

PECO Energy 2008 LIURP Evaluation Final Report

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Executive Summary

This report presents the findings from the Evaluation of PECO's 2008 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 2008 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 100 ccf per month for gas heat.
- 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 2008 was \$6,475,000. In 2008, 8,812 customers received LIURP services.

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 makes arrangements for a future visit, by one or more of five subcontractors, to install measures.

Program Statistics

In 2008, 29,988 customers were evaluated for LIURP services. There were 4,277 customers who were ineligible for the program and 16,899 customers who were cancelled (both are lower than in 2007). The cancellations were due to customers' lack of response to contact attempts, refusal of services, moves, and lack of landlord consent.¹ In total, 8,812 customers received LIURP services in 2008.

Table ES-1 displays how program funds were expended in 2008. In total \$6.475 million were spent. Approximately 67 percent was for weatherization measures, 27 percent was for audit and education, and six percent was for program administration.

Category	Amount Spent	Percent of Funds
Weatherization Measures	\$4,306,205	67%
Audit/Education	\$1,745,352	27%
PECO Administration	\$419,924	6%
Solar Water Maintenance	\$3,520	<1%
TOTAL	\$6,475,000	100%

Table ES-12008 LIURP ExpendituresGas and Electric TreatmentsBy Category

Table ES-2 displays the distribution of 2008 LIURP jobs by job type. The table shows that 64 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 27 percent of total costs. The average cost for measures on these jobs was \$193. Gas heating jobs represent 13 percent of jobs and 58 percent of costs, averaging \$1,995 in measure costs per home. Electric heating jobs averaged \$2,190 per home.

¹ See Table III-3.

Јор Туре	# of Jobs ¹	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	5,620	64%	\$1,084,572	27%	\$193
Electric Heating	143	2%	\$313,225	8%	\$2,190
Gas Heating	1,140	13%	\$2,273,749	58%	\$1,995
Low Usage	1,541	18%	\$215,791	5%	\$140
Electric Heat Low Use	331	4%	\$51,125	1%	\$154
Solar Water Heat Maintenance	3	<1%	\$1,990	<1%	\$663
Prior Year	24	<1%	\$5,283	<1%	\$220
Total	8,802	100%	\$3,945,735	100%	\$448

Table ES-22008 LIURP Service Delivery and ExpendituresBy Job Type

¹There are 10 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 one third of the customers served through LIURP use electric supplemental heat (3,134 customers).
- *Air conditioning:* Air conditioning is used by 97 percent of the LIURP participants (8,511 customers).
- *Renters:* PECO's LIURP is successful in serving renters. Over 40 percent of the customers served are renters (3,791 customers).
- *Vulnerable households:* Fifty-three percent of the customers had a child (4,643 customers) and almost 30 percent had an elderly member (2,520 customers).
- *Poverty level:* Approximately 23 percent had income below 50 percent of the FPL (1,955 customers), 44 percent had income between 51 and 100 percent of the FPL (3,873 customers), 25 percent had income between 101 and 150 percent of the FPL (2,209 customers), and nine percent had income above 150 percent of the FPL (775 customers).
- *CAP*: Eighty-five percent of LIURP recipients were CAP participants (7,471 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 80 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 714 kWh, or 6.5 percent of pre-treatment usage.
- *Electric heat jobs* had average savings of approximately 2,172 kWh, or 10.4 percent of pre-treatment usage.
- *Gas heat jobs* had average savings of approximately 103 ccf, or 9.5 percent of pre-treatment usage.

	#	Pre-Use	Post-Use	Savings	% Savings		
Electric Baseload (kWh)							
Non Normalized	4,524	11,024	9,909	1,115	10.1%		
Degree Day Normalized	4,524	10,990	10,276	714	6.5%		
Prism Normalized	2,724	10,972	10,139	833	7.6%		
Electric Heat (kWh)							
Non Normalized	98	20,639	18,789	1,850	9.0%		
Degree Day Normalized	98	20,786	18,614	2,172	10.4%		
Prism Normalized	75	21,324	19,329	1,995	9.4%		
Gas Heat (ccf)							
Non Normalized	882	1,073	1,000	73	6.8%		
Degree Day Normalized	882	1,087	984	103	9.5%		
Prism Normalized	506	1,072	979	93	8.7%		

Table ES-3Average Usage and Savings

We compared the usage impact results to historical savings results.²

² Table IV-3 provides the historical comparison of energy savings by job type.

- The 2008 electric baseload jobs had lower savings than the 1999-2007 average. Savings were 6.5 percent in 2008 compared to the historical average of 9.5 percent. Weatherization spending, at \$191 in 2008, was also lower than the nine-year average of \$228.
- Electric heat jobs had average savings that were significantly higher than the 1999-2007 average. Savings were 10.4 percent in 2008 compared to 7.9 percent for the nine-year average. Costs for 2008 were also significantly higher than the nine-year average, at least partially because a greater percentage of electric heat jobs in 2008 had major measures than in other recent years.
- Gas heat jobs had pre-treatment usage and savings that were lower than the 1999-2007 average. Pre-treatment usage was 1,087 compared to the nine-year average of 1,208, approximately 10 percent lower. Gas savings were 9.5 percent in 2008, as compared to 11.0 percent for the eight-year average. Gas heat measure costs were greater than the nine-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. Additionally, recent increases in energy prices may have caused customers to conserve energy prior to receiving services.

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 507 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.³ 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 12 cents per kWh. This indicates that there may be potential to cost-effectively increase

 $^{^{3}}$ (60 watts - 13 watts)*.001 * 365 days * 4 hours/day * 4 bulbs = 274 kWh

savings by providing more CFLs to LIURP participants. PECO has begun providing additional CFLs to LIURP participants with Act 129 funding. It also indicates that the LIURP education process is very effective.

	Savings	Cost/Home	\$/Unit Saved	Measure Life	\$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	507 (±101)	\$74/\$272	\$0.15/\$0.54	5	\$0.03/\$0.12
Refrigerator	1,008 (±269)	\$769	\$0.76	12	\$0.08
Gas Heat - ccf					
Gas Furnace	122 (±41)	\$2,546	\$20.87	15	\$1.90
Boiler	69 (±42)	\$3,137	\$45.46	15	\$4.30
Insulation	38 (±27)	\$679	\$17.87	15	\$1.75

Table ES-4Measure Savings Estimates

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. The most reasonable assumption for electric baseload reduction is probably a five to seven-year measure life. Baseload electric services, at a cost of 13 cents per kWh saved with a 5-year measure life and eight cents per kWh saved with a 10-year measure life, are cost-effective under a seven-year measure life assumption. 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 \$1.93, which is close to cost-effective with current gas prices.

