline) and

[16] Efficiency Valuation Organization. *International Performance Measurement & Verification Protocol (IPMVP); Concepts and Options for Determining Energy and Water Savings: Volume 1*.September 2009. EVO 10000 – 1:2009.

bias down the estimate of program impacts. However, spillover from treated to non-treated homes is unlikely to be significant and will be ignored.

3.10.3 Program Sampling

Surveys of customers receiving Home Energy Reports were conducted in PY2 and will be conducted in PY3. In PY2, the EM&V CSP conducted the telephone survey with a sample of 300 customers who received a Home Energy Report during the program year. The surveys covered customers' exposure and recall of the Home Energy Reports, their satisfaction with the reports and messaging, concerns with the neighbors' comparison shown in the Report, reasons for opting-out of the Reports, and changes in their energy efficiency measures and behaviors. In PY3, the EM&V CSP will conduct surveys with a sample of 150 customers who received Home Energy Reports and 150 control group customers, and 40 who opted out of receiving the Home Energy Reports.

3.10.4 Process Evaluation

The process evaluation for the Energy Efficiency Behavior & Education Program will be completed in PY3. The goal is to produce findings that will help improve the overall program design and implementation. The process evaluation will include interviews with PPL Electric staff and program vendors, as well as surveys with program participants.

Evaluating the contribution of the program's various steps toward behavior change is crucial to understanding program effects, whether and how savings goals are being reached, and how savings goals can be met in the future. Specific information on measures and behaviors taken that are directly attributable to the program component will be gathered. The surveys will include information about customers' attitudes regarding conservation, intentions to adopt measures, and behavior changes. These data will be analyzed to understand the program's effectiveness.

3.10.5 Program Partners and Trade Allies

OPOWER is the third-party implementation CSP for the Energy Efficiency Behavior & Education Program. OPOWER 's responsibilities include selecting homes eligible for participation, preparing and distributing the Home Energy Reports, analyzing program impacts, and reporting results to PPL Electric.

Trade allies are entities that provide services for participants of the Energy Efficiency Behavior & Education Program: however, there are no trade allies for this program.

PPL Electric's administrative CSP (Helgeson Enterprises) responds to customer questions through its call center. Participants can call Helgeson to update information about their home characteristics used to generate Home Energy Reports.

PPL Electric's EM&V and QA/QC CSP reviews participant data and verifies impacts and calculations.

3.10.6 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-29. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-29: Summary of Customer Education and Behavior Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$0	$0	$0
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$0	$0	$0
B.1	Design & Development	$0	$0	$0
B.2	Administration	$0	$0	$0
B.3	Management[a]	$126,172	$251,942	$1,209,023
B.4	Marketing	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$126,172	$251,942	$1,209,023
C	**EDC Evaluation Costs**[b]	$0	$0	$0
D	**SWE Audit Costs**	$0	$0	$0
	Total EDC Costs (A + B + C + D)	$126,172	$251,942	$1,209,023
E	**Participant Costs**	Not required	Not required	Not required
	Total EDC & Participant Costs	$126,172	$251,942	$1,209,023
F.1	**Annualized Avoided Supply Costs –Residential**	Not required	Not required	Not required
F.2	**Annualized Avoided Supply Costs – Small C&I**	Not required	Not required	Not required
F.3	**Annualized Avoided Supply Costs – Large C&I**	Not required	Not required	Not required
G	**Lifetime Avoided Supply Costs**	Not required	Not required	Not required
	Total Lifetime Economic Benefits	Not required	Not required	Not required
	Program Benefit-to-Cost Ratio	Not required	Not required	Not required

NOTES:
Definitions for terms in the following table are subject to TRC Order.
[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.

Appendix A: Glossary of Terms[17]

– A –

Administration Costs: As defined by the TRC Technical Working Group.

Avoided Cost: In the context of energy efficiency, these are the costs that are avoided by the implementation of an energy efficiency measure, program, or practice. Such costs are used in benefit-cost analyses of energy efficiency measures and programs as defined by the Pennsylvania PUC in the TRC Test Order.[18] *Any additions to this definition will be discussed by the TRC Technical Working Group.*

– B –

Baseline: Conditions that would have occurred without implementation of the subject measure or project. Baseline conditions are sometimes referred to as 'business-as-usual' conditions and are used to calculate program-related efficiency or emissions savings. Baselines can be defined as either project specific baselines or performance standard baselines (e.g., building codes). For the purposes of Act 129, baselines are defined in the Pennsylvania TRM, in approved custom protocols, and in TRM interim approved protocols.

Baseline Data: The information representing the systems being upgraded before the energy efficiency activity takes place.

Benefit-Cost Ratio: The mathematical relationship between the benefits and costs associated with the implementation of energy efficiency measures, programs, or practices. The benefits and costs are typically expressed in dollars. This is the ratio of the discounted total benefits of the program to the discounted total costs over the expected useful life of the energy efficiency measure. The explicit formula for use in Pennsylvania is set forth in the Appendix to the TRC Order.[19] Also see *Benefit-Cost Test*.

Benefit-Cost Test: Also called *Cost-Effectiveness Test*, defined as the methodology used to compare the benefits of an investment to the costs. For programs evaluated under Act 129, the TRC Test is the required benefit-cost test as issued in the TRC Order.[20]

Bias: The extent to which a measurement, sampling, or analytic method systematically underestimates or overestimates a value. Some examples of types of bias include engineering model bias; meter bias; sensor bias; an inadequate or inappropriate estimate of what would have happened absent a program or measure installation; a sample that is unrepresentative of a population; and selection of other variables in an analysis that are too correlated with the savings variable (or each other) in explaining the dependent variable (such as consumption).

– C –

Coefficient of Variation: The mean (average) of a sample, divided by its standard error.

Coincident Demand: The demand of a device, circuit, or building that occurs at the same time as the peak demand of a utility's system load or at the same time as some other peak of interest, such as a building or facility peak demand. The peak or interest should be specified (e.g., 'demand coincident with the utility system peak').

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[17] This Glossary of Terms was provided by the SWE.

[18] Pennsylvania Public Utility Commission. *Implementation of Act 129 of 2009 – Total Resource Cost Test (TRC) Order*. Docket No. M-2009-2108601. Issued June 18, 2009.

[19] Ibid.

[20] Ibid.

Coincidence Factor: The ratio, expressed as a numerical value or as a percentage of connected load, of the coincident demand of an electrical appliance or facility type with the utility system peak.

Confidence: An indication of the probability that an estimate is within a specified range of the true value of the quantity in question. Confidence is the likelihood that the evaluation has captured the true value of a variable within a certain estimated range. Also see *Precision*.

Correlation: For a set of observations, such as for participants in an energy efficiency program, the extent to which values for one variable are associated with values of another variable for the same participant. For example, facility size and energy consumption usually have a high positive correlation.

Cost-Benefit and Cost-Effectiveness Analysis: See *Benefit-Cost Test*.

Cost-Effectiveness: An indicator of the relative performance or economic attractiveness of an investment or practice. In the energy efficiency field, the present value of the estimated benefits produced by an energy efficiency program is compared to the estimated total costs to determine if the proposed investment or measure is desirable from a variety of perspectives (e.g., whether the estimated benefits exceed the estimated costs from a societal perspective). See *Benefit-Cost Test*.

Cost-Effectiveness Test: See *Benefit-Cost Test*.

Cumulative Energy Savings: The summation of energy savings associated with multiple projects or programs over a specified period of time.

