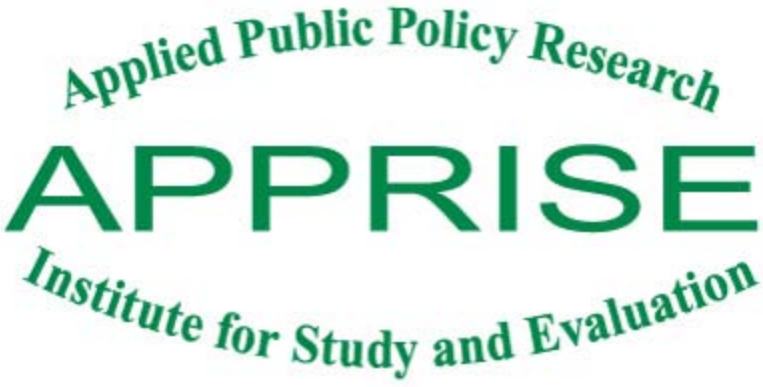

PECO Energy
2009 LIURP Evaluation
Final Report

April 2011

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Executive Summary

This report presents the findings from the Evaluation of PECO's 2009 Low Income Usage Reduction Program (LIURP). LIURP provides energy efficiency services and energy education to PECO's low-income customers to help them reduce their energy usage and increase the affordability of their energy bills. The Program addresses both electric and gas energy usage. This report describes the LIURP services and analyzes the impact of the Program on customers' energy usage, energy bills, and payments.

Evaluation

The goals of the evaluation were to analyze the LIURP services provided and the impacts of the services on participating customers. The activities that were undertaken included:

- *Process Review:* Review and update of LIURP program description.
- *Program Database Analysis:* Analysis of 2009 LIURP services, homes, and customer characteristics.
- *Program Impacts Analysis:* Analysis of LIURP impact on energy usage, energy costs, and bill payment.

PECO's LIURP

The Low Income Usage Reduction Program (LIURP) provides education, conservation, and weatherization measures to reduce electric and gas usage. Customers must meet the following usage and income eligibility criteria for program participation.

- Household usage levels that exceed 600 kWh per month for electric baseload, 1,400 kWh per month for electric heat, or 50 ccf per month for gas heat.[1]
- Residential customers with household income at or below 150 percent of the federal poverty level (FPL), or special needs residential customers with an arrearage and household income between 151 percent and 200 percent of the FPL.

CAP customers are targeted for Program services, but participation in CAP is not required for LIURP services. The CAP rate customer definition of high usage is 500 kWh. CAP customers are required to participate in LIURP if they are identified as high users.

The number of customers who receive LIURP services each year is largely determined by the annual program budget established in the settlement agreement of PECO's electric restructuring case (PUC Docket Numbers R-00973953 and P-00971265). The annual budget for 2009 was $7,825,000. In 2009, 9,429 customers received LIURP services.

[1] The required monthly gas usage was reduced from 100 to 50 ccf in 2009.

PECO contracts with CMC Energy Services to administer LIURP. PECO provides CMC with a list of eligible customers and their energy usage data. CMC recruits these households in descending order based on highest usage and largest arrearages. CMC also contacts households who are directly referred from external organizations, including social and governmental agencies. CMC conducts an energy audit to determine the behavioral changes and program measures required for usage reduction. Following the audit, the auditor schedules appointments for follow up work, by one or more subcontractors, to install measures.

Program Statistics

In 2009, 33,637 customers were evaluated for LIURP services. There were 7,085 customers who were ineligible for the program and 17,123 customers who were cancelled (both are greater than in 2008, but the number cancelled is very similar). The cancellations were due to customers' lack of response to contact attempts, refusal of services, moves, and lack of landlord consent.[2] In total, 9,429 customers received LIURP services in 2009.

Table ES-1 displays how program funds were expended in 2009. In total $7.285 million were spent. Approximately 69 percent was for weatherization measures, 24 percent was for audit and education, and six percent was for program administration.

Table ES-1
2009 LIURP Expenditures
Gas and Electric Treatments
By Category

Category	Amount Spent	Percent of Funds
Weatherization Measures	$5,412,641	69%
Audit/Education	$1,904,314	24%
PECO Administration	$502,258	6%
Solar Water Maintenance	$5,790	<1%
TOTAL	$7,825,003	100%

Table ES-2 displays the distribution of 2009 LIURP jobs by job type. The table shows that 63 percent of jobs are classified as baseload, meaning that measures primarily address electric baseload usage. However, the baseload jobs have lower job costs and represent only 21 percent of total costs. The average cost for measures on these jobs was $189. Gas heating jobs represent 16 percent of jobs and 58 percent of costs, averaging $2,071 in measure costs per home. Electric heating jobs averaged $2,393 per home.

[2] See Table III-3.

Table ES-2
2009 LIURP Service Delivery and Expenditures
By Job Type

Job Type	# of Jobs[1]	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	5,957	63%	$1,123,026	21%	$189
Electric Heating	352	4%	$842,401	16%	$2,393
Gas Heating	1,496	16%	$3,098,623	58%	$2,071
Low Usage	1,296	14%	$178,759	3%	$138
Electric Heat Low Use	278	3%	$60,598	1%	$218
Prior Year	42	<1%	$16,940	<1%	$403
Total	9,421	100%	$5,320,347	100%	$565

[1]There are eight accounts that had no weatherization costs.

Participant Characteristics

PECO's LIURP database allows for extensive analysis of home and participant characteristics. Some of the important findings from this analysis include:

- *Supplemental heat usage:* Over forty percent of the customers served through LIURP use electric supplemental heat (3,862 customers).

- *Air conditioning:* Air conditioning is used by 97 percent of the LIURP participants (9,140 customers).

- *Renters:* PECO's LIURP is successful in serving renters. Just over half of the customers served are renters (4,738 customers). Renters are not eligible for refrigerator replacement, air conditioner replacement, or furnace replacement.

- *Vulnerable households:* Fifty-nine percent of the customers had a child (5,550 customers) and over 20 percent had an elderly member (1,983 customers).

- *Poverty level:* Approximately 26 percent had income below 50 percent of the FPL (2,424 customers), 45 percent had income between 51 and 100 percent of the FPL (4,241 customers), 23 percent had income between 101 and 150 percent of the FPL (2,196 customers), four percent had income between 151 and 175 percent of the FPL (340 customers), and two percent had income above 175 percent of the FPL (228 customers).

- *CAP:* Ninety percent of LIURP recipients were CAP participants (8,462 customers).

Usage Impacts

Energy usage was analyzed for the year prior to the LIURP visit and for the year after service delivery was completed. The analysis included as close to a full year of data pre and post-treatment as possible. Data were available for approximately 74 percent of the treated households.

Energy usage data were weather-normalized in the pre and the post usage period to ensure that changes in energy usage are due to changes in usage patterns, rather than due to changes in weather. We used a degree-day normalization process to conduct this analysis. Results were similar to PRISM, but allowed for inclusion of a much larger number of homes.

Table ES-3 summarizes the overall usage impact results.

- *Baseload jobs* had average savings of approximately 1,054 kWh, or 8.7 percent of pre-treatment usage.
- *Electric heat jobs* had average savings of approximately 1,686 kWh, or 7.3 percent of pre-treatment usage.
- *Gas heat jobs* had average savings of approximately 92 ccf, or 8.4 percent of pre-treatment usage.

Table ES-3
Average Usage and Savings

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload (kWh)					
Non Normalized	4,463	11,900	11,166	734	6.2%
Degree Day Normalized	4,463	12,144	11,090	1,054	8.7%
Prism Normalized	2,385	12,019	10,967	1,052	8.8%
Electric Heat (kWh)					
Non Normalized	227	20,786	19,249	1,537	7.4%
Degree Day Normalized	227	23,179	21,493	1,686	7.3%
Prism Normalized	106	22,539	20,612	1,927	8.5%
Gas Heat (ccf)					
Non Normalized	1,138	1,083	968	115	10.6%
Degree Day Normalized	1,138	1,090	998	92	8.4%
Prism Normalized	524	1,069	979	90	8.4%

We compared the usage impact results to historical savings results.[3]

[3] Table IV-3 provides the historical comparison of energy savings by job type.

- The 2009 electric baseload jobs had slightly lower savings than the 1999-2008 average. Savings were 8.7 percent in 2009 compared to the historical average of 9.2 percent, though savings were higher than in 2008, when they were 6.5 percent. Weatherization spending, at $186 in 2009, was also lower than the nine-year average of $224.

- Electric heat jobs had average savings that were lower than the 1999-2008 average. Savings were 7.3 percent in 2009 compared to 8.2 percent for the ten-year average. Costs for 2009 were significantly higher than the ten-year average, at least partially because a greater percentage of electric heat jobs in 2009 had major measures than in other recent years.

- Gas heat jobs had pre-treatment usage and savings that were lower than the 1999-2008 average. Pre-treatment usage was 1,090 compared to the ten-year average of 1,196, approximately nine percent lower. Gas savings were 8.4 percent in 2009, as compared to 10.9 percent for the ten-year average. Gas heat measure costs were greater than the ten-year average.

The lower pre-treatment usage for the gas heating jobs may be due to the longevity of PECO's LIURP and their historical treatment of high usage customers. After so many years of providing LIURP to the highest use customers, there are fewer high usage customers to provide LIURP treatments to.

Measure Savings

The analysis also estimated the impact of specific LIURP measures on kWh and ccf savings. Table ES-4 displays results from this analysis. Savings for most measures were computed by running a regression model that predicted savings based on the measures provided and home and customer characteristics. Estimates were developed for refrigerators, furnaces, boilers, and insulation.

Because almost all LIURP participants received four CFLs, there was no variation in this measure to statistically estimate savings. Therefore, we estimated savings for CFLs by examining total annual kWh savings for electric baseload jobs that only received CFLs. These customers saved an average of 921 kWh, much higher than the 274 kWh that might be expected to be saved if each of the four CFLs replaced 60 watt incandescent bulbs that were used an average of four hours per day.[4] Therefore, we expect that a significant part of these savings is due to education and resulting changes in behavior.

In the cost and cost-effectiveness columns of the table, we provide estimates using only the CFL costs and estimates that include the CFL costs and the audit/education costs. Even when the audit/education costs are included, the cost per kWh saved over a 5-year lifetime is seven cents per kWh. This indicates that there may be potential to cost-effectively increase

[4] (60 watts – 13 watts)*.001 * 365 days * 4 hours/day * 4 bulbs = 274 kWh

savings by providing more CFLs to LIURP participants. It also indicates that the LIURP education process is very effective.