Table ES-5Cost Per Unit SavedBy 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)	4,524	714	\$416	\$0.58	\$0.13	\$0.08	\$0.06
Gas (ccf)	184	15	\$21	\$1.37	\$0.32	\$0.18	\$0.13
Electric Heat							
Electric (kWh)	98	2,172	\$2,578	\$1.19	\$0.27	\$0.15	\$0.11
Gas Heat							
Electric (kWh)	871	530	\$197	\$0.37	\$0.09	\$0.05	\$0.04
Gas (ccf)	882	103	\$2,066	\$20.05	\$4.63	\$2.60	\$1.93

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 \$40, total payments and credits increased by \$77 from the pre to post period. This resulted in an increase in the total bill coverage rate of approximately 11 percentage points.

	#	Pre	Post	Change	Percent Change		
All Job Types							
Total Bills and Charges		\$1,375	\$1,335	-\$40	-2.9%		
Total Payments and Credits	3,947	\$1,278	\$1,355	\$77	6.0%		
Total Coverage Rate		93.6%	104.7%	11.1%	11.9%		

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

Key Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to 8,812 customers in 2008, 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 somewhat lower than in previous years. This reduction 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. Additionally, lower pre-treatment usage may be due to higher energy prices and customers' energy conservation efforts.

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. Lower energy savings for 2008 participants may be related to lower pre-treatment usage and fewer energy saving opportunities for these households. 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 is currently providing additional CFLs to LIURP participants through Act 129 Program funding. PECO should evaluate the impact of these additional measures.

- 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 increases in energy prices, which may lead customers to conserve even in the absence of LIURP. Failure to account for this change may lead to an overestimate of LIURP savings, particularly on the gas side. However, the Pennsylvania Public Utility Commission does not require the use of a comparison group.

I. Introduction

This report presents the findings from the 2008 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 costeffective 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 2008 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 2008 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 annual LIURP budget for 2008, determined by the settlement agreement of PECO's electric restructuring case, was \$5,600,000, with \$875,000 earmarked for the LIURP Gas Program through gas restructuring.

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 16 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 15 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 ten 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. Five subcontractors 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
 - o Income at or below 150 percent of the Federal Poverty Level (FPL), or
 - \circ Income between 150 and 200 percent of the FPL⁴ and special circumstances
- Usage requirements
 - At least 600 kWh monthly for baseload customers⁵
 - At least 1,400 kWh monthly for electric heating customers
 - o At least 100 ccf monthly 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

⁴ 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.

⁵ CAP customers with usage over 500 kWh monthly are evaluated for LIURP.

• Water heater timer installation

The following minor measures may be provided:

- Water heater and pipe wraps
- Faucet aerators
- Showerheads
- Smoke 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)
- 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 86 percent who are eligible and 29 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.

⁷This 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.
- 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, wants ownership of the new appliances, 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 a minimum of three times by telephone and one time by mail over a 30-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.

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.

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 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.

The auditor 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 major measures are installed, and by other CMC staff 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

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, and 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 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.

III. Program and Participant Statistics

This section provides statistics on the LIURP services that were provided in 2008, as well as the characteristics of the homes and the customers who were served by the Program.

A. 2008 Customer Participation

PECO screened 29,988 customers for LIURP services in 2008. Table III-1 shows that 4,277 customers were not eligible, 16,899 were cancelled, and 8,812 received Program services.

Category	Number	Percent of Total
Ineligible	4,277	14%
Cancelled	16,899	56%
Treated	8,812	29%
TOTAL Evaluated	29,988	100%

Table III-1Customers Evaluated for Program Services

Table III-2 displays the reasons why customers were deemed ineligible for LIURP. The largest group, 46 percent, was not eligible due to income that was above the guidelines. Twenty-four percent had usage that was below the eligibility guidelines and 16 percent did not submit income verification. Seven percent did not have a sufficient usage history, four percent were previously treated by LIURP, and three percent were commercial accounts.

Table III-2 Ineligible Customers

Category	Number	Percent of Total
Over income	1,972	46%
Usage below guidelines	1,036	24%
Income verification not submitted	669	16%
Insufficient Usage History	279	7%
Previously Treated in LIURP	179	4%
Commercial Account	122	3%
Scope of Work Beyond Guidelines	20	<1%
TOTAL Ineligible	4,277	100%

Table III-3 displays reasons why customers were cancelled. The largest group of customers, 46 percent, made no response to contact attempts. Another large group, 15 percent, were cancelled because of a planned move. Six percent refused services and three percent were cancelled because landlord consent was not obtained. Approximately 30 percent of customers were cancelled due to other reasons.

Category	Number	Percent of Total
No response to contact attempts	7,828	46%
Customer moving	2,566	15%
Customer refused	997	6%
No landlord consent	573	3%
Other	4,935	29%
TOTAL Cancelled	16,899	100%

Table III-3Cancelled Customers

B. 2008 LIURP Services

This section describes LIURP services that were delivered in 2008. The annual LIURP budget for 2008, determined by the settlement agreement of PECO's electric restructuring case, was \$5,600,000, with \$875,000 earmarked for the LIURP Gas Program through Gas restructuring. Table III-4 shows the distribution of this spending. Sixty-seven percent was spent on weatherization measures and labor, 27 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.

Category	Amount Spent	Percent of Funds
Weatherization Measures	\$4,306,205	67%
Audit/Education	\$1,745,352	27%
PECO Administration	\$419,924	6%
Solar Water Maintenance	\$3,520	<1%
TOTAL	\$6,475,000	100%

Table III-5 displays the distribution of LIURP jobs and expenditures by job type. While 64 percent of jobs are classified as baseload, meaning that measures primarily address electric baseload usage, these are lower cost jobs and represent approximately 27 percent of total

weatherization costs. The average cost for measures on these jobs is \$193. Gas heating jobs represent 13 percent of jobs and 58 percent of costs, averaging \$1,995 in measure costs per home. Electric heating jobs average \$2,190 per home.

