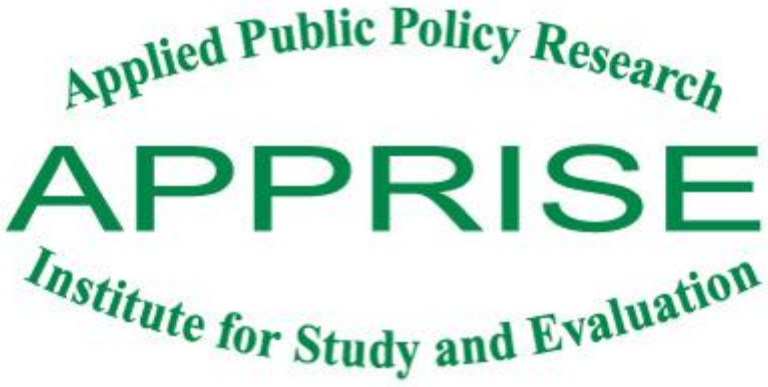

PECO Energy

2007 LIURP Evaluation

Final Report

April 2009

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Executive Summary

This report presents the findings from the Evaluation of PECO's 2007 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 2007 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.[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.

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 2007 was $6,475,000. In 2007, 9,329 customers received LIURP services.

[1] CAP customers with usage above 500 kWh monthly are evaluated for 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 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 2007, 34,358 customers were evaluated for LIURP services. There were 4,346 customers who were ineligible for the program and 20,683 customers who were cancelled. The cancellations were due to customers' lack of response to contact attempts, refusal of services, moves, and lack of landlord consent.[2] In total, 9,329 customers received LIURP services in 2007.

Table ES-1 displays how program funds were expended in 2007. In total $6.475 million were spent. Approximately 66 percent was for weatherization measures, 28 percent was for audit and education, and six percent was for program administration.

Table ES-1
2007 LIURP Expenditures
By Category

Category	Amount Spent	Percent of Funds
Weatherization Measures	$4,279,267	66%
Audit/Education	$1,786,373	28%
PECO Administration	$404,630	6%
Solar Water Maintenance	$4,730	<1%
TOTAL	$6,475,000	100%

Table ES-2 displays the distribution of 2007 LIURP jobs by job type. The table shows that 65 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 34 percent of total costs. The average cost for measures on these jobs was $224. Gas heating jobs represent 11 percent of jobs and 49 percent of costs, averaging $1,895 in measure costs per home. Electric heating jobs averaged $1,754 per home.

[2] See Table III-3.

Table ES-2
2007 LIURP Service Delivery and Expenditures
By Job Type

Job Type	# of Jobs[1]	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	6,102	65%	$1,366,833	34%	$224
Electric Heating	229	2%	$401,714	10%	$1,754
Gas Heating	1,040	11%	$1,971,217	49%	$1,895
Low Usage – CAP	1,382	15%	$175,477	4%	$127
Low Usage – Non-CAP	273	3%	$33,056	1%	$121
Electric Heat Low Use	254	3%	$43,047	1%	$169
Solar Water Heat Maintenance	7	<1%	$4,751	<1%	$679
Prior Year	35	<1%	$13,247	<1%	$378
Total	9,322	100%	$4,009,342	100%	$430

[1]There are 7 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:* Approximately one third of the customers served through LIURP use electric supplemental heat.
- *Air conditioning:* Air conditioning is used by 96 percent of the LIURP participants.
- *Renters:* PECO's LIURP is successful in serving renters. Nearly half of the customers served are renters.
- *Vulnerable households:* Fifty-six percent of the customers had a child and 25 percent had an elderly member.
- *Poverty level:* Approximately 24 percent had income below 50 percent of the FPL, 43 percent had income between 51 and 100 percent of the FPL, 24 percent had income between 101 and 150 percent of the FPL, and ten percent had income above 150 percent of the FPL.
- *CAP:* Eighty percent of LIURP recipients were CAP participants.