Table ES-4
Measure Savings Estimates

	Savings	Cost/Home	$/Unit Saved	Measure Life	$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	921 (±121)	$76/$278	$0.08/$0.30	5	$0.02/$0.07
Refrigerator	627 (±330)	$793	$1.26	12	$0.14
Gas Heat - ccf					
Gas Furnace	89 (±43)	$2,618	$29.42	15	$2.83
Boiler	79 (±38)	$3,281	$41.53	15	$4.00
Insulation	61 (±26)	$631	$10.34	15	$1.00

LIURP Cost Effectiveness

We also analyzed the cost-effectiveness of LIURP by job type. Table ES-5 estimates the cost per unit saved based on different assumptions about measure life. These costs should be compared to retail rates to evaluate the cost-effectiveness of the program at different measure lives. The most reasonable assumption for electric baseload reduction is probably a five to seven-year measure life. Baseload electric services, at a cost of ten cents per kWh saved with a 5-year measure life and five cents per kWh saved with a 10-year measure life, are cost-effective. Gas heat savings probably have a 10-year to 15-year measure life. Under the 15-year measure life assumption, the cost per ccf saved is $2.28, which is not cost-effective with current gas prices.

Table ES-5
Cost Per Unit Saved
By Measure Life Assumption

	#	Average Savings	Average Total Cost	Cost Per Unit Saved	5-Year Measure Life	10-Year Measure Life	15-Year Measure Life
Electric Baseload							
Electric (kWh)	4,463	1,054	$438	$0.42	$0.10	$0.05	$0.04
Gas (ccf)	181	5	$77	$16.29	$3.78	$2.12	$1.58
Electric Heat							
Electric (kWh)	227	1,686	$2,769	$1.64	$0.38	$0.21	$0.16
Gas Heat							
Electric (kWh)	1131	668	$178	$0.27	$0.06	$0.03	$0.03
Gas (ccf)	1138	92	$2,178	$23.67	$5.47	$3.07	$2.28

Bill and Payment Impacts

The evaluation also included an analysis of the charges and payments made by customers in the pre and post-treatment periods. Table ES-6 summarizes the results of this analysis. While total bills and charges declined by $25, total payments and credits increased by $11 from the pre to post period. This resulted in an increase in the total bill coverage rate of approximately 2.5 percentage points. Customers were paying an average of 97.5 percent of their bills prior to LIURP treatment and an average of 100 percent of their bills following LIURP treatment.

Table ES-6
Bills, Payments, and Coverage Rates
Pre and Post-LIURP Treatment

	#	Pre	Post	Change	Percent Change
All Job Types					
Total Bills and Charges	3,742	$1,436	$1,411	-$25	-1.7%
Total Payments and Credits		$1,374	$1,385	$11	0.8%
Total Coverage Rate		97.5%	100.0%	2.5%	2.6%

Key Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to 9,429 customers in 2009, many of whom had vulnerable household members. They have kept program administration costs low, at just six percent of program expenditures.

Reductions in energy usage were slightly lower than in previous years. At least for customers receiving gas heating services, the reduction in energy usage is probably due to lower pre-treatment energy usage. PECO has been providing LIURP services for many years, and has furnished LIURP to many of its highest usage customers.

We have the following recommendations to continue to deliver effective services and potentially improve savings.

1. *Targeting:* It is a challenge to continue to find high usage customers to treat in the program. Results from this evaluation show that electric heating customers with usage over 26,000 kWh saved 10.5 percent of pre-treatment usage and electric heating customers with usage below 16,000 kWh saved .6 percent of pre-treatment usage, showing the importance of targeting higher usage customers. PECO should continue to make targeting the highest usage households a priority for the program.

2. *CFL's:* The program provides four CFLs to nearly every household served in LIURP. The measure saving analysis found that customers who only received

CFLs had high average savings. PECO should consider providing additional CFLs to LIURP participants.

3. *Education:* The high savings for households that only received CFLs, as well as previous customer survey research conducted as part of PECO's USF evaluation, indicate that the energy education conducted as part of LIURP is successful. We believe this is due to the extensive education process that occurs during the audit and the reinforcement that occurs through letters and phone calls. PECO should continue the emphasis on education.

4. *Evaluation:* The evaluation methodology that has been used examines gross savings, the difference between weather-normalized pre and post usage. PECO should consider using a comparison group to calculate the net savings due to the program. The net savings would be measured as the difference between the change for the treatment group and the change for the comparison group. Because electric baseload usage has been increasing over time, this may show a more accurate estimate of a greater reduction in electric usage that is due to LIURP. Such an analysis would also control for other factors, such as changes in energy prices, which may lead customers to change their energy usage behavior even in the absence of LIURP. However, the Pennsylvania Public Utility Commission does not require the use of a comparison group.

I. Introduction

This report presents the findings from the 2009 PECO LIURP evaluation. PECO's LIURP provides energy efficiency services and energy education to low-income households to help them reduce their energy usage and increase the affordability of their energy bills. This report describes the Program services and analyzes the impact of the Program on customers' energy usage, energy bills, and payments.

A. Background

PECO Energy has implemented a set of Universal Services Programs to meet requirements set by Pennsylvania's electric and gas restructuring legislation and various Public Utility Commission orders and agreements. The Universal Service goals are:

- To protect consumers' health and safety by helping low-income customers maintain affordable utility service.
- To provide affordable utility service by making available payment assistance to low-income customers.
- To help low-income customers conserve energy and reduce residential utility bills.
- To ensure utilities operate universal service and energy conservation Programs in a cost-effective and efficient manner.

The Universal Services Programs include:

- A CAP payment assistance Program that is designed to make energy bills more affordable by furnishing payment subsidies.
- A LIURP Program that is designed to make energy bills more affordable by helping to reduce usage.
- A CARES Program that is designed to assist households in developing appropriate strategies for maintaining energy service.
- A MEAF hardship fund Program that is designed to furnish emergency payments to households that cannot pay their energy bills.

B. Evaluation Objectives and Activities

The goals of the evaluation were to analyze the LIURP services provided and the impacts of the services on participating customers. The activities that were undertaken as part of the evaluation included:

- *Process Review:* We reviewed and updated the LIURP program description.

- *Program Database Analysis:* We conducted analysis of the 2009 LIURP Program database, which included data on services delivered, homes serviced, and customers served.

- *Program Impacts Analysis:* We analyzed billing and transactions data to estimate the impact of the Program on energy usage, energy costs, and bill payment.

C. Organization of the Report

Four sections follow this introduction.

- Section II – Low Income Usage Reduction Program: This section describes PECO's LIURP design and implementation.

- Section III – Program and Participant Statistics: This section provides descriptive statistics on LIURP services delivered in 2009 and the customers who received these services.

- Section IV – Usage Impacts: This section analyzes the impacts of the LIURP on customers' electric and gas usage.

- Section V – Payment Impacts: This section analyzes changes in customers' bills, payments, and arrearages after receiving Program services.

- Section VI – Summary of Findings and Recommendations: This section provides a summary of the key findings and furnishes recommendations for PECO's LIURP based on the analyses in this report.

APPRISE prepared this report under contract to PECO. PECO facilitated this research by furnishing Program data to APPRISE. Any errors or omissions in this report are the responsibility of APPRISE. Further, the statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of PECO.

II. Low Income Usage Reduction Program

PECO has implemented a set of Universal Service Programs to comply with Public Utility Commission Regulations. The programs are designed for low-income, residential customers. One of these programs is the Low Income Usage Reduction Program (LIURP).

The Pennsylvania Public Utility Commission (PUC) requires that all electric and gas utilities in the state offer a Low-Income Usage Reduction Program (LIURP) to their customers. PECO has contracted with CMC Energy Services (CMC) to administer LIURP since the implementation of the Program in 1991. PECO and CMC worked together to create Program procedures that complied with Chapter 58 guidelines, and continue to work together to design and implement Program changes when necessary. CMC sub-contracts with five subcontractors to install major Program measures.

The total budget was $7.825 million with $5.6 million for electric usage reduction and $2.225 million for gas usage reduction.

A. Program Management and Administration

LIURP managers and staff have many years of experience with LIURP. PECO's analyst is responsible for overseeing overall LIURP production, quality assurance, and the annual Program evaluation. She is also responsible for managing the LIURP budget, refining the Program, and analyzing CMC reports.

CMC has the following staff responsible for PECO's LIURP:

- LIURP Manager: The LIURP Manager has 17 years of PECO LIURP experience. She is responsible for monitoring Program performance, including training, sub-contractor performance and customer satisfaction. She is also responsible for coordinating Program activities, making recommendations for and implementing Program improvements, analyzing Program data, and reporting to PECO.

- LIURP Office Manager: The LIURP Office Manager has 16 years of PECO LIURP experience. She is responsible for supervising daily LIURP work activities. She is also responsible for ensuring accurate and timely data input, evaluating training and performance, managing customer service calls, and following up on referrals.

- LIURP Quality Control Manager: The LIURP Quality Control Manager has 11 years of PECO LIURP experience. He is responsible for providing training and technical support to field staff and sub-contractors. He is also responsible for completing pre and post work inspections and resolving job issues.

CMC meets with PECO monthly for performance reviews and bi-monthly for Program review meetings. PECO conducts monthly site visits and inspections and has regular telephone and/or e-mail contact with CMC.

CMC staff conduct the LIURP audit and develop a work order for additional measures to be installed on subsequent visit(s) by the program subcontractors who assist in the implementation of LIURP.

- Premier Contractors completes weatherization work, air sealing, insulation, and air conditioner replacements.
- Davis Modern Heating completes house heating and water heating repair and replacement work.
- McCann Company completes house heating and water heating repair and replacement work.
- Colonial Electrical installs water heater timers and line voltage thermostats.
- Whirlpool delivers new refrigerators.

B. LIURP Eligibility and Benefits

PECO customers must meet the following criteria to participate in the Program.

- Residential customer
- Income requirement
  - Income at or below 150 percent of the Federal Poverty Level (FPL), or
  - Income between 150 and 200 percent of the FPL[5]
- Usage requirements
  - At least 500 kWh average monthly usage for CAP customers
  - At least 600 kWh average monthly usage for baseload customers
  - At least 1,400 kWh average monthly usage for electric heating customers
  - At least 50 ccf average monthly usage for gas heating customers

LIURP provides weatherization and conservation measures to promote usage reduction. Energy education tailored to the individual household's energy use is also provided to facilitate usage reduction.

The following major measures may be provided:

- Insulation
- Air sealing
- Heating system repair or replacement
- Air conditioner replacement
- Refrigerator replacement
- Water heater timer installation

The following minor measures may be provided:

[5] Since 1998, LIURP regulations have permitted companies to spend up to 20 percent of their annual Program budgets on customers with income between 150 and 200 percent of the FPL.