Јор Туре	# of Jobs ¹	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	5,620	64%	\$1,084,572	27%	\$193
Electric Heating	143	2%	\$313,225	8%	\$2,190
Gas Heating	1,140	13%	\$2,273,749	58%	\$1,995
Low Usage	1,541	18%	\$215,791	5%	\$140
Electric Heat Low Use	331	4%	\$51,125	1%	\$154
Solar Water Heat Maintenance	3	<1%	\$1,990	<1%	\$663
Prior Year	24	<1%	\$5,283	<1%	\$220
Total	8,802	100%	\$3,945,735	100%	\$448

Table III-52008 LIURP Service Delivery and Expenditures
By Job Type

¹There are 10 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 seven percent received a refrigerator replacement. Approximately 12 percent received air sealing and 11 percent received weatherization. Seven percent received insulation, and five percent received a heating system tune-up.

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Baseload	8,573	97%	\$822,629	21%	\$96
Refrigerator Replacement	635	7%	\$489,177	12%	\$770
Weatherization	952	11%	\$305,771	8%	\$321
Air Sealing	1,042	12%	\$305,847	8%	\$294
Insulation	590	7%	\$490,729	12%	\$832
Electrical	262	3%	\$143,975	4%	\$550
Heating System Replacement	294	3%	\$992,094	25%	\$3,374
Heating System Tune Up	469	5%	\$187,256	5%	\$399
Air Conditioner Replacement	180	2%	\$123,999	3%	\$689
Water Heater Replacement	105	1%	\$75,614	2%	\$720
Water Heater Service	39	<1%	\$8,074	<1%	\$207

Table III-62008 LIURP Service Delivery and Expenditures

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Solar Water Heater Tune Up	1	<1%	\$570	<1%	\$570
TOTAL	8,802	100%	\$3,945,735	100%	\$448

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:* Over 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 635 homes and second refrigerators were removed in 44 homes.
- Air conditioner replacement: Window air conditioners were replaced in 181 homes.
- *Aerators and showerheads:* A total of 3,210 aerators were provided in 1,510 homes and 1,749 showerheads were provided in 1,442 homes.
- *Water heaters:* Electric water heater timers were provided in 167 homes and water heater replacements were provided in 100 homes.
- *Air sealing:* Air sealing was provided in approximately 1,050 homes. As expected, most of the customers who received air sealing also received a blower door test.
- Insulation: Insulation was provided in approximately 700 homes.
- *Heat system repair:* Approximately 350 homes received heating system repair work.
- *Heating system replacement:* Heat pumps were replaced in 18 homes, furnaces in 134 homes, and boilers in 138 homes.
- Solar water heaters: One home received solar water heater repair.

Table III-72008 LIURP Service Delivery and Expenditures
By Measure Type

Measure	Number of Jobs	% of Jobs	Total Number
Smoke Detector	4,971	56%	12,412

Measure	Number of Jobs	% of Jobs	Total Number
Smoke Detector Battery	548	6%	1,094
CFLs	8,570	97%	34,244
Refrigerator Removal	44	<1%	46
Refrigerator Replacement	635	7%	635
AC Maintenance	34	<1%	34
Air Conditioner Replacement	181	2%	200
Aerator	1,510	17%	3,210
Showerhead	1,442	16%	1,749
Water Heater Pipe Insulation	185	2%	185
Water Heater Tank Insulation	43	<1%	43
Water Heater Labor	48	1%	48
Water Heater Part	41	<1%	52
Electric Water Heater Timer	167	2%	167
Water Heater Replacement	100	1%	100
Blower Door Test	938	11%	938
Air Sealing	1,051	12%	1,051
Duct/Pipe Insulation	304	3%	304
Insulation	707	8%	707
Electric Labor	70	1%	70
Electrical Part	59	1%	1,932
Manual Thermostat	296	3%	308
Programmable Thermostat	250	3%	271
Other Thermostat	3	<1%	8
Heating System Labor	165	2%	165
Heating System Part	332	4%	3,009
Clean and Tune	375	4%	375
Furnace Filter	58	1%	60
Electric Baseboard	16	<1%	34
Heat Pump	18	<1%	18
Furnace	134	2%	134
Gas Boiler	138	2%	138
Solar Water Heater Repair	1	<1%	1

C. 2008 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 10,990 kWh, electric heating customers had average usage of 20,786 kWh, and gas heating customers had average gas usage of 1,087 ccf.

Јор Туре	Number of Jobs	Jobs with Data	Electric Use (kWh)	Gas Use (ccf)
Baseload	5,626	4,524	10,990	830
Electric Heating	143	98	20,786	1,232
Gas Heating	1,141	882	9,733	1,087
Low Usage	1,543	1,283	6,623	527
Electric Heat Low Use	331	203	9,702	-
Solar Water Heat Maintenance	3	3	12,520	-
Prior Year	25	19	8,659	954
Total	8,812	7,003	10,128	994

Table III-8Pre-Treatment UsageWeather Normalized

¹There are only seven electric heating jobs with gas usage and 38 low usage jobs with gas usage.

Table III-9 displays the primary heating source for LIURP jobs by job type and overall. Approximately 80 percent of the homes served have utility gas as their primary heating source. Twelve percent use fuel oil and seven percent have electric heat. Baseload jobs are distributed similarly.

Table III-9Primary Heating Source

	Bas	eload	Elect	ric Heat	Gas	Heat	All	Jobs
Primary Heating Source	# of Jobs	% of Jobs						
Utility Gas	4,535	81%	17	12%	1,132	99%	7,103	81%
Fuel Oil	865	15%	0	0%	5	<1%	1,025	12%
Electric	188	3%	126	88%	4	<1%	624	7%
Other	35	1%	0	0%	0	0%	47	1%
Missing	3	<1%	0	0%	0	0%	13	<1%
Total	5,626	100%	143	100%	1,141	100%	8,812	100%

Table III-10 describes the use of supplemental heating by jobs treated through LIURP. Overall, 36 percent of the customers who were treated by LIURP used supplemental heat, virtually all of whom used electric supplemental heat. Forty-four percent of the customers who had baseload services used electric supplemental heat.

	Base	load	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	3,094	55%	127	89%	938	82%	5,616	64%
Electric	2,489	44%	12	8%	198	17%	3,134	36%
Other	43	1%	4	3%	5	<1%	62	1%
Total	5,626	100%	143	100%	1,141	100%	8,812	100%

Table III-10 Supplemental Heating

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 62 percent, was a window unit. Twenty-four percent had central air conditioning.

