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

October 17, 2011

VIA E-FILING

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-2009-2093210

RE: First Quarterly Report for 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 First Quarterly Report for Year 3 of PPL Electric's Act 129 Plan.

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 June 1, 2011 to August 31, 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.
October 15, 2011

Table of Contents

1 OVERVIEW OF PORTFOLIO 1

1.1 SUMMARY OF PORTFOLIO IMPACTS 4
1.2 SUMMARY OF ENERGY IMPACTS BY PROGRAM 6
1.3 SUMMARY OF DEMAND IMPACTS BY PROGRAM 11
1.4 SUMMARY OF EVALUATION 14
1.5 SUMMARY OF FINANCES 15

2 ENERGY EFFICIENCY PORTFOLIO RESULTS BY SECTOR 17

2.1 RESIDENTIAL EE SECTOR 21
2.2 RESIDENTIAL LOW-INCOME EE SECTOR 25
2.3 SMALL COMMERCIAL & INDUSTRIAL EE SECTOR 29
2.4 LARGE COMMERCIAL & INDUSTRIAL EE SECTOR 34
2.5 GOVERNMENT, SCHOOL & NON-PROFIT EE SECTOR 38

3 PORTFOLIO RESULTS BY PROGRAM 41

3.1 APPLIANCE RECYCLING PROGRAM 41
3.2 RESIDENTIAL LIGHTING PROGRAM (FORMERLY COMPACT FLUORESCENT LIGHTING CAMPAIGN) 44
3.3 CUSTOM INCENTIVE PROGRAM 51
3.4 EFFICIENT EQUIPMENT INCENTIVE PROGRAM 56
3.5 E-POWER WISE PROGRAM 60
3.6 LOW-INCOME WRAP 64
3.7 RENEWABLE ENERGY PROGRAM 67
3.8 HVAC TUNE-UP PROGRAM 71
3.9 RESIDENTIAL ENERGY ASSESSMENT & WEATHERIZATION PROGRAM 75
3.10 ENERGY EFFICIENCY BEHAVIOR & EDUCATION PROGRAM 79

APPENDIX A: GLOSSARY OF TERMS 84

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, 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 (EDC) 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 1 (August 31, 2011), with the last verification activity occurring in PY2 Q3.

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) reported gross energy savings are 641,855 MWh/yr.
- Reported energy savings to date are approximately 56% of the May 31, 2013 compliance target (1,146,000 MWh/yr). The compliance targets are based on verified savings. Approximately 1,348,000 MWh/yr of reported savings are required to achieve 1,146,000 MWH/yr of verified savings at an estimated realization rate of 85%.
- The CPITD preliminary verified energy savings[3] are 320,575 MWh/yr.
- The CPITD preliminary verified savings are 28% of the 1,146,000 MWh/yr May 31, 2013 energy savings compliance target.[3]
- The CPITD reported participation is 242,622 participants[4] excluding the Residential Lighting Program (formerly Compact Fluorescent Lighting (CFL) Campaign), and approximately 961,672 participants[5] including the Residential Lighting Program.

Portfolio Demand Reduction

- The CPITD reported gross demand reduction is 88.64 MW[6], which is approximately 30% of the September 30, 2012 compliance target (297 MW).
- The CPITD preliminary verified demand reduction is 31.57 MW.[3]

---

[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] 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).

[4] 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.

[5] See Table 1-4 for an estimate of Residential Lighting Program participants.

[6] This number only includes *constant* peak load reductions from energy efficiency measures. Peak load reductions from demand response measures (direct load control and load curtailment) will only apply during the summer of 2012.

- The CPITD preliminary verified demand reduction is 11% of the 297 MW May 31, 2013 demand reduction compliance target.[3]

Low-Income Sector[7]

- 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 customer participation in non-low-income programs) are 8,990 MWh/yr.
- The CPITD preliminary verified energy savings for low-income sector programs (excluding low-income customer participation in non-low-income programs) are 6,219 MWh/yr.

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

- Reported energy savings to date for government, school, and non-profit sector programs are approximately 49% of the May 31, 2013 compliance target (114,600 MWh/yr). The compliance targets are based on verified savings. Approximately 134,800 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 3,883 MWh/yr.[3]
- The CPITD preliminary verified savings are 3% of the 114,600 MWh/yr May 31, 2013 energy savings compliance target.[3]
- *The CPITD preliminary verified savings are 2% of the 29.7 MW May 31, 2013 demand reduction* compliance target.

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 108,318 MWh/yr.
- The PYTD preliminary verified energy savings are 0 MWh/yr because verification activities have not been completed for PY3 savings.[3]
- The PYTD reported gross demand reduction is 19.17 MW.[6]
- The PYTD preliminary verified demand reduction is 0 MW because verification activities have not been completed for PY3 savings.[3]
- The PYTD reported participation is 21,045 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) 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 Programs and the New Home Program, from the EE&C Plan. Ten programs claimed savings in the first quarter of PY3.

- The Appliance Recycling Program (ARP) offers customers incentives to turn in their outdated refrigerators, freezers, and air conditioners.

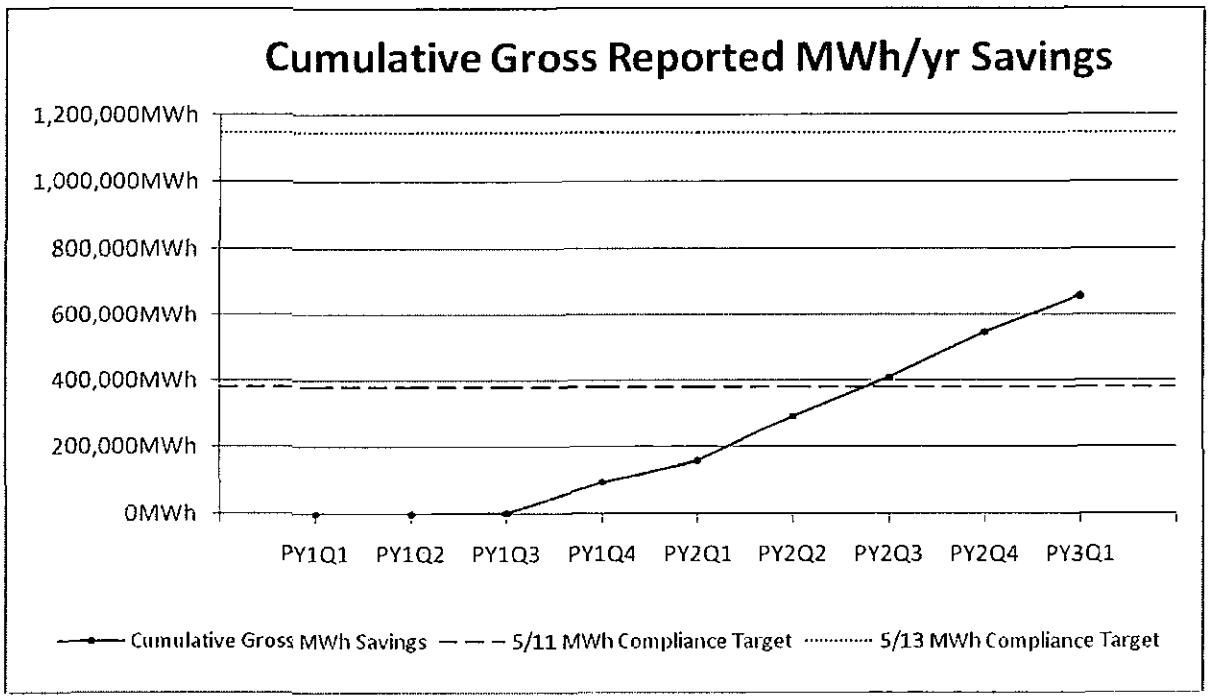
[7] The Final Annual Report, issued in November each year, will include estimates of gross and verified savings attributable to low-income customer participation in non-low-income programs.

- 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 expanding 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 home's 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 comparisons of their usage 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.

Figure 1-1 shows the quarterly progress of PPL Electric's suite of energy efficiency programs. This figure provides a rough benchmark comparing goals to targets. The displayed savings are gross reported savings, whereas compliance targets are for verified savings. There will be some differences between the gross reported savings and the final verified savings.

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 1-2. The reported gross impacts reflect savings reported in PPL Electric's tracking database. Those reported *ex ante* savings from the tracking database have been 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, this adjustment is explained in more detail in the program chapters.

The *ex ante* adjusted 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 SSEMVP) was approved for the measure, and (2) *ex post* verification activities are complete.
Table 1-1 shows the status of each program's verified savings as reported in the PY2 Q4 report. This table will be updated in the PY2 Annual Report, which will be filed in November 2011.

Table 1-1: Verification Status of EDC Reported Measures[a]

Program	*Ex Ante* Reported in EEMIS	*Ex Ante* Adjusted TRM or Approved Savings Method	*Ex Post* Evaluated (Verified)
Appliance Recycling Program	C	C	C
Residential Lighting Program	C	C	C

Program	*Ex Ante* Reported in EEMIS	*Ex Ante* Adjusted TRM or Approved Savings Method	*Ex Post* Evaluated (Verified)
Custom Incentive Program	C	C	P
Energy Efficiency Behavior & Education Program	C	C	
Efficient Equipment Incentive Program (non-lighting measures)	C	P	P
Efficient Equipment Incentive Program (commercial and industrial lighting)	C	P	P
E-Power Wise Program	C	C	
Low-Income WRAP	C	C	P
Renewable Energy Program	C	P	P
HVAC Tune-Up Program	C	C	
Residential Energy Assessment & Weatherization Program	C	P	

NOTES:
[a] This table reflects the status as of the PY2 Q4 report and will be updated in PY2 Annual Report. In the table:
- A 'C' signifies that the program meets these criteria.
- A 'P' signifies that: (1) savings were verified for some, but not all, measures or projects in the program, or (2) a TRM or CMP was not approved for one or more measures, and savings were *not verified* for those measure(s).
- A blank space indicates that these steps have not been completed for the program (typically because the program claimed savings for the first time in PY2 Q4 or batch-wise sampling includes activity from more than one quarter).

Table 1-2: 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	108,318	19.17
Reported Gross Impact: PYTD	108,318	19.17
Reported Gross Impact: CPITD	641,855	88.64
Adjusted *Ex Ante* Impact: Incremental Quarterly[c]	108,584	19.21
Adjusted *Ex Ante* Impact: PYTD	108,584	19.21
Adjusted *Ex Ante* Impact: CPITD	625,156	103.59
PYTD Unverified *Ex Post* Savings[d]	108,584	19.21
Estimated Impact: Projects in Progress[e]	101,931	141.38
Estimated Impact: PYTD Total Committed	210,249	160.55
Preliminary PYTD Verified Impact[f] (see report footnote #3 in Section 1)	0	0.00
Preliminary CPITD Verified Impact (see report footnote #3 in Section 1)	320,575	31.57
Preliminary PYTD Net Impact[g] (see report footnote #3 in Section 1)	0	0.00

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 (direct load control and load curtailment) 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 program (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 PY2 Q3 evaluation results, as the evaluation efforts for Q4 are in progress.
[d] Unverified *ex post* savings are pending approval of a TRM Protocol or CMP by the Commission. In addition, unverified savings are those with an approved protocol but which have not yet been verified. In this report, these unverified savings include, for example, commercial lighting

Impact Type	Total Energy Savings (MWh/yr)	Total Demand Reduction[b] (MW)
installations. [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 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. [g] This is the portfolio net impact, which is calculated by aggregating program net impacts. The EM&V CSP *calculated program* net impacts by multiplying PYTD verified impacts by program net-to-gross (NTG) ratios. 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.

Table 1-3: Verified Preliminary Portfolio Total Evaluation Adjusted Impacts Through the End of the Reporting Period

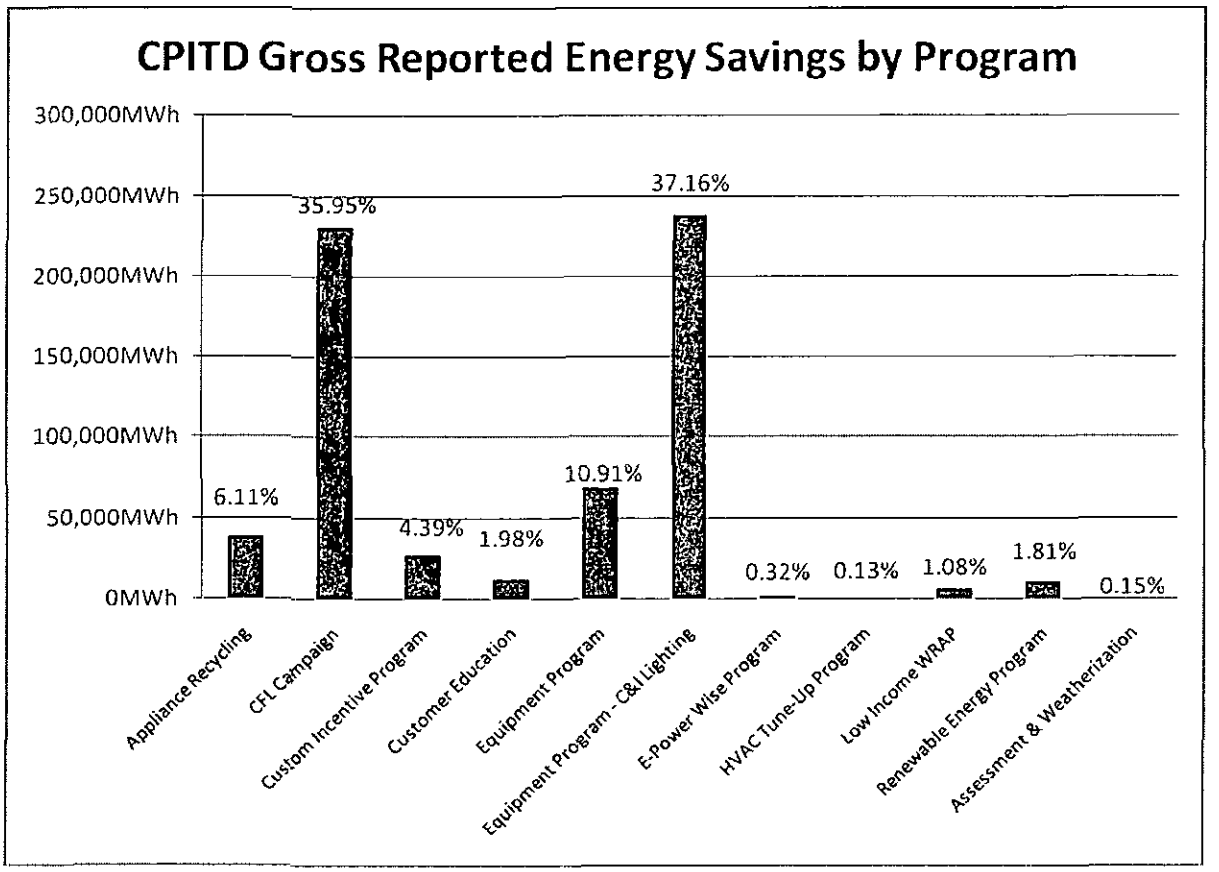
TRC Category	IQ[a]	PYTD[a]	CPITD
TRC Benefits ($)	Not required	Not required	Not required
TRC Costs ($)	Not required	Not required	Not required
TRC Benefit-Cost Ratio		Not required	Not required
NOTES: [a] Based on reported gross savings.			

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 the first quarter of PY3 is presented in Table 1-4 and Table 1-5.

Table 1-4: EDC Reported Participation and Gross Energy Savings by Program Through the End of the Reporting Period

	Participants			Reported Gross Impact (MWh/yr)[a]		
Program	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Appliance Recycling Program	3,121	3,121	20,944	5,300	5,300	39,236
Residential Lighting Program[b]	71,484	71,484	719,050	22,933	22,933	230,771
Custom Incentive Program	19	19	74	12,019	12,019	28,197
Energy Efficiency Behavior & Education Program	0	0	50,000	0	0	12,699
Efficient Equipment Incentive Program (non-lighting measures)	15,212	15,212	154,046	2,968	2,968	70,010
Efficient Equipment Incentive Program (commercial and industrial lighting)	880	880	2,876	63,201	63,201	238,530
E-Power Wise Program	599	599	4,649	334	334	2,071
Low-Income WRAP	548	548	5,652	684	684	6,919
Renewable Energy Program	8	8	1,721	391	391	11,609

Program	Participants			Reported Gross Impact (MWh/yr)[a]		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
HVAC Tune-Up Program	462	462	1,173	371	371	839
Residential Energy Assessment & Weatherization Program	196	196	1,487	118	118	974
TOTAL PORTFOLIO	92,529	92,529	961,672	108,318	108,318	641,855

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 (480,379 in PY3 Q1; 651,357 in PY2 Q4; 889,668 in PY2 Q3; 988,915 in PY2 Q2; 526,296 in PY2 Q1; 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 1-5: 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	5,300	-	5,300	35,311	15%
Residential Lighting Program	22,933	-	22,933	92,742	25%
Custom Incentive Program	12,019	101,931	113,950	39,331	290%
Energy Efficiency Behavior & Education Program	-	-	-	4,525	0%
Efficient Equipment Incentive Program (non-lighting measures)	2,968	-	2,968	228,229	1%
Efficient Equipment Incentive Program (commercial and industrial lighting)	63,201	-	63,201		
E-Power Wise Program	334	-	334	338	99%
Low-Income WRAP	949	-	684	4,829	14%
Renewable Energy Program	391	-	391	6,163	6%
HVAC Tune-Up Program	371	-	371	7,054	5%
Residential Energy Assessment & Weatherization Program	118	-	118	1,721	7%
TOTAL PORTFOLIO	108,584	101,931	210,249	420,244	50%

NOTES:
[a] Unverified *ex post* savings are pending approval of a TRM Protocol or CMP by the Commission. 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 at 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 reflect the estimated gross impacts, including reported impacts and in-progress impacts, for the current program year through the end of the current quarter.