Cumulative-to-Date: Beginning June 1, 2009 through the end of the current quarterly reporting period (February 28/29, May 31, August 31, or November 30).

Cumulative Portfolio/Program Inception-to-Date: Beginning June 1, 2009 through the end of the current quarterly reporting period (February 28/29, May 31, August 31, or November 30).

Custom Program: An energy efficiency program intended to provide efficiency solutions to unique situations not amenable to common or prescriptive solutions addressed by the PA TRM. Each custom project is examined for its individual characteristics, savings opportunities, efficiency solutions, and often, customer incentives. Under Act 129, these programs fall outside of the jurisdiction of the Pennsylvania TRM, and thus the M&V protocols for each should be approved by the Statewide Evaluation Team.

– D –

Deemed Savings: An estimate of energy or demand savings for a single unit of an installed energy efficiency measure that: (1) has been developed from data sources and analytical methods that are widely considered acceptable for the measure and purpose, and (2) is applicable to the situation being evaluated. Individual parameters or calculation methods can also be deemed. Deemed savings for measures implemented under Act 129 are stipulated in the Pennsylvania TRM, which undergoes an annual review and update process, as well as in the Interim TRM Measures, which are subject to interim approval by the Statewide Evaluation Team.

Defensibility: The ability of evaluation results to stand up to scientific scrutiny. Defensibility is based on experts' assessments of the evaluation's validity, reliability, and accuracy. Under Act 129, it is the role of the SWE to determine the defensibility of the verified savings estimates reported by each EDC.

Delta Watts: The difference in the connected load (wattage) between existing or baseline equipment and the energy efficient replacement equipment, expressed in Watts or kilowatts.

Demand: The rate of energy flow. Demand usually refers to the amount of electric energy used by a customer or piece of equipment over a defined time interval (e.g., 15 minutes), expressed in kW

(equals kWh/h). Demand can also refer to natural gas usage over a defined time interval, usually expressed in Btu/hr, kBtu/hr, therms/day, or ccf/day.

Demand Reduction: See *Demand Savings*.

Demand Response: The reduction of customer energy usage at times of peak usage in order to help system reliability, to reflect market conditions and pricing, or to support infrastructure optimization or deferral of additional infrastructure. Demand response programs may include contractually obligated or voluntary curtailment, direct load control, and pricing strategies.

Demand Savings: The reduction in electric demand from the demand associated with baseline systems to the demand associated with the higher-efficiency equipment or installation. For the purposes of Act 129, demand savings resulting from demand response programs must occur during the 100 peak hours as defined in Act 129. Demand savings associated with energy efficiency measures implemented under Act 129 are calculated according to the approved calculation methods stipulated in the TRM or subsequently approved through alternative methods (e.g., interim measures, custom protocols).

Demand Side Management: Strategies used to manage energy demand including energy efficiency, load management, fuel substitution, and load building.

– E –

Energy Efficiency and Conservation (EE&C) Plan: Plan filed by the EDC and approved by the PUC.

EE&C Plan Estimate for Program Year: An estimate of the energy savings or demand reduction for the current program year as filed in the EDC EE&C plans.

Effective Useful Life: An estimate of the median number of years that efficiency measures installed under a program are still in place and operable. For measures implemented under Act 129, it is required that the effective useful life or 15 years, whichever is less, be used to determine measure assessments.

Electric Distribution Company (EDC): In reference to Act 129, there are seven EDCs with at least 100,000 customers that are required to adopt a plan to reduce energy and demand consumption within their service territory in accordance with 66 Pa. C.S. § 2608. The seven EDCs include: Allegheny Power, Duquesne Light, Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, PECO Energy Company, and PPL Electric Utilities.

Electric Distribution Company (EDC) Evaluation Costs: Expenses incurred by the EDC pertaining to EM&V activities. This includes expenses for contractors, metering equipment, evaluation software, etc.

Electric Distribution Company (EDC) Implementation Costs: Expenses incurred by the EDC pertaining to the implementation of Act 129 programs approved in their respective EE&C Plans. This includes payments to conservation service providers, marketing expenses, rebates, etc.

Electric Distribution Company (EDC) Incentive Costs: Payments by the EDC to a customer participating in an EE&C program approved by the Commission. This may include rebates for the purchase of energy efficiency qualifying equipment, cash payments for participation in programs, etc.

End Use: An appliance that uses energy.

Energy Conservation: Using less of a service in order to save energy. The term is often unintentionally used instead of energy efficiency.

Energy Efficiency: The use of less energy to provide the same or an improved level of service to the energy consumer; or the use of less energy to perform the same function.

Energy Efficiency Measure: An installed piece of equipment or a system, modification of equipment systems, or modified operations in customer facilities that reduce the total amount of electrical

or gas energy and the capacity that would otherwise have been needed to deliver an equivalent or improved level of comfort or energy service.

Energy Savings: Reduction in electricity use (kWh) or in fossil fuel use (in thermal unit(s).

Evaluation: The conduct of any of a wide range of assessment studies and other activities aimed at documenting enhanced understanding of a program or portfolio, including determining the effects of a program or understanding or documenting program performance, program or program-related markets and market operations, program-induced changes in energy efficiency markets, levels of potential demand or energy savings, and/or program cost-effectiveness. Market assessments, monitoring and evaluation, and M&V are aspects of evaluation.

***Ex Ante* Savings Estimate**: Forecasted savings used for program and portfolio planning purposes.

***Ex Post* Savings Estimate**: Savings estimate reported by an evaluator after the energy impact evaluation has been completed.

– F –

Free Driver: A program non-participant who has adopted a particular efficiency measure or practice as a result of the evaluated program. Also see *Spillover*.

Free-Rider: A program participant who would have implemented the program measure or practice in the absence of the program. Free-riders can be: 1) total, in which the participant's activity would have completely replicated the program measure; 2) partial, in which the participant's activity would have partially replicated the program measure; or 3) deferred, in which the participant's activity would have completely replicated the program measure, but after the program's timeframe.

Free-Ridership Rate: The percent of savings attributable to free-riders.

– G –

Gross Impact: See *Gross Savings*.

Gross Savings: The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

Gross kW: Expected demand reduction based on a comparison of standard or replaced equipment with equipment installed through an energy efficiency program.

Gross kWh: Expected kWh reduction based on a comparison of standard or replaced equipment with equipment installed through an energy efficiency program.

– H –

– I –

Impact Evaluation: An evaluation of the program-specific, directly induced quantitative changes (kWh, kW, and therms) attributable to an energy efficiency program.

Incremental Cost: The difference between the cost of existing or baseline equipment or service and the cost of alternative energy efficient equipment or service.

Incremental Energy Savings: The difference between the amount of energy savings associated with a project or a program in one period and the amount of energy savings associated with that project or program in a prior period.

Incremental Quarter: The time period of one reporting quarter; typically used to reference the additional results accrued during the reporting quarter.

Incremental Quarterly Participants: The difference between the cumulative number of program participants acquired in a program in one period and the cumulative number of participants acquired by that program in a prior period.

Incremental Quarterly Reported Gross Impact: The difference between the amount of reported gross impacts of a program in one period and the amount of reported gross impacts of that program in a prior period.

– J –

– K –

Kilowatt (kW): A measure of the rate of power used during a preset time period (e.g., minutes, hours, days, months) equal to 1,000 Watts.

Kilowatt-Hour (kWh): A common unit of electric energy; one kilowatt-hour is numerically equal to 1,000 Watts used for one hour.

– L –

Lifetime kW: The expected demand savings over the lifetime of an installed measure, equal to the annual peak kW reduction associated with a measure multiplied by the expected lifetime of that measure. It is expressed in units of kW-years.