Air Conditioning	Number of Jobs	% of Jobs
None Used	301	3%
Window Unit	5,467	62%
Central Electric	2,113	24%
Wall Unit	599	7%
Window/Wall Unit	6	<1%
Central Heat Pump	302	3%
Portable Unit	24	<1%
Total	8,812	100%

Table III-11 Air Conditioning

Table III-12 shows the home ownership characteristics of LIURP recipients. This table shows that the Program was successful at serving renters, as over 40 percent of the LIURP recipients are renters.

	Number of Jobs	% of Jobs
Own	5,021	57%
Rent	3,791	43%

Table III-12Home Ownership

Homes treated by LIURP are fairly old. The average age of homes treated was 69 years, and over 40 percent were more than 75 years old.

	Number of Jobs	% of Jobs	
<=25 Years	726	8%	
26 – 50 Years	1,270	14%	
51 – 75 Years	3,011	34%	
76 Years or Older	3,805	43%	
Mean	69 Years		

Table III-13Home Age

Table III-14 displays the dwelling type for the homes served under LIURP. The most common type was a row home, with 57 percent of homes served. Fourteen percent live in other types of single family homes, another 14 percent live in duplexes, and 11 percent live in multi-family homes.

Table III-14Dwelling Type

	Number of Jobs	% of Jobs
Row	5,055	57%
Other Single Family	1,256	14%
Duplex	1,208	14%
Multi	1,008	11%
Mobile	58	1%
Other	227	3%
Total	8,812	100%

Table III-15 describes the heated square footage of the homes treated by LIURP. Homes averaged 1,189 square feet. Only 37 percent of the homes were greater than 1,200 square feet.

	Number of Jobs	% of Jobs	
<=800	1,315	15%	
801 - 1,000	1,770	20%	
1,001 - 1,200	2,492	28%	
1,201 or more	3,235 37%		
Mean	1,189		

Table III-15Heated Square Footage

D. 2008 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, 53 percent contain at least one child, and 29 percent contain at least one elderly member.

	Number of Jobs	% of Jobs
Female Household Head	6,673	76%
Male Household Head	2,137	24%
Child in Household (<18)	4,643	53%
Elderly in Household (>62)	2,520	29%

Table III-16Household Composition

Table III-17 shows that the mean annual household income level was \$14,167. Approximately 40 percent of the households served had annual income below \$10,000. Only 21 percent had annual income above \$20,000.

Table III-17Annual Income

	Number of Jobs	% of Jobs		
<=\$5,000	853	10%		
\$5,001 - \$10,000	2,682	30%		
\$10,001 - \$15,000	2,207	25%		
\$15,001 - \$20,000	1,260	14%		
\$20,001 or more	1,810	21%		
Mean	\$14,167			

Table III-18 displays the household poverty level. Approximately 23 percent of the households had income below 50 percent of the Federal Poverty Level (FPL) and approximately nine percent had income above 150 percent of the FPL.

	Number of Jobs	% of Jobs		
<=25%	672	8%		
26% - 50%	1,283	15%		
51% - 100%	3,873	44%		
101% - 150%	2,209	25%		
151% or greater	775	9%		
Mean	85%			

Table III-18Poverty Level

Table III-19 describes the account type of households who participated in the Program. Approximately 85 percent are CAP participants, less than one percent are customer choice participants, and two percent have the off peak rate.

Table III-19Account Type

	Number of Jobs ¹	% of Jobs	
CAP	7,471	85%	
Customer Choice	7	<1%	
Off Peak	170	2%	

¹Customer Choice, CAP, and Off Peak data were missing for five accounts.

Table III-20 displays the education level of the head of household. The majority of participants, 58 percent, have a high school education. Sixteen percent have some high school, 15 percent have some college, and seven percent have a college degree.

Table III-20Education Level

	Number of Jobs	% of Jobs
No Formal Education	21	<1%
Some Grade School	38	<1%
Grade School	252	3%
Some High School	1,406	16%
High School	5,082	58%

	Number of Jobs	% of Jobs
Some College	1,326	15%
College Degree	590	7%
Some Graduate Work	13	<1%
Graduate Degree	20	<1%
Missing	64	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-nine percent had public assistance as their primary source of income, 21 percent had full time work, 17 percent had a pension and/or retirement, and 12 percent had part-time work.

	Number of Jobs	% of Jobs
Public Assistance	3,444	39%
Full Time Work	1,807	21%
Pension/Retirement	1,521	17%
Part Time Work	1,092	12%
Dependent on Another	284	3%
Self Employment	25	<1%
Seasonal Employment	7	<1%
Other	632	7%

Table III-21Income Source

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 2008 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 80 percent of the treated population in the usage analysis.

	Electric Baseload	Electric Heating	Gas Heating	All Jobs ^{1}
Original Population	5,626	143	1,141	8,812
Not Enough Pre-Treatment Days	261	11	78	462
Not Enough Post-Treatment Days	496	14	86	748
Pre Usage Below 1200 kWh or 300 ccf	147	4	9	196
Post Usage Below 1200 kWh or 300 ccf	23	3	12	47
Change in Total Usage>65%	175	13	74	350
Final Sample	4,524	98	882	7,009
% Included in Analysis	80%	69%	77%	80%

Table IV-1Usage Impact Data Attrition

¹There 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 degreedays. 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 714 kWh, or 6.5 percent of pretreatment usage.
- Electric heat jobs had average savings of approximately 2,172 kWh, or 10.4 percent of pre-treatment usage.
- Gas heat jobs had average savings of approximately 103 ccf, or 9.5 percent of pretreatment usage.

	#	Pre-Use	Post-Use	Savings	% Savings	
Electric Baseload (kWh)						
Non Normalized 4,524 11,024 9,909 1,115 10.19						
Degree Day Normalized	4,524	10,990	10,276	714	6.5%	
Prism Normalized	2,724	10,972	10,139	833	7.6%	
Electric Heat (kWh)						
Non Normalized	98	20,639	18,789	1,850	9.0%	
Degree Day Normalized	98	20,786	18,614	2,172	10.4%	
Prism Normalized	75	21,324	19,329	1,995	9.4%	
	Ga	as Heat (ccf)				
Non Normalized	882	1,073	1,000	73	6.8%	
Degree Day Normalized	882	1,087	984	103	9.5%	
Prism Normalized	506	1,072	979	93	8.7%	

Table IV-2Average Usage and Savings

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 baseload jobs and somewhat higher than the PRISM estimated savings for the electric heat and gas heat jobs.