A summary of evaluation verified energy impacts by program is presented in Table 1-6 and Table 1-7.

Table 1-6: 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 (see report footnote #3) (MWh/yr)	PYTD Preliminary NTG Ratio[c]	PYTD Net Impact (MWh)
Appliance Recycling Program	5,300	5,300	N/A	-	N/A	-
Residential Lighting Program	22,933	22,933	N/A	-	N/A	-
Custom Incentive Program	12,019	12,019	N/A	-	N/A	-
Energy Efficiency Behavior & Education Program	-	-	N/A	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	2,968	2,968	N/A	-	N/A	-
Efficient Equipment Incentive Program (commercial and industrial lighting)	63,201	63,201	N/A	-	N/A	-
E-Power Wise Program	334	334	N/A	-	N/A	-
Low-Income WRAP	684	949	N/A	-	N/A	-
Renewable Energy Program	391	391	N/A	-	N/A	-
HVAC Tune-Up Program	371	371	N/A	-	N/A	-
Residential Energy Assessment & Weatherization Program	118	118	N/A	-	N/A	-
TOTAL PORTFOLIO	108,318	108,584	N/A	-	N/A	-

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 Q1 reported savings.
[c]The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY2 Annual Report, which will be filed in November 2011. That value will be used as a placeholder in future quarters in PY3, until PY3 surveys are completed and analyzed.

Table 1-7: 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 (see report footnote #3) (MWh/yr)	CPITD Preliminary NTG Ratio[c]	CPITD Net Impact (MWh)
Appliance Recycling Program	39,236	39,463	N/A	34,162	57%	19,547
Residential Lighting Program	230,771	230,771	N/A	207,838	84%	173,570
Custom Incentive	28,197	28,197	N/A	9,148	100%	9,148

Program	CPITD Reported Gross Impact (MWh/yr)[a]	CPITD Adjusted *Ex Ante* Impact (MWh/yr)[b]	CPITD Preliminary Realization Rate	Preliminary CPITD Verified Impact (see report footnote #3) (MWh/yr)	CPITD Preliminary NTG Ratio[c]	CPITD Net Impact (MWh)
Program						
Energy Efficiency Behavior & Education Program	12,699	12,699	N/A	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	70,010	56,472	N/A	42,044	60%	25,043
Efficient Equipment Incentive Program, (commercial and industrial lighting)	238,530	232,309	N/A	11,699	100%	11,699
E-Power Wise Program	2,071	2,816	N/A	-	N/A	-
Low-Income WRAP	6,919	7,184	N/A	6,219	100%	6,219
Renewable Energy Program	11,609	13,490	N/A	9,466	37%	3,476
HVAC Tune-Up Program	839	839	N/A	-	N/A	-
Residential Energy Assessment & Weatherization Program	974	918	N/A	-	N/A	-
TOTAL PORTFOLIO	641,855	625,156	N/A	320,575	78%	248,702

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.

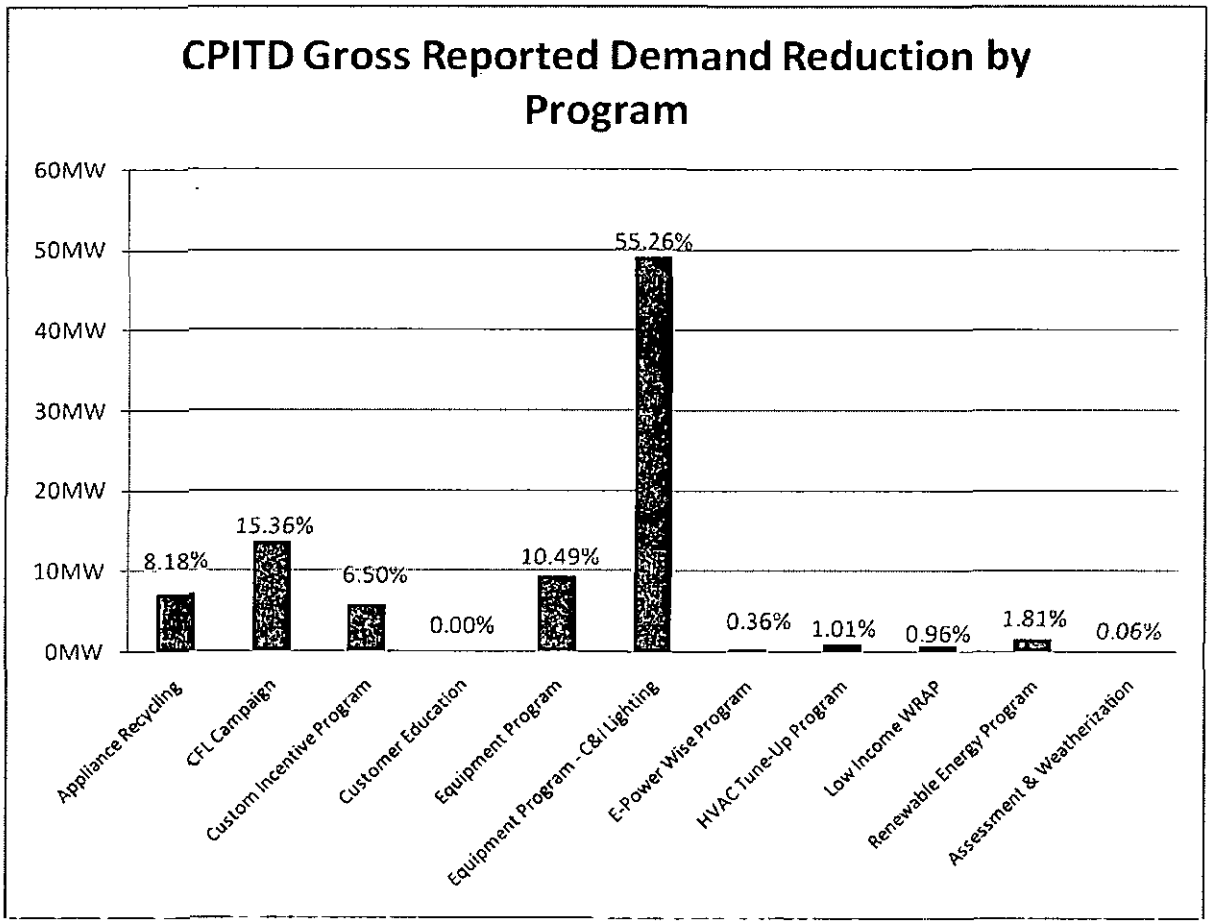
[b] At the time of this report, no adjustments had been made for PY3 Q1 reported savings.

[c] The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY2 Annual Report, which will be filed in November 2011. That value will be used as a placeholder in future quarters in 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 (direct load control and load curtailment) 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 Q1 is presented in Table 1-8 and Table 1-9.

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

	Participants			Reported Gross Impact (MW)[a]		
Program	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Appliance Recycling Program	3,121	3,121	20,944	0.96	0.96	7.25
Residential Lighting Program	71,484	71,484	719,050	1.23	1.23	13.61
Custom Incentive Program	19	19	74	2.76	2.76	5.76

Program	Participants			Reported Gross Impact (MW)[a]		
	IQ	PYTD	CPITD	IQ	PYTD	CPITD
Energy Efficiency Behavior & Education Program	0	0	50,000	-	-	-
Efficient Equipment Incentive Program (non-lighting measures)	15,212	15,212	154,046	0.44	0.44	9.30
Efficient Equipment Incentive Program (commercial and industrial lighting)	880	880	2,876	13.15	13.15	48.98
E-Power Wise Program	599	599	4,649	0.08	0.08	0.32
Low-Income WRAP	548	548	5,652	0.08	0.08	0.85
Renewable Energy Program	8	8	1,721	0.05	0.05	1.61
HVAC Tune-Up Program	462	462	1,173	0.42	0.42	0.90
Residential Energy Assessment & Weatherization Program	196	196	1,487	0.01	0.01	0.05
TOTAL PORTFOLIO	92,529	92,529	961,672	19.17	19.17	88.64

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 (480,379 in PY3 Q1; 651,357 in PY2 Q4; 889,668 in PY2 Q3; 988,915 in PY2 Q2; 526,296 in PY2 Q1; 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 1-9: 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)	EE&C Plan Estimate for Program Year (MW)	Estimate Committed (%)
Appliance Recycling Program	0.96	-	0.96	4.05	24%
Residential Lighting Program	1.23	-	1.23	14.49	8%
Custom Incentive Program	2.76	141.38	144.14	7.80	1848%
Energy Efficiency Behavior & Education Program	-	-	-	0.51	0%
Efficient Equipment Incentive Program (non-lighting measures)	0.44	-	0.44	40.64	1%
Efficient Equipment Incentive Program (commercial and industrial lighting)	13.15	-	13.15		
E-Power Wise Program	0.08	-	0.08	0.05	180%
Low-Income WRAP	0.12	-	0.08	0.78	11%
Renewable Energy Program	0.05	-	0.05	0.67	7%
HVAC Tune-Up Program	0.42	-	0.42	3.66	11%
Residential Energy Assessment & Weatherization Program	0.01	-	0.01	0.17	5%
TOTAL PORTFOLIO	19.21	141.38	160.55	72.81	221%

Program	Unverified *Ex Post* Savings (MW)[a]	Projects In Progress (MW)[b]	PYTD Total Committed (MW)	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 Commission.
[b] Because the peak load reduction was determined at the system or generation level, reported peak load reductions reflect transmission and distribution losses.

A summary of evaluation adjusted demand impacts by program is presented in Table 1-10 and Table 1-11.The adjusted *ex ante*, realization rate, and NTG ratio in Table 1-10 and Table 1-11 reflect results reported in the PY2 Q4 report and will be updated in the PY2 Annual Report, which will be filed in November 2011.

Table 1-10: 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 (see report footnote #3) (MW)	PYTD Preliminary NTG Ratio[c]	PYTD Net Impact (MW)
Appliance Recycling Program	0.96	0.96	N/A	-	N/A	-
Residential Lighting Program	1.23	1.23	N/A	-	N/A	-
Custom Incentive Program	2.76	2.76	N/A	-	N/A	-
Energy Efficiency Behavior & Education Program	-	-	N/A	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	0.44	0.44	N/A	-	N/A	-
Efficient Equipment Incentive Program (commercial and industrial lighting)	13.15	13.15	N/A	-	N/A	-
E-Power Wise Program	0.08	0.08	N/A	-	N/A	-
Low-Income WRAP	0.08	0.12	N/A	-	N/A	-
Renewable Energy Program	0.05	0.05	N/A	-	N/A	-
HVAC Tune-Up Program	0.42	0.42	N/A	-	N/A	-
Residential Energy Assessment & Weatherization Program	0.01	0.01	N/A	-	N/A	-
TOTAL PORTFOLIO	19.17	19.21	N/A	-	N/A	-

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 Q1 reported savings.
[c]The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY2 Annual Report, which will be filed in November 2011. That value will be used as a placeholder in future quarters in PY3, until PY3 surveys are completed and analyzed.

Table 1-11: 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 (see report footnote #3) (MW)	CPITD Preliminary NTG Ratio[c]	CPITD Net Impact (MW)
Appliance Recycling Program	7.25	8.07	N/A	7.11	56%	3.99
Residential Lighting Program	13.61	13.61	N/A	12.39	84%	10.34
Custom Incentive Program	5.76	5.76	N/A	1.21	100%	1.21
Energy Efficiency Behavior & Education Program	-	-	N/A	-	N/A	-
Efficient Equipment Incentive Program (non-lighting measures)	9.30	9.74	N/A	5.80	60%	3.50
Efficient Equipment Incentive Program (commercial and industrial lighting)	48.98	48.10	N/A	2.73	100%	2.73
E-Power Wise Program	0.32	0.42	N/A	-	N/A	-
Low-Income WRAP	0.85	0.89	N/A	0.77	100%	0.77
Renewable Energy Program	1.61	9.25	N/A	1.56	37%	0.57
HVAC Tune-Up Program	0.90	0.90	N/A	-	N/A	-
Residential Energy Assessment & Weatherization Program	0.05	6.85	N/A	-	N/A	-
TOTAL PORTFOLIO	88.64	103.59	N/A	31.57	73%	23.12

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 Q1 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] The NTG ratio will be computed using results of completed surveys. All programs will include an updated NTG ratio in the PY2 Annual Report, which will be filed in November 2011. That value will be used as a placeholder in future quarters in 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 through the 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[8] 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

As evaluation efforts are currently being finalized for PY2, a summary of realization rates and confidence intervals for the PY3 participant sample will be updated in the PY3 Annual Report. More details about the PY2 results will be available in PPL Electric's Annual Report, which will be filed November 15, 2011.

1.4.2 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* was submitted on September 15, 2010. The process evaluation will be updated at the end of PY2, and will be filed with the impact evaluation report on November 15, 2011. The PY3 process evaluation will be conducted at the end of PY3, and submitted in November 2012.

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 1-12 and Table 1-13.

Table 1-12: Summary of Portfolio Finances: TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$14,159,501	$14,159,501	$65,072,641
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$14,159,501	$14,159,501	$65,072,641
B.1	Design & Development[a]	$75,516	$75,516	$2,765,821
B.2	Administration[b]	$563,270	$563,270	$5,908,038
B.3	Management[c]	$5,255,020	$5,255,020	$16,758,406
B.4	Marketing	$579,073	$579,073	$7,846,273
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$6,472,880	$6,472,880	$33,278,538
C	**EDC Evaluation Costs**	$502,931	$502,931	$5,945,907
D	**SWE Audit Costs**	$500,432	$500,432	$592,311
E	**Participant Costs**	Not required	Not required	Not Required
	Total Costs	$21,635,744	$21,635,744	$104,889,397

[8] TRM measures with stipulated values and variables.

	Category	IQ	PYTD	CPITD
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] The CPITD includes charges to develop and update the EE&C Plan from December 2008 through the current period.
[b] Includes administrative CSP (application and rebate processing), PPL Electric's general administrative/clerical costs, and PPL Electric's tracking system.
[c] Includes direct program management costs and common costs associated with overall portfolio management.