Lifetime MWh: The expected electrical energy savings over the lifetime of an installed measure, calculated by multiplying the annual MWh reduction associated with a measure by the expected lifetime of that measure.

Lifetime Supply Costs: The net present value of avoided supply costs associated with savings, net of changes in energy use that would have happened in the absence of the program over the life of the energy efficiency measure, factoring in persistence of savings. See *Avoided Cost.*[21]

Load Factor: A percentage indicating the ratio of electricity or natural gas used during a given timeframe to the amount that would have been used if the usage had stayed at the highest demand the whole time. The term is also used to indicate the percentage of capacity of an energy facility, such as a power plant or gas pipeline, that is utilized in a given period of time.

Load Management: Steps taken to reduce power demand at peak load times or to shift some of the power to off-peak times. Load management may coincide with peak hours, peak days, or peak seasons. Load management may be pursued by persuading consumers to modify their behavior or by using equipment that regulates some electric consumption. This may lead to complete elimination of electric use during the period of interest (load shedding) and/or to an increase in electric demand in the off-peak hours as a result of shifting electric usage to that period (load shifting).

– M –

Management Costs: To be defined by the TRC Technical Working Group.

Market Assessment: An analysis that provides an assessment of how and how well a specific market or market segment is functioning with respect to the definition of well-functioning markets or with respect to other specific policy objectives. Generally includes a characterization or description of the specific market or market segments, including a description of the types and number of buyers and sellers in the market, the key actors that influence the market, the type and number of transactions that occur on an annual basis, and the extent to which market participants consider energy efficiency as an important part of these transactions. This analysis may also include an assessment of whether a market has been sufficiently transformed to justify a reduction or elimination of specific program interventions. Market assessments can be blended with a strategic planning analysis to produce recommended program designs or budgets. One particular kind of market assessment effort is a baseline study, or the characterization of a

[21] Ibid.

market before the commencement of a specific intervention in the market, for the purpose of guiding the intervention and/or assessing its effectiveness later.

Measurement and Verification (M&V): A subset of program impact evaluations that are associated with the documentation of energy savings at individual sites or projects using one or more methods that can involve measurements, engineering calculations, statistical analyses, and/or computer simulation modeling.

Measurement Error: In the evaluation context, a reflection of the extent to which the observations conducted in the study deviate from the true value of the variable being observed. The error can be random (equal around the mean) or systematic (indicating bias).

Megawatt (MW): A unit for measuring electricity equal to 1,000 kilowatts or 1,000,000 Watts.

Megawatt-Hour (MWh): A unit of electric energy numerically equal to 1,000,000 Watts used for one hour.

Metered Data: Data collected over time through a meter for a specific end use, energy-using system (e.g., lighting, HVAC), or location (e.g., floors of a building, a whole premise). Metered data may be collected over a variety of time intervals. Usually refers to electricity or gas data.

Metering: The collection of energy consumption data over time through the use of meters. These meters may collect information about an end-use, a circuit, a piece of equipment, or a whole building (or facility). Short-term metering generally refers to data collection for no more than a few weeks. End-use metering refers specifically to separate data collection for one or more end-uses in a facility, such as lighting, air conditioning, or refrigeration. Spot metering is an instantaneous measurement (rather than over time) to determine equipment size or power draw.

Monitoring: The collection of relevant measurement data over time at a facility, including but not limited to energy consumption or emissions data (e.g., energy and water consumption, temperature, humidity, volume of emissions, hours of operation), for the purpose of conducting a savings analysis or to evaluate equipment or system performance.

– N –

Net Impact: See *Net Savings*.

Net Present Value: The discounted value of the net benefits or costs over a specified period of time (e.g., the expected useful life of the energy efficiency measure).[22]

Net Savings: The total change in load that is attributable to an energy efficiency program. This change in load may include, implicitly or explicitly, the effects of free drivers, free-riders, energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand. Net savings are calculated by multiplying verified savings by a NTG ratio.

Net-to-Gross (NTG) Ratio: A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts.

Non-Participant: Any consumer who was eligible but did not participate in the subject efficiency program in a given program year.

– O –

Off-Peak Energy kWh Savings: The kWh reduction that occurs during a specified period of off-peak hours for energy savings (see the PA TRM Table 1-1).

[22] Ibid.

On-Peak Energy kWh Savings: The kWh reduction that occurs during a specified period of on-peak hours for energy savings (see the PA TRM Table 1-1).

– P –

Participant: A utility customer partaking in an energy efficiency program, defined as one transaction or rebate payment in a program. For example, a customer receiving one payment for two measures within one program counts as one participant. A customer receiving two payments in two programs counts as two participants. A customer partaking in one program at two different times receiving two separate payments counts as two participants.

Participant Costs: Costs incurred by a customer participating in an energy efficiency program. Typically, these costs are represented as incremental costs (i.e., the costs incurred for the purchase, installation, and maintenance of energy efficiency equipment over standard or existing equipment).

Peak Demand: The maximum level of metered demand during a specified period, such as a billing month or a peak demand period. For Act 129, peak period is defined by the TRC Order as the peak 100 hours.

Peak Load: The highest electrical demand within a particular period of time. Daily electric peaks on weekdays typically occur in the late afternoon and early evening. Annual peaks typically occur on hot summer days.

Percent of Estimate Committed: The program year-to-date total committed savings as a percent of the savings targets established in each EDCs EE&C Plan, calculated by dividing the PYTD total committed by the EE&C Plan program year estimate.

Portfolio: Can be defined as: (1) a collection of programs addressing the same market (e.g., a portfolio of residential programs), technology (e.g., motor efficiency programs), or mechanisms (e.g., loan programs); or (2) the set of all programs conducted by one or more organizations, such as a utility or program administrator, and which could include programs that cover multiple markets, technologies, etc.

Precision: An indication of the closeness of agreement among repeated measurements of the same physical quantity. It is also used to represent the degree to which an estimated result in social science (e.g., energy savings) would be replicated with repeated studies.

Preliminary Program Year-to-Date (PYTD) Net Impact: Net impacts reported in quarterly reports. These net impacts are preliminary in that they are based on preliminary realization rates.

Preliminary Program Year-to-Date (PYTD) Verified Impact: Verified impacts reported in quarterly reports. These verified impacts are preliminary in that they are based on preliminary realization rates.

Preliminary Realization Rate: Realization rates reported in quarterly reports based on the results of M&V activities conducted on the sample to date. These results are preliminary because the sample to date is likely to have not met the required levels of confidence and precision.

Prescriptive Program: An energy efficiency program focused on measures that are one-for-one replacements of the existing equipment and for which fixed customer incentives can be developed based on the similar savings that are anticipated to accrue from their installation.

Process Evaluation: A systematic assessment of an energy efficiency program for the purposes of documenting program operations at the time of the examination and identifying and recommending improvements to increase the program's efficiency or effectiveness for acquiring energy resources, while maintaining high levels of participant satisfaction.

Program Administrator: Those entities that oversee the implementation of energy efficiency programs. This generally includes regulated utilities, other organizations chosen to implement such programs, and state energy offices.

Program Year Energy Savings Target: Energy target established for the given program year as approved in each EDCs EE&C Plan.

Program Year Sample Participant Target: Estimated sample size for evaluation activities in the given program year.

Program Incentive: An incentive, generally monetary, that is offered to a customer through an energy efficiency program to encourage the customer to participate in the program. The incentive is intended to overcome one or more barriers that keep the customer from taking the energy efficiency action on their own.