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

- The 2008 electric baseload jobs had lower savings than the 1999-2007 average. Savings were 6.5 percent in 2008 compared to the historical average of 9.5 percent. Weatherization spending, at \$191 in 2008, was also lower than the nine-year average of \$228.
- Electric heat jobs had average savings that were significantly higher than the 1999-2007 average. Savings were 10.4 percent in 2008 compared to 7.9 percent for the nine-year average. Costs for 2008 were also significantly higher than the nine-year average.
- Gas heat jobs had pre-treatment usage and savings that were lower than the 1999-2007 average. Pre-treatment usage was 1,087 compared to the nine-year average of 1,208, approximately 10 percent lower. Gas savings were 9.5 percent in 2008, as compared to 11.0 percent for the eight-year average. Gas heat measure costs were greater than the nine-year average.

	Pre-Use	Post-Use	Savings	Percent Savings	Wx Cost			
Electric Baseload (kWh)								
2008	10,990	10,276	714	6.5%	\$191			
1999-2007 Average	10,292	9,315	977	9.5%	\$228			
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			
	E	lectric Heat ((kWh)		•			
2008	20,786	18,614	2,172	10.4%	\$2,332			
1999-2007 Average	22,192	20,436	1,756	7.9%	\$1,724			
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			
	·	Gas Heat (o	cf)					
2008	1,087	984	103	9.5%	\$2,016			
1999-2007 Average	1,208	1,075	133	11.0%	\$1,711			
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			

Table IV-3Time-Series Comparison of Usage Savings

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. Additionally, recent increases in energy prices may have caused customers to conserve energy prior to receiving services.

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

	#	Pre-Use Post-Use		Savings	% Savings	Share of Savings				
	Electric Baseload (kWh)									
Baseload		7,359	7,055	304	4.1%	42.6%				
Heating	4,524	1,672	1,412	260	15.6%	36.4%				
Cooling	ling		1,809	150	7.7%	21.0%				
	Electric Heat (kWh)									
Baseload		11,356	10,465	891	7.8%	41.0%				
Heating	98	8,195	7,053	1,142	13.9%	52.6%				
Cooling		1,235	1,096	139	11.3%	6.4%				
Gas Heat (ccf)										
Baseload	007	261	259	2	0.8%	2.0%				
Heating	002	806	709	97	12.0%	98.0%				

Table IV-4Seasonal Usage Analysis

Energy efficiency program savings are often found to correlate with the level of pretreatment 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 2008 PECO LIURP savings are consistent with this expectation.

• Baseload jobs with pre-treatment usage over 12,000 kWh have savings of 8.4 percent, compared to savings of 5.8 percent for baseload jobs with pre-treatment usage between 8,000 and 12,000 kWh, and 3.0 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 17 cents per kWh saved, as compared to a cost of 75 cents per kWh saved for the lowest pre-usage jobs.

- Electric heat jobs with pre-treatment usage over 26,000 kWh had average savings of 16.5 percent, compared to jobs with usage between 16,000 and 26,000 kWh that had average savings of 7.2 percent and jobs with usage below 16,000 kWh had savings of 5.6 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 11.5 percent, compared to average savings of 9.2 percent for jobs with usage between 800 and 1,400 ccf, and 7.2 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.

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved			
Electric Baseload										
< 8,000 kWh	895	7,426	7,206	220	3.0%	\$164	\$0.75			
8,000 – 12,000 kWh	2,353	9,682	9,119	563	5.8%	\$179	\$0.32			
> 12,000 kWh	1,276	15,902	14,564	1,338	8.4%	\$234	\$0.17			
Electric Heat										
< 16,000 kWh	38	12,923	12,205	718	5.6%	\$2,361	\$3.29			
16,000 – 26,000 kWh	37	20,002	18,570	1,432	7.2%	\$1,800	\$1.26			
> 26,000 kWh	23	35,036	29,271	5,765	16.5%	\$3,143	\$0.55			
	Gas Heat ¹									
< 800 ccf	182	720	668	52	7.2%	\$1,519	\$29.21			
800 – 1,400 ccf	563	1,037	942	95	9.2%	\$1,845	\$19.42			
> 1,400 ccf	137	1,779	1,574	205	11.5%	\$2,255	\$11.00			

Table IV-5Change in UsageBy Pre Program Usage

¹Measure 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 and electric heat jobs, savings were somewhat lower for CAP participants for 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	3,997	10,954	10,236	718	6.6%	\$187	\$0.26		
Non-CAP	527	11,263	10,580	683	6.1%	\$223	\$0.33		

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved		
Electric Heat									
CAP	51	19,597	16,890	2,707	13.8%	\$2,390	\$0.88		
Non-CAP	47	22,075	20,483	1,592	7.2%	\$2,270	\$1.43		
	Gas Heat ¹								
CAP	479	1,093	998	95	8.7%	\$1,795	\$18.89		
Non-CAP	403	1,079	967	112	10.4%	\$1,896	\$16.93		

¹Measure 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	4	9,896	9,495	401	4.1%				
Non-Choice	4,520	10,991	10,277	714	6.5%				
		Electric H	Ieat ¹						
Non-Choice	98	20,786	18,614	2,172	10.4%				
Gas Heat ¹									
Non-Choice	882	1,087	984	103	9.5%				

¹Electric and gas heat jobs do not contain any choice customers.

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 baseload off-peak customers were significantly lower than for the non off-peak customers.

Table IV-8Change in UsageBy Peak Service

	#	Pre-Use	Post-Use	Savings	% Savings				
Electric Baseload									
Off-Peak	78	9,626	9,502	124	1.3%				
Not Off-Peak	4,446	11,014	10,290	724	6.6%				
	Electric Heat								
Off Peak	5	21,917	18,945	2,972	13.6%				
Not Off-Peak	93	20,725	18,596	2,129	10.3%				

	#	Pre-Use	Post-Use	Savings	% Savings				
Gas Heat (electric usage)									
Off Peak	13	10,860	11,248	-388	-3.6%				
Not Off Peak	858	9,716	9,173	543	5.6%				

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

Table IV-9 displays the change in usage by home ownership status. Approximately 40 percent of the customers who received baseload services were renters. A smaller percentage of the electric heat and gas heat recipients were renters. Baseload job renters have savings that average 6.1 percent, compared to average savings of 6.8 percent for owners and measure costs that average only \$96, as compared to measure costs that average \$242 for owners. None of the renters received refrigerator replacement, a major source of savings for baseload homes. For all job types, differences in savings between renters and owners were not statistically significant.