Table 1-13: 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:

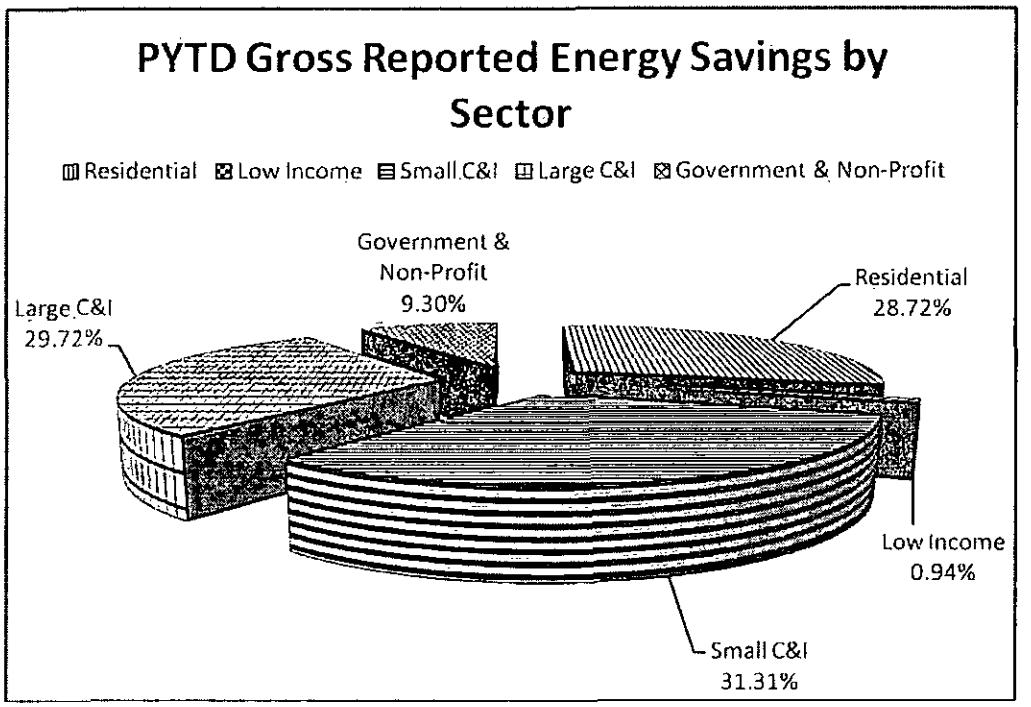
2 Energy Efficiency Portfolio Results by Sector

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

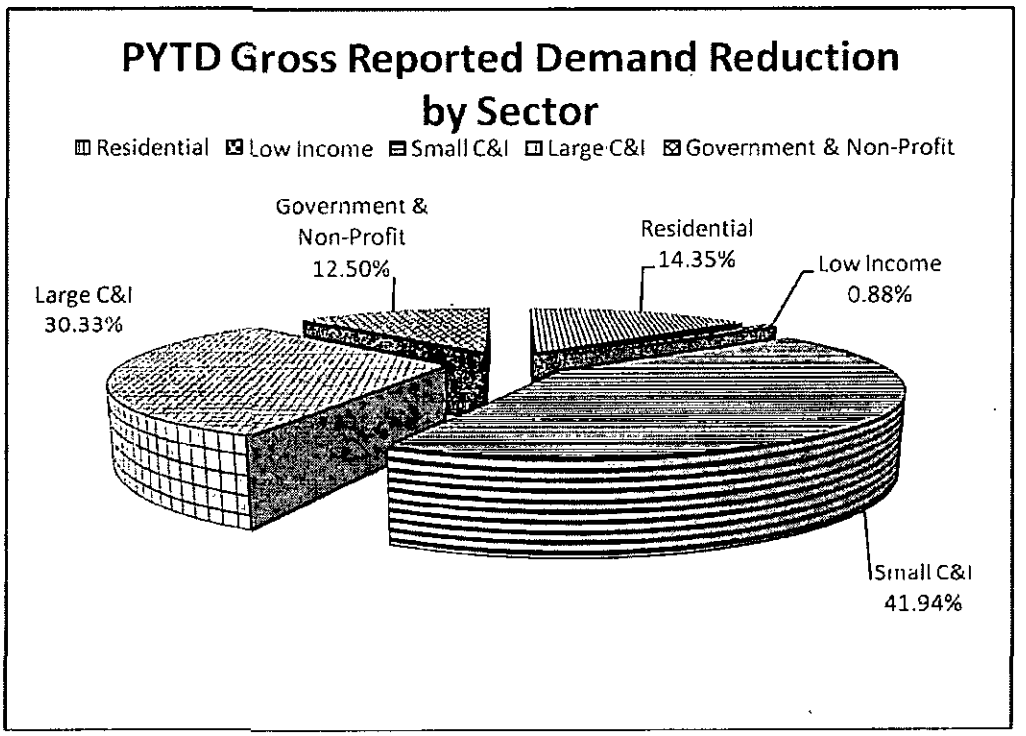
A summary of portfolio gross energy savings and gross demand reduction by sector is presented in Figure 2-1 and Figure 2-2. A summary of CPITD gross energy savings and gross demand reduction by sector is presented in Figure 2-3 and Figure 2-4, as well as in Table 2-1 and Table 2-2.

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



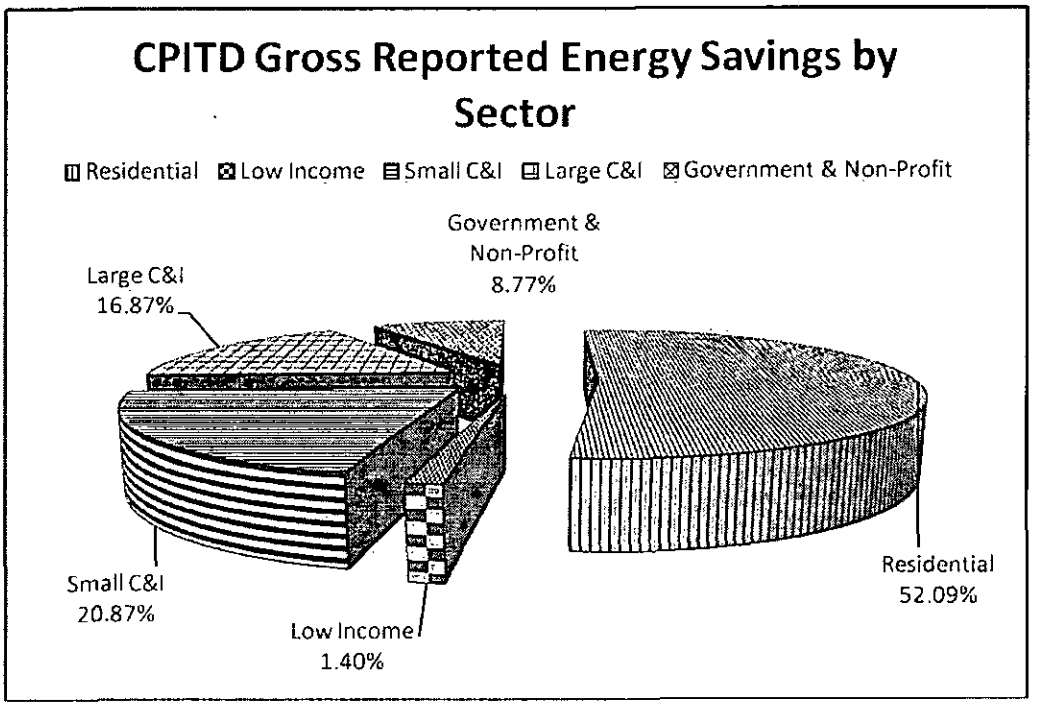
In the PY3 Annual Report, which will be filed in November 2012, this figure will be amended to account for low-income savings attributable to low-income customers' participation in non-low-income programs.

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



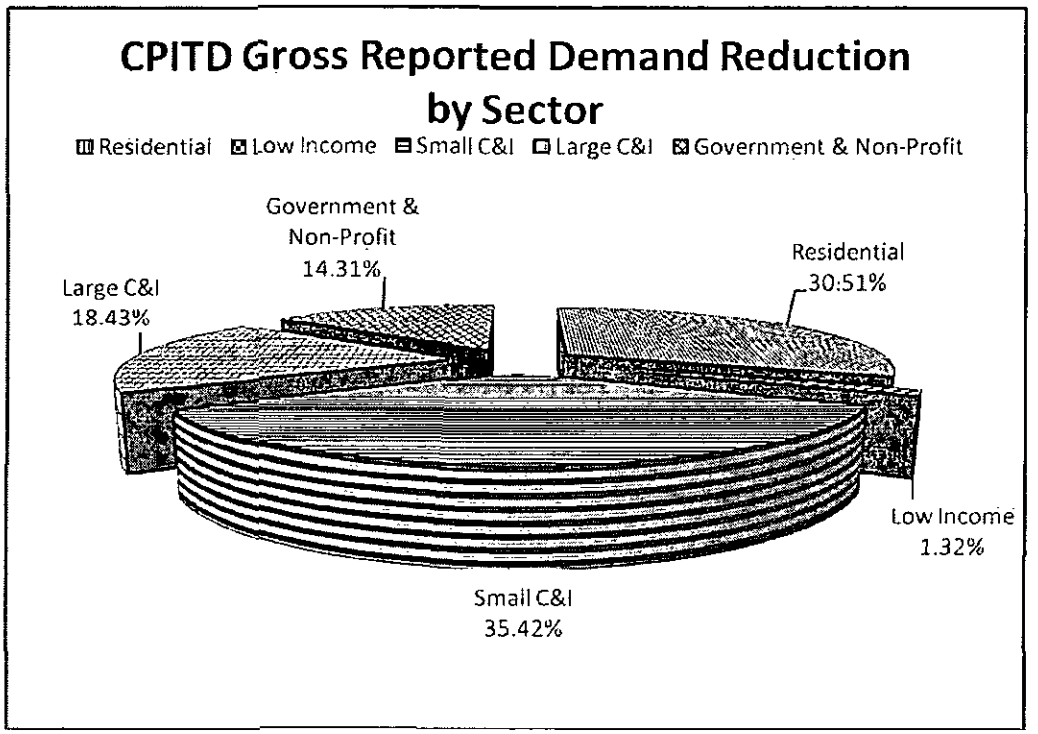
In the PY3 Annual Report, which will be filed in November 2012, this figure will be amended to account for low-income customers' participation in non-low-income programs.

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 low-income savings attributable to low-income customers' participation in non-low-income programs.

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 low-income savings attributable to low-income customers' participation in non-low-income programs.

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	31,114	31,114	334,316	-	334,316	31,114
Residential Low-Income EE	1,018	1,018	8,990	-	8,990	1,283
Low-Income Participation in Non-Low-Income Programs[b]	-	-	-	-	-	-
Small Commercial & Industrial EE	33,919	33,919	133,961	6,188	140,148	33,919
Large Commercial & Industrial EE	32,196	32,196	108,274	58,577	166,852	32,196
Government & Non-Profit EE	10,072	10,072	56,314	37,166	93,480	10,072
TOTAL PORTFOLIO	108,318	108,318	641,855	101,931	743,786	108,584

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 report non-low-income program 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	2.75	2.75	27.04	-	27.04	2.75
Residential Low-Income EE	0.17	0.17	1.17	-	1.17	0.20
Low-Income Participation in Non-Low-Income Programs[c]	-	-	-	-	-	-
Small Commercial & Industrial EE	8.04	8.04	31.40	0.54	31.94	8.04
Large Commercial & Industrial EE	5.81	5.81	16.34	23.15	39.49	5.81
Government & Non-Profit EE	2.40	2.40	12.69	117.68	130.37	2.40
TOTAL PORTFOLIO	19.17	19.17	88.64	141.38	230.01	19.21

NOTES:
[a] Results include only the constant peak load reductions from energy efficiency measures. Peak load reductions from demand response measures (direct load control and load curtailment) will only apply during the summer of 2012.
[b] Total committed uses CPITD gross impact values.
[c] In the PY2 Annual Report, which will be filed in November 2011, this table will be amended to distinguish low-income program savings from savings attributable to low-income customers in non-low-income programs. The table will also be updated for the PY3 Annual Report delivered November 2012.

2.1 Residential EE Sector

The Residential EE sector target for annual energy savings in PY3 is 126,224 MWh/yr and the sector target for annual peak demand reduction is 17.86 MW. The Residential EE sector target for CPITD annual energy savings is 279,484 MWh/yr and the CPITD target for peak demand reduction is 39.24 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	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Appliance Recycling Program	3,049	5,178	0.94
Residential Lighting Program[a]	71,484	22,933	1.23
Efficient Equipment Incentive Program (non-lighting measures)	13,889	2,499	0.39
Efficient Equipment Incentive Program (commercial and industrial lighting)	22	387	0.19
Residential Energy Assessment & Weatherization Program	196	118	0.01
Sector Total	88,640	31,114	2.75

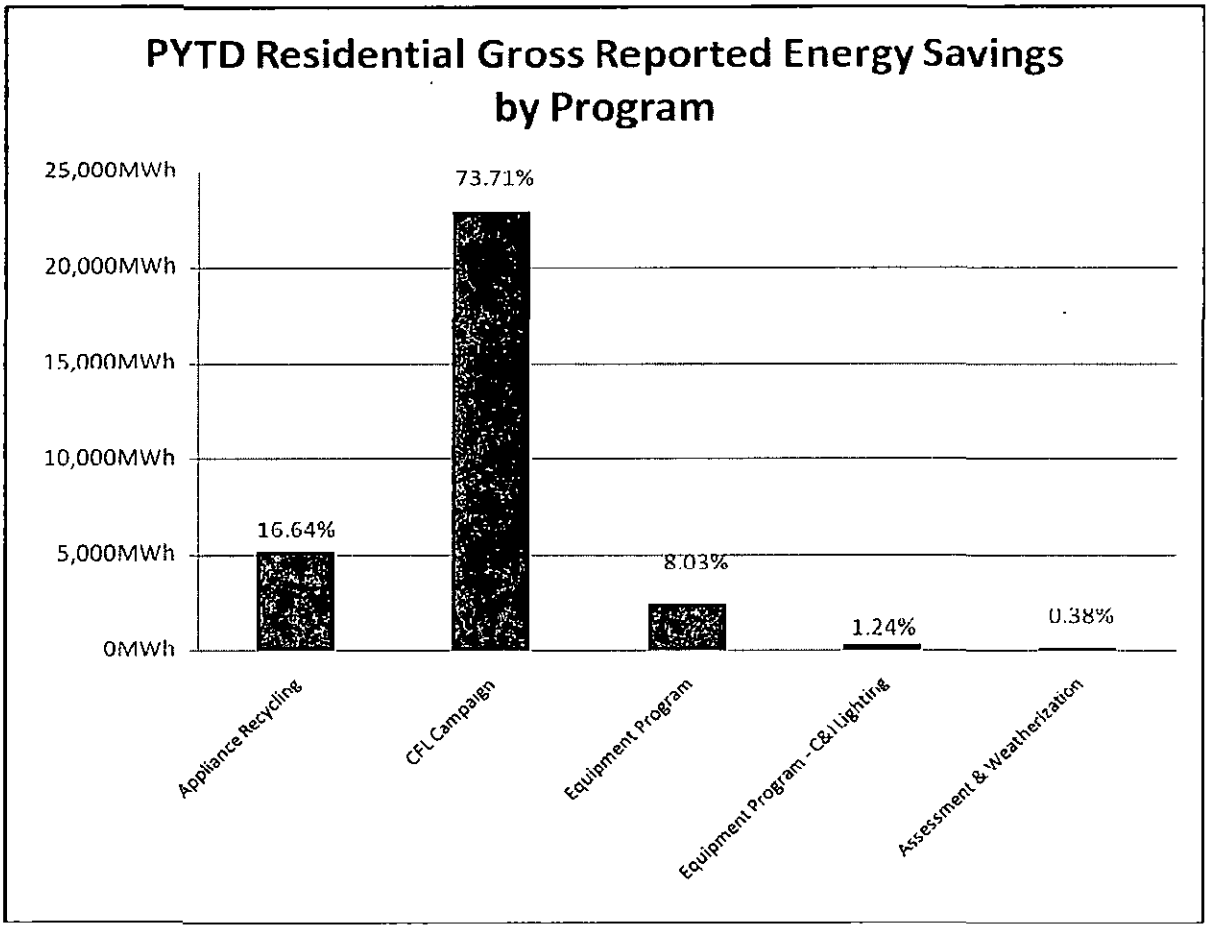
NOTES:
[a] As an upstream program, exact participation in the Residential Lighting Program is not known. The EM&V CSP estimated the number of program participants by dividing the total number of bulbs discounted (480,379 in PY3 Q1; 651,357 in PY2 Q4; 889,668 in PY2 Q3; 988,915 in PY2 Q2; 526,296 in PY2 Q1; 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	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Appliance Recycling Program	3,049	5,178	0.94
Residential Lighting Program	71,484	22,933	1.23
Efficient Equipment Incentive Program (non-lighting measures)	13,889	2,499	0.39
Efficient Equipment Incentive Program (commercial and industrial lighting)	22	387	0.19
Residential Energy Assessment & Weatherization Program	196	118	0.01
Sector Total	88,640	31,114	2.75
NOTES:			