- Water heater and pipe wraps
- Line voltage thermostats
- Faucet aerators
- Showerheads
- Smoke detectors
- Carbon monoxide detectors
- CFL bulbs

C. Qualification of Leads

PECO sends a quarterly download of high usage, low-income customers to CMC.[6] The majority of LIURP recipients are recruited from this list. Customers are also referred to LIURP through the following mechanisms:

- PECO Universal Services staff
- CAP call center
- Community Based Organizations (CBOs)
- Government agencies
- Prior Program recipients
- CARES customers

The electronic file downloaded from PECO contains high energy users who are also LIHEAP recipients, Customer Assistance Program (CAP) participants, payment troubled customers, or customers with multiple payment agreements. CMC reviews the lists and eliminates customers who have received LIURP within the past two years, refused Program services, or moved within the past six months. Typically, after these removals, the remaining customers on the downloaded file are eligible for and receive services from LIURP.

CMC screens all referrals from other sources to determine Program eligibility. If income and usage history are available and the customer is determined to be eligible, CMC enrolls the customer immediately. If income eligibility cannot be determined from PECO's system, CMC mails income documentation forms to the customer. Typically, 25 to 30 percent of customers referred through other sources are determined to be eligible for and receive services from LIURP. This compares to about 79 percent who are eligible and 28 percent who receive treatment overall.

Referred customers may not receive LIURP services because the customer:

- Refused LIURP services.
- Has insufficient usage history.[7]
- Has an inactive account.

[6] This is done through a three step process.
[7] This may be the case if the customer recently moved into the home.

- Has income over the eligibility limit.
- Is non-responsive to contacts by CMC.
- Has recently, or is planning, to move.
- Is deceased.
- Has usage below the required level.[8]
- Is a tenant and has a landlord who will not provide consent.

CMC is required to obtain consent from the landlord to provide services to a tenant. A landlord may not give approval because he or she wants to choose Program measures or is evicting the tenant. [9] Some landlords never respond to CMC inquiries. CMC estimates that they are unable to obtain landlord consent for about seven percent of renters.[10]

Approximately 90 percent of customers who receive LIURP services are identified through the downloaded list, and about 10 percent through other referrals.

D. Customer Outreach

CMC's customer service representatives contact potential Program participants by telephone to explain Program services, obtain customer information, and confirm or determine eligibility. If the customer is eligible, an appointment is scheduled for the energy audit. CMC will attempt to make this contact 25 to 30 times by telephone and one time by mail over a 90-day period. Information collected during this contact includes the following:

- Name of person responsible for bill payment
- Age of each household member
- Income sources for each household member
- Income amounts for each household member
- Property status and, if applicable, landlord contact information
- Monthly amount of mortgage or rent
- Housing type
- Occupation
- Employment status, marital status and level of education

E. Job Types

There are two different LIURP job types: Baseload and Heating. Baseload jobs focus on a household's lighting and appliances. Heating jobs include services such as weatherization, insulation, and heating system repair or replacement. Both heating and baseload issues in a household are addressed when necessary.[11]

[8] There are some hardship cases where PECO makes exceptions to the usage requirement.
[9] Landlords are not required to contribute to the cost of LIURP services.
[10] PECO Energy Universal Services Program, Final Evaluation Report, April 2006, APPRISE.
[11] Renters do not receive appliance replacement.

F. Service Delivery

CMC prioritizes CAP participants for LIURP service delivery. All CAP participants with monthly usage above 500 kWh are considered for LIURP. Those with the lowest income and the greatest CAP benefits receive the highest priority. CMC prioritizes remaining LIURP participants by energy use and income.

The first step in service delivery is the Program audit, performed by CMC staff. The auditor verifies the previously reported household characteristics, including income, number of household occupants, age of home, and years of occupancy. He or she also calculates the average household energy use per day, the energy use for each household appliance, temperature settings, and water temperature. Based on this information, the auditor may wrap the water heater and pipes, and install aerators, smoke detectors, showerheads, and CFLs during this initial audit visit.

CMC schedules the appropriate sub-contractors to complete any necessary major measures, such as insulation, heating system repair or replacement, or new appliances. A work order is sent to the subcontractor to communicate the work that is needed. CMC requires that major measures be installed within 30 days of the initial audit.

PECO and the PUC have pre-approved all of the minor and major LIURP measures. They have placed no cap on the amount of money spent per home. The minor measures, particularly smoke detectors and CFLs, are much more commonly provided than the major measures.

G. Energy Education

PECO and CMC designed the energy education portion of LIURP to facilitate customers' clear understanding of the reasons for high energy use, and to communicate how their behaviors contribute to energy use and energy bills. The auditor provides the primary LIURP energy education session during the initial audit visit. This session lasts at least 30 minutes. Further education is often provided by subcontractors when measures are installed, and by other CMC quality control inspectors during quality control inspections and follow-up telephone calls.

During the initial education session, the educator reviews the customer's audit results and identifies ways that the customer can modify the behaviors of household members to save energy and money. The auditor and the customer set a monthly usage and bill reduction goal for the household. The educator also provides the customer with an education package, which includes the following materials:

- Tips for saving energy
- An energy calculator
- 'Hazards of Space Heating' pamphlet
- Energy Savers calendar
- Energy cost estimate form

- Energy saving recommendations list based on the household's energy use
- 'Does Your Money Run Out' booklet
- Referrals to CAP rate

The educator reviews these educational materials with the customer, and compares the household's energy cost estimate form to the household's actual energy bill. Additionally, the educator refers the customer to programs and agencies that might help him or her meet household needs, and answers any questions the customer may have about the Program or the education session. The educator reviews the measures that have been installed and those that will be installed by subcontractors. In addition, the educator reviews the LIURP follow-up procedures that the customer can expect.

For one year after LIURP services have been provided, PECO and CMC monitor the customer's energy usage monthly. CMC mails monthly progress letters to customers to highlight any changes in monthly usage, as compared to the customer's individual goal. Each quarter CMC revises the letters to emphasize energy saving tips that are specific to the current season. CMC provides an additional telephone energy education session to customers who do not reduce energy usage after they receive LIURP services. In some cases an auditor is sent back to the home for reinforcement.

H. Quality Control

Three methods primarily used for LIURP quality control are:

- An annual evaluation, conducted by an independent program evaluator.
- Customer satisfaction surveys administered by CMC.
- Inspections by the CMC Quality Control Manager and PECO's LIURP Manager.

CMC conducts customer satisfaction surveys during post delivery site inspections, by telephone, and by mail. CMC reported that the surveys show customers increased their knowledge of energy conservation through Program participation. Customers reported that they were satisfied with LIURP and with the new appliances that the Program provided.

CMC's Quality Control Manager inspects approximately 30 percent of LIURP jobs. The inspector works from an inspection checklist, and has the customer satisfaction survey, the home's audit results, and the completed work order to assist in the inspection. The inspector also conducts blower door, heating, and carbon monoxide testing, and confirms the presence of all invoiced measures. In addition to post-completion inspections, the inspector sometimes accompanies CMC staff on audits, and sub-contractor staff on installations.

When the inspector finds missed opportunities or small mistakes, he fixes the problem and provides feedback to the individual who performed the work. For larger mistakes, or discrepancies in quantities invoiced and quantities received, the inspector fails the job and allows CMC or subcontractor staff 10 business days to fix the problems and send written confirmation of resolution to the inspector. Depending on the nature of the problem, the inspector may return to the site to re-inspect.

The PECO LIURP manager also randomly selects home for visits. She visits these homes and confirms that the work listed on the invoice was performed in the home.

The LIURP inspection process helps to ensure high quality work, and highlights areas for potential improvement. Inspection findings led to the addition of LIURP measures including central AC maintenance and an anti-spill switch for heating systems.

I. Data and Reporting

LIURP databases contain the following information:

- Personal and household demographics
- Landlord contact information
- Audit results
- Quantity and costs of installed measures
- Referrals made to other programs
- Post treatment follow-up outreach results
- Completion dates and usage history

CMC conducts data entry every week. CMC and PECO check the database for completeness and accuracy. These data are used to generate regular reports, including:

- Completed jobs compared to projected jobs
- Program costs by category
- Average cost per job
- Completed jobs by type
- Outreach call volume
- Customer demographics

CMC and PECO monitor Program data monthly and the independent evaluator monitors Program data annually. In addition to this report, CMC and PECO produce an annual report to the PUC.

J. LIURP Training

PECO states in their contract with CMC that they require LIURP staff members to be adequately trained. CMC's Quality Control Manager assesses the training needs of the CMC field and sub-contractor staff. The CMC Office Manager assesses the training needs of the CMC administrative staff. CMC provides full training to each LIURP staff member at the time of hire, and additional training as needed.

CMC provides LIURP staff with diagnostic training through the Pennsylvania College of Technology, state certification, and auditor certification. CMC also sends staff members to Affordable Comfort conferences. PECO provides LIURP staff with training on mainframe connection and procedures, the Universal Services Programs, customer service procedures,

and safety hazards. PECO also provides LIURP staff with the opportunity to attend conferences.

Subcontractors only attend trainings that are relevant to the Program measures that they install. CMC provides subcontractors with in-field training as needed.

K. Program Coordination

CMC maintains a LIURP referral list consisting of other Universal Services Programs and state and county agencies that provide assistance to low-income customers. CMC staff make referrals during the initial energy audit, as well as during inspection and post treatment follow-up calls. During the follow-up call, CMC staff members ask customers whether they were able to obtain any benefits from the referrals they were given. Additionally, the CMC auditor provides CAP and LIHEAP applications to customers at the time of the LIURP audit.

Participation in LIURP is a requirement of PECO's CAP. Historically, PECO and CMC have not enforced this requirement. However, beginning in Fall 2005, a procedure was initiated in which CMC sends a list of CAP customers who refused LIURP services to PECO, and PECO sends a reminder letter that restates CAP requirements. Most customers who received the letter have agreed to receive LIURP services.

One potential method by which PECO could improve program cost effectiveness may be to integrate delivery of baseload services with the publicly funded Weatherization Assistance Program (WAP) or other utility programs.[12]

[12] CMC currently makes referrals to WAP.

III. Program and Participant Statistics

This section provides statistics on the LIURP services that were provided in 2009, as well as the characteristics of the homes and the customers who were served by the Program.

A. 2009 Customer Participation

PECO screened 33,637 customers for LIURP services in 2009. Table III-1 shows that 7,085 customers were not eligible, 17,123 were cancelled, and 9,429 received Program services.

Table III-1
Customers Evaluated for Program Services

Category	Number	Percent of Total
Ineligible	7,085	21%
Cancelled	17,123	51%
Treated	9,429	28%
TOTAL Evaluated	33,637	100%

Table III-2 displays the reasons why customers were deemed ineligible for LIURP. The largest group, 64 percent (4,542 customers), was not eligible because they had usage that was below the eligibility guidelines, which is much larger than last year, when only 24 percent (1,036 customers) had usage below the eligibility guidelines. This points to the challenge of continuing the serve high usage customers. Twelve percent were ineligible due to previous treatment by LIURP. Eleven percent did not submit income verification, while six percent were not eligible due to income that was above the guidelines. Four percent did not have a sufficient usage history, and one percent was commercial accounts.