Program Participant: A consumer that received a service offered through an efficiency program in a given program year. The term "service" can be one or more of a wide variety of services, including financial rebates, technical assistance, product installations, training, energy efficiency information, or other services, items, or conditions.

Program Year-to-Date (PYTD): Beginning June 1 of the current program year through the end of the current quarter (February 28/29, May 31, August 31, or November 30).

Program Year-to-Date (PYTD) Net Impact: The total change in load that is attributable to an energy efficiency program from June 1 of the current program year through the end of the current quarter (February 28/29, May 31, August 31, or November 30).

Program Year-to-Date (PYTD) Participants: The number of utility customers partaking in an energy efficiency program beginning June 1 of the current program year through the end of the current quarter (February 28/29, May 31, August 31, or November 30).

Program Year-to-Date (PYTD) Reported Gross Impact: The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated, beginning June 1 of the current program year through the end of the current quarter (February 28/29, May 31, August 31, or November 30). This value is unverified by an independent third-party evaluator.

Program Year-to-Date (PYTD) Sample Participants: Total participant sample beginning June 1 of the current program year through the end of the current quarter (February 28/29, May 31, August 31, or November 30).

Program Year-to-Date (PYTD) Total Committed: The estimated gross impacts, including reported impacts and in-progress impacts, beginning June 1 of the current program year through the end of the current quarter (February 28/29, May 31, August 31, or November 30), calculated by adding PYTD reported gross impact and projects in progress.

Project: An activity or course of action involving one or multiple energy efficiency measures at a single facility or site.

Projects in Progress: Energy efficiency and demand response projects currently being processed and tracked by the EDC, but that are not yet complete at the time of the report. A complete project is defined as a project in which the energy conservation measure has been installed and is commercially operable, and for which a rebate check has been issued.

– Q –

– R –

Realization Rate: The term is used in several contexts in the development of reported program savings. The primary applications include the ratio of project tracking system savings data (e.g., initial

estimates of project savings) to savings that: 1) are adjusted for data errors, and 2) incorporate the evaluated or verified results of the tracked savings.

Rebate Program: An energy efficiency program in which the program administrator offers a financial incentive for the installation of energy efficient equipment.

Rebound Effect: Also called 'snap back,' defined as a change in energy-using behavior that yields an increased level of service that is accompanied by an increase in energy use and occurs as a result of taking an energy efficiency action. The result of this effect is that the savings associated with the direct energy efficiency action is reduced by the resulting behavioral change.

Regression Analysis: Analysis of the relationship between a dependent variable (response variable) to specified independent variables (explanatory variables). The mathematical model of their relationship is the regression equation.

Regression Model: A mathematical model based on statistical analysis where the dependent variable is quantified based on its relationship to the independent variables which are believed to determine its value. The relationship between the variables is estimated statistically from the data used.

Reliability: The quality of a measurement process that would produce similar results on: (1) repeated observations of the same condition or event, or (2) multiple observations of the same condition or event by different observers.

Renewable Energy: Energy derived from resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

Reported Gross Impact: The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated. This value is unverified by an independent third-party evaluator.

Reporting Period: The time following implementation of an energy efficiency activity during which results are to be determined.

Representative Sample: A sample that has approximately the same distribution of characteristics as the population from which it was drawn.

Rigor: The level of effort expended to minimize uncertainty due to factors such as sampling error and bias. Higher levels of rigor are associated with more confidence that the results of the evaluation are accurate and precise.

– S –

Sample: In program evaluation, a portion of the population selected to represent the whole. Differing evaluation approaches rely on simple or stratified samples (based on some characteristic of the population).

Sample Design: The approach used to select the sample units.

Sampling Error: The error in estimating a parameter caused by the fact that all of the disturbances in the sample are not zero.

Savings Factor: The percent of time the lights are off due to lighting controls relative to the baseline controls system (typically a manual switch). Also referred to as the lighting controls savings factor.

Simple Random Sample: A method for drawing a sample from a population such that all samples of a given size have an equal probability of being drawn.

Snap Back: See *Rebound Effect.*

Simulation Model: An assembly of algorithms that calculate energy use based on engineering equations and user-defined parameters.

Spillover: Reductions in energy consumption and/or demand caused by the presence of an energy efficiency program, beyond the program-related gross savings of the participants and without financial or technical assistance from the program. There can be participant and/or non-participant spillover. Participant spillover is the additional energy savings that occur when a program participant independently installs energy efficiency measures or applies energy saving practices after having participated in the efficiency program as a result of the program's influence. Non-participant spillover refers to energy savings that occur when a program non-participant installs energy efficiency measures or applies energy savings practices as a result of a program's influence.

Spillover Rate: An estimate of energy savings attributable to spillover effects expressed as a percent of savings installed by participants through an energy efficiency program.

Standard Error: A measure of the variability in a data sample indicating how far a typical data point is from the mean of a sample. In a large sample, approximately two-thirds of observations lie within one standard error of the mean, and 95% of observations lie within two standard errors.

Statistically Adjusted Engineering Models: A category of statistical analysis models that incorporate the engineering estimate of savings as a dependent variable. The regression coefficient in these models is the percentage of the engineering estimate of savings observed in changes in energy usage. For example, if the coefficient on the statistically adjusted engineering term is 0.8, the customers are, on average, realizing 80% of the savings from their engineering estimates.

Stipulated Values: See *Deemed Savings*.

Stratified Random Sampling: A sampling technique in which the population is divided into subpopulations, called strata, which are non-overlapping and together comprise the entire population, and then a simple random sample of each stratum is taken to create a sample based on stratified random sampling.

Stratified Ratio Estimation: A sampling method that combines a stratified sample design with a ratio estimator to reduce the coefficient of variation by using the correlation of a known measure for the unit (e.g., expected energy savings) to stratify the population and allocate a sample from the strata for optimal sampling.

– T –

Takeback Effect: See *Rebound Effect*.

Total Resource Cost (TRC) Test: A cost-effectiveness test that measures the net direct economic impact to the utility service territory, state, or region. The TRC Order[23] details the method and assumptions to use when calculating the TRC test for EE&C portfolios implemented under Act 129. The results of the TRC test are to be expressed as both a net present value and a benefit-cost ratio.

Total Resource Cost (TRC) Test Benefits: Benefits calculated in the TRC test that include the avoided supply costs, such as the reduction in transmission, distribution, generation, and capacity costs, valued at marginal cost for the periods when there is a consumption reduction. The PA TRC benefits will look at avoided supply costs, such as the reduction in forecasted zonal wholesale electric generation prices, ancillary services, losses, generation capacity, transmission capacity, and distribution capacity. The avoided supply costs will be calculated using net program savings,

[23] Ibid.

defined as the savings net of changes in energy use that would have happened in the absence of the program. The persistence of savings over time is also considered in the net savings.[24]

Total Resource Cost (TRC) Test Costs: The costs calculated in the TRC test include the costs of the various programs paid for by an EDC (or by a default service provider) and the participating customers, and reflect any net change in supply costs for the periods in which consumption is increased in the event of load shifting. Note that the TRC test should utilize the incremental costs of services and equipment. Thus, for example, this would include equipment, installation, operation and maintenance costs, cost of removal (less salvage value), and administrative costs, regardless of who pays for them.[25]

– U –

Uncertainty: The range or interval of doubt surrounding a measured or calculated value within which the true value is expected to fall with some degree of confidence.

Upstream Program: A program that provides information and/or financial assistance to entities in the delivery chain of high-efficiency products at the retail, wholesale, or manufacturing level. Such a program is intended to yield lower retail prices for the products.