Table IV-9 Change in Usage By Home Ownership

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost Per Unit Saved		
				Electri	c Baseload				
Owner	2,684	11,223	10,465	758	6.8%	\$242	\$0.32		
Renter	1,840	10,651	10,001	650	6.1%	\$96	\$0.15		
	Electric Heat								
Owner	72	21,518	19,535	1,983	9.2%	\$2,651	\$1.34		
Renter	26	18,757	16,063	2,694	14.4%	\$1,452	\$0.54		
Gas Heat ¹									
Owner	738	1,090	988	102	9.4%	\$1,999	\$19.60		
Renter	144	1,070	961	109	10.2%	\$1,032	\$9.47		

¹Measure 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 9.8 percent, compared to average savings of 3.5 percent for baseload jobs without supplemental heat. Electric heat and gas heat jobs without supplemental heat have higher savings than those with supplemental heat.

By Supplemental Heat										
	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost Per Unit Saved			
			Ele	ctric Baselo	ad					
Supplemental Heat	2,018	11,779	10,626	1,153	9.8%	\$208	\$0.18			
No Supp Heat	2,506	10,355	9,995	360	3.5%	\$178	\$0.49			
			E	Electric Hear	t					
Supplemental Heat	12	22,822	21,789	1,033	4.5%	\$4,303	\$4.17			
No Supp Heat	86	20,501	18,171	2,330	11.4%	\$2,058	\$0.88			
				Gas Heat ¹						
Supplemental Heat	146	1,123	1,043	80	7.1%	\$1,895	\$23.69			
No Supp Heat	736	1,079	972	107	9.9%	\$1,831	\$17.11			

Table IV-10 Change in Usage

¹Measure 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 ٠ 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 11 percent of baseload jobs received major measures. Costs for these jobs, averaging \$855, were significantly higher than costs for baseload jobs that did not receive major measures, averaging \$109. Savings for baseload jobs with major measures averaged 13.4 percent, as compared to savings that averaged 5.6 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 11.4 percent, as compared to average savings of 4.9 percent for jobs that did not receive major measures. Spending on jobs that received major measures averaged \$2,617, compared to average spending of \$756 for jobs that did not receive major measures.
- Gas Heat Jobs Gas Measures: Approximately 86 percent of gas heat jobs received major measures aimed at reducing gas usage. Gas savings for jobs with major measures averaged 9.9 percent, compared to average savings of 6.5 percent for jobs that did not receive major measures. Costs for gas jobs with major measures averaged \$1,955 compared to average costs of \$1,128 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 12.7 percent compared to 4.5 percent for those who received only basic electric measures.

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost per Unit Saved			
Electric Baseload										
Basic	4,022	10,887	10,281	606	5.6%	\$109	\$0.18			
Major	502	11,821	10,240	1,581	13.4%	\$855	\$0.54			
Electric Heat										
Basic	15	20,568	19,550	1,018	4.9%	\$756	\$0.74			
Major	83	20,825	18,444	2,381	11.4%	\$2,617	\$1.10			
				Gas He	$at - ccf^{1}$					
Basic	121	1,070	999	71	6.5%	\$1,128	\$15.89			
Major	761	1,089	981	108	9.9%	\$1,955	\$18.10			
Gas Heat – kWh ²										
Basic	773	9,637	9,208	429	4.5%	\$84	\$0.20			
Major	98	10,497	9,169	1,328	12.7%	\$899	\$0.68			

Table IV-11Change in UsageBy Level of Service

¹Measure costs for gas heat (ccf) jobs exclude the costs for the measures targeted at reducing electric usage. ²Measure 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 (11.5%) than those who did not (6.4%).
- *Refrigerator*: Baseload participants who received a refrigerator had higher savings (15.1%) than those who did not (5.7%). Gas heat customers who received a refrigerator had higher electric savings (13.7%) than those who did not (4.5%).
- *Electric Water Heater Timer*: Participants who received an electric water heater timer had slightly higher savings (8.1%) than those who did not (6.5%).
- *Blower Door Guided Air Sealing:* Gas heating customers who received blower door guided air sealing had higher savings (10.0%) than those who did not (7.5%).
- *Insulation:* Gas heating customers who received insulation had higher savings (11.1%) than those who did not (7.3%).
- *Furnace:* Gas heating customers who received a new furnace had higher savings (18.7%) than those who did not (8.4%).

Table IV-12
Change in Usage
By Major Measures

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost				
Electric Baseload										
Air Conditioner	97	11,562	10,238	1,324	11.5%	\$1,010				
No Air Conditioner	4,427	10,978	10,277	701	6.4%	\$174				
Refrigerator	363	11,399	9,683	1,716	15.1%	\$920				
No Refrigerator	4,161	10,955	10,328	627	5.7%	\$128				
Air Conditioner/Refrigerator	20	12,205	9,831	2,374	19.5%	\$1,508				
Air Conditioner/ No Refrigerator	77	11,395	10,344	1,051	9.2%	\$880				
No Air Conditioner/ Refrigerator	343	11,352	9,675	1,677	14.8%	\$886				
No Air Conditioner/ No Refrigerator	4,084	10,946	10,328	618	5.6%	\$114				
Electric Water Heater Timer	72	15,350	14,111	1,239	8.1%	\$569				
No Electric Water Heater Timer	4,452	10,920	10,214	706	6.5%	\$185				
		Electr	ic Heat							
Refrigerator	14	18,826	16,393	2,433	12.9%	\$3,136				
No Refrigerator	84	21,112	18,984	2,128	10.1%	\$2,199				
Blower Door Test	55	20,055	17,963	2,092	10.4%	\$2,321				
No Blower Door Test	43	21,719	19,445	2,274	10.5%	\$2,347				
Electric Water Heater Timer	33	24,218	20,564	3,654	15.1%	\$2,892				
No Electric Water Heater Timer	65	19,043	17,623	1,420	7.5%	\$2,048				
Insulation	55	20,740	18,563	2,177	10.5%	\$2,471				

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost			
No Insulation	43	20,844	18,679	2,165	10.4%	\$2,155			
		Gas He	eat - ccf ¹						
Blower Door Test	677	1,097	987	110	10.0%	\$1,920			
No Blower Door Test	205	1,054	975	79	7.5%	\$1,581			
Insulation	496	1,062	944	118	11.1%	\$2,031			
No Insulation	386	1,118	1,036	82	7.3%	\$1,597			
Furnace	97	1,087	884	203	18.7%	\$3,799			
No Furnace	785	1,087	996	91	8.4%	\$1,599			
Gas Heat - kWh ²									
Refrigerator	83	10,300	8,894	1,406	13.7%	\$916			
No Refrigerator	788	9,674	9,236	438	4.5%	\$98			

¹Measure costs for gas heat (ccf) jobs exclude the costs for the measures targeted at reducing electric usage. ²Measure 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 507 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.¹¹ 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 \$0.12. 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.