Table III-2
Ineligible Customers

Category	Number	Percent of Total
Usage below guidelines	4,542	64%
Previously Treated in LIURP	874	12%
Income verification not submitted	800	11%
Over income	455	6%
Insufficient Usage History	318	4%
Commercial Account	70	1%
Scope of Work Beyond Guidelines	26	<1%
TOTAL Ineligible	7,085	100%

Table III-3 displays reasons why customers were cancelled. The largest group of customers, 44 percent, made no response to contact attempts. CMC attempts to contact customers 25 to 30 times prior to removing customers from the targeted list. Another large group of customers, 32 percent, had inactive accounts. Nine percent were cancelled because of a planned move. Seven percent were cancelled because landlord consent was not obtained, and four percent refused services.

Table III-3
Cancelled Customers

Category	Number	Percent of Total
No response to contact attempts	7,566	44%
Inactive account	5,489	32%
Customer moving	1,551	9%
No landlord consent	1,244	7%
Customer refused	694	4%
Customer cancelled	211	1%
No show	199	1%
Unsafe conditions	134	1%
Customer died	31	<1%
Auditor cancelled	4	<1%
TOTAL Cancelled	17,123	100%

B. 2009 LIURP Services

This section describes LIURP services that were delivered in 2009. The total budget was $7.825 million with $5.6 million for electric usage reduction and $2.225 million for gas usage reduction. Table III-4 shows the distribution of this spending. Sixty-nine percent was spent on weatherization measures and labor, 24 percent was spent on audits and education, six percent was spent on PECO administration, and less than one percent was spent on solar water maintenance.

Table III-4
2009 LIURP Expenditures
By Category

Category	Amount Spent	Percent of Funds
Weatherization Measures	$5,412,641	69%
Audit/Education	$1,904,314	24%
PECO Administration	$502,258	6%
Solar Water Maintenance	$5,790	<1%

TOTAL	$7,825,003	100%

Table III-5 displays the distribution of LIURP jobs and expenditures by job type. While 63 percent of jobs are classified as baseload, meaning that measures primarily address electric baseload usage, these are lower cost jobs and represent approximately 21 percent of total weatherization costs. The average cost for measures on these jobs is $189. Gas heating jobs represent 16 percent of jobs and 58 percent of costs, averaging $2,071 in measure costs per home. Electric heating jobs average $2,393 per home.

Table III-5
2009 LIURP Service Delivery and Expenditures
By Job Type

Job Type	# of Jobs[1]	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	5,957	63%	$1,123,026	21%	$189
Electric Heating	352	4%	$842,401	16%	$2,393
Gas Heating	1,496	16%	$3,098,623	58%	$2,071
Low Usage	1,296	14%	$178,759	3%	$138
Electric Heat Low Use	278	3%	$60,598	1%	$218
Prior Year	42	<1%	$16,940	<1%	$403
Total	9,421	100%	$5,320,347	100%	$565

[1]There are eight accounts that had no weatherization costs.

Table III-6 provides a more detailed breakdown of the type of work done in LIURP jobs, based on CMC's classification of measure types. Many jobs received more than one type of service. Almost all of the customers received baseload services, but only six percent received a refrigerator replacement. Approximately 16 percent received air sealing and 15 percent received weatherization. Nine percent received insulation, and seven percent received a heating system tune-up.

Table III-6
2009 LIURP Service Delivery and Expenditures

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Baseload	9,012	96%	$1,013,285	19%	$112
Refrigerator Replacement	542	6%	$430,160	8%	$794
Air Sealing	1,513	16%	$432,984	8%	$286
Weatherization	1,450	15%	$440,498	8%	$304
Insulation	850	9%	$685,889	13%	$807
Electrical	571	6%	$451,034	8%	$790
Heating System Tune Up	706	7%	$269,218	5%	$381
Heating System Replacement	382	4%	$1,411,568	27%	$3,695

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Air Conditioner Replacement	138	1%	$97,212	2%	$704
Water Heater Replacement	107	1%	$79,393	1%	$742
Water Heater Service	51	1%	$6,812	<1%	$134
Solar Water Heater System Repair	4	<1%	$2,294	<1%	$574
TOTAL	9,421	100%	$5,320,347	100%	$569

Table III-7 provides information on the frequency of individual measures installed through LIURP. Some of the key pieces of information from this table are described below.

- *Health and safety:* Almost 12,000 smoke detectors were provided in approximately 5,000 homes.

- *Compact fluorescent light bulbs:* CFL's were provided to nearly all the homes serviced. On average, four bulbs were provided to each home serviced. As there was very little variation in the number of bulbs provided per home, almost all homes received four CFLs.

- *Refrigerator replacement and removal:* Refrigerators were replaced in 540 homes and second refrigerators were removed in 49 homes.

- *Air conditioner replacement:* Window air conditioners were replaced in 138 homes.

- *Aerators and showerheads:* A total of 3,981 aerators were provided in 1,925 homes and 2,111 showerheads were provided in 1,781 homes.

- *Water heaters:* Electric water heater timers were provided in 339 homes and water heater replacements were provided in 105 homes.

- *Air sealing:* Air sealing was provided in over 1,500 homes. As expected, most of the customers who received air sealing also received a blower door test.

- *Insulation:* Insulation was provided in over 1,000 homes.

- *Heat system repair:* Heating system repair work was provided to 440 homes.

- *Heating system replacement:* Heat pumps were replaced in 33 homes, furnaces in 136 homes, and boilers in 211 homes.

- *Solar water heaters:* Four homes received solar water heater repair.

Table III-7
2009 LIURP Service Delivery and Expenditures
By Measure Type

Measure	Number of Jobs	% of Jobs	Total Number
Smoke Detector	4,986	53%	11,674
Smoke Detector Battery	636	7%	1,354
Other Health and Safety	1,505	16%	2,571
CFLs	9,006	96%	35,761
Refrigerator Removal	49	<1%	49
Refrigerator Replacement	540	6%	540
AC Maintenance	38	<1%	38
Air Conditioner Replacement	138	1%	201
Aerator	1,925	20%	3,981
Showerhead	1,781	19%	2,111
Water Heater Pipe Insulation	327	3%	327
Water Heater Tank Insulation	41	<1%	41
Water Heater Labor	50	1%	50
Water Heater Part	36	<1%	175
Electric Water Heater Timer	339	4%	339
Water Heater Replacement	105	1%	105
Blower Door Test	1,396	15%	1,396
Air Sealing	1,522	16%	1,522
Duct/Pipe Insulation	436	5%	436
Weatherization	948	10%	948
Insulation	1,031	11%	1,031
Electric Labor	178	2%	178
Electrical Part	116	1%	9,113
Manual Thermostat	222	2%	234
Programmable Thermostat	394	4%	466
Line Voltage Thermostat	305	3%	1,227
Heating System Labor	273	3%	273
Heating System Part	440	5%	9,498
Clean and Tune	544	6%	544
Furnace Filter	55	1%	57
Electric Baseboard	81	1%	218
Heat Pump	33	<1%	33
Furnace	136	1%	136

Measure	Number of Jobs	% of Jobs	Total Number
Gas Boiler	211	2%	211
Solar Water Heater Repair	4	<1%	4

C. 2009 LIURP Home Characteristics

CMC collects detailed information on customers who receive LIURP services, which allows for an in-depth analysis of the homes treated by the Program. We first examine the weather-normalized pre-treatment usage of customers who received LIURP treatments. Table III-8 shows that customers who received baseload services had average usage of 12,144 kWh, electric heating customers had average usage of 23,179 kWh, and gas heating customers had average gas usage of 1,090 ccf.

Table III-8
Pre-Treatment Usage
Weather Normalized

Job Type	Number of Jobs	Jobs with Data	Electric Use (kWh)	Gas Use (ccf)
Baseload	5,961	4,463	12,144	740
Electric Heating	352	227	23,179	1,033
Gas Heating	1,496	1,131	9,552	1,090
Low Usage	1,298	1,003	6,943	545
Electric Heat Low Use	279	123	11,043	-
Prior Year	43	29	11,263	1,128
Total	9,429	6,976	11,312	973

[1]There are only ten electric heating jobs with gas usage and 73 low usage jobs with gas usage.

Table III-9 displays the primary heating source for LIURP jobs by job type and overall. Approximately 75 percent of the homes served have utility gas as their primary heating source. Fifteen percent use fuel oil and nine percent have electric heat. Baseload jobs are distributed similarly.

Table III-9
Primary Heating Source

	Baseload		Electric Heat		Gas Heat		All Jobs	
Primary Heating Source	# of Jobs	% of Jobs	# of Jobs	% of Jobs	# of Jobs	% of Jobs	# of Jobs	% of Jobs
Utility Gas	4,391	74%	26	7%	1,472	98%	7,076	75%
Fuel Oil	1,240	21%	0	0%	7	<1%	1,417	15%
Electric	247	4%	326	93%	15	1%	831	9%

	Baseload		Electric Heat		Gas Heat		All Jobs	
Primary Heating Source	**# of Jobs**	**% of Jobs**	**# of Jobs**	**% of Jobs**	**# of Jobs**	**% of Jobs**	**# of Jobs**	**% of Jobs**
Other	81	1%	0	0%	2	<1%	98	1%
Missing	2	<1%	0	0%	0	0	7	<1%
Total	5,961	100%	352	100%	1,496	100%	9,429	100%

Table III-10 describes the use of supplemental heating by jobs treated through LIURP. Overall, 42 percent of the customers who were treated by LIURP used supplemental heat, virtually all of whom used electric supplemental heat. Fifty-two percent of the customers who had baseload services used electric supplemental heat.

Table III-10
Supplemental Heating

	Baseload		Electric Heat		Gas Heat		All Jobs	
Supplemental Heating Source	**# of Jobs**	**% of Jobs**	**# of Jobs**	**% of Jobs**	**# of Jobs**	**% of Jobs**	**# of Jobs**	**% of Jobs**
None Used	2,756	46%	321	91%	1,245	83%	5,453	58%
Electric	3,118	52%	27	8%	249	17%	3,862	41%
Other	87	2%	4	1%	2	<1%	114	1%
Total	5,961	100%	352	100%	1,496	100%	9,429	100%

Table III-11 shows the type of air conditioning that LIURP recipients used. Most of the LIURP recipients, 97 percent, used some form of air conditioning. The most common type, with 61 percent, was a window unit. Twenty-five percent had central air conditioning.

Table III-11
Air Conditioning

Air Conditioning	Number of Jobs	% of Jobs
Window Unit	5,734	61%
Central Electric	2,363	25%
Wall Unit	693	7%
Central Heat Pump	308	3%
Portable Unit	40	<1%
Window/Wall Unit	2	<1%
None Used	289	3%
Total	9,429	100%

Table III-12 shows the home ownership characteristics of LIURP recipients. This table shows that the Program was successful at serving renters, as 50 percent of the LIURP recipients are renters. Renters are not eligible for refrigerator replacement, air conditioner replacement, or furnace replacement.