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

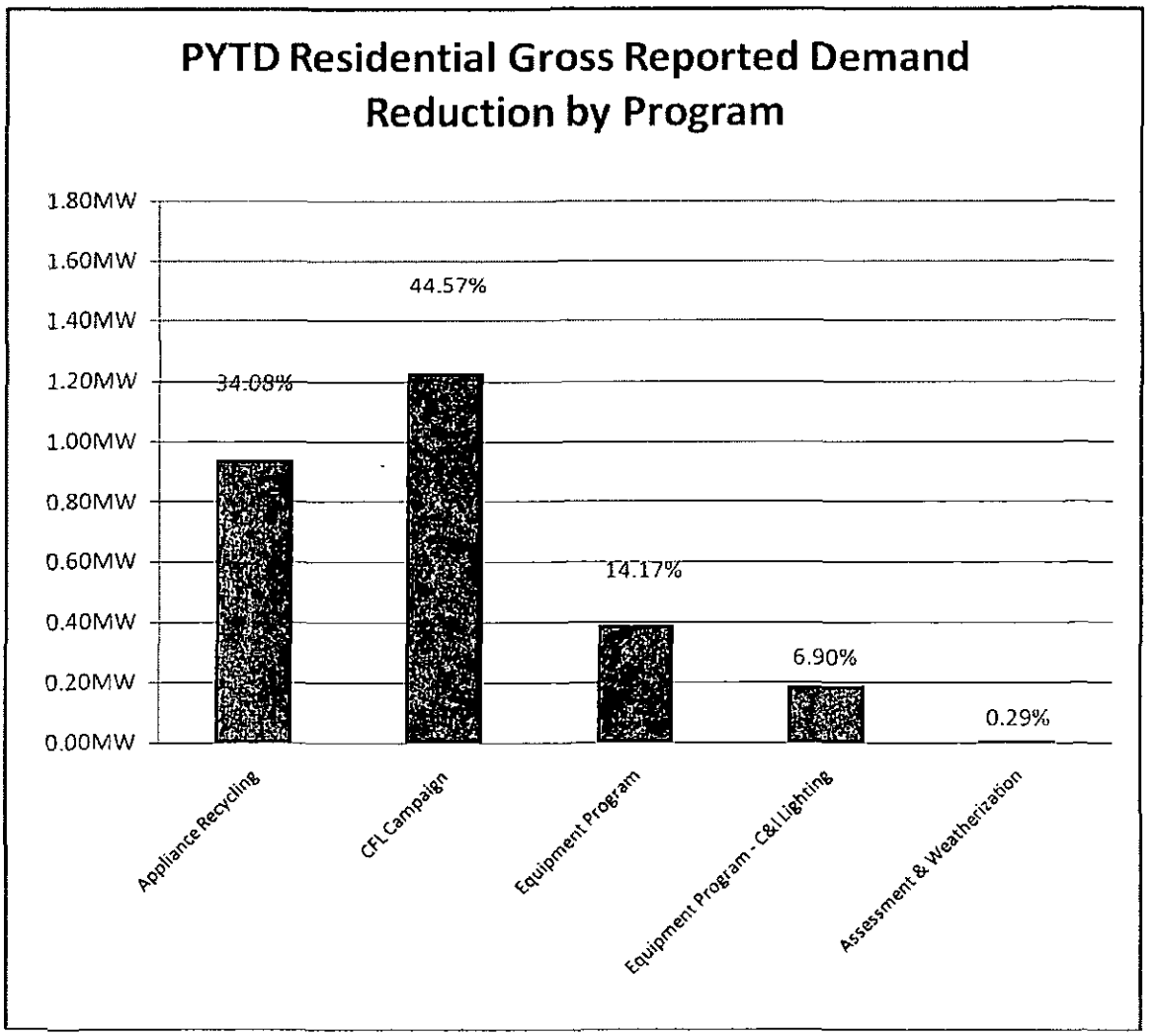


Figure 2-7: Summary of Residential EE Sector CPITD Reported Gross Energy Savings by Program

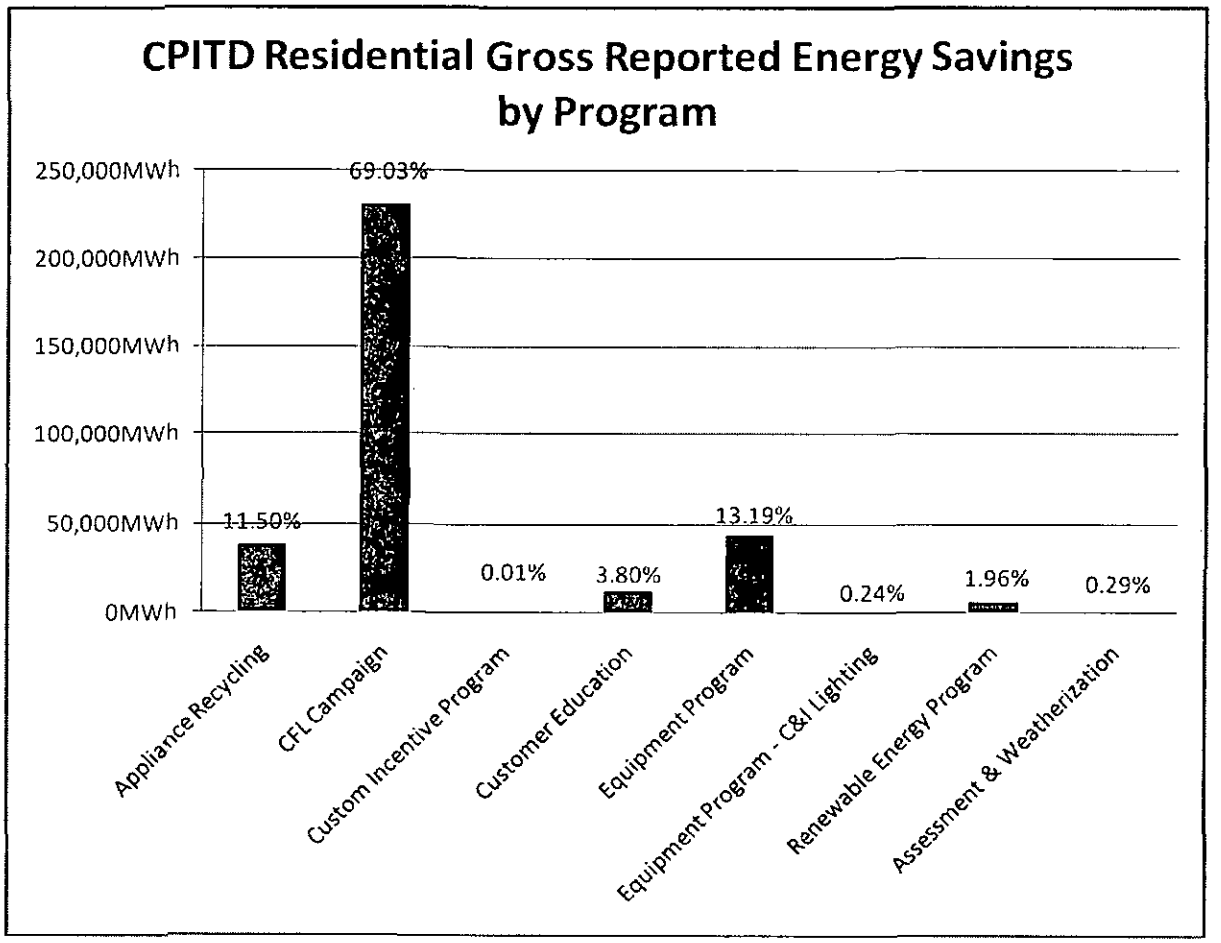
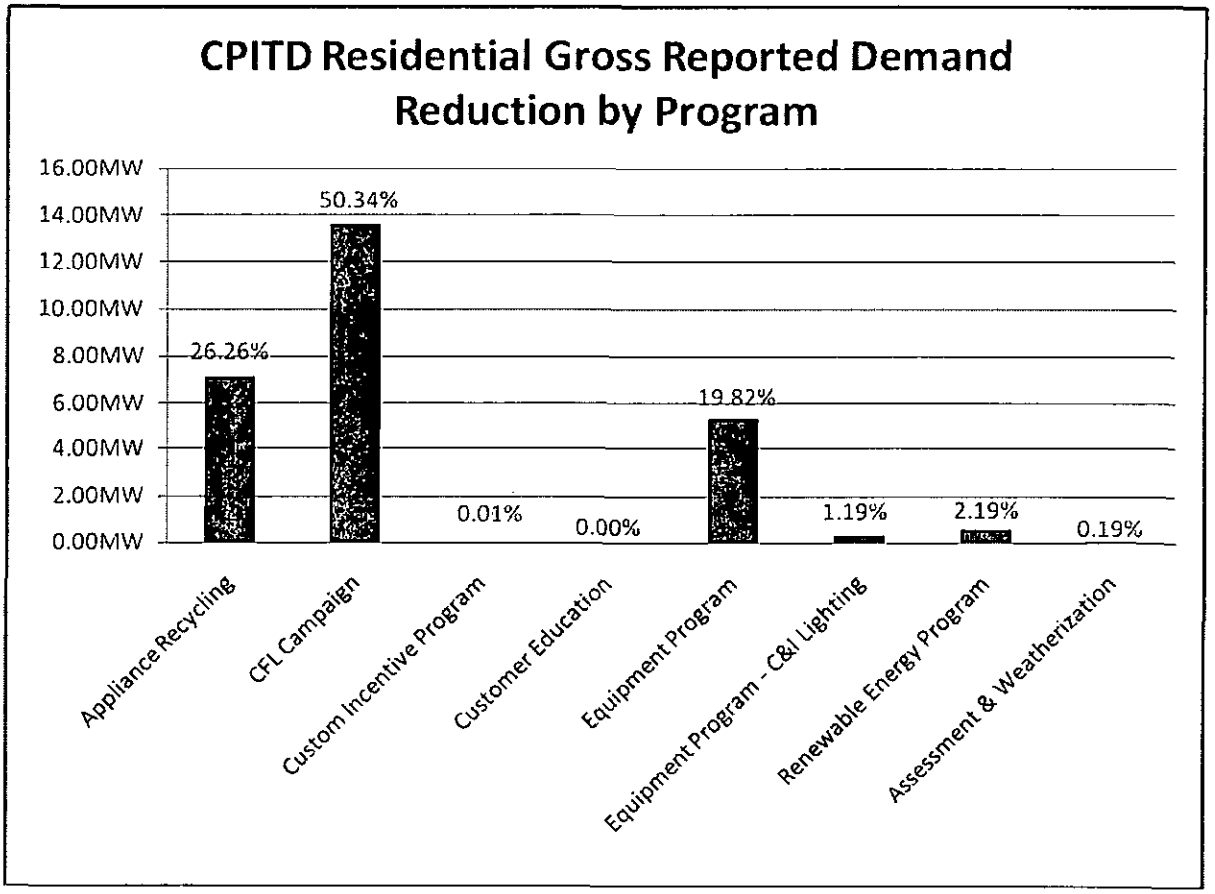


Figure 2-8: Summary of Residential EE Sector CPITD Reported Demand Reduction by Program



2.2 Residential Low-Income EE Sector

The Residential Low-Income EE sector target for annual energy savings in PY3 is 20,654 MWh/yr and the sector target for annual peak demand reduction is 3.23 MW. These values were reported in the EE&C Plan. The Residential Low-Income EE sector target for CPITD annual energy savings is 47,297 MWh/yr and the CPITD target for peak demand reduction is 7.31 MW.

In keeping with the Commission's Order on May 5, 2011, directing PPL Electric Utilities 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 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 are 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 customer sector level.

A sector summary of results of the designated low-income programs is presented in Table 2-5 and Table 2-6. Final results summarizing low-income participation in other 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[b]	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
E-Power Wise Program	599	334	0.08
Low-Income WRAP	548	684	0.08
Sector Total	1,147	1,018	0.17

NOTES:
[a] In the PY2 Annual Report, which will be filed in November 2011, 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.

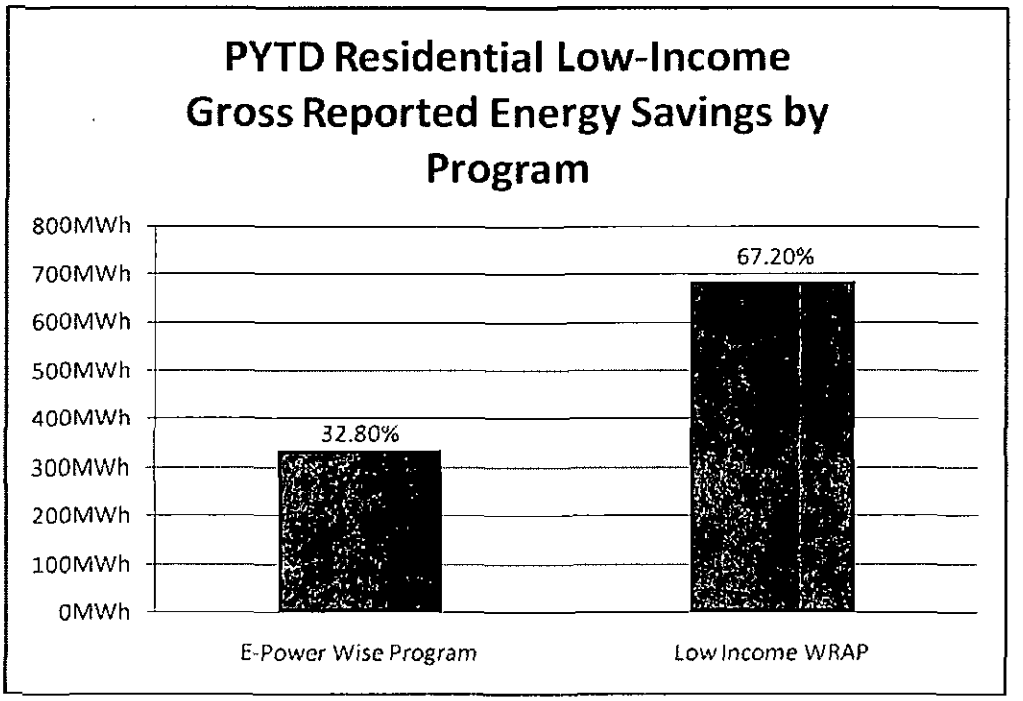
Table 2-6: Summary of Residential Low-Income EE Sector PYTD Impacts by Program Through the End of the Reporting Period[a]

Residential Low-Income EE Sector[b]	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
E-Power Wise Program	599	334	0.08
Low-Income WRAP	548	684	0.08
Sector Total	1,147	1,018	0.17

NOTES:
[a] In the PY2 Annual Report, which will be filed in November 2011, 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

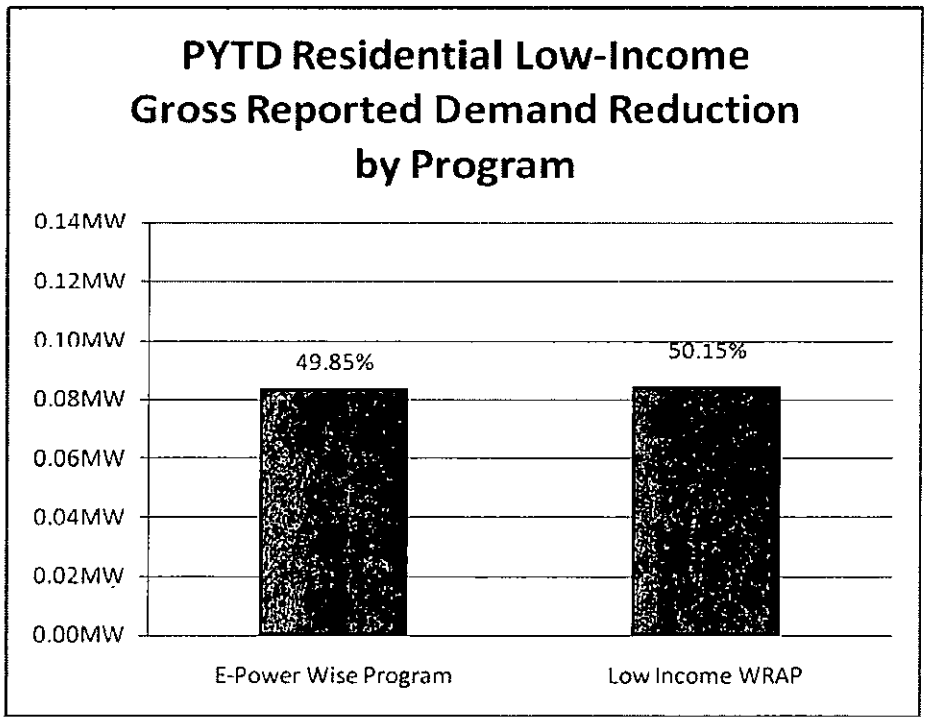


Figure 2-11: Summary of Residential Low-Income EE Sector CPITD Reported Gross Energy Savings by Program