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

	Savings	Cost/Home	\$/Unit Saved	Measure Life	\$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	507 (±101)	\$74/\$272	\$0.15/\$0.54	5	\$0.03/\$0.12
Refrigerator	1,008 (±269)	\$769	\$0.76	12	\$0.08
Gas Heat - ccf					
Gas Furnace	122 (±41)	\$2,546	\$20.87	15	\$1.90
Boiler	69 (±42)	\$3,137	\$45.46	15	\$4.30
Insulation	38 (±27)	\$679	\$17.87	15	\$1.75

Table IV-13Measure Savings Estimates

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 \$0.58 for baseload jobs, \$1.19 for electric heat jobs, and \$0.37 for gas heat jobs. The cost per ccf saved is \$1.37 for electric baseload jobs and \$20.05 for gas heat jobs.

	#	Average Savings	Average Measure Cost	Average Audit/ Education Cost	Average Admin Cost	Average Total Cost	Cost Per Unit Saved
Electric Baseload							
Electric (kWh)	4,524	714	\$182	\$189	\$46	\$416	\$0.58
Gas (ccf)	184	15	\$9	\$9	\$2	\$21	\$1.37
Electric Heat							
Electric (kWh)	98	2,172	\$2,332	\$198	\$48	\$2,578	\$1.19
Gas Heat							
Electric (kWh)	871	530	\$176	\$17	\$4	\$197	\$0.37
Gas (ccf)	882	103	\$1,841	\$181	\$44	\$2,066	\$20.05

Table IV-14Cost per Unit Saved

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. 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 eight cents for each kWh saved.

	#	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)	4,524	714	\$416	\$0.58	\$0.13	\$0.08	\$0.06
Gas (ccf)	184	15	\$21	\$1.37	\$0.32	\$0.18	\$0.13
Electric Heat							
Electric (kWh)	98	2,172	\$2,578	\$1.19	\$0.27	\$0.15	\$0.11
Gas Heat							
Electric (kWh)	871	530	\$197	\$0.37	\$0.09	\$0.05	\$0.04
Gas (ccf)	882	103	\$2,066	\$20.05	\$4.63	\$2.60	\$1.93

Table IV-15Cost Per Unit SavedBy Measure Life Assumption

V. Bill and Payment Impacts

This section of the report examines the bill and payment impacts for 2008 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.

	Electric Baseload	Electric Heating	Gas Heating	All Jobs
Original Population	5,626	143	1,141	8,812
Not Enough Pre-Treatment Days	2,348	66	471	3,708
Not Enough Post-Treatment Days	489	12	85	737
Data Outliers	274	3	115	420
Final Sample	2,515	62	470	3,947
% Included in Analysis	45%	43%	41%	45%

Table V-1Payment Impact Data Attrition

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 while overall electric revenue declined by an average of \$27 or three percent, gas revenue increased by \$17 or six percent. Total revenue declined by about one percent.

	#	Pre	Post	Change	Percent Change		
	1	Electric Ba	seload	I			
Electric Revenue		\$1,132	\$1,081	-\$51	-4.5%		
Gas Revenue	4,524	\$110	\$119	\$9	8.2%		
Total Revenue		\$1,242	\$1,200	-\$42	-3.4%		
		Electric	Heat				
Electric Revenue		\$1,900	\$1,907	\$7	0.4%		
Gas Revenue	98	\$114	\$120	\$6	5.3%		
Total Revenue		\$2,014	\$2,027	\$13	0.6%		
		Gas H	eat				
Electric Revenue		\$1,519	\$1,531	\$12	0.8%		
Gas Revenue	882	\$1,576	\$1,649	\$73	4.6%		
Total Revenue		\$3,095	\$3,180	\$85	2.7%		
All Job Types							
Electric Revenue		\$1,078	\$1,051	-\$27	-2.5%		
Gas Revenue	7,009	\$278	\$295	\$17	6.1%		
Total Revenue		\$1,356	\$1,346	-\$10	-0.7%		

Table V-2Billing Revenue

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 declined by 4.5 percent for electric baseload jobs, 1.0 percent for electric heat jobs, and 3.1 percent for gas heat jobs.

Table V-3Bills and Total Charges

	#	Pre	Post	Change	Percent Change			
Electric Baseload								
Electric and Gas Charges		\$1,243	\$1,150	-\$93	-7.5%			
Other Charges	2,515	\$115	\$147	\$32	27.8%			
Total Charges		\$1,358	\$1,297	\$61	-4.5%			
Electric Heat								
Electric and Gas Charges		\$2,108	\$2,087	-\$21	-1.0%			
Other Charges	62	\$101	\$100	-\$1	-1.0%			
Total Charges		\$2,209	\$2,187	-\$22	-1.0%			
Gas Heat								
Electric and Gas Charges	470	\$2,510	\$2,392	-\$118	-4.7%			
Other Charges	470	\$106	\$144	\$38	35.8%			

	#	Pre	Post	Change	Percent Change			
Total Charges		\$2,616	\$2,536	-\$80	-3.1%			
All Job Types								
Electric and Gas Charges		\$1,274	\$1,205	-\$69	-5.4%			
Other Charges	3,947	\$101	\$130	\$29	28.7%			
Total Charges		\$1,375	\$1,335	-\$40	-2.9%			