Table III-12
Home Ownership

	Number of Jobs	% of Jobs
Own	4,691	50%
Rent	4,738	50%

Homes treated by LIURP are fairly old. The average age of homes treated was 68 years, and over 41percent were more than 75 years old.

Table III-13
Home Age

	Number of Jobs	% of Jobs
<=25 Years	778	8%
26 – 50 Years	1,694	18%
51 – 75 Years	3,060	32%
76 Years or Older	3,897	41%
Mean	68 Years	

Table III-14 displays the dwelling type for the homes served under LIURP. The most common type was a row home, with 54 percent of homes served. Seventeen percent live in other types of single family homes, another 12 percent live in duplexes, and 12 percent live in multi-family homes.

Table III-14
Dwelling Type

	Number of Jobs	% of Jobs
Row	5,116	54%
Other Single Family	1,639	17%
Duplex	1,087	12%
Multi	1,108	12%
Mobile	175	2%
Other	304	3%
Total	9,429	100%

Table III-15 describes the heated square footage of the homes treated by LIURP. Homes averaged 1,236 square feet. Forty percent of the homes were greater than 1,200 square feet.

Table III-15
Heated Square Footage

	Number of Jobs	% of Jobs
<=800	1,324	14%
801 – 1,000	1,611	17%
1,001 – 1,200	2,700	29%
1,201 or more	3,794	40%
Mean	1,236	

D. 2009 LIURP Customer Characteristics

The Program also captures detailed information on the characteristics of households who participate in the Program. Table III-16 shows that 76 percent of the households are female-headed, 59 percent contain at least one child, and 21 percent contain at least one elderly member.

Table III-16
Household Composition

	Number of Jobs	% of Jobs
Female Household Head	7,132	76%
Male Household Head	2,294	24%
Child in Household (<18)	5,550	59%
Elderly in Household (>62)	1,983	21%

Table III-17 shows that the mean annual household income level was $14,088. Approximately 38 percent of the households served had annual income below $10,000. Only 20 percent had annual income above $20,000.

Table III-17
Annual Income

	Number of Jobs	% of Jobs
<=$5,000	970	10%
$5,001 - $10,000	2,601	28%
$10,001 - $15,000	2,524	27%

	Number of Jobs	% of Jobs
$15,001 - $20,000	1,452	15%
$20,001 or more	1,882	20%
Mean	$14,088	

Table III-18 displays the household poverty level. Approximately 26 percent of the households had income below 50 percent of the Federal Poverty Level (FPL) and approximately six percent had income above 150 percent of the FPL.

Table III-18
Poverty Level

	Number of Jobs	% of Jobs
<=25%	835	9%
26% - 50%	1,589	17%
51% - 100%	4,241	45%
101% - 150%	2,196	23%
151% -175%	340	4%
>175%	228	2%
Mean	79%	

Table III-19 describes the account type of households who participated in the Program. Approximately 90 percent are CAP participants, less than one percent are Customer Choice participants, and five percent have the off peak rate.

Table III-19
Account Type

	Number of Jobs[1]	% of Jobs
CAP	8,462	90%
Customer Choice	22	<1%
Off Peak	439	5%

[1] Customer Choice, CAP, and Off Peak data were missing for two accounts.

Table III-20 displays the education level of the head of household. The majority of participants, 59 percent, have a high school education. Fourteen percent have some high school, 16 percent have some college, and seven percent have a college degree.

Table III-20
Education Level

	Number of Jobs	% of Jobs
No Formal Education	33	<1%
Some Grade School	53	<1%
Grade School	218	2%
Some High School	1,301	14%
High School	5,593	59%
Some College	1,534	16%
College Degree	655	7%
Some Graduate Work	16	<1%
Graduate Degree	19	<1%
Missing	7	<1%

Table III-21 displays the primary income source for the LIURP participants. The table shows that the largest sources of income were public assistance and full time work. Thirty-eight percent had public assistance as their primary source of income, 20 percent had full time work, 14 percent had a pension and/or retirement, and 14 percent had part-time work.

Table III-21
Income Source

	Number of Jobs	% of Jobs
Public Assistance	3,539	38%
Full Time Work	1,858	20%
Pension/Retirement	1,280	14%
Part Time Work	1,308	14%
Dependent on Another	387	4%
Self Employment	10	<1%
Seasonal Employment	3	<1%
Other	1,044	11%

IV. Usage Impacts

This section of the report provides analysis of the impacts of LIURP on participants' electric and gas usage. The section describes the methodology for the analysis, the results for all participants by job type, and the results by type of service. We then provide estimates of the impacts of individual measures and the cost effectiveness of LIURP.

A. Methodology

Customers who received LIURP services in 2009 were treated as the analysis group for this evaluation. We focus on the electric impacts for customers who were treated as electric baseload and electric heating jobs, and the gas impacts for customers who were treated as gas heating jobs.

Energy usage was analyzed for the year prior to the LIURP audit visit and the year after service delivery was completed. The analysis included as close to a full year of data pre and post-treatment as possible. Table IV-1 displays the attrition statistics for the usage analysis. Customers were included in the analysis if their pre and post usage data each spanned between 299 and 390 days. Some additional customers were removed from the analysis if their usage was below 1,200 kWh or 300 ccf, or if their change in usage was greater than 65 percent. After these eliminations, we include 74 percent of the treated population in the usage analysis.

Table IV-1
Usage Impact Data Attrition

	Electric Baseload	Electric Heating	Gas Heating	All Jobs[1]
Original Population	5,961	352	1,496	9,429
Not Enough Pre-Treatment Days	180	25	49	312
Not Enough Post-Treatment Days	816	42	141	1,189
Pre Usage Below 1200 kWh or 300 ccf	213	8	15	293
Post Usage Below 1200 kWh or 300 ccf	48	3	23	102
Change in Total Usage>65%	241	47	130	550
Final Sample	4,463	227	1,138	6,983
% Included in Analysis	75%	64%	76%	74%

[1]There are a number of jobs that are not classified as electric baseload, electric heating, or gas heating.

Energy usage data are weather normalized in the pre and the post usage period to ensure that changes in energy usage are due to changes in usage patterns, rather than due to changes in weather. We use a degree-day normalization process to conduct this analysis. This process involves the following steps.

1. Calculate the heating and cooling degree-days that are included in each usage period.

2. Determine whether periods should be classified as baseload periods, heating periods, or cooling periods, based on the number of heating and cooling degree-days in the period.

3. Calculate the total baseload period usage, heating period usage, and cooling period usage.

4. Calculate the relationship between heating usage minus baseload usage and degree-days. Use that slope and the average long-term heating degree-days to calculate normalized heating period usage.

5. Follow the same method to calculate normalized cooling period usage.

6. Add up the baseload usage, heating period usage, and cooling period usage to obtain the normalized annual usage.

This process yielded results that were similar to the PRISM analysis results, but allowed for a much higher percentage of cases to be included in the analysis, due to fewer restrictions on data availability, and the fact that cases did not need to be removed because the model did not run or the model had a poor fit.

While the PUC does not require that baseload usage is normalized, we have chosen to conduct the normalization process on the baseload usage as well as the heating and cooling usage. Baseload usage may vary with weather because of the use of air conditioning, the gas furnace's electric fan, the refrigerator, and use of electric space heaters.

B. Energy Savings Impacts

This section of the report provides the average weather-normalized usage for the pre and post-treatment periods and the average energy savings. Table IV-2 displays these results by job type. The table shows the following degree-day normalized savings.

- Baseload jobs had average savings of approximately 1,054 kWh, or 8.7 percent of pre-treatment usage.

- Electric heat jobs had average savings of approximately 1,686 kWh, or 7.3 percent of pre-treatment usage.

- Gas heat jobs had average savings of approximately 92 ccf, or 8.4 percent of pre-treatment usage.

Table IV-2
Average Usage and Savings

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload (kWh)					
Non Normalized	4,463	11,900	11,166	734	6.2%
Degree Day Normalized	4,463	12,144	11,090	1,054	8.7%
Prism Normalized	2,385	12,019	10,967	1,052	8.8%
Electric Heat (kWh)					
Non Normalized	227	20,786	19,249	1,537	7.4%
Degree Day Normalized	227	23,179	21,493	1,686	7.3%
Prism Normalized	106	22,539	20,612	1,927	8.5%
Gas Heat (ccf)					
Non Normalized	1,138	1,083	968	115	10.6%
Degree Day Normalized	1,138	1,090	998	92	8.4%
Prism Normalized	524	1,069	979	90	8.4%

In the rest of the report we focus on the degree day normalized savings, which were shown to be somewhat lower than the non-normalized savings for the electric heat jobs and approximately equal to the PRISM estimated savings for the baseload and gas heat jobs.

Table IV-3 provides the historical comparison of energy savings by job type.

- The 2009 electric baseload jobs had slightly lower savings than the 1999-2008 average. Savings were 8.7 percent in 2009 compared to the historical average of 9.2 percent. Weatherization spending, at $186 in 2009, was also lower than the ten-year average of $224.

- Electric heat jobs had average savings that were somewhat lower than the 1999-2008 average. Savings were 7.3 percent in 2009 compared to 8.2 percent for the ten-year average. Costs for 2009 were significantly higher than the nine-year average.

- Gas heat jobs had pre-treatment usage and savings that were lower than the 1999-2008 average. Pre-treatment usage was 1,090 compared to the ten-year average of 1,196, approximately nine percent lower. Gas savings were 8.4 percent in 2009, as compared to 10.9 percent for the ten-year average. Gas heat measure costs were greater than the ten-year average.