– V –

Verification: An independent assessment of the reliability (considering completeness and accuracy) of claimed energy savings or an emissions source inventory.

Verified Gross Impact: Calculated by applying the realization rate to reported gross impacts.

– W –

Watt: A unit of measure of electric power at a point in time as capacity or demand. One Watt of power maintained over time is equal to one Joule per second. The Watt is named after Scottish inventor James Watt, and is shortened to W and used with other abbreviations, as in kWh (kilowatt-hours).

Watt-Hour: One Watt of power expended for one hour. One-thousandth of a kilowatt-hour.

Whole-Building Calibrated Simulation Approach: A savings measurement approach (defined in the IPMVP Option D and in the American Society of Heating, Refrigerating and Air-Conditioning Engineers Guideline 14) that involves the use of an approved computer simulation program to develop a physical model of the building in order to determine energy and demand savings. The simulation program is used to model the energy used by the facility before and after the retrofit. The pre- or post-retrofit models are developed by calibration with measured energy use, demand data, and weather data.

Whole-Building Metered Approach: A savings measurement approach (defined in the IPMVP Option C and in the American Society of Heating, Refrigerating and Air-Conditioning Engineers Guideline 14) that determines energy and demand savings through the use of whole-facility energy (end use) data, which may be measured by utility meters or data loggers. This approach may involve the use of monthly utility billing data or data gathered more frequently from a main meter.

– X –

– Y –

– Z –

References

[24] Ibid.

[25] Ibid.

Pennsylvania Public Utility Commission. *Implementation of Act 129 of 2009 – Total Resource Cost Test (TRC) Order*. Docket No. M-2009-2108601. Issued June 18, 2009.

PAH Associations, prepared by Paul Horowitz. Facilitated by the Northeast Energy Efficiency Partnership. *Glossary of Terms Version 1.0.* A project of the Regional Evaluation, Measurement and Verification Forum. March 2009.

Appendix B: PY3 Verification Sampling

Introduction

In November 2010, the SWE provided *Sampling Resolutions*, a set of guidelines that established revised and refined sampling protocols for ACT 129 programs. Guidelines were refined by SWE in February, 2011. Cadmus revised the sampling plans that were initially discussed in the individual program evaluation plans submitted to, and approved by, the SWE. This appendix reviews the updated sampling plans and verification activities for PPL Electric's ACT 129 programs. The revisions bring PPL Electric sampling plans into alignment with the SWE directives, and still exceed the SWE sampling guidelines. SWE's sampling guidelines direct revisions to the existing sampling plans according to five primary instructions. These are:

1. 90/10 for Residential Portfolio
2. 90/10 for Non-Residential Portfolio
3. 85/15 for each Program within each Portfolio
4. Government/Non Profit and Low Income sector populations should be treated as independent program populations (and sampled at 85/15) if their contribution to the respective sector level portfolios is >20%
5. All C/P levels are minimum levels. EDC evaluators are encouraged to exceed minimum requirements

PPL Electric Programs

There are 14 programs in PPL Electric's portfolio that were approved in the EE&C Plan. Each of the programs is in various stages of development and implementation. Of these, ten programs claimed savings in PY2. Twelve are expected to claim savings in PY3; including two that expressly target demand reduction. Two programs will not be launched. The portfolio includes a number of programs that serve multiple sectors.

Participant Definitions

Participants are defined differently by program, as shown in Table 30. For some, there is one job identification number (CSP Job Number) per customer, defined by their billing account number. These include, for example, Consumer Behavior and Education, WRAP, and E-PowerWise. For other programs, e.g., Efficient Equipment, each rebate form processed receives a CSP Job Number. Households can submit more than one rebate form. Each rebate form can include one measure or multiple measures. In addition, each rebate form and CSP Job Number could report one or more than one installation of the same measure. The participant definitions are summarized by program in Table 30.

Table 30. PY3 Participant Definition by Program

Program	Participant Definition	Can there be more than one measure per CSP Job Number?	Sample Defined By:
Appliance Recycling	CSP job number (unique rebates).	Yes	CSP job number
CFL Lighting Campaign	Number of CFLs discounted by the program, divided by average number of bulbs purchased, determined through surveys.	NA; upstream discount	Survey responses
Consumer Behavior & Education	Household (unique account number).	No	Account number
Efficient Equipment	CSP job number (unique rebate application).	Yes	CSP job number, account number
Efficient Equipment lighting	Project (unique account number; multiple measures per project submitted on the same rebate form/Appendix C).	Yes	Project – determined by CSP job number, account number
Efficient Equipment—Direct Discount	Project (unique account number; multiple measures per project submitted on the same rebate form/Appendix C).	Yes	Project – determined by CSP job number, account number
Energy Assessment and Weatherization	CSP job number (unique rebate application) by type of energy assessment (survey, audit all electric, audit CAC only). Multiple measures can be recommended per assessment.	Yes	CSP job number, account number
Renewable Energy	CSP job number (one location per job number)	Yes	CSP job number
Low Income WRAP	Household (unique account number): 1 CSP job number. Savings were deemed by job type regardless of the number of measures installed.	No	Account number, job number
Low Income E-Power Wise	Household (unique account number): 1 per CSP job number. The energy kit includes multiple measures, but there is one kit per household.	No	Account number, CSP job number
HVAC Tune-Up	Individual roof top units (RTU) that received some type of incentive. This includes only diagnostic test-in in some cases (determined using account number, site ID, unit ID). Multiple RTU per account number/address. Not all units received the same services/measures.	No, but multiple Job Numbers per RTU	Account number, Site ID, Unit ID CSP job number,
Custom Incentive Program	Project.	Yes	Project - Job number
Direct Load Control	Unique account number (Household or business).	No	Account number, CSP job number
Load Curtailment	Project.	No	Project - Job number

PY3 Evaluation Activities

Evaluation activities and measure verification include records review, participant surveys, site visits and metering. The records reviews also play a primary role in QA/QC. Where metering will be conducted, the sample will be nested within site visits. Site visits, by their nature, include records review. Table 31 shows the evaluation activities planned for each of the programs that will claim savings in PY3. Non-participant surveys will be conducted for select programs to collect information for the net savings adjustments. Non-participant spillover surveys are planned to collect data for the net-to-gross analyses.

Table 31. PY3 Planned Evaluation Activities

Programs	Sectors	Records Review	Participant Surveys	Non-participant Surveys	Site Visits	Metering
Appliance Recycling	Residential	Census -- Quarterly	Planned Q4	NA	NA	NA
CFL Lighting Campaign	Residential	Census -- Quarterly	Planned Q4		NA	NA
Consumer Behavior & Education	Residential	Census -- Quarterly	Planned Q4	Planned Q4	NA	NA
Efficient Equipment	Residential	Quarterly	Planned Q4	NA	NA	NA
Energy Assessment and Weatherization	Residential	Quarterly	Planned Q4	NA	NA	NA
Renewable Energy	Residential	Program Closed to Residential Sector PY3				
Low Income WRAP	Residential	Census to identify duplicates Quarterly, prorated by job type	NA	NA	NA	NA
Low Income E-Power Wise	Residential	Census database, Quarterly	Potential Q3	NA	NA	NA
Renewable Energy	Govt/Non-profit	Batched	Planned Q4	NA	Planned Q3, Q4	NA
Efficient Equipment non-lighting	Non-residential	Batched	Planned Q4	NA	Batched	NA
Efficient Equipment lighting	Non-residential	Quarterly	Planned Q4	NA	Quarterly	As needed
Efficient Equipment Direct Discount	Small commercial	Batched	Planned Q4	NA	Batched	As needed
HVAC Tune-Up	Small commercial	Batched	Contractors Customers	NA	Batched	Spot
Custom Incentive Program	Commercial & Industrial	Census large Sample small	Planned Q3, Q4	NA	As needed	As needed
Direct Load Control	Residential, Commercial	Planned Q3	Planned PY4	NA	NA	By CSP
Load Curtailment	Commercial & Industrial	Census	Planned PY4	Planned PY4	NA	By CSP

Sample Size Specifications

The PY3 sample targets shown in Table 32 are designed to meet 90% confidence and 10% precision by portfolio sector (residential and non-residential). Sampling targets are designed in accordance to the SWE Guidance Memo 0003, *Sampling Resolutions*, issued in November 2010 and revised in February 2011.