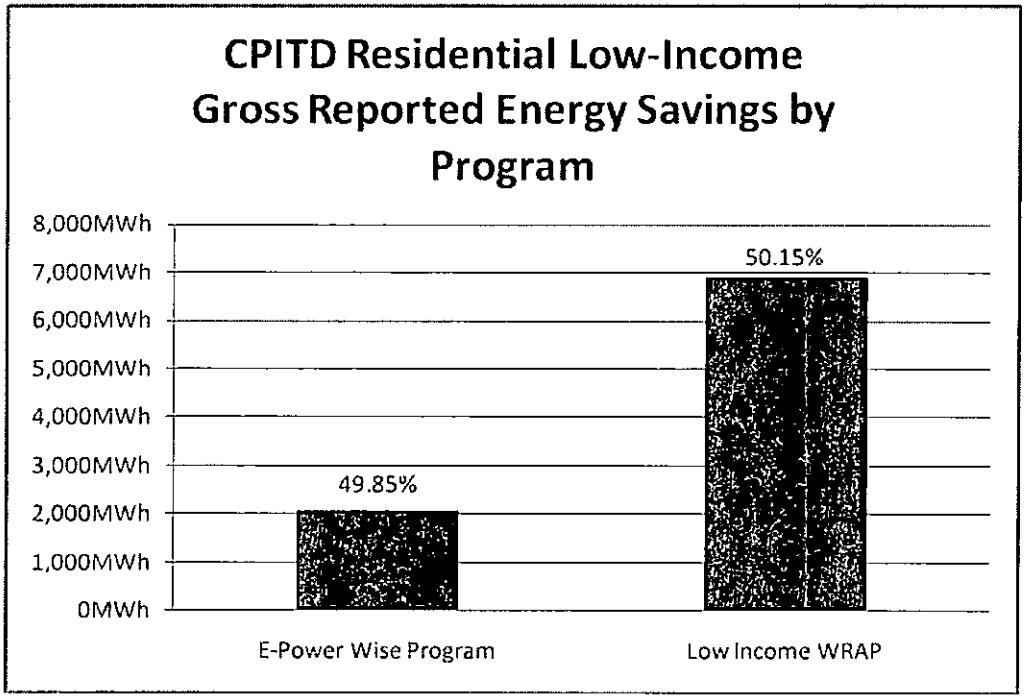
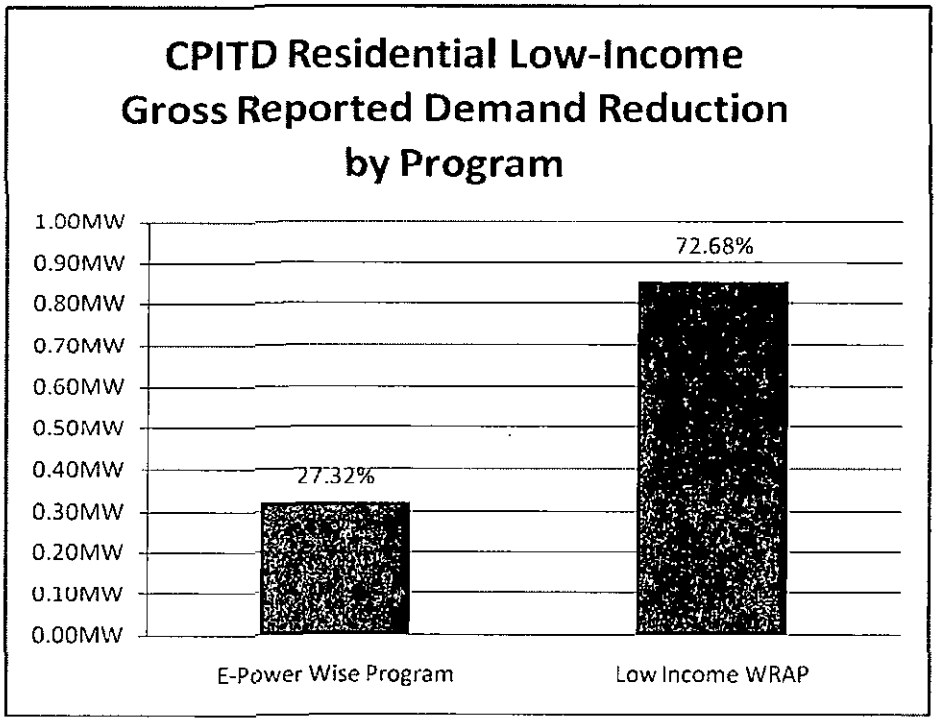


Figure 2-12: Summary of Residential Low-Income EE Sector CPITD Reported Demand Reduction by Program



2.3 Small Commercial & Industrial EE Sector

The Small Commercial & Industrial (C&I) EE sector target for annual energy savings in PY3 is 192,844 MWh/yr and the sector target for annual peak demand reduction is 37.53 MW. The Small C&I EE sector target for CPITD annual energy savings is 361,698 MWh/yr and the CPITD target for peak demand reduction is 70.25 MW.

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

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

Small Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Appliance Recycling Program	72	123	0.02
Custom Incentive Program	4	598	0.08
Efficient Equipment Incentive Program (non-lighting measures)	711	316	0.03
Efficient Equipment Incentive Program (commercial and industrial lighting)	600	32,508	7.50
HVAC Tune-Up Program	447	375	0.42
Sector Total	1,834	33,919	8.04

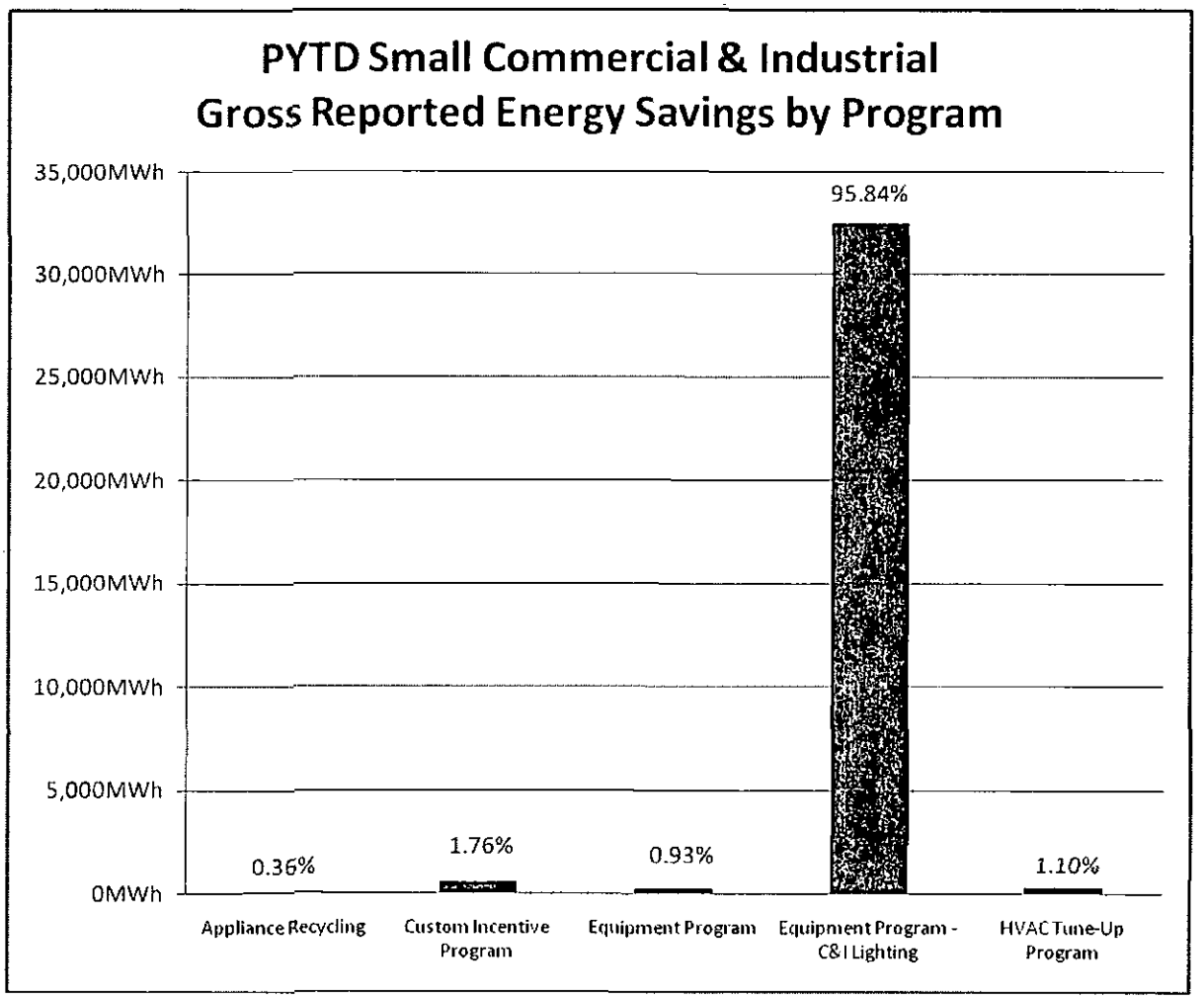
Small Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
NOTES:			

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

Small Commercial & Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Appliance Recycling Program	72	123	0.02
Custom Incentive Program	4	598	0.08
Efficient Equipment Incentive Program (non-lighting measures)	711	316	0.03
Efficient Equipment Incentive Program (commercial and industrial lighting)	600	32,508	7.50
HVAC Tune-Up	447	375	0.42
Sector Total	1,834	33,919	8.04
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

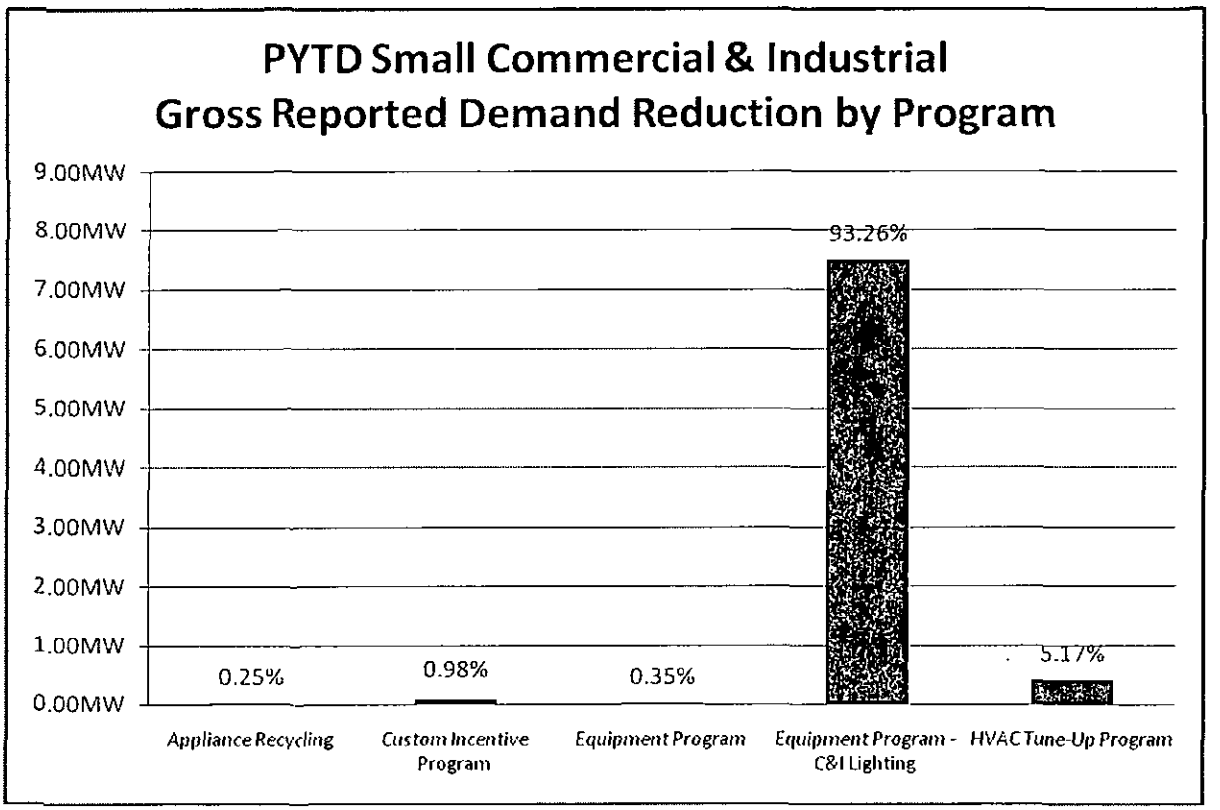


Figure 2-15: Summary of Small C&I EE Sector CPITD Reported Gross Energy Savings by Program

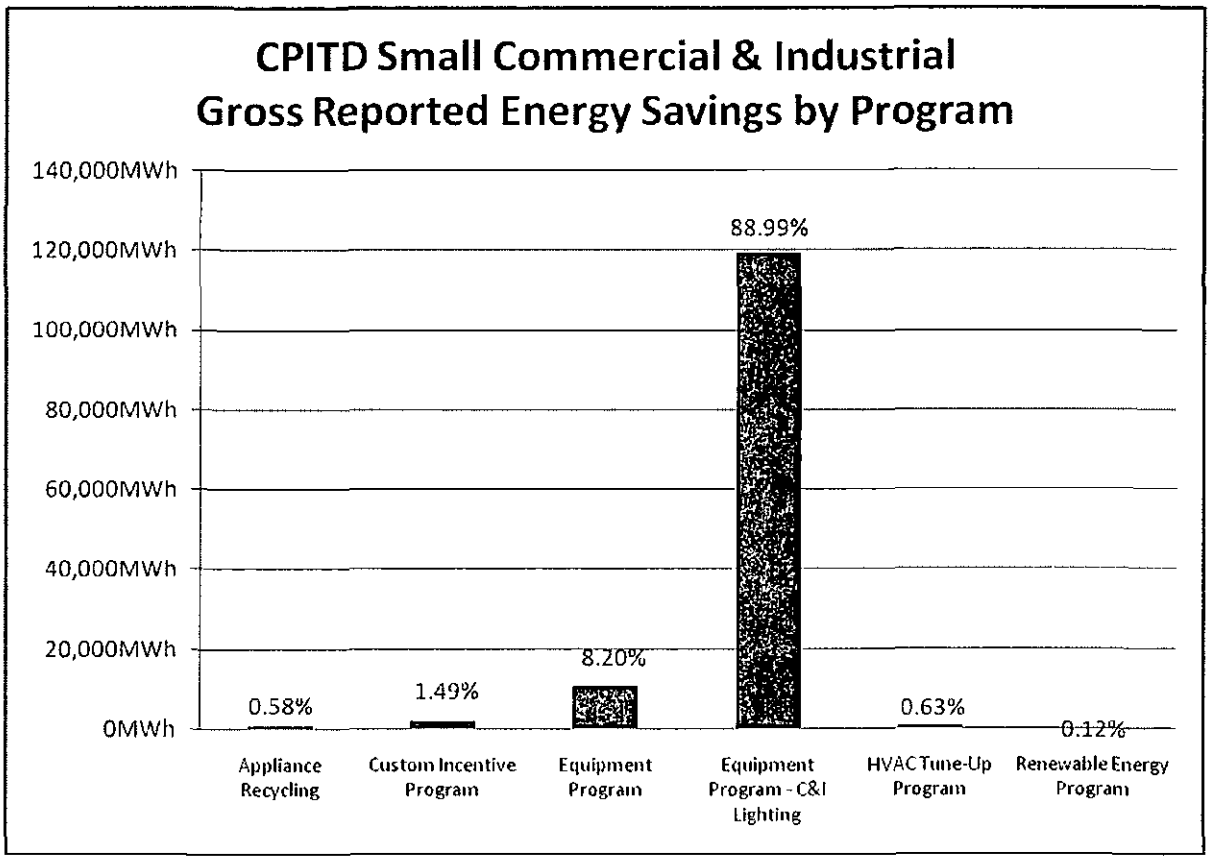
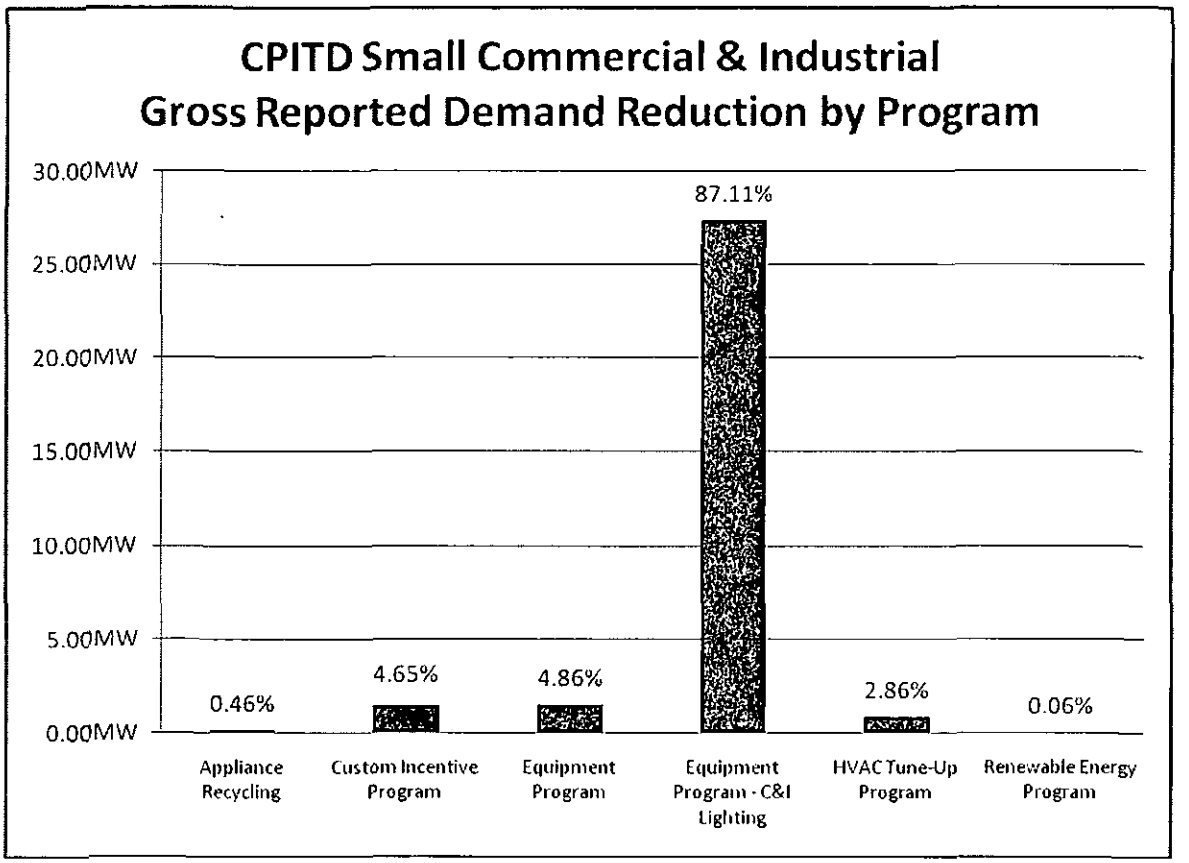