Table IV-3
Time-Series Comparison of Usage Savings

	Pre-Use	Post-Use	Savings	Percent Savings	Wx Cost
Electric Baseload (kWh)					
2009	12,144	11,090	1,054	8.7%	$186
1999-2008 Average	10,362	9,411	951	9.2%	$224
2008	10,990	10,276	714	6.5%	$191
2007	10,919	10,032	887	8.1%	$240
2006	10,695	9,953	742	6.9%	$214
2005	11,188	10,073	1,115	10.0%	$208
2004	9,309	8,384	925	9.9%	$215
2003	10,040	8,679	1,361	13.6%	$214
2002	10,591	9,687	904	8.5%	$192
2001	10,821	9,722	1,099	10.2%	$296
2000	9,741	8,843	898	9.2%	$268
1999	9,324	8,460	864	9.3%	$206
Electric Heat (kWh)					
2009	23,179	21,493	1,686	7.3%	$2,514
1999-2008 Average	22,052	20,254	1,798	8.2%	$1,785
2008	20,786	18,614	2,172	10.4%	$2,332
2007	21,017	19,888	1,129	5.4%	$1,735
2006	21,890	20,458	1,433	6.5%	$1,643
2005	21,956	20,326	1,629	7.4%	$1,824
2004	23,449	21,148	2,301	9.8%	$1,782
2003	22,510	20,220	2,290	10.2%	$1,646
2002	22,745	21,441	1,304	5.7%	$1,753
2001	22,825	20,469	2,356	10.3%	$2,234
2000	21,368	19,724	1,644	7.7%	$1,521
1999	21,970	20,251	1,719	7.8%	$1,377

	Pre-Use	Post-Use	Savings	Percent Savings	Wx Cost
Gas Heat (ccf)					
2009	1,090	998	92	8.4%	$2,100
1999-2008 Average	1,196	1,066	130	10.9%	$1,742
2008	1,087	984	103	9.5%	$2,016
2007	1,054	965	89	8.4%	$1,914
2006	1,128	1,037	91	8.0%	$1,640
2005	1,206	1,039	168	13.9%	$1,643
2004	1,205	1,037	168	13.9%	$1,789
2003	1,227	1,086	141	11.5%	$1,422
2002	1,253	1,159	94	7.5%	$1,488
2001	1,262	1,097	165	13.1%	$2,003
2000	1,265	1,106	159	12.6%	$1,763
1999	1,273	1,148	125	9.8%	$1,741

The lower pre-treatment usage for the gas heating jobs may be due to the longevity of PECO's LIURP and their historical treatment of high usage customers. After so many years of providing LIURP to the highest use customers, the customers who have not yet received service have lower usage.

Table IV-4 displays the seasonal analysis of energy savings by job type. The table shows that electric baseload jobs had over 70 percent of the savings from baseload usage, less than five percent from heating usage, and about one fifth from cooling usage. Electric heating jobs had over half of their savings from baseload usage, over 40 percent from heating usage, and about five percent from cooling usage. Gas heat households had slightly less savings from heating usage than from baseload usage.

Table IV-4
Seasonal Usage Analysis

	#	Pre-Use	Post-Use	Savings	% Savings	Share of Savings
Electric Baseload (kWh)						
Baseload	4,463	8,083	7,308	775	9.6%	73.5%
Heating		1,979	1,940	39	2.0%	3.7%
Cooling		2,082	1,842	240	11.5%	22.8%
Electric Heat (kWh)						
Baseload	227	11,678	10,818	860	7.4%	51.0%
Heating		10,163	9,425	738	7.3%	43.8%
Cooling		1,338	1,251	87	6.5%	5.2%
Gas Heat (ccf)						
Baseload	1,138	280	231	49	17.5%	57.0%
Heating		784	747	37	4.7%	43.0%

Energy efficiency program savings are often found to correlate with the level of pre-treatment usage. This is because households with higher pre-treatment usage have greater opportunities for energy savings and often receive greater energy efficiency investments. Table IV-5 shows that the 2009 PECO LIURP savings are consistent with this expectation.

- Baseload jobs with pre-treatment usage over 12,000 kWh have savings of 10.6 percent, compared to savings of 7.3 percent for baseload jobs with pre-treatment usage between 8,000 and 12,000 kWh, and 1.5 percent savings for baseload jobs with pre-treatment usage of below 8,000 kWh. The higher usage jobs had higher measure expenditures, but the cost per kWh saved is much lower for the higher usage jobs. The jobs with over 12,000 kWh in pre-treatment usage cost just 12 cents per kWh saved, as compared to a cost of $1.54 per kWh saved for the lowest pre-usage jobs.

- Electric heat jobs with pre-treatment usage over 26,000 kWh had average savings of 10.5 percent, compared to jobs with usage between 16,000 and 26,000 kWh that had average savings of 5.4 percent and jobs with usage below 16,000 kWh had savings of 0.6 percent. Again, the expenditures are greater for the higher usage jobs, but the cost per kWh saved is lower for the higher usage jobs.

- Gas heat jobs with pre-treatment usage over 1,400 ccf had average savings of 12.7 percent, compared to average savings of 7.4 percent for jobs with usage between 800 and 1,400 ccf, and 4.7 percent savings for jobs with usage below 800 ccf. Costs are higher for the higher usage jobs, but the cost-effectiveness is greater for these jobs.

Table IV-5
Change in Usage
By Pre Program Usage

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved
Electric Baseload							
< 8,000 kWh	555	7,111	7,004	107	1.5%	$165	$1.54
8,000 – 12,000 kWh	2,163	9,782	9,066	716	7.3%	$171	$0.24
> 12,000 kWh	1,745	16,672	14,898	1,774	10.6%	$211	$0.12
Electric Heat							
< 16,000 kWh	44	12,860	12,786	74	0.6%	$1,861	$25.15
16,000 – 26,000 kWh	109	20,625	19,501	1,123	5.4%	$2,597	$2.31
> 26,000 kWh	74	33,078	29,605	3,473	10.5%	$2,778	$0.80
Gas Heat[1]							
< 800 ccf	259	702	669	33	4.7%	$1,848	$56.00
800 – 1,400 ccf	691	1,053	975	78	7.4%	$2,070	$26.54
> 1,400 ccf	188	1,760	1,536	224	12.7%	$2,556	$11.41

[1]Measure costs for gas heat jobs exclude the costs for the measures targeted at reducing electric usage.

Table IV-6 shows usage impacts by job type and by whether the household participated in CAP in the pre or post-treatment period. The table shows that while savings are somewhat higher for CAP participants for baseload jobs, savings were somewhat lower for CAP participants for electric heat and gas heat jobs. However, the differences in savings by CAP participation are not statistically significant.

Table IV-6
Change in Usage
By CAP Participation

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved
Electric Baseload							
CAP	4,091	12,128	11,069	1,059	8.7%	$185	$0.17
Non-CAP	372	12,324	11,321	1,003	8.1%	$199	$0.20
Electric Heat							
CAP	192	22,993	21,522	1,471	6.4%	$2,447	$1.66
Non-CAP	35	24,201	21,335	2,866	11.8%	$2,877	$1.00
Gas Heat[1]							
CAP	878	1,098	1,011	87	7.9%	$1,910	$21.95
Non-CAP	260	1,064	955	109	10.2%	$2,047	$18.78

[1]Measure costs for gas heat jobs exclude the costs for the measures targeted at reducing electric usage.

Table IV-7 displays the change in usage by whether the customer had selected an alternate supplier in the pre or post period. Only a very small percentage of customers served by LIURP are Customer Choice. Differences in savings are not statistically significant.

Table IV-7
Change in Usage
By Customer Choice

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload					
Choice	9	11,702	9,746	1,956	16.7%
Non-Choice	4,454	12,145	11,093	1,052	8.7%
Electric Heat					
Choice	1	47,445	48,518	-1,073	-2.3%
Non-Choice	226	23,072	21,374	1,698	7.4%
Gas Heat					
Choice	2	1,034	1,008	26	2.5%
Non-Choice	1,136	1,090	998	92	8.4%

Table IV-8 displays energy savings by whether the customer had the off-peak rate in the pre or the post-treatment period. Only a small percentage of customers have this rate. However, savings for the electric heat off-peak customers were significantly higher than for the non off-peak customers.

Table IV-8
Change in Usage
By Peak Service

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload					
Off-Peak	242	11,390	10,042	1,348	11.8%
Not Off-Peak	4,221	12,187	11,150	1,037	8.5%
Electric Heat					
Off Peak	22	28,437	24,899	3,538	12.4%
Not Off-Peak	205	22,615	21,128	1,487	6.6%
Gas Heat (electric usage)					
Off Peak	27	9,205	8,279	926	10.1%
Not Off Peak	1,104	9,561	8,899	661	6.9%

Seven Gas Heat job accounts do not have electricity usage data.

Table IV-9 displays the change in usage by home ownership status. Approximately 50 percent of baseload service participants were renters, 35 percent of electric heat service participants were renters, and 25 percent of gas heat service participants were renters.

Baseload job renters have savings that average 7.9 percent, compared to average savings of 9.4 percent for owners, and measure costs that average only $107, as compared to measure costs that average $264 for owners. None of the renters received refrigerator replacements, a major source of savings for baseload homes. Differences in savings between renters and owners were statistically significant.

The savings and measure costs for electric heat jobs were much higher among owners than renters, because owners received more major baseload measures than renters did. Among electric heat service participants, 91 percent of owners received major measures as compared with only 74 percent of renters. In particular, among electric heat service participants, 20 percent of owners received refrigerator replacements, while no renters received refrigerator replacements.

Table IV-9
Change in Usage
By Home Ownership

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost Per Unit Saved
Electric Baseload							
Owner	2,246	12,566	11,382	1,184	9.4%	$264	$0.22
Renter	2,217	11,717	10,795	922	7.9%	$107	$0.12
Electric Heat							
Owner	147	24,444	22,202	2,242	9.2%	$3,035	$1.35
Renter	80	20,855	20,192	663	3.2%	$1,556	$2.35
Gas Heat[1]							
Owner	887	1,084	987	97	8.9%	$2,197	$22.65
Renter	251	1,112	1,038	74	6.7%	$1,038	$14.03

[1]Measure costs for gas heat jobs exclude the costs for the measures targeted at reducing electric usage.

Table IV-10 displays energy savings by whether the customer used supplemental heat. Customers with supplemental heat have a significantly greater reduction in usage for Baseload jobs. Baseload jobs with supplemental heat have average savings of 9.9 percent, compared to average savings of 7.1 percent for baseload jobs without supplemental heat, despite the fact that these groups have approximately the same average measure costs. Therefore, differences in savings may be due to education about reduced electric space heater usage. Electric heat and gas heat jobs without supplemental heat have higher savings than those with supplemental heat.

Table IV-10
Change in Usage
By Supplemental Heat

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost Per Unit Saved
Electric Baseload							
Supplemental Heat	2,368	13,011	11,726	1,285	9.9%	$190	$0.15
No Supp Heat	2,095	11,164	10,371	793	7.1%	$181	$0.23
Electric Heat							
Supplemental Heat	16	28,166	27,318	848	3.0%	$2,807	$3.31
No Supp Heat	211	22,801	21,052	1,749	7.7%	$2,491	$1.42
Gas Heat[1]							
Supplemental Heat	195	1,117	1,034	83	7.4%	$1,781	$21.46
No Supp Heat	943	1,085	991	94	8.7%	$1,975	$21.01

[1]Measure costs for gas heat jobs exclude the costs for the measures targeted at reducing electric usage.

C. Measure Specific Savings

This section of the report attributes savings to specific measures that were provided through LIURP. We begin by analyzing savings by whether major measures are provided. Major measures are defined as the following:

- Baseload jobs: Major measures include refrigerator replacement, air conditioner replacement, water heater replacement, and electric water heater timers.