For purposes of defining sample sizes according to the Guidance Memo, each sector was considered first, and each program within the sector considered second.
Verification samples meet or exceed required rigor levels of 90/10 for the residential, non-residential, and low income segments. Generally, sample sizes meeting 90/10 are maximized at 68-70 sample points (using 0.5 CV).

Sample sizes by program meet or exceed rigor levels designed to meet 85% confidence and 15% precision (85/15). Generally, sample sizes meeting 85/15 are maximized at 20-25 sample points (using 0.5 CV). Samples in the following tables either meet or are rounded up to meet or exceed this target. The government/non-profit sector meets or exceeds 85/15.

PY3 initial sample sizes were derived considering PY2 participation and verification realization rates. Samples will be reviewed each quarter to adjust the measure mix or prorate by measure or sector, as appropriate for the program and sector. Final verification samples will be revised (if needed) in PY3 Q4, considering participation in all measure groups.

Nonparticipant Spillover

An additional survey is proposed to collect data for the NTG analysis. This is the nonparticipant spillover survey. Details for this survey and sampling plan can be found in a separate Net-to-Gross analysis memo.

Table 32. PY3 Annual Sampling Strategy by Program

Programs	Conf & Precision	PY2 Participation Population Used to determine PY3 sample	Records Review	Participant Surveys	Site Visits	Notes
Appliance Recycling	85/15	13,083 (unique CSP job numbers)	Census (Quarterly Review)	70 participants (Planned Q4)	NA	Designed to meet minimum for 90/10 (68), prorated by appliance type. Prorate surveys among sectors in proportion to number of participants.
Residential Efficient Lighting (CFL Lighting Campaign)	90/10	All customers	Census (Quarterly Review)	300 (Planned Q4)	NA	Upstream program; participants unknown. Sample size 300, for a 90/10 precision target, including NTG adjustment.
Consumer Behavior & Education	90/5	50,000	Census (Planned Q4)	150 participants 40 drop-outs 150 nonparticipants (Planned Q4)	NA	Billing analysis includes census of participants Surveys examine program processes and measure adoption.
Efficient Equipment – residential	90/10	113,747	70 stratified	70 stratified (Planned Q4)	NA	Samples by stratum defined by technology (base on high, medium, low savings). See Table 8.
Efficient Equipment - Non-residential non-lighting (medium & small stratum)	85/15 in each of 2 strata	2,917	50 (12 Quarterly, batched)	50 (Planned Q4)	50 (Batched to occur in Q3 & Q4)	Samples by two strata (25 each) defined by measure groups. See Table 6.
Efficient Equipment - Non-residential Direct Discount	85/15	New delivery channel	25 (12 Quarterly, Batched Q3-Q4)	70 customers TBD contractors (Planned Q4)	25 (Batched to occur in Q3-Q4)	Measures primarily direct install lighting, some refrigeration. Contractors receive rebates and will be interviewed to discuss program process. Customers will be interviewed to verify measure installation. Site visit and survey samples are independent.
Efficient Equipment - Non-residential lighting (large stratum)	90/10	1,996 (unique CSP job numbers)	92 - same records as site visits (23 Quarterly)	70 (Planned Q4)	92 (23 Quarterly)	Large stratum included majority of ex ante savings; sample must approach 90/10; CV = .06(planned 23 site visits and records review per quarter). Sample size will meet GNI sector precision targets. Metering as needed (+/- 50% of TRM Appendix C EFLH). Prorate and target by sector (GNI, large, small

Programs	Conf & Precision	PY2 Participation Population Used to determine PY3 sample	Records Review	Participant Surveys	Site Visits	Notes
						commercial). Phone surveys focus primarily on process related issues, with some questions to verify or clarify measure installation. Satisfaction/process related surveys are not conducted during site visits.
Energy Assessment and Weatherization	85/15	1,288	60 (20 each audit type)	70 (Planned Q4)	NA	Surveys designed to meet minimum for 90/10 (68), prorated by audit type (two program tracks). Records review sample size is designed to meet 85/15, and will be prorated by audit type. Records review focus on QAQC; results are reported separately from surveys. Records review and surveys are independent samples.
Renewable Energy, targets by sector (residential and GNI)	85/15	84 GNI 1,245 Res.	~5 GNI (Planned Q4)	~5 GNI (Planned Q4)	~5 GNI (Planned Q4)	Final sample depends on participation. Additional site visits and records needed to collect data required for analysis. There will likely be more than five, but the number will be based on actual enrollment.
Low Income WRAP	90/10	4,415	45-48 (10-12 Quarterly, prorated by job type)	NA	NA	85/15 prorated by job type. Designated low income programs meet 90/10 as a sector.
Low Income E-Power Wise		3,995	Census database 70 enrollment forms	70 (Planned Q4)	NA	70 participant surveys may be conducted with customers receiving the energy kit via direct mail delivery channel. Enrollment form review split between pilot direct mail and CBO delivery channel.
HVAC Tune-Up	85/15	300 serviced units	20 pre 20 post	10 contractors Customers TBD	20 pre 20 post	Midstream program; surveys with contractors. Contractor interviews focus on program processes and satisfaction. Spot measurements during site visits; 20 pre & 20 post. Possible surveys with customers if receive rebate.

Programs	Conf & Precision	PY2 Participation Population Used to determine PY3 sample	Records Review	Participant Surveys	Site Visits	Notes
Custom Incentive Program	90/10	54	All large Sample small	70 (Batched Q3-Q4; ~19 each quarter)	All large Sample small	Number of customer surveys proportionate with large and small projects (census of large if not many); allocate by sector proportionately. Metering and spot measurements as needed. Number of surveys depends on number of completed, paid, and verified projects each quarter. Surveys focus on customer satisfaction and the program processes.
Direct Load Control	85/15	New PY3 Test events PY3	50 (25 per sector) (Planned Q3)	(Planned PY4)	NA	Test events will be called in PY 3 (summer 2011). Demand reduction from events called in PY 4 (summer 2012) will be claimed. Surveys will be conducted in PY4.
Load Curtailment	85/15	New PY3 Test events PY3	Census (Planned PY4)	(Planned PY4)	NA	Review Forecasting methods & model performance. Demand reduction from events called in PY 4 (summer 2012) will be claimed. Surveys will be conducted in PY4.

Sampling Strategy
The PY3 sampling strategy for each program that will claim savings is discussed below.