Figure 2-16: Summary of Small C&I EE Sector CPITD Reported Demand Reduction by Program



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 Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Custom Incentive Program	10	10,619	2.57
Efficient Equipment Incentive Program (non-lighting measures)	58	42	0.00
Efficient Equipment Incentive Program (commercial and industrial lighting)	54	21,538	3.24
HVAC Tune-Up Program	15	(3)	-
Sector Total	137	32,196	5.81

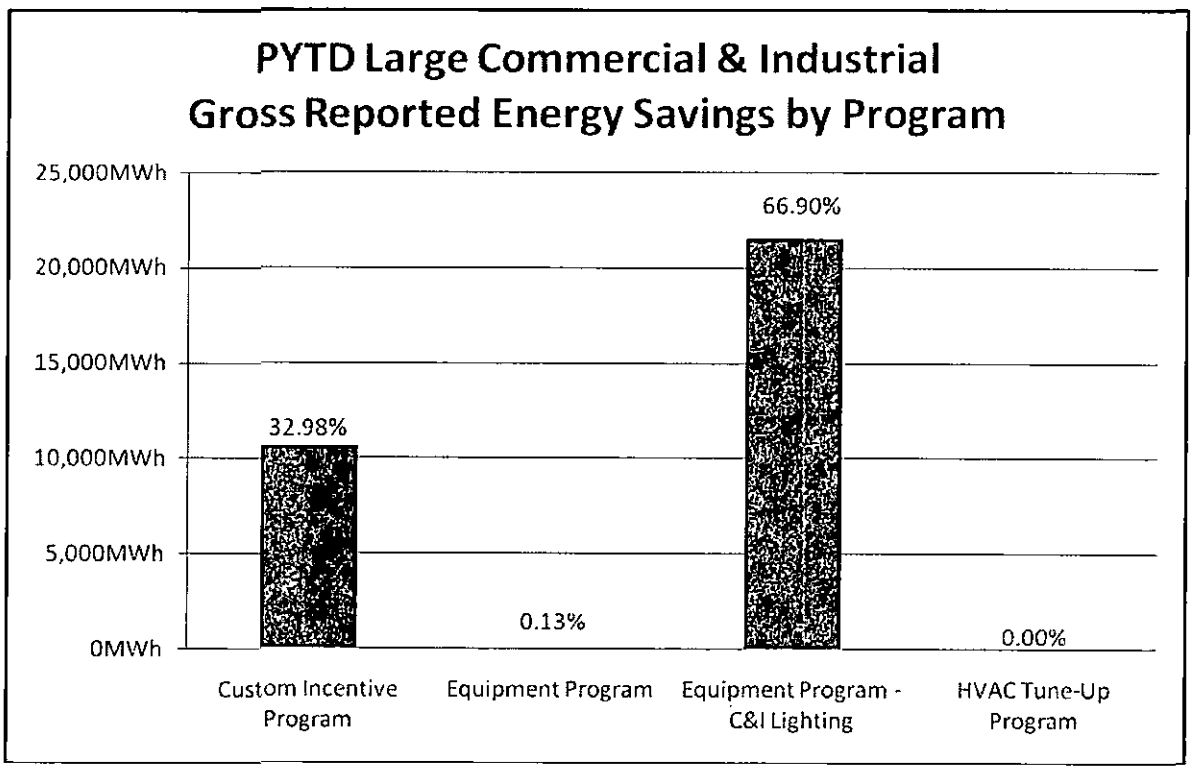
Large Commercial & Industrial EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
NOTES:			

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

Large Commercial & Industrial EE Sector	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Custom Incentive Program	10	10,619	2.57
Efficient Equipment Incentive Program (non-lighting measures)	58	42	0.00
Efficient Equipment Incentive Program (commercial and industrial lighting)	54	21,538	3.24
HVAC Tune-Up Program	15	(3)	-
Sector Total	137	32,196	5.81
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

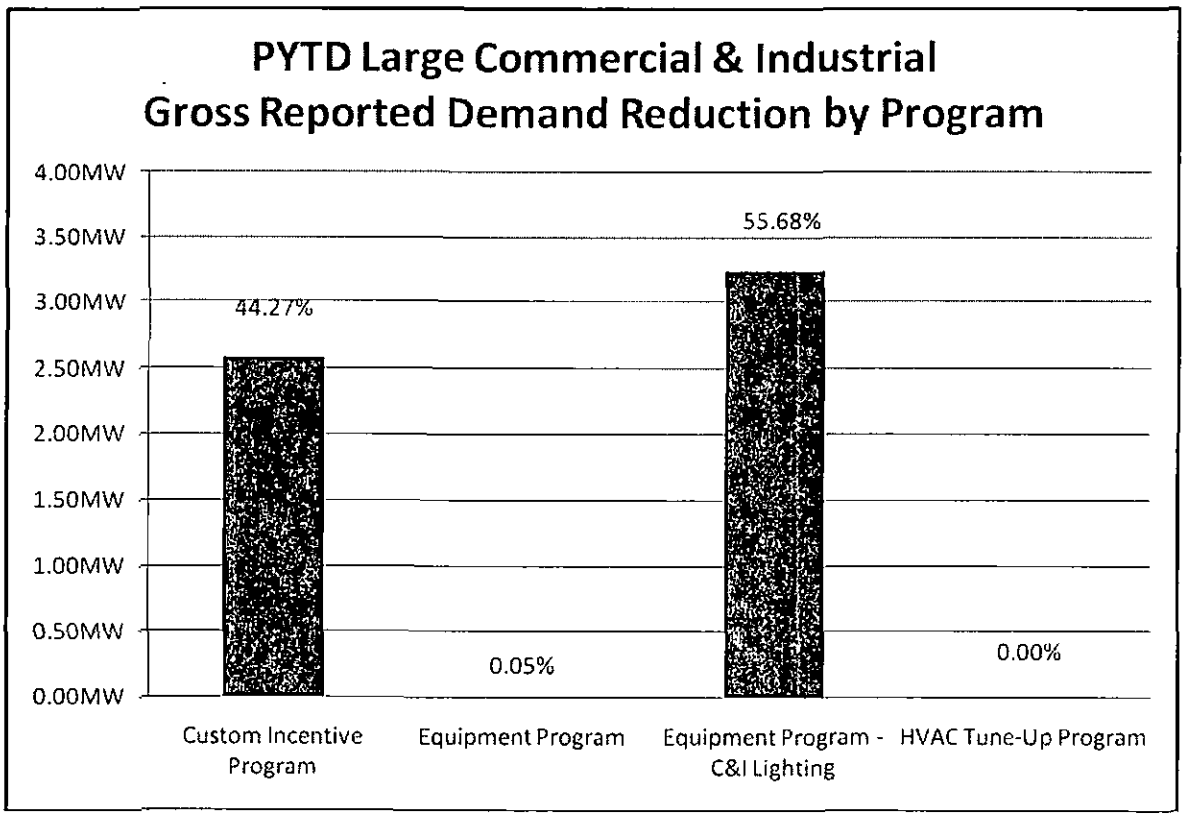


Figure 2-19: Summary of Large C&I EE Sector CPITD Reported Gross Energy Savings by Program

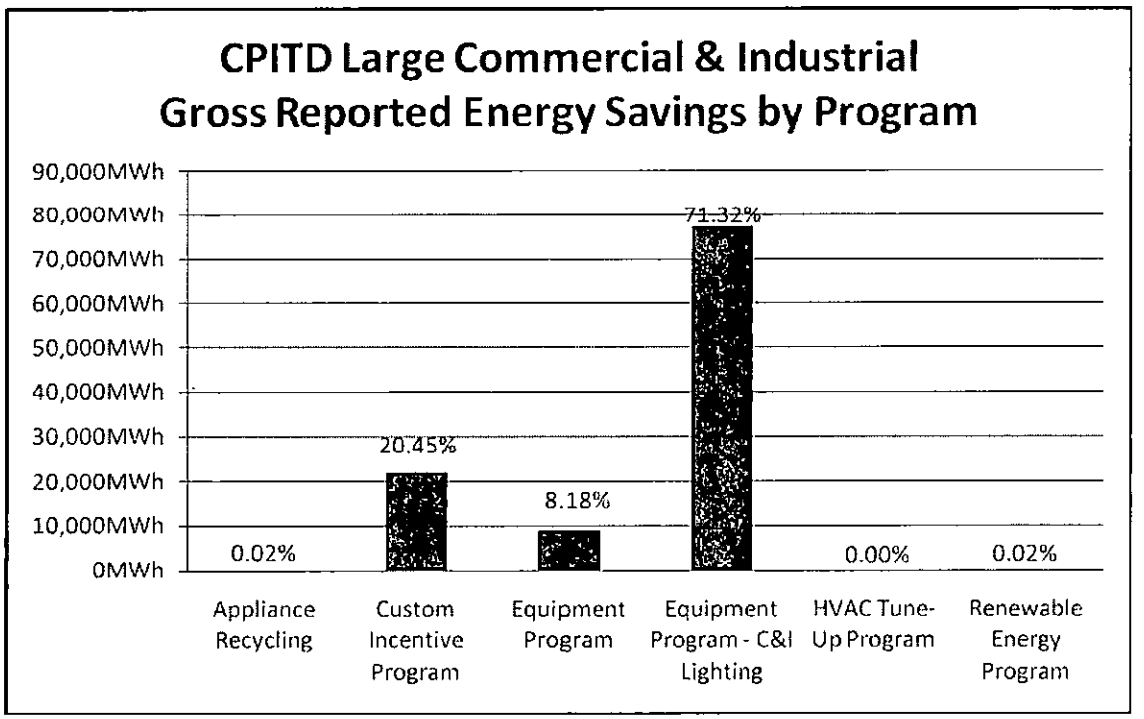
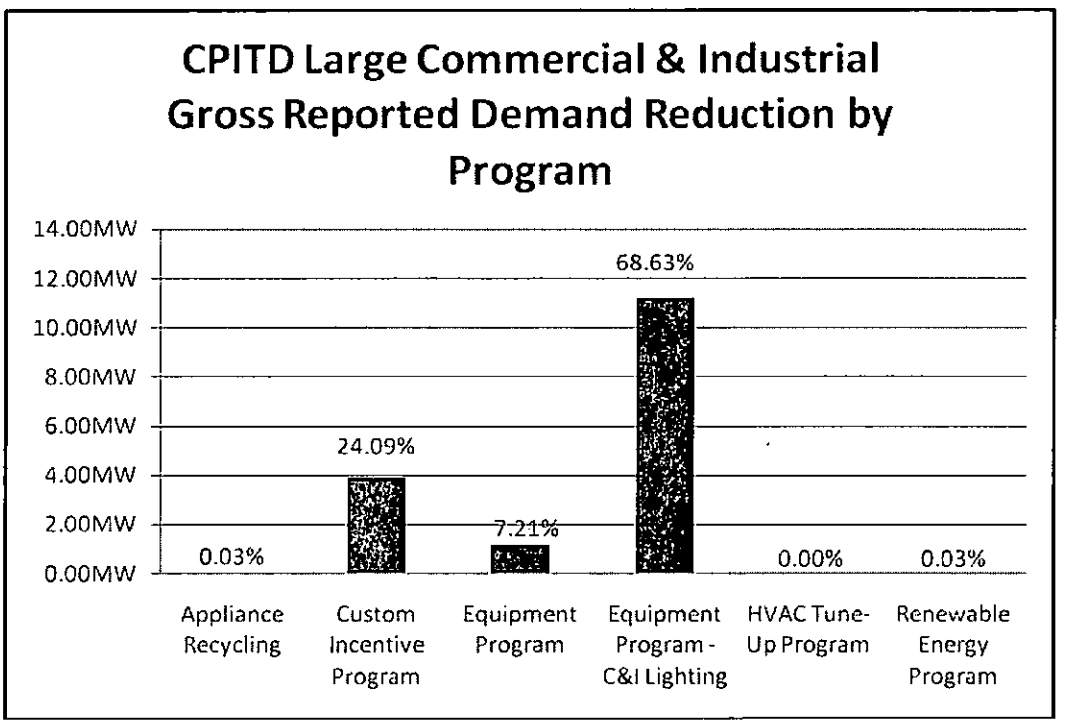


Figure 2-20: Summary of Large C&I EE Sector CPITD Reported Demand Reduction by Program



2.5 Government, School & Non-Profit EE Sector

The Government, School & 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, School, and 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

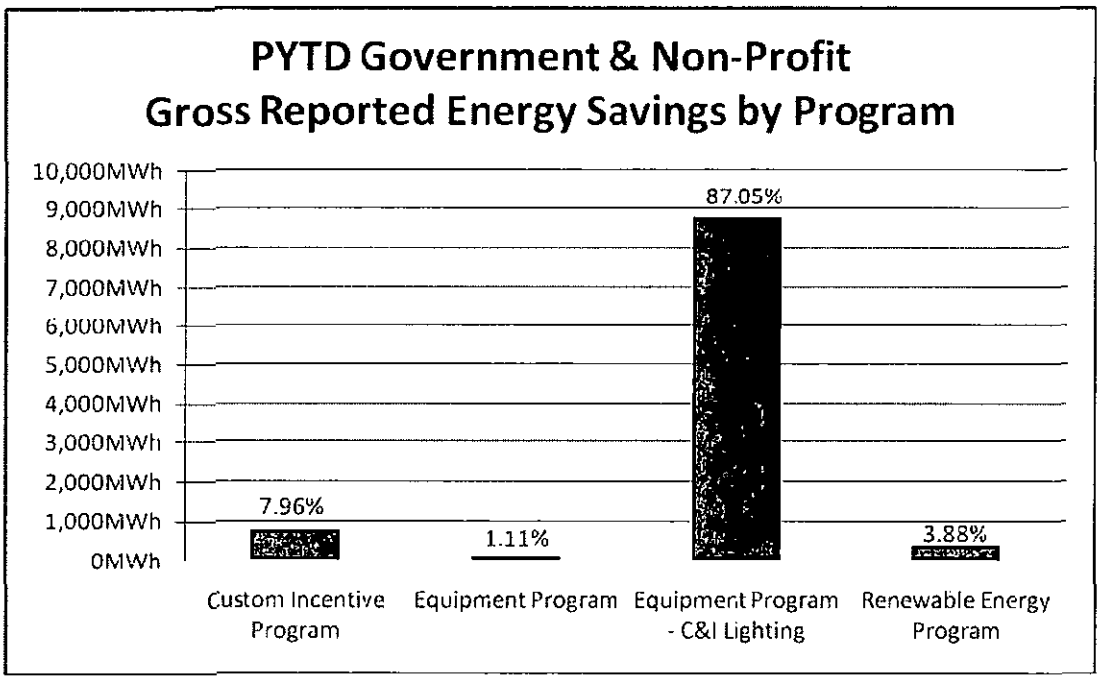
Government & Non-Profit EE Sector	IQ Participants	IQ Reported Gross Energy Savings (MWh/yr)	IQ Reported Gross Demand Reduction (MW)
Custom Incentive Program	5	802	0.11
Efficient Equipment Incentive Program (non-lighting measures)	554	112	0.02
Efficient Equipment Incentive Program (commercial and industrial lighting)	204	8,768	2.22
Renewable Energy Program	8	391	0.05
Sector Total	771	10,072	2.40
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	PYTD Participants	PYTD Reported Gross Energy Savings (MWh/yr)	PYTD Reported Gross Demand Reduction (MW)
Custom Incentive Program	5	802	0.11
Efficient Equipment Incentive Program (non-lighting measures)	554	112	0.02
Efficient Equipment Incentive Program (commercial and industrial lighting)	204	8,768	2.22
Renewable Energy Program	8	391	0.05
Sector Total	771	10,072	2.40
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