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 70 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 887 kWh, or 8.1 percent of pre-treatment usage.
- *Electric heat jobs* had average savings of approximately 1,129 kWh, or 5.4 percent of pre-treatment usage.
- *Gas heat jobs* had average savings of approximately 89 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	4,198	10,415	9,865	550	5.3%
Degree Day Normalized	4,198	10,919	10,032	887	8.1%
Prism Normalized	2,372	10,734	9,945	789	7.4%
Electric Heat (kWh)					
Non Normalized	162	20,757	19,523	1,234	5.9%
Degree Day Normalized	162	21,017	19,888	1,129	5.4%
Prism Normalized	130	21,091	20,001	1,190	5.6%
Gas Heat (ccf)					
Non Normalized	854	1,038	938	100	9.6%
Degree Day Normalized	854	1,054	965	89	8.4%
Prism Normalized	506	1,055	968	87	8.2%

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

- The 2007 electric baseload jobs had higher savings than in 2006, but lower than the historical average. Savings were 8.1 percent in 2007 compared to the historical average of 9.7 percent. Weatherization spending, at $240 in 2007, was also approximately the same as in the recent history of the Program.

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

- Electric heat jobs had pre-treatment usage and average savings that were lower than the 1999-2006 average. Savings were 5.4 percent in 2007 compared to 8.2 percent for the eight-year average. Costs for 2007 were approximately the same as the eight-year average.

- Gas heat jobs had pre-treatment usage and savings that were significantly lower than the 1999-2006 average. Pre-treatment usage was 1,054 compared to the eight year average of 1,227, more than 14 percent lower. Gas savings were 8.4 percent in 2007, as compared to 11.2 percent for the eight-year average. Gas heat measure costs were somewhat greater than the eight-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, 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.

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 kWh savings for electric baseload jobs that only received CFLs. These customers saved an average of 658 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 nine cents per kWh. This indicates that there may be potential to cost-effectively increase savings by providing more CFLs to LIURP participants. It also indicates that the LIURP education process is very effective.

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

Table ES-4
Measure Savings Estimates

	Savings	Cost/Home	$/Unit Saved	Measure Life	$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	658 (±114)	$73/$264	$0.11/$0.40	5	$0.03/$0.09
Refrigerator	949 (±238)	$744	$0.78	12	$0.09
Gas Heat - ccf					
Gas Furnace	122 (±47)	$2,405	$19.71	15	$1.90
Boiler	147 (±41)	$3,081	$20.96	15	$2.02
Insulation	52 (±28)	$692	$13.31	15	$1.28

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 12 cents per kWh saved with a 5-year measure life and six 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 $2.10, which is close to 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)	4,198	887	$444	$0.50	$0.12	$0.06	$0.05
Gas (ccf)	157	3	$30	$10	$2.31	$1.30	$0.96
Electric Heat							
Electric (kWh)	162	1,129	$1,969	$1.74	$0.40	$0.23	$0.17
Gas Heat							
Electric (kWh)	841	550	$203	$0.37	$0.09	$0.05	$0.04
Gas (ccf)	854	89	$1,936	$21.76	$5.02	$2.82	$2.10

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. Total bills and charges declined by $36 and total payments and credits increased by $16 from the pre to post period. There was a increase in the total bill coverage rate of about five percentage points.

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	3,557	$1,303	$1,267	-$36	-2.8%
Total Payments and Credits		$1,211	$1,227	$16	1.3%
Total Coverage Rate		94%	100%	5.4%	5.7%

Key Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to over nine thousand customers in 2007, 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 bills 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 2007 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 should modify LIURP procedures to evaluate each customer's lighting usage, and provide CFLs for any bulb used more

than 2 hours per day. This may require the use of a broader range of CFLs than are currently used, but would probably be a very cost-effective investment.

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 2007 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 2007 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 2007 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 2007, 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 15 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 14 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 nine 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
  - Income at or below 150 percent of the Federal Poverty Level (FPL), or
  - Special needs customer with income between 150 and 200 percent of the FPL[5]
- Usage requirements
  - At least 600 kWh monthly for baseload customers[6]
  - At least 1,400 kWh monthly for electric heating customers
  - 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

[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.
[6] 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.[7] 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 87 percent who are eligible and 36 percent who receive treatment over all who are evaluated.

Referred customers may not receive LIURP services because the customer:

- Refused LIURP services.
- Has insufficient usage history.[8]
- Has an inactive account.

[7] This is done through a three step process.
[8] 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.
- Has usage below the required level.[9]
- 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. [10] Some landlords never respond to CMC inquiries. CMC estimates that they are unable to obtain landlord consent for about seven percent of renters.[11]

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.

[9] There are some hardship cases where PECO makes exceptions to the usage requirement.
[10] Landlords are not required to contribute to the cost of LIURP services.
[11] 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 2007, as well as the characteristics of the homes and the customers who were served by the Program.