- Electric heat jobs: Major measures include refrigerator replacement, air conditioner replacement, water heater replacement, electric water heater timers, heat pumps, insulation, and blower door guided air sealing.

- Gas heat jobs – gas measures: Major measures include furnace replacement, water heater replacement, insulation, and blower door guided air sealing.

- Gas heat jobs – electric measures: Major measures include refrigerator replacement and air conditioner replacement.

Homes that do not receive one of the major measures listed above are considered to have basic measures.

Table IV-11 displays energy savings by whether the job received one or more major measures.

- Baseload Jobs: Only about 10 percent of baseload jobs received major measures. Costs for these jobs, averaging $823, were significantly higher than costs for

baseload jobs that did not receive major measures, averaging $114. Savings for baseload jobs with major measures averaged 12.4 percent, as compared to savings that averaged 8.2 percent for baseload jobs that did not receive major measures.

- Electric Heat Jobs: Eighty-five percent of electric heat jobs received major measures. Savings for jobs that received major measures averaged 7.2 percent, as compared to average savings of 7.5 percent for jobs that did not receive major measures. Spending on jobs that received major measures averaged $2,813, compared to average spending of $813 for jobs that did not receive major measures.

- Gas Heat Jobs – Gas Measures: Approximately 85 percent of gas heat jobs received major measures aimed at reducing gas usage. Gas savings for jobs with major measures averaged 9.2 percent, compared to average savings of 3.9 percent for jobs that did not receive major measures. Costs for gas jobs with major measures averaged $2,092 compared to average costs of $1,083 for jobs that did not receive major measures.

- Gas Heat Jobs – Electric Measures: Most of the gas jobs did not receive major measures targeted at reducing electric usage. Electric savings for gas heat jobs that received major electric measures were 13.8 percent compared to 9.1 percent for those who received only basic electric measures.

Table IV-11
Change in Usage
By Level of Service

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost per Unit Saved
Electric Baseload							
Basic	4,013	12,043	11,052	991	8.2%	$114	$0.12
Major	450	13,049	11,433	1,616	12.4%	$823	$0.51
Electric Heat							
Basic	34	20,887	19,315	1,572	7.5%	$813	$0.52
Major	193	23,583	21,877	1,706	7.2%	$2,813	$1.65
Gas Heat – ccf[1]							
Basic	170	1,063	1,022	41	3.9%	$1,083	$26.41
Major	968	1,095	994	101	9.2%	$2,092	$20.71
Gas Heat – kWh[2]							
Basic	1,038	9,378	8,792	856	9.1%	$87	$0.10
Major	93	11,500	9,915	1,585	13.8%	$970	$0.61

[1]Measure costs for gas heat (ccf) jobs exclude the costs for the measures targeted at reducing electric usage.
[2]Measure costs for gas heat (kWh) jobs exclude the costs for the measures targeted at reducing gas usage.

Table IV-12 displays energy savings by whether or not participants received particular measures. Some of the key findings in this table include:

- *Air conditioner*: Participants who received an air conditioner had higher savings (12.9%) than those who did not (8.6%).

- *Refrigerator*: Baseload participants who received a refrigerator had higher savings (14.9%) than those who did not (8.3%). Gas heat customers who received a refrigerator had higher electric savings (14.4%) than those who did not (6.3%).

- *Electric Water Heater Timer*: Among those who received electric heat measures, participants who received an electric water heater timer had lower savings (4.4%) than those who did not (9.1%).

- *Blower Door Guided Air Sealing:* Gas heating customers who received blower door guided air sealing had higher savings (9.1%) than those who did not (6.1%).

- *Insulation:* Gas heating customers who received insulation had higher savings (10.9%) than those who did not (5.6%).

- *Furnace:* Gas heating customers who received a new furnace had higher savings (17.3%) than those who did not (7.6%).

Table IV-12
Change in Usage
By Major Measures

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost
Electric Baseload						
Air Conditioner	89	11,765	10,242	1,523	12.9%	$911
No Air Conditioner	4,374	12,151	11,107	1,044	8.6%	$171
Refrigerator	285	12,008	10,214	1,794	14.9%	$970
No Refrigerator	4,178	12,153	11,149	1,004	8.3%	$132
Air Conditioner/Refrigerator	19	11,892	9,552	2,340	19.7%	$1,495
Air Conditioner/ No Refrigerator	70	11,731	10,429	1,302	11.1%	$753
No Air Conditioner/ Refrigerator	266	12,016	10,261	1,755	14.6%	$933
No Air Conditioner/ No Refrigerator	4,108	12,160	11,162	998	8.2%	$122
Electric Water Heater Timer	110	17,286	15,827	1,459	8.4%	$559
No Electric Water Heater Timer	4,353	12,014	10,970	1,044	8.7%	$176
Electric Heat						
Refrigerator	29	25,085	23,211	1,874	7.5%	$4,019
No Refrigerator	198	22,900	21,242	1,658	7.2%	$2,293
Blower Door Test	139	24,079	22,251	1,828	7.6%	$2,837
No Blower Door Test	88	21,759	20,298	1,461	6.7%	$2,003
Electric Water Heater Timer	86	23,829	22,778	1,051	4.4%	$3,180
No Electric Water Heater Timer	141	22,783	20,710	2,073	9.1%	$2,107

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost
Insulation	135	23,407	21,681	1,726	7.4%	$3,007
No Insulation	92	22,844	21,218	1,626	7.1%	$1,789
Gas Heat - ccf[1]						
Blower Door Test	894	1,102	1,002	100	9.1%	$2,074
No Blower Door Test	244	1,048	984	64	6.1%	$1,457
Insulation	610	1,095	976	119	10.9%	$2,283
No Insulation	528	1,085	1,024	61	5.6%	$1,547
Furnace	105	969	801	168	17.3%	$4,008
No Furnace	1,033	1,102	1,018	84	7.6%	$1,731
Gas Heat - kWh[2]						
Refrigerator	76	11,664	9,982	1,682	14.4%	$976
No Refrigerator	1,055	9,400	8,805	595	6.3%	$100

[1]Measure costs for gas heat (ccf) jobs exclude the costs for the measures targeted at reducing electric usage.
[2]Measure costs for gas heat (kWh) jobs exclude the costs for the measures targeted at reducing gas usage.

Table IV-13 displays measure-specific savings estimates. For the most part, these savings were calculated by running a regression model that predicted savings based on the measures that were provided and other household characteristics.

CFL savings could not be predicted through the regression analysis, as there was almost no variation in the distribution of CFLs – almost all participants received four CFLs of the same type. Therefore, we attempt to estimate the savings due to CFL installation by examining savings for the Electric Baseload jobs that only received CFLs. The table shows that these savings averaged 921 kWh, higher than the 274 kWh that might be expected to be saved if each of the four CFLs replaced 60 watt incandescents that were used an average of four hours per day.[13] Therefore, we expect that a significant part of these savings is due to education and resulting changes in behavior.

In the cost and cost-effectiveness columns in the table we provide estimates using only the CFL costs and estimates that include the CFL costs and the audit/education costs. Even when including the entire education and audit cost, the cost per kWh saved over the lifetime of the bulbs is only $0.07. This indicates that there may be potential to cost-effectively increase savings by providing more CFLs to LIURP participants, and that the education process is very effective.

The table also shows estimates of savings for refrigerators, furnaces, boilers, and insulation.

[13] (60 watts-13 watts)*0.001*365 days*4 hours/day* 4 bulbs=274 kWh

Table IV-13
Measure Savings Estimates

	Savings	Cost/Home	$/Unit Saved	Measure Life	$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	921 (±121)	$76/$278	$0.08/$0.30	5	$0.02/$0.07
Refrigerator	627 (±330)	$793	$1.26	12	$0.14
Gas Heat - ccf					
Gas Furnace	89 (±43)	$2,618	$29.42	15	$2.83
Boiler	79 (±38)	$3,281	$41.53	15	$4.00
Insulation	61 (±26)	$631	$10.34	15	$1.00

D. Cost Effectiveness

This section examines the cost-effectiveness of the Program services delivered by job type. Audit and administrative costs are assigned to electric and gas costs in the same proportion as the measure costs. Table IV-14 shows the measure costs, audit/education costs, and administrative costs by job type and electric and gas reduction. Cost per unit saved is calculated as the average total cost divided by the unit savings. The cost per kWh saved is $0.42 for baseload jobs, $1.64 for electric heat jobs, and $0.27 for gas heat jobs. The cost per ccf saved is $16.29 for electric baseload jobs and $23.67 for gas heat jobs.

Table IV-14
Cost per Unit Saved

	#	Average Savings	Average Measure Cost	Average Audit/ Education Cost	Average Admin Cost	Average Total Cost	Cost Per Unit Saved
Electric Baseload							
Electric (kWh)	4,463	1,054	$185	$201	$53	$438	$0.42
Gas (ccf)	181	5	$30	$37	$10	$77	$16.29
Electric Heat							
Electric (kWh)	227	1,686	$2,514	$202	$53	$2,769	$1.64
Gas Heat							
Electric (kWh)	1131	668	$159	$15	$4	$178	$0.27
Gas (ccf)	1138	92	$1,942	$187	$49	$2,178	$23.67

The previous analysis displayed the total job cost divided by the total savings as an indicator of how cost-effective the services were. Table IV-15 displays the discounted present value of the job savings under 5-year, 10-year and 15-year measure life assumptions. The costs per unit saved should be compared to retail rates to evaluate the cost-effectiveness of the program at different measure lives. This table shows that some of the electric investments are cost-effective at current retail rates if the measures have a life of at ten years. For

example, assuming a 10-year measure life, electric baseload services cost five cents for each kWh saved.

Table IV-15
Cost Per Unit Saved
By Measure Life Assumption

	#	Average Savings	Average Total Cost	Cost Per Unit Saved	5-Year Measure Life	10-Year Measure Life	15-Year Measure Life
Electric Baseload							
Electric (kWh)	4,463	1,054	$438	$0.42	$0.10	$0.05	$0.04
Gas (ccf)	181	5	$77	$16.29	$3.78	$2.12	$1.58
Electric Heat							
Electric (kWh)	227	1,686	$2,769	$1.64	$0.38	$0.21	$0.16
Gas Heat							
Electric (kWh)	1131	668	$178	$0.27	$0.06	$0.03	$0.03
Gas (ccf)	1138	92	$2,178	$23.67	$5.47	$3.07	$2.28

V. Bill and Payment Impacts

This section of the report examines the bill and payment impacts for 2009 LIURP participants. We review the methodology used in the analysis, and then analyze the billing and payment impacts.

A. Methodology

Billing and payment transactions data were used to analyze the pre and post-treatment billing and payment statistics. Accounts were required to have between 300 and 390 days of transactions data in both the pre and post periods to be included in the analysis.