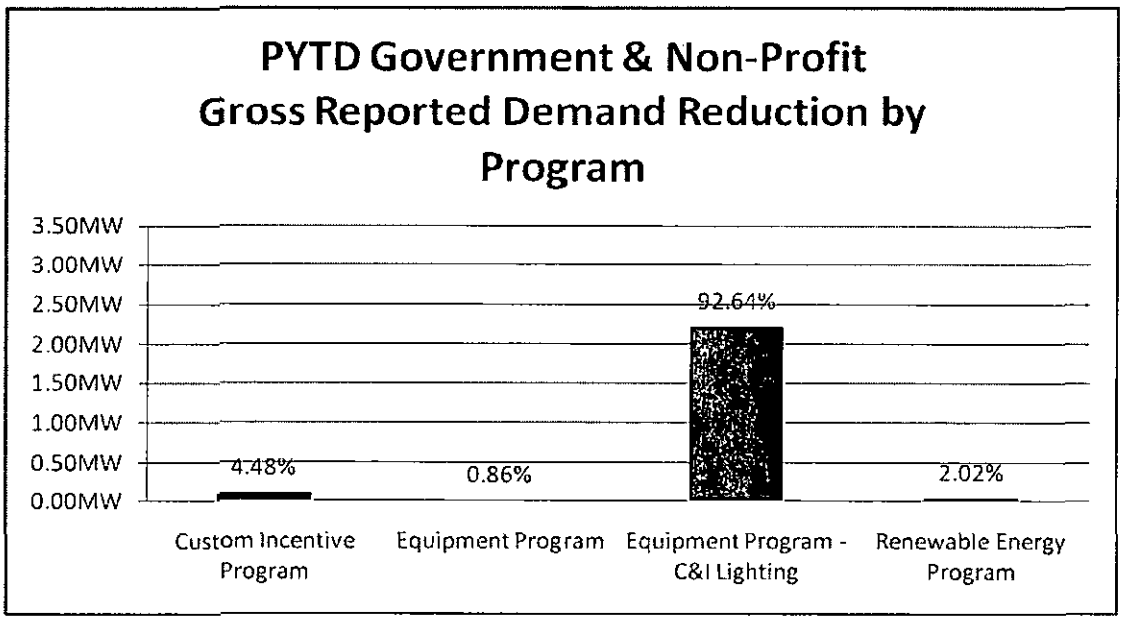


Figure 2-23: Summary of Government & Non-Profit EE Sector CPITD Reported Gross Energy Savings by Program

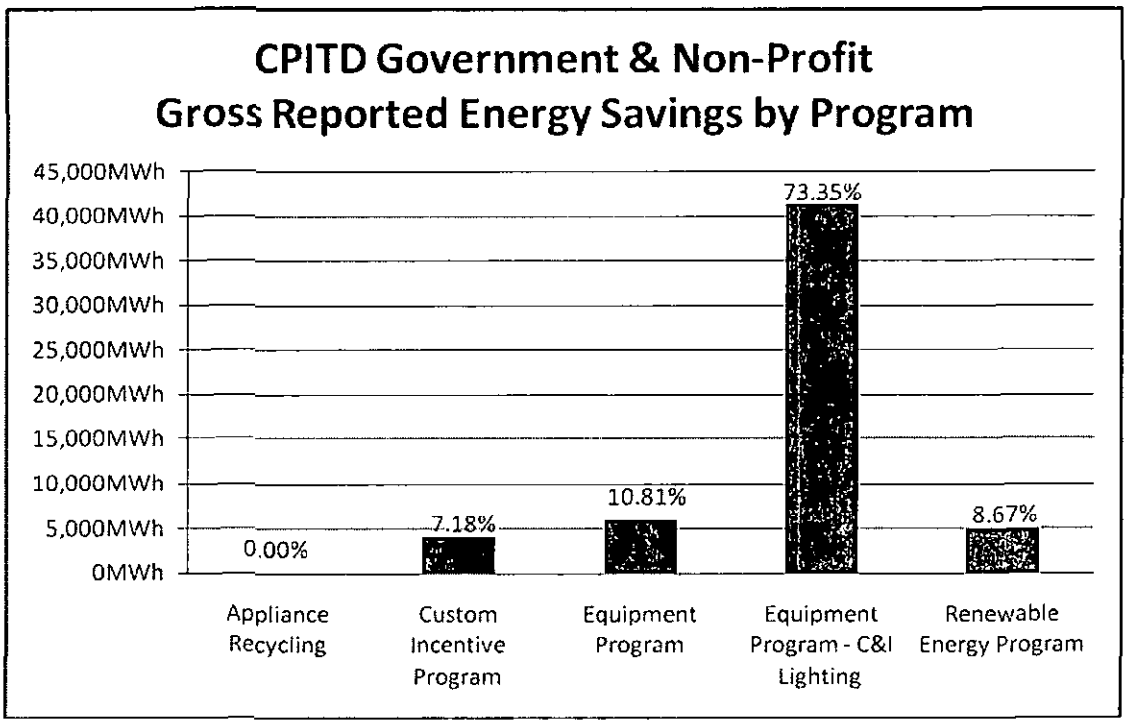
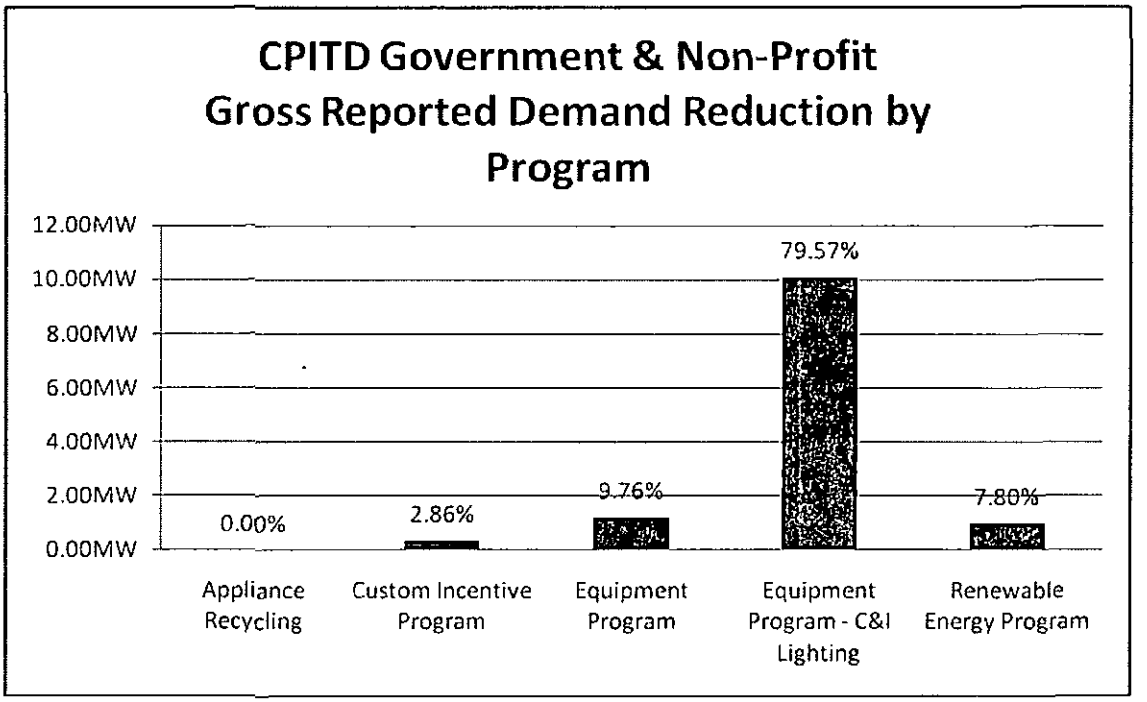


Figure 2-24: Summary of Government & Non-Profit EE Sector CPITD Reported Demand Reduction by Program



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 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.

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 adjustment results in the adjusted *ex ante*, bringing the reported savings into alignment with the TRM.

Savings Realization Rate Methodology
Once adjusted *ex ante* savings are calculated, a realization rate is determined through records inspections and participant surveys (to determine installation rates). 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* and evaluated *ex post* savings.

The realization rates reported for PY3 Q1 rely on data used to determine the PY2 Q4 realization rates.

The realization rates are calculated in two steps. 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.

Second, a random sample of program participants is selected from EEMIS for participant surveys. The sample for PY3 will be stratified by measure type to exceed 90% confidence and 10% precision for the program year. The quantity of units recycled, the quantity of units replaced with ENERGY STAR® or standard efficiency unit, and the operational condition of units collected will be verified to adjust reported energy savings.

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 QA/QC and EM&V Plan and will be available in PPL Electric's Final Annual Report, which is filed every November. The results in this report reflect PY2 results as of the Q4 filing, used as a placeholder. The NTG analysis will be updated over the course of PY3 and reported in the PY3 final Annual Report.

3.1.3 Program Sampling

In PY2, the EM&V CSP conducted over 100 phone surveys with randomly selected participants for 90% confidence and 10% precision. In PY3, surveys will be conducted to reach 90% confidence and 10% precision at the program level by year end. The PY3 surveys will verify the removal of working units, their replacement, and customer satisfaction with the program. The sample will be pro-rated to reflect actual distributions of refrigerators and freezers (as one group, since savings are the same), and the number of room air conditioners recycled.

3.1.4 Process Evaluation

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

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 3-1.

Table 3-1: Summary of Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$198,910	$198,910	$825,089
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$198,910	$198,910	$825,089
B.1	Design & Development[a]	$0	$0	$0
B.2	*Administration*[a]	$0	$0	$0

	Category	IQ	PYTD	CPITD
B.3	Management[b]	$460,965	$460,965	$1,954,894
B.4	Marketing[a]	$131,875	$131,875	$556,850
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$592,840	$592,840	$2,511,744
C	**EDC Evaluation Costs[a]**	$0	$0	$0
D	**SWE Audit Costs[a]**	$0	$0	$0
E	**Participant Costs[c]**	Not required	Not required	Not required
	Total Costs	$791,750	$791,750	$3,336,833
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 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. The upstream incentives then 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.[9]

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

The objectives of the Residential Lighting Program are to:

- Developing and executing strategies aimed at transforming the market for ENERGY STAR-qualified efficient 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 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 for 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. Both models' program inputs are PPL Electric's strategic direction, program management, and other support; PPL Electric's funding; and the CSP's program implementation expertise.

The logic models' elements include:

- **Program inputs:** Inputs to the program include PPL Electric staff and customers, the CFL technology, trade allies (energy efficient light bulb manufacturers, retailers, and community groups), incentive funding, and the program CSP.
- **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 planned through 2013.

3.2.2 Program Measurement and Verification Methodology

The PY3 Q1 energy and demand savings reported in EEMIS for the Residential Lighting Program (*ex ante* reported gross savings) included a single adjustment to the realization rate.

***Ex Ante* Adjustment Methodology**
For the Residential Lighting Program, the realization rate was based on the EM&V CSP's records review. The EM&V CSP applied the realization rate to the Residential Lighting Program's *ex ante* energy and demand savings to derive *ex post* verified energy and demand savings for the program.

During PY2, the SWE requested that the EM&V CSP explore several parameters related to CFL savings estimation, but indicated that adjustments for these parameters need not 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. These parameters may or may not be explored in the PY3 surveys; this has yet to be determined.

Savings Realization Rate Methodology
The EM&V CSP derived the realization rate for the Residential Lighting Program by reviewing 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, and the program CSP reformats these disparate data sets and uploads them to their own internal program database. Finally, the program CSP uploads the monthly (participation) sales data from its database to EEMIS. EEMIS also maintains a separate, mostly static 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, PPL Electric and the program CSP do not 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, and
- Date each CFL/LED was sold to retail customers.

Other variables captured in EEMIS for the Residential Lighting Program include 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.

Using the system described above, the EM&V CSP completed a review of the census of PY2 Residential Lighting Program records from EEMIS for each quarter, rather than reviewing a sample of randomly selected records (as was described in the CFL Campaign EM&V and QA/QC Plan). The EM&V CSP then compared these records to records in the program CSP's participation database, and they matched 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. This method will be deployed in PY3.

Savings Realization Rate Findings

The EM&V CSP's energy and demand savings calculations, based on inputs from the program CSP's participation database, will be matched to EEMIS recorded energy (kWh) and demand (kW) savings to determine the realization rate. This process has not been completed for PY3 Q1.

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 as was employed in earlier program years. Namely, the EM&V CSP will ask survey respondents who have recently purchased CFLs about the number and location (i.e., which rooms) of CFLs installed in their homes and the number of CFLs in storage. The EM&V CSP will then calculate the installation rate as the number of CFLs installed divided by the sum of the total number of CFLs installed and in storage.

Survey respondents who say they have one or more CFLs installed in their home at the time the surveys are fielded will be asked how many CFLs are installed in specific rooms of their homes. The EM&V CSP will use respondents' survey answers, in combination with secondary research published by the Regional Technical Forum (RTF),[10] to develop an estimate of the average HOU per day per CFL for PPL Electric customers.

Through assessment of the customer survey implemented in PY1, the EM&V CSP found that customers were generally unable to accurately report the wattages of CFLs they installed and the incandescent 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.

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

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:

- Light bulbs 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 true for CFLs/LEDs as well as for incandescent bulbs, especially after customers become somewhat familiar with CFLs/LEDs and no longer view them as novelty items.
- 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's customers. Many end-use customer participants are unaware they are taking part in the program. In fact, evaluations of upstream programs implemented elsewhere have found that the majority of customer participants are unaware of their participation status.
- The program's marketing and outreach components are expected to lead not only to sales of program-discounted CFLs and LEDs, but potentially also to sales of large numbers of non-program CFLs and LEDs (spillover). Non-program energy efficient bulb sales can occur at participating retailers (i.e., 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 later in PY3. The Residential Lighting Program NTG analysis will be repeated once results from the PY3 customer surveys become available.

The EM&V CSP observed that some of the recent 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's NTG result 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's 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 program's actual NTG ratio is likely at the higher end of the 71% to 94% range. The EM&V CSP therefore estimates 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 3-2, NTG ratios for these other utilities ranged from 62% to 96%.

Table 3-2: 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%
Xcel Energy				
NOTES:				

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

3.2.3 Program Sampling

The EM&V CSP conducts a records review with random sample target designed to achieve 90% confidence and 10% precision. The customer telephone survey for the Residential Lighting Program evaluation survey sample frame is developed from PPL Electric's customer database and, to ensure the telephone survey will provide useful results for both CFL purchasers and non-purchasers while staying within a reasonable budget, the survey is 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 One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation report. The PY2 process evaluation will be delivered with the final Annual Report impact evaluation in November

2011.The PY3 process evaluation will be delivered with the final Annual Report impact evaluation 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, and resolves program issues. A third-party implementation program CSP, 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 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 give-away events. These events are used as a forum for education and outreach to increase customer awareness of (1) CFL benefits, (2) appropriate CFL use and installation, (3) CFL safe handling and recycling, and (4) the range of EE&C programs that PPL Electric offers. The Residential Lighting Program CSP negotiates with CFL manufacturers to distribute CFLs at these events, and provides point-of-purchase displays and educational materials for use at the events.

The Residential Lighting 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 Residential Lighting 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 3-3.

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

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$534,906	$534,906	$5,160,081

	Category	IQ	PYTD	CPITD
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$534,906	$534,906	$5,160,081
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$400,196	$400,196	$2,524,169
B.4	Marketing[a]	$4,296	$4,296	$150,256
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$404,492	$404,492	$2,674,425
C	**EDC Evaluation Costs[a]**	$0	$0	$0
D	**SWE Audit Costs[a]**	$0	$0	$0
E	**Participant Costs[c]**			
	Total Costs	$939,398	$939,398	$7,834,506
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 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 should be added to the Efficient Equipment Incentive Program or other programs and that no longer need to be treated as custom.
- Promoting other PPL Electric EE&C programs.
- Achieving energy savings of 140,459 MWh/yr and peak demand saving impacts of 27 MW with roughly 400 custom projects (anticipated to include over 1,500 measures) over the initial four year term of the program.
- Reducing the first-cost barrier and making high-efficiency equipment a more viable option for customers through incentives that serve to partially offset the difference in costs between high-efficiency equipment and standard (baseline) equipment. The incentives offered for technical assessments reduce the cost of energy audits, thus expanding their use and leading to the identification of cost-effective energy efficiency projects.

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, the 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 non-participating structures.
- **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 are 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 and the results will not be extrapolated to other sites through a realization rate.

A sample of small projects is selected at the close of each program quarter. Savings for this sample are verified and a realization rate is determined based on this sample. The realization rate is applied to the population of the projects in the small project 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 through self-reported data from participants. The PY2 Annual Report, which will be filed November 15, 2011, will also provide additional information about NTG. Information obtained by computing the NTG ratio will be used to refine and improve program delivery.

3.3.3 Program Sampling

As discussed above, the EM&V CSP defined each custom project as 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 is selected for savings verification at 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 may 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). This approach further weights the EM&V research towards the larger projects. See Table 3-4 for an outline of the sampling plan. Additional detail can be found in the Custom Incentive Program Evaluation Plan. Savings thresholds will be periodically re-evaluated based on the distribution of projects.

Table 3-4: PY3 Q1 Custom Projects Impact Evaluation Sampling

Project #	PPL Reported Savings (kWh)	Strata	In Sample?
23	112,977	Large	Yes
47	2,816,243	Large	Yes
49	711,730	Large	Yes
62	2,635,793	Large	Yes
76	62,534	Small	TBD
78	1,178,291	Large	Yes
119	57,903	Small	TBD
121	295,153	Large	Yes
124	21,480	Small	TBD
148	288,033	Large	Yes
159	1,633,711	Large	Yes
168	1,061,087	Large	Yes
187	390,837	Small	TBD
189	34,448	Small	TBD
198	10,686	Small	TBD
203	218,520	Small	TBD
214	43,767	Small	TBD
217	215,903	Small	TBD
264	229,591	Small	TBD
Total	**12,018,688**		**19**
Small	**1,285,669**	**11%**	**10**
Large	**10,733,018**	**89%**	**9**
NOTES:			

In addition, during PY3, verification activities continue for PY2 projects. Specifically, six small strata projects were sampled for PY2 and are currently being verified. Several large PY2 projects were not verified at the time the PY2 Q4 report was issued. These projects will be verified during PY3.