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 2008 LIURP participants. The average number of payments made increased by between one-third 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		8.7	9.3	0.6	6.9%				
Cash Payments		\$1,069	\$1,101	\$32	3.0%				
Assistance Payments	2,515	\$51	\$90	\$39	76.5%				
Other Credits		\$117	\$132	\$15	12.8%				
Total Credits		\$1,237	\$1,324	\$87	7.0%				
		Electr	ic Heat						
# Payments		9.9	10.9	1.0	10.1%				
Cash Payments		\$2,024	\$2,050	\$26	1.3%				
Assistance Payments	62	\$33	\$56	\$23	69.7%				
Other Credits		\$97	\$131	\$34	35.1%				
Total Credits		\$2,154	\$2,237	\$83	3.9%				
Gas Heat									
# Payments		10.1	10.4	0.3	3.0%				
Cash Payments	470	\$2,351	\$2,291	-\$60	-2.6%				
Assistance Payments		\$43	\$103	\$60	139.5%				

	#	Pre	Post	Change	Percent Change			
Other Credits		\$135	\$155	\$21	14.8%			
Total Credits		\$2,529	\$2,549	\$20	0.8%			
All Job Types								
# Payments		8.8	9.4	0.6	6.8%			
Cash Payments		\$1,121	\$1,141	\$20	1.8%			
Assistance Payments	3,947	\$51	\$91	\$40	78.4%			
Other Credits		\$105	\$123	\$18	17.1%			
Total Credits		\$1,278	\$1,355	\$77	6.0%			

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 both CAP and non-CAP customers had a significant increase in assistance payments and other credits. Both CAP and non-CAP customers had relatively smaller increase in cash payments.

Table V-5Payments for CAP CustomersPre and Post-LIURP Treatment

	#	Pre	Post	Change	Percent Change				
CAP Customers – All Job Types									
# Payments		8.6	9.2	0.6	7.0%				
Cash Payments		\$932	\$943	\$11	1.2%				
Assistance Payments	3,292	\$61	\$101	\$40	65.6%				
Other Credits		\$99	\$125	\$26	26.3%				
Total Credits		\$1,092	\$1,169	\$77	7.1%				
	Non-	CAP Custom	ers – All Job	Types					
# Payments		9.7	10.3	0.6	6.2%				
Cash Payments		\$2,075	\$2,133	\$58	2.8%				
Assistance Payments	655	\$3	\$39	\$36	1200.0%				
Other Credits		\$88	\$101	\$13	14.8%				
Total Credits		\$2,166	\$2,274	\$108	5.0%				

Table V-6 displays a more detailed analysis of the types of assistance payments received in the pre and the post-treatment periods by 2008 LIURP participants. The table shows large increases in assistance payments that resulted from increases in both LIHEAP cash and crisis payments.

	#	Pre	Post	Change	% Change		
Electric Baseload							
LIHEAP Cash	2,515	\$33	\$49	\$16	48.5%		
LIHEAP Crisis		\$15	\$41	\$26	173.3%		
MEAF		\$3	\$0	-\$3	-100.0%		
Total Assistance		\$51	\$90	\$39	76.5%		
Electric Heat							
LIHEAP Cash	62	\$33	\$56	\$23	69.7%		
LIHEAP Crisis		\$0	\$0	\$0	0%		
MEAF		\$0	\$0	\$0	0%		
Total Assistance		\$33	\$56	\$23	69.7%		
Gas Heat							
LIHEAP Cash	470	\$32	\$79	\$47	146.9%		
LIHEAP Crisis		\$10	\$24	\$14	140.0%		
MEAF		\$1	\$0	-\$1	-100.0%		
Total Assistance		\$43	\$103	\$60	139.5%		
All Job Types							
LIHEAP Cash	3,947	\$35	\$57	\$22	62.9%		
LIHEAP Crisis		\$14	\$34	\$20	142.9%		
MEAF		\$2	\$0	-\$2	-100.0%		
Total Assistance		\$51	\$91	\$40	78.4%		

Table V-6Assistance PaymentsPre and Post-LIURP Treatment

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 12 percent.

Table V-7Coverage RatesPre and Post-LIURP Treatment

	#	Pre	Post	Change	Percent Change	
Electric Baseload						
Cash Coverage Rate	2,515	80.5%	89.2%	8.7%	10.8%	
Total Coverage Rate		92.0%	105.4%	13.4%	14.6%	
Electric Heat						
Cash Coverage Rate	62	90.4%	93.8%	3.4%	3.8%	
Total Coverage Rate		97.1%	102.6%	5.5%	5.7%	
Gas Heat						
Cash Coverage Rate	470	90.1%	90.8%	0.7%	0.8%	

	#	Pre	Post	Change	Percent Change	
Total Coverage Rate		96.6%	101.1%	4.5%	4.7%	
All Job Types						
Cash Coverage Rate	3,947	82.0%	88.3%	6.3%	7.7%	
Total Coverage Rate		93.6%	104.7%	11.1%	11.9%	

Table V-8 displays changes in customer balances. The table shows that while balances increased during the pre treatment period, they declined during the post period. Balances at the end of the post treatment period were lower than those at the end of the pre treatment period.

	#	Start	End	Change	Percent Change	
Electric Baseload						
Pre Balance	2,475	\$68	\$190	\$122	179%	
Post Balance		\$171	\$143	-\$28	-16%	
Electric Heat						
Pre Balance	62	\$262	\$317	\$55	21%	
Post Balance		\$192	\$141	-\$51	-27%	
Gas Heat						
Pre Balance	465	\$232	\$320	\$88	38%	
Post Balance		\$262	\$246	-\$16	-6%	
All Job Types						
Pre Balance	3,886	\$88	\$185	\$97	110%	
Post Balance		\$163	\$143	-\$20	-12%	

Table V-8Change in Customer Balance

VI. Summary of Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to nearly nine thousand customers in 2008, 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 somewhat lower than in previous years, although electric heat and gas heat savings were higher than in 2007. The reduction in energy savings 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. Additionally, lower pretreatment usage may be due to higher energy bills and customers' energy conservation efforts.

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. Lower energy savings for 2008 participants may be related to lower 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 is currently providing additional CFLs to LIURP customers, funded through Act 129 program funding. PECO should evaluate the additional impacts of these measures.
- *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 increases in energy prices, which may lead customers to conserve even in the absence of LIURP. Failure to account for this change may lead to an overestimate of LIURP savings, particularly on the gas side. However, the Pennsylvania Public Utility Commission does not require the use of a comparison group.