Efficient Equipment Program
The Efficient Equipment Program is open to all sectors. For sampling, two sectors were identified: residential and non-residential. Participation in the Government and Non-Profit participants will be monitored to determine whether it meets 20% of the program's total program savings. If they do meet 20% by the close of PY3, we will consider them an independent sector in this program.
In PY2, there were over 400 measures rebated and installed through the Efficient Equipment program. Because of the large variation in ex ante savings across measures, measure groups were defined and stratified by large, medium and small ex ante savings. PY3 sampling plan is based on the participation in PY2, anticipating similar participation.

Non-residential Sector
The measure groups planned for the PY3 Efficient Equipment Program's non-residential participants are shown in
Table 33. The strata were determined from cumulative PY1 and PY2 participation, examining the verified savings and number of participants. Lighting measures clearly comprise the largest measure group and are treated as the large stratum. The PY3 medium stratum includes the ASD, VSD, compressors (including motors and refrigeration) measure groups. The PY3 non-residential small stratum includes HVAC measures, residential appliances, office equipment and miscellaneous measures.

Table 33. PY3 Efficient Equipment Program Non-residential Strata

PY3 Efficient Equipment Non-residential Strata				
Stratum	**Stratum Definition**	**PY2 Percent of Efficient Equipment verified savings**	**Measure Groups Included in Stratum**	**PY3 Sampling Rigor**
Large	Top measure	94%	Lighting	90/10, CV = .6
Medium	Next 10%	5%	Compressors VSD Retrofit, ASD, Motors	85/15, CV = .5
Small	Last 10%	1%	All others: HVAC, appliances, office equip, other	85/15, CV = .5

Since lighting measures included in the large stratum exhibited a large variability in the range of *ex ante* savings reported and verified savings in PY2, this stratum is again separated into large, medium, and small stratum. Each quarter the sample will be reexamined and the samples drawn according to the strategy shown in Table 34. That is, the large stratum consists of the projects with the top 50% of reported *ex ante* savings, the medium stratum includes projects with the next 30% of savings, and the small stratum includes projects with the last 20% of savings. Therefore, the range of kWh savings in each stratum could change each quarter, depending on the projects that are processed and recorded in EEMIS (PPL Electric's data tracking system) each quarter.

The PY3 sampling plan for verification activity for the non-residential lighting participants is shown in Table 34. Site visits, by their nature, include records review and verification. We plan to conduct about 92 site visits in PY3, (CV = .6), about 23 or 24 drawn from each quarter's participants (savings claimed in EEMIS). We will include a sample of large stratum participants in the telephone surveys.

Table 34. PY3 Efficient Equipment Non-residential Large Stratum: Lighting

PY3 Lighting Sample Strata		
Stratum	Percent of ex ante savings	Quarterly PY3 Sample
Large	Top 50%	12
Medium	Next 30%	7
Small	Last 20%	5
	Total	24

Cumulatively, in PY1 and PY2, compressor VSD retrofits, ASD/VSD, and motors constituted 87% of all non-lighting measures in the non-residential sector. PY3 non-lighting strata are organized by measure group based on PY2 activity, as shown in Table 35, along with the sample size for the independent verification activities, including records review, site visits, and surveys.

Table 35. PY3 Efficient Equipment Non-residential Medium and Small Strata

PY3 Efficient Equipment Non-residential Medium and Small Strata			
Stratum	Measure Groups Included	PY3 Sampling Rigor	Annual PY3 Sample
Medium	Compressor VSD Retrofit, ASD/VSD, Motors	85/15, CV = .5	25 each: records review, survey, site visits
Small	HVAC, appliances, office equip, other	85/15, CV = .5	25 each: records review, survey, site visits

Non-residential Direct Discount Delivery Channel

In late PY2, PPL Electric introduced a new delivery channel for specific Efficient Equipment measures, targeting the small commercial sector. This delivery channel offers directly installed lighting and some refrigeration measures. Because this is a new delivery channel, both the delivery contractors (who receive the rebates) and the participating customers will be contacted for surveys. The verification sample size will be determined using the 85/15 rigor level, assuming a CV of 0.5. Based on anticipated participation of about 4,000 customers, a verification sample size of 23 to 25 participants will be targeted. This sample size will be used to draw independent samples for records review, surveys, and verification site visits. Contractor surveys will focus on program processes and collect data to assess the net-to-gross ratio.

Residential Sector

We based the PY3 sampling for residential sector participants in the Efficient Equipment program on the final PY1 and PY2 cumulative participation. The residential sector followed the same approach to define strata as that used in the large lighting strata. That is, the measure group with the top 50% of ex ante verified savings is included in the large stratum. Measure groups that made up close to the next 30% are included in the medium stratum. The remaining measures are included in the small stratum. Table 36 shows the verification results in the Efficient Equipment program, residential sector, by stratum.

Table 36. Cumulative Efficient Equipment Program: Residential Strata

PY3 Efficient Equipment Residential Strata				
Stratum	Stratum Definition	Percent of cumulative verified savings	Cumulative Realization Rate and precision	Measure Groups
Large	Top 50%	50%	84% RR; 13% precision	HVAC measures
Medium	Next 30%	35%	99.8% RR; 0.5% precision	Appliances

Small	Last 20%	15%	120% RR: 7.6% precision	HPWH RTS, refrigeration, office equipment, other

Table 36 shows the measures included in each stratum in PY3. Because the cumulative realization rates and precision were very high for the small and medium strata, the majority of sample points in PY3 will be assigned to the large stratum. Rigor levels for the residential section in this program should approach 90/10 since the majority of residential sector savings across all programs occur in this program; therefore, 70 sample points are distributed across these strata. Verification activities include records reviews and surveys. By design, site visits were not used to verify measure installation. However, we may include site visits for HVAC measures only, depending on whether the data required for verification is included in the records.

Table 37. PY3 Efficient Equipment Program Residential Strata

Stratum	Stratum Definition	PY3 Measure Groups	PY3 Sample Size
Large	Top 50%	HVAC measures (CAC, ASHP, room AC, ductless mini-split)	46 (2/3 of total)
Medium	Next 30%	Appliances	12 (1/3 of total)
Small	Last 20%	HPWH, RTS, refrigeration, office equipment, other	12 (1/3 of total)

Renewables Program

The Renewables Program offered two technologies during PY2, PV systems and Ground Source Heat Pumps. The program closed to the residential sector in PY3. The program is open to only the government, non-profit sector in PY3. Installations were verified through records reviews, site visits and engineering analyses. The PY3 verification sample will meet rigor levels of 85% confidence and 15% precision. Verification activities will occur in Q4, to draw the sample from the largest population.

HVAC Tune-Up

Sampling procedures follow the HVAC Tune-up CMP approved by the SWE. The sample is based on individual serviced units, including all measures that apply to the serviced unit. The unit of sample is not a 'project' which could include multiple units at one location. Servicing can include multiple measures, depending on the outcome of the diagnostic test results. The unit sample size is based on the SWE's sampling guidelines, requiring sample sizes meeting an 85 percent confidence level with a 15 percent margin of error (precision). In PY2, 300 units were serviced. Using this population to estimate the sample for PY3, the sample size for 85/15 level of rigor is 22.

Table 38. PY2 HVAC Tune-Up Sample

PY2 HVAC Tune-Up Sample					
		Number of Sample Points (Units) by Verification Activity			
Technology	Sector	Surveys with contractors	Records Review	Site Visits	Engineering Analysis
HVAC Tune-Up	Non-residential	10	22	22	22

Custom Incentives Program

Each custom project was defined as large or small for verification purposes. Large projects are identified in real time and all are included in the impact evaluation sample. These projects generally have a large

amount of savings (currently defined as reserved (*ex ante*) savings greater than 500,000 kWh/yr). However, projects with savings below this threshold can also be included in the large stratum.
A sample of small projects will be selected from all projects completed and paid during PY3. Savings for this sample will be verified and a realization rate determined based on this sample. The realization rate will be applied to the population of the projects in the small project stratum.