Table V-1 displays the data attrition statistics. While fewer data were available for the billing and payment analysis than for the usage analysis, the available data are adequate to analyze the impact of LIURP on billing and payment statistics.

Table V-1
Payment Impact Data Attrition

	Electric Baseload	Electric Heating	Gas Heating	All Jobs
Original Population	5,961	352	1,496	9,429
Not Enough Pre-Treatment Days	2,584	181	703	4,160
Not Enough Post-Treatment Days	783	31	133	1,125
Data Outliers	439	37	145	672
Final Sample	2,155	103	515	3,472
% Included in Analysis	36%	29%	34%	37%

B. Billing and Payment Impacts

Table V-2 displays the billing revenue data, obtained from the usage file. These data show the changes in charges that were associated with electric and gas usage only. For example, charges related to service agreements or late payment charges would not be included in this table.

Table V-2 shows that overall electric revenue declined by an average of $12 or one percent, and gas revenue declined by $51 or 14.7 percent. Total revenue declined by about four percent.

Table V-2
Billing Revenue

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Electric Revenue	4,463	$1,209	$1,189	-$20	-1.7%
Gas Revenue		$121	$108	-$13	-10.7%
Total Revenue		$1,330	$1,297	-$33	-2.5%
Electric Heat					
Electric Revenue	227	$1,717	$1,689	-$28	-1.6%
Gas Revenue		$48	$64	$16	33.3%
Total Revenue		$1,764	$1,752	-$12	-0.7%
Gas Heat					
Electric Revenue	1,138	$1,391	$1,382	-$9	-0.7%
Gas Revenue		$1,563	$1,307	-$256	-16.4%
Total Revenue		$2,954	$2,689	-$265	-9.0%
All Job Types					
Electric Revenue	6,983	$1,159	$1,147	-$12	-1.0%
Gas Revenue		$347	$296	-$51	-14.7%
Total Revenue		$1,507	$1,444	-$63	-4.2%

Table V-3 displays the change in customer electric and gas bills and total charges, between the pre and the post-treatment periods, based on analysis of the transactions file. Total charges increased by 0.5 percent for electric baseload jobs, declined by 9.4 percent for electric heat jobs, and declined by 9.6 percent for gas heat jobs.

Table V-3
Bills and Total Charges

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Electric and Gas Charges	2,155	$1,234	$1,214	-$20	-1.6%
Other Charges		$173	$200	$27	15.6%
Total Charges		$1,407	$1,414	$7	0.5%
Electric Heat					
Electric and Gas Charges	103	$1,972	$1,809	-$163	-8.3%
Other Charges		$103	$70	-$33	-32.0%
Total Charges		$2,075	$1,878	-$197	-9.4%
Gas Heat					
Electric and Gas Charges	515	$2,141	$1,906	-$235	-11.0%
Other Charges		$120	$138	$18	15.0%
Total Charges		$2,261	$2,044	-$217	-9.6%

	#	Pre	Post	Change	Percent Change
All Job Types					
Electric and Gas Charges	3,472	$1,285	$1,240	-$45	-3.5%
Other Charges		$151	$171	$20	13.2%
Total Charges		$1,436	$1,411	-$25	-1.7%

Differences in results between the revenue analysis from the billing data (shown in Table V-2) and the billing analysis from the transactions data (shown in Table V-3) result from two factors:

1) The transactions data include all charges, while the revenue data only include charges for electric and gas usage.

2) The transactions analysis is available for a different and smaller group of customers than the revenue analysis based on the usage data.

Table V-4 displays payment statistics for the 2009 LIURP participants. The average number of payments made increased by between 0.9 payments and one payment for all groups of participants between the pre and post-treatment years. There was an increase in cash payments for electric baseload and electric heating customers, and a decline in cash payments for gas heating customers.

Table V-4
Annual Payments
Pre and Post-LIURP Treatment

	#	Pre	Post	Change	Percent Change
Electric Baseload					
# Payments	2,155	8.5	9.4	0.9	10.6%
Cash Payments		$1,061	$1,091	$30	2.8%
Assistance Payments		$105	$90	-$15	-14.3%
Other Credits		$171	$199	$28	16.4%
Total Credits		$1,337	$1,379	$42	3.1%
Electric Heat					
# Payments	103	8.6	9.6	1.0	11.6%
Cash Payments		$1,524	$1,491	$33	2.2%
Assistance Payments		$227	$257	$30	13.2%
Other Credits		$247	$88	-$159	-64.4%
Total Credits		$1,998	$1,835	-$163	-8.2%
Gas Heat					
# Payments	515	9.1	10.0	0.9	9.9%
Cash Payments		$1,846	$1,735	-$111	-6.0%
Assistance Payments		$163	$173	$10	6.1%
Other Credits		$156	$128	-$28	-17.9%

	#	Pre	Post	Change	Percent Change
Total Credits		$2,165	$2,036	-$129	-6.0%
All Job Types					
# Payments	3,472	8.5	9.5	1.0	11.8%
Cash Payments		$1,102	$1,111	$9	0.8%
Assistance Payments		$112	$105	-$7	-6.3%
Other Credits		$159	$169	$10	5.9%
Total Credits		$1,374	$1,385	$11	0.8%

Table V-5 displays payments for CAP and Non-CAP customers in the year prior to and after receipt of LIURP. This table shows that CAP customers had no change in assistance payments, and non-CAP customers had a significant decrease in assistance payments. CAP customers had relatively similar cash payments in the pre and post-treatment periods, while non-CAP customers increased cash payments by $100.

Table V-5
Payments for CAP Customers
Pre and Post-LIURP Treatment

	#	Pre	Post	Change	Percent Change
CAP Customers – All Job Types					
# Payments	3,137	8.4	9.4	1.0	11.9%
Cash Payments		$1,008	$1,007	-$1	-0.1%
Assistance Payments		$117	$114	-$3	-2.6%
Other Credits		$160	$171	$11	6.9%
Total Credits		$1,285	$1,292	$7	0.5%
Non-CAP Customers – All Job Types					
# Payments	335	9.5	10.7	1.2	12.6%
Cash Payments		$1,981	$2,082	$101	5.1%
Assistance Payments		$62	$19	-$43	-69.4%
Other Credits		$155	$151	-$4	-2.6%
Total Credits		$2,198	$2,251	$53	2.4%

Table V-6 displays a more detailed analysis of the types of assistance payments received in the pre and the post-treatment periods by 2009 LIURP participants. The table shows that assistance payments were approximately the same in the pre and post treatment periods.

Table V-6
Assistance Payments
Pre and Post-LIURP Treatment

	#	Pre	Post	Change	% Change
Electric Baseload					
LIHEAP Cash	2,155	$64	$69	$5	7.8%
LIHEAP Crisis		$38	$19	-$19	-50.0%
MEAF		$3	$2	-$1	-33.3%
Total Assistance		$105	$90	-$15	-14.3%
Electric Heat					
LIHEAP Cash	103	$175	$232	$57	32.6%
LIHEAP Crisis		$46	$24	-$22	-47.8%
MEAF		$5	0	-$5	-100.0%
Total Assistance		$227	$257	$30	13.2%
Gas Heat					
LIHEAP Cash	515	$126	$155	$29	23.0%
LIHEAP Crisis		$32	$17	-$15	-46.9%
MEAF		$5	0	-$5	-100.0%
Total Assistance		$163	$173	$10	6.1%
All Job Types					
LIHEAP Cash	3,472	$75	$87	$12	16.0%
LIHEAP Crisis		$34	$17	-$17	-50.0%
MEAF		$3	$1	-$2	-66.7%
Total Assistance		$112	$105	-$7	-6.3%

Table V-7 displays changes in cash and total bill coverage rates between the pre and the post-treatment periods. Total bill coverage rates increased for all job types. The overall change was an increase of approximately three percent.

Table V-7
Coverage Rates
Pre and Post-LIURP Treatment

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Cash Coverage Rate	2,155	79.3%	82.0%	2.7%	3.4%
Total Coverage Rate		96.6%	100.0%	3.4%	3.5%
Electric Heat					
Cash Coverage Rate	103	72.6%	76.7%	4.1%	5.6%
Total Coverage Rate		97.2%	98.6%	1.4%	1.4%
Gas Heat					
Cash Coverage Rate	515	82.7%	84.2%	1.5%	1.8%

	#	Pre	Post	Change	Percent Change
Total Coverage Rate		97.3%	100.7%	3.4%	3.5%
All Job Types					
Cash Coverage Rate	3,472	80.0%	82.0%	2.0%	2.5%
Total Coverage Rate		97.5%	100.0%	2.5%	2.6%

Table V-8 displays changes in customer balances. The table shows that balances increased more during the pre treatment period than the post period, both in dollars and percentage change.

Table V-8
Change in Customer Balance

	#	Start	End	Change	Percent Change
Electric Baseload					
Pre Balance	2,154	$2	$73	$71	3,550%
Post Balance		$54	$89	$35	65%
Electric Heat					
Pre Balance	103	$129	$206	$77	60%
Post Balance		$135	$178	$43	32%
Gas Heat					
Pre Balance	514	$72	$169	$97	135%
Post Balance		$138	$147	$9	7%
All Job Types					
Pre Balance	3,465	$19	$82	$63	332%
Post Balance		$63	$90	$27	43%

VI. Summary of Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to over nine thousand customers in 2009, many of whom had vulnerable household members. They have kept program administration costs low, at just six percent of program expenditures. Reductions in energy usage were similar to previous years, although electric baseload savings were higher than in 2008.

We have the following recommendations to continue to deliver effective services and potentially improve savings.

- *Targeting:* It is a challenge to continue to find high usage customers to treat in the program. Higher energy savings for 2009 participants as compared with 2008 participants may be related to higher pre-treatment usage for these households. PECO should continue to make targeting the highest usage households a priority for the program.

- *CFL's:* The program provides four CFLs to nearly every household served in LIURP. The measure saving analysis found that customers who only received CFLs had high average savings. PECO should consider providing additional CFLs to LIURP participants.

- *Education:* The high savings for households that only received CFLs, as well as previous customer survey research conducted as part of PECO's USF evaluation, indicate that the energy education conducted as part of LIURP is successful. We believe this is due to the extensive education process that occurs during the audit and the reinforcement that occurs through letters and phone calls. PECO should continue the emphasis on education.

- *Evaluation:* The evaluation methodology that has been used examines gross savings, the difference between weather-normalized pre and post usage. PECO should consider using a comparison group to calculate the net savings due to the program. The net savings would be measured as the difference between the change for the treatment group and the change for the comparison group. Because electric baseload usage has been increasing over time, this may show a more accurate estimate of a greater reduction in electric usage that is due to LIURP. Such an analysis would also control for other factors, such as changes in energy prices, which may lead customers to change their usage behavior even in the absence of LIURP. However, the Pennsylvania Public Utility Commission does not require the use of a comparison group.