3.3.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process

evaluation will be delivered with the final Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Report impact evaluation 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 developing the EEMIS system (CGI). In January 2011, PPL Electric hired a new third-party implementer to act as the C&I CSP, KEMA (referred to as E-Power Solutions or EPS), who 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 3-5.

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

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$972,411	$972,411	$2,386,326
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$972,411	$972,411	$2,386,326
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$793,572	$793,572	$1,346,695
B.4	Marketing[a]	$6,085	$6,085	$6,085
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$799,658	$799,658	$1,352,780
C	**EDC Evaluation Costs[a]**	$0	$0	$0
D	**SWE Audit Costs[a]**	$0	$0	$0
E	**Participant Costs[c]**			
	Total Costs	$1,772,069	$1,772,069	$3,739,106
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

	Category	IQ	PYTD	CPITD
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 sector 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 a rebate for high-efficiency/ENERGY STAR-rated equipment (such as HVAC measures, motors, appliances, and lighting), the program will increase market saturation and acceptance of high-efficiency equipment. Customers will learn about the energy benefits of, 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, the 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 program awareness, 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 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 at a sample of sites.

***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 planning assumptions and installed equipment, and rely solely on information in the EEMIS tracking database. These adjustments result in the adjusted *ex ante*, bringing the reported savings into alignment with the 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 with which to make adjustments. For those measures, there is a single adjustment made using the savings realization rate.

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* and evaluated *ex post* savings.

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 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 PY1 Annual Report filed September 15, 2010. The PY2 Annual Report, which will be filed November 15, 2011, will also provide additional information about NTG. 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 team 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 release of the Guidance Memo provide direction to change the sampling plans once more. The updated sampling plan was used for the final PY2 samples. The revised plan will be submitted to the SWE, and sampling plan updates will be added to the Appendix of the program's Evaluation Plan. Sampling details and results will be included in the PY2 Annual Report.

3.4.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process evaluation will be delivered with the Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Report impact evaluation in November 2012.

3.4.5 Program Partners and Trade Allies

PPL Electric does not currently employ a customer programs specialist to oversee implementation of the Efficient Equipment Incentive Program for the residential sector. The exception is for residential appliances installed in commercial applications. Rebates for these measures continue to be processed by the administrative CSP (Helgeson).

In January 2011, PPL Electric hired a third-party implementer to act as the C&I CSP, EPS. 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's 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 and small C&I sectors. In this role, they develop marketing and communication plans and materials, inform trade allies about the program through direct mailings, and inform customers about the program through direct mailings and mass

media. Trade allies also promote the program by explaining the 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 in submitting program documentation.

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

3.4.6 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-6. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-6: Summary of Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$9,256,761	$9,256,761	$37,912,078
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$9,256,761	$9,256,761	$37,912,078
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$1,686,051	$1,686,051	$2,525,204
B.4	Marketing[a]	$7,820	$7,820	$37,931
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$1,693,871	$1,693,871	$2,563,135
C	**EDC Evaluation Costs[a]**	$0	$0	$0
D	**SWE Audit Costs[a]**	$0	$0	$0
E	**Participant Costs**			
	Total Costs	$10,950,631	$10,950,631	$40,475,213
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

	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] 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.

3.5 E-Power Wise Program

The E-Power Wise Program serves PPL Electric customers with 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 identified by the CSP 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 take-home 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:

> Providing low-income customers with information about the steps they can take to reduce their power consumption will enable 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 themselves. 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 Evaluation 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 energy savings take-home 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 energy efficiency measures (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): Outcomes include 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. As described there, two savings adjustments are necessary to calculate the E-Power Wise Program realization rate. The first, which adjusts the savings from the program's plan to the savings specified in the TRM, results in TRM-adjusted *ex ante* savings. The second adjustment incorporates the results of the program's QA/QC records review, the measure installation rate findings from the participant kit survey, and the behavior change findings from the customer telephone survey. Both methodologies are explained in more detail below; results from each adjustment are reported separately.

The E-Power Wise Program *ex post* verified savings for PY2 will be included in the PY2 Annual Report.

***Ex Ante* Adjustment Methodology**

The first adjustment modifies the savings reported in EEMIS (*ex ante* reported gross savings) based on actual kit measure characteristics. This adjustment accounts for differences between planning assumptions and the equipment that was actually distributed to participants, and brings the reported savings into alignment with the TRM. The results of this adjustment are the TRM-adjusted *ex ante* savings.

Savings Realization Rate Methodology

The second adjustment used to compute the program realization rate involves two components: the QA/QC records review findings and the self-reported installation rates of the measures included in the

energy kits. Realization rates that incorporate these installation rates will be reported in the PY2 Annual Report.

Telephone surveys are also used to collect data used to determine energy savings resulting from program-influenced behavior changes.

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. The EM&V CSP will also conduct quarterly records reviews comparing the CSP's electronic database with EEMIS, 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 One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process evaluation will be delivered with the final Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Impact evaluation 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, kit contents, 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 energy efficiency 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 to the program CSP on workshop attendance and kits delivered. 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 3-7. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-7: Summary of Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants[a]	$40,297	$40,297	$320,937
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal *EDC Incentive* Costs**	$40,297	$40,297	$320,937
B.1	Design & Development[b]	$0	$0	$0
B.2	Administration[b]	$0	$0	$0
B.3	Management[c]	$10,067	$10,067	$139,828
B.4	Marketing[b]	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$10,067	$10,067	$139,828
C	**EDC Evaluation Costs[b]**	$0	$0	$0
D	**SWE Audit Costs[b]**	$0	$0	$0
E	**Participant Costs**			
	Total Costs	$50,364	$50,364	$460,765
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] Beginning in PY3 Q2, the value of the kits and education (given for free to participants) 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.

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 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. The 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's 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 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 participants' 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 the number of 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 Evaluation 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. Client energy usage stability also improves, 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 their independent program evaluator evaluate the existing USP Low-Income WRAP and report energy savings achieved 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 recent discussions between the PA EDCs and the SWE in which the parties decided that Act 129 WRAP savings will be deemed values based on the most recent PA PUC-approved savings for each USP WRAP job-type from a prior period (based on billing/consumption analysis), until a billing analysis can be completed for Act 129 WRAP projects. PPL Electric submitted a CMP to the SWE describing this method.

The *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

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

Savings Realization Rate Methodology
E M&V efforts include review and verification of a random sample of contractor reports, WRAP V database records, and EEMIS data. Extensive reviews of the EEMIS and WRAP V database savings algorithms and underlying measures tables will be conducted.

PPL Electric inspects 60% of the full cost jobs and the SWE inspects a sample of Act 129 WRAP jobs. Given the contribution of this program's savings to the overall portfolio, as well as the limited resources, the EM&V CSP determined that no additional site visits were necessary.

Net-to-Gross Ratio Methodology
There is no free-ridership in this low-income weatherization program. Measures are installed at no cost to these 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.

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 sample, ensuring that participants from each job type are represented. One sample point per stratum will be reserved for the participant with the greatest number of measures installed. The EM&V CSP will request copies of all supporting documents for each of the sampled participants, including contractor reports, invoices, and PPL Electric's WRAP summary reports. The EM&V CSP will compared information within the supporting documents 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 resulting from participation in Act 129 Low-Income WRAP. The EM&V CSP will use these estimates prospectively to deem savings inPY4 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 One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process evaluation will be delivered with the final Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Report impact evaluation 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. The 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, which provide the energy audits and direct installation measures. CBOs also coordinate, under the direction of PPL Electric, 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 3-8.

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

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants[a]	$2,984,077	$2,984,077	$14,360,686
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$2,984,077	$2,984,077	$14,360,686
B.1	Design & Development[b]	$0	$0	$0
B.2	Administration[b]	$0	$0	$0
B.3	Management[c]	$184,265	$184,265	$1,276,259
B.4	Marketing[b]	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$184,265	$184,265	$1,276,259
C	**EDC Evaluation Costs[b]**	$0	$0	$0
D	**SWE Audit Costs[b]**	$0	$0	$0
E	**Participant Costs[d]**			
	Total Costs	$3,168,343	$3,168,343	$15,636,945
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 Q2, the value of the kits and education (given for free to participants) 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 is available to residential and institutional customers (government, non-profit, and schools). For each of these customer segments, the program uses a consistent delivery and administrative strategy; however, budgets, savings, and impacts 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 Evaluation 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 the first quarter of PY3 and will report results in the next quarterly report. The 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.

Savings Realization Rate Methodology
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 a comparison of rebate records and documentation to EEMIS reported values. Verification was also achieved through site visits conducted at a sample of sites.

The 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 heating and cooling degree days of cities stipulated in the TRM). This adjustment accounts for differences between planning assumptions and installed equipment and relies solely on information in the EEMIS tracking database. These adjustments result in the adjusted *ex ante*, bringing the reported savings into alignment with the TRM.

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 program savings is currently in progress for PY3 Q1 and will be reflected in the next quarterly report.

Net-to-Gross Ratio Methodology
The NTG ratio is determined through self report participant surveys with a sample of participants. The questions proposed in the free-ridership battery of survey questions were tailored to participants of the Renewable Energy Program to develop a free-ridership score using a scoring matrix. More detail about the free-ridership analysis can be found in the PY2 Annual Report, which will be 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.

3.7.3 Program Sampling

The EM&V CSP will conduct telephone surveys and post-installation site visits using sampling rates designed to meet a 90/10 confidence and precision level at the program level by year end. A subset of the sites chosen for the participant surveys will make up the sample for the records verification and site visits.

3.7.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process

evaluation will be delivered with the final Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Report impact evaluation 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, also plays a vital role in the Renewable Energy Program operation. Their responsibilities include reviewing rebate reservation forms, project documentation, and project completion reports; making initial determinations on project eligibility; issuing rebate payments; and tracking and reporting program data.

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

3.7.6 Program Finances

A summary of the project finances is presented in Table 3-9.

Table 3-9: Summary of Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$126,485	$126,485	$3,909,657
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$126,485	$126,485	$3,909,657
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$17,491	$17,491	$186,671
B.4	Marketing[a]	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$17,491	$17,491	$186,671
C	**EDC Evaluation Costs[a]**	$0	$0	$0
D	**SWE Audit Costs[a]**	$0	$0	$0
E	**Participant Costs[c]**			
	Total Costs	$143,976	$143,976	$4,096,328
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

	Category	IQ	PYTD	CPITD
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.[11]

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'

[11] Combined total for all target customer segments.

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 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 may be conducted on different samples of units, as not all units tested by contractors will need service (and for that reason, the post-servicing population will be smaller than the pre-servicing population).

In PY3, the EM&V CSP will conduct on-site inspections to verify baseline and post-installation conditions. The on-site inspections will be conducted independent of the services provided through the program. Individuals experienced with HVAC unit operation and/or evaluation will conduct the inspections to collect data on key system characteristics by conducting the following activities:

- Verify that reported unit data are correct and complete.
- Confirm and record unit manufacturer and model number, cooling capacity (tons), model number, model age, and unit type.
- Verify that the unit is operating as expected.
- Examine and record unit settings.

The EM&V CSP will use data collected during the inspection to verify data submitted by the HVAC Tune-Up Program implementation CSP.

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 will establish standard practices and will be used to determine the effect of the program on participating contractor's normal business practices.

The EM&V CSP will determine free-ridership among participant contractors through survey responses. Surveys were conducted in PY2 Q4. The NTG ratio will be reported in the PY2 Annual Report, which will be filed in November 2011.

3.8.3 Program Sampling

The EM&V CSP will survey a random sample of the HVAC contractors and conduct site visits for a sample of projects, in which they will consider building type, contractor level of participation in the program, and the range of measures implemented during PY3. Sampling procedures follow the HVAC Tune-Up Program CMP approved by the SWE.

3.8.4 Process Evaluation

The *PPL Electric Implementation of Act 129 Energy Efficiency & Conservation Plan, Program Year One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process evaluation will be delivered with the final Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Report impact evaluation in November 2012.

3.8.5 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.

3.8.6 Program Finances

A summary of PPL Electric's project finances is presented in Table 3-10. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-10: Summary of Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants[a]	$19,955	$19,955	$29,070
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$19,955	$19,955	$29,070
B.1	Design & Development[b]	$0	$0	$0
B.2	Administration[b]	$0	$0	$0
B.3	Management[c]	$79,182	$79,182	$714,654
B.4	Marketing[b]	$2,566	$2,566	$18,054
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$81,747	$81,747	$732,708
C	**EDC Evaluation Costs[b]**	$0	$0	$0
D	**SWE Audit Costs[b]**	$0	$0	$0

	Category	IQ	PYTD	CPITD
E	Participant Costs			
	Total Costs	$101,702	$101,702	$761,778
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 for each unit installed, using savings estimates provided by the EM&V CSP. Savings are claimed and reported by PPL Electric via information captured in the EEMIS database. Adjusted *ex ante* savings reflect any updates in savings calculations made to the TRM since PPL Electric's plan was approved, including changes to algorithms in the TRM. In addition, adjusted *ex ante* savings reflect any discrepancies in installed measure quantities or duplicate information discovered in the records and database reviews.

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.

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 measures installed by participants of the Residential Energy Assessment & Weatherization Program . Additional details about the free-ridership analysis and the scoring matrix are included in PPL Electric final Annual Report filed September 15, 2010. Information obtained by computing the NTG ratio will only be used to refine and improve program delivery.

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 72 records of PY3 participants, or 18 records per quarter. 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 One Process Evaluation* report dated September 15, 2010 contains the baseline process evaluation. The *Program Year Two Process Evaluation* report will update the PY1 process evaluation. The PY2 process evaluation will be delivered with the final Annual Report impact evaluation in November 2011. The PY3 process evaluation will be delivered with the final Annual Report impact evaluation 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 3-11. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-11: Summary of Program Finances - TRC Test

	Category	IQ	PYTD	CPITD
A.1	EDC Incentives to Participants	$25,699	$25,699	$168,717
A.2	EDC Incentives to Trade Allies	$0	$0	$0
A	**Subtotal EDC Incentive Costs**	$25,699	$25,699	$168,717
B.1	Design & Development[a]	$0	$0	$0
B.2	Administration[a]	$0	$0	$0
B.3	Management[b]	$86,760	$86,760	$691,028
B.4	Marketing[a]	$1,159	$1,159	$1,159
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$87,918	$87,918	$692,187
C	**EDC Evaluation Costs[a]**	$0	$0	$0
D	**SWE Audit Costs[a]**	$0	$0	$0
E	**Participant Costs**			

	Category	IQ	PYTD	CPITD
	Total Costs	$113,617	$113,617	$860,904
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] 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.[12]
- 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.

[12] 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. However, such comparative information could also have the opposite effect for some customers, leading low usage customers to increase their consumption. This is known as the "boomerang effect."

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[13] (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 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 estimate of the program impact will be unbiased if the model is properly specified and the error term of the model has an expected value of zero, conditional on the observed covariates. 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;
- The regression analysis controls for the effects of weather on consumption; and
- The regression analysis uses consumption data from before and after the treatment.

Factors affecting energy consumption that are unrelated to the program, such as macroeconomic-driven changes in income and employment, could bias estimates of program impacts. With the use of consumption data for program participants and non-participants before and after the beginning of the program, it will be possible to implement a difference-in-differences regression modeling strategy to control for such factors.

***Ex Ante* Adjustments Methodology**
Calculation of the *ex ante* savings estimates will be the responsibility of the program's third-party implementer. These savings will be calculated based on data from OPOWER programs with verified estimates of program impacts or from a partial billing analysis for months in PY3 Q1 and Q2. 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.

Savings Realization Rate Methodology
The PY3 savings realization rate will be estimated as the ratio of verified to *ex ante* savings 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.

[13] 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.

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 and 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 may 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.

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 on where and how customers heard about the program, their 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 would be 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 3-12. Per direction from the SWE, the TRC analysis is not included for this quarter.

Table 3-12: Summary of 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]	$125,771	$125,771	$1,082,851
B.4	Marketing	$0	$0	$0
B.5	Technical Assistance	$0	$0	$0
B	**Subtotal EDC Implementation Costs**	$125,771	$125,771	$1,082,851
C	**EDC Evaluation Costs[b]**	$0	$0	$0
D	**SWE Audit Costs**	$0	$0	$0
E	**Participant Costs**			
	Total Costs	$125,771	$125,771	$1,082,851
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[14]

– 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.[15] *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.[16] 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.[17]

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').

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.

---

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

[15] 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.

[16] Ibid.

[17] Ibid.

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*.[18]

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 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.

[18] Ibid.

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).[19]

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).

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.

[19] ibid.

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[20] 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, 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.[21]

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.[22]

– 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

[20] Ibid.
[21] Ibid.
[22] Ibid.

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

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.