Appliance Recycling
The records review includes a census of participants in the EEMIS database, verified by unique CSP job numbers (i.e., unique rebates). The CSP job number is tied to the rebate applications; a rebate can include more than one appliance. Participant surveys will be fielded once, with a target sample of 70 respondents, meeting 90/10 criteria for confidence and precision. PY1 and PY2 nonparticipant survey data will be used in PY3; no new ARP nonparticipant surveys will be conducted in PY3. Non-participant surveys will be used to determine the net savings and part use factor. Sample sizes meet or exceed the SWE's requirements for sampling to meet 85/15 by program.

Residential Lighting
This CFL program is an upstream program, and participants are not known. The telephone survey sample frame will be developed from PPL Electric's customer database. To ensure that the telephone survey provides useful results for both participants and non-participants while staying within a reasonable budget, the survey will be conducted using the maximum and minimum target numbers for completed interviews. For PY3, 300 customer surveys are targeted. The PY3 survey efforts are designed to target 90% confidence with 10% precision.

Consumer Behavior & Education
A survey of customers receiving Home Energy Reports will be conducted annually. In PY3, PPL Electric anticipates 10,000 customers will receive Home Energy Reports. We will survey 150 customers receiving Home Energy Reports during the program year, and 150 customers who do not receive the report. This non-participant sample will be drawn from the population that the program CSP uses as the non-participant sample. The sample will be stratified by metropolitan area. The sample strata will be sufficiently large to estimate the program effect i.e., the difference between the two groups.

Energy Assessment and Weatherization
The EM&V CSP will draw a random sample to meet specifications of the SWE team's revised sampling requirements in Guidance Memo 0003. Telephone surveys will be conducted with 68 randomly selected customers participating in PY3. The sample will be prorated by participation in the walk-through surveys (80% in PY2) and the comprehensive audit (20% in PY2).
An annual sample of 50 records (25 each audit type, meeting 85/15 sampling criteria) will be selected and verified through a records review of the documentation. Records will be stratified by audit type: walk-through survey (EEMIS measure code PEU), comprehensive audit of all electric items (measure code PEY1), and comprehensive audit of CAC only (measure code PEY2).

Low Income WRAP
The sample size for the two designated low income programs will meet sampling rigor of 90/10. In PY3, 45 - 48 records will be reviewed and verified. Records will be stratified by job type (i.e., baseload, low-cost, and full-cost) and sorted by the number of measures installed within each stratum. The sample points per quarter will be distributed evenly across the three case type strata, with any extra sample point assigned to the full-cost stratum. For each case type, the record with the greatest number of measures will be selected for verification through a desk review, and the remaining sample points will be selected via a simple random sample.

Low Income E-PowerWise

Together with low income WRAP, the sampling exceeded requirements for 90/10 in the low income sector. We will review all of the program's enrollment records to ensure that records were traceable from the implementation contractor's database to the PPL Electric EEMIS database, and to verify that the program counts only one kit per household. This review will capture duplications across program quarters. We will conduct a QA/QC review of a random sample of 70 participant enrollment forms (35 pilot enrollment form and 35 CBO enrollment forms).

PPL Electric planned a pilot delivery channel, mailing the energy kits to customers. We may conduct a telephone survey with 70 direct mail participants to assess satisfaction and behavior changes associated with the program. The surveys included in the direct mail participant's kit will be included in the analysis.

No further surveys are planned for participants who receive the kit through their CBO.

Telephone Survey Sampling Procedures

Cadmus will conduct telephone surveys in PY3, following a batch-wise sampling approach. Figure 25 shows the months each survey will be fielded. The sample will be selected from participants in all prior quarters.

Figure 25. PY3 Planned Telephone Survey Schedule

Programs	PY3												PY4
	Q1			Q2			Q3			Q4			Q1
	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Efficient Equipment – Residential												X	
Efficient Equipment – Commercial												X	
Efficient Equipment – Commercial Direct Discount												X	
Energy Assessment and Weatherization												X	
Renewable Energy												X	
Custom Incentives							X	X		X			X
HVAC Tune-Up (Contractors & Customers)											X		
Res Efficient Lighting (CFL)											X		
Appliance Recycling											X		
Consumer Education											X		
LI E-Power Wise Pilot											X		
Non-participant Spillover survey												X	

Cadmus developed two types of telephone survey sampling procedures for PPL Electric Utilities Act 129 programs. This section discusses each of these survey sampling procedures in detail. The first process, and most complex, is used for programs that use PPL's EEMIS tracking system. The second process was developed for programs that do not utilize EEMIS and for non-participant surveys. These programs include the population surveyed for the upstream CFL program, the Behavior & Education non-participant sample, and the non-participant spillover sample.

For participant surveys, a program participant is defined as a unique billing account number that installs an energy efficiency measure under that program. Accounts that install multiple measures are counted only once. For example, if a single billing account installs both a central air conditioner and a dishwasher under the Efficient Equipment program, that account is treated as a single participant.

EEMIS-Sourced Sampling

Survey results will inform various process evaluation metrics, verify measure installation, and collect data for the net-to-gross analysis. During PY3, this methodology will be used to select samples for telephone surveys.

- Appliance Recycling
- Efficient Equipment (Residential, Non-residential, Direct Discount)
- Renewable Energy
- Energy Assessment and Weatherization

- E-PowerWise

The sample for these surveys will be selected using the same nine-step process used in PY2:

1. Determine targeted number of completed surveys per program, sufficient to meet confidence and precision requirements.
2. Aggregate EEMIS participant records across selected programs.
3. Summarize EEMIS data by billing account and measure code.
4. For each billing account, stratify according to the measure code with the largest deemed kWh savings value.
5. Remove any account contacted for a phone survey within the past twelve months, either by the EM&V CSP or by Bellomy Research (PPL Electric's survey vendor).
6. Remove any account with an invalid phone number (e.g., less than 10 digits, invalid area code, etc.).
7. Apply any additional exclusion to the pool of stratified accounts; this may include items like site visits or other phone verification activity.
8. Randomly select a set of accounts of sufficient size within each stratum, such that calling all names in that set will yield enough completed surveys to meet the designated sample size requirements. Typically, the sample is six times the sample size targets.
9. For all selected names, append contact information and any program participation data needed to inform the read-ins for all survey questions.
10. Deliver the selected names to subcontractor conducting telephone surveys, along with any special instructions for calling.

Non-EEMIS Sourced Sampling

Non-participant and other participant surveys are conducted each year. In PY3 we will use the same methodology used in PY2 to develop calling samples for three surveys.

- Compact Fluorescent Lighting
- Behavior and Education participants (program implemented by OPower)
- Non-participant spillover surveys

The sample for these surveys will be drawn from PPL's customer information database or from the OPower participant database, as appropriate. A five-step process is used, as follows:

1. Select a large sample of accounts (typically 5,000 to 10,000) from PPL's customer database or alternative data source.
2. Remove any account that has been contacted for a phone survey within the past twelve months, either by the EM&V CSP or by Bellomy Research (PPL Electric's survey vendor).
3. Remove any account with an invalid phone number (for example, less than 10 digits, invalid area code, etc.).
4. For all selected names, append contact information and any additional data needed to inform the read-ins for all survey questions.
5. Deliver the selected names to subcontractor conducting telephone surveys, along with any special instructions for calling.