A. 2007 Customer Participation

PECO screened 34,358 customers for LIURP services in 2007. Table III-1 shows that 4,346 customers were not eligible, 20,683 were cancelled, and 9,329 received Program services.

Table III-1
Customers Evaluated for Program Services

Category	Number	Percent of Total
Ineligible	4,346	13%
Cancelled	20,683	60%
Treated	9,329	27%
TOTAL Evaluated	34,358	100%

Table III-2 displays the reasons why customers were deemed ineligible for LIURP. The largest group, 42 percent, was not eligible due income that was above the guidelines. Twenty-two percent had usage that was below the eligibility guidelines and 15 percent did not submit income verification. Nine percent were previously treated by LIURP, six percent did not have a sufficient usage history, and five percent were commercial accounts.

Table III-2
Ineligible Customers

Category	Number	Percent of Total
Over income	1,845	42%
Usage below guidelines	977	22%
Income verification not submitted	635	15%
Previously Treated in LIURP	397	9%
Insufficient Usage History	272	6%
Commercial Account	210	5%
Scope of Work Beyond Guidelines	10	<1%
TOTAL Ineligible	4,346	100%

Table III-3 displays reasons why customers were cancelled. The largest group of customers, 51 percent, made no response to contact attempts. Large groups, 23 percent of each, were planning to move or refused services.

Table III-3
Cancelled Customers

Category	Number	Percent of Total
No response to contact attempts	10,598	51%
Customer moving	4,748	23%
Customer refused	4,731	23%
No landlord consent	343	2%
Other	263	1%
TOTAL Cancelled	20,683	100%

B. 2007 LIURP Services

This section describes LIURP services that were delivered in 2007. The annual LIURP budget for 2007, 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-six percent was spent on weatherization measures and labor, 28 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
2007 LIURP Expenditures
By Category

Category	Amount Spent	Percent of Funds
Weatherization Measures	$4,279,267	66%
Audit/Education	$1,786,373	28%
PECO Administration	$404,630	6%
Solar Water Maintenance	$4,730	<1%
TOTAL	$6,475,000	100%

Table III-5 displays the distribution of LIURP jobs and expenditures by job type. While 65 percent of jobs are classified as baseload, meaning that measures primarily address electric baseload usage, these are lower cost jobs and represent approximately 34 percent of total weatherization costs. The average cost for measures on these jobs is $224. Gas heating jobs

represent 11 percent of jobs and 49 percent of costs, averaging $1,895 in measure costs per home. Electric heating jobs average $1,754 per home.

Table III-5
2007 LIURP Service Delivery and Expenditures
By Job Type

Job Type	# of Jobs[1]	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	6,102	65%	$1,366,833	34%	$224
Electric Heating	229	2%	$401,714	10%	$1,754
Gas Heating	1,040	11%	$1,971,217	49%	$1,895
Low Usage – CAP	1,382	15%	$175,477	4%	$127
Low Usage – Non-CAP	273	3%	$33,056	1%	$121
Electric Heat Low Use	254	3%	$43,047	1%	$169
Solar Water Heat Maintenance	7	<1%	$4,751	<1%	$679
Prior Year	35	<1%	$13,247	<1%	$378
Total	9,322	100%	$4,009,342	100%	$430

[1]There are 7 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 eight percent received a refrigerator replacement. Approximately ten percent received weatherization and approximately 11 percent received air sealing. Approximately seven percent received insulation, and approximately five percent received a heating system tune-up.

Table III-6
2007 LIURP Service Delivery and Expenditures

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Baseload	8,871	95%	$840,579	21%	$95
Refrigerator Replacement	764	8%	$569,974	14%	$746
Weatherization	961	10%	$320,458	8%	$333
Air Sealing	999	11%	$315,574	8%	$316
Insulation	628	7%	$528,817	13%	$843
Electrical	324	3%	$198,265	5%	$612
Heating System Replacement	234	3%	$782,651	20%	$3,345
Heating System Tune Up	482	5%	$198,797	5%	$412
Air Conditioner Replacement	268	3%	$182,390	5%	$681
Water Heater Replacement	106	1%	$67,081	2%	$633
Water Heater Service	6	<1%	$687	<1%	$114

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Solar Water Heater Tune Up	7	<1%	$4,070	<1%	$581
TOTAL	9,322	100%	$4,009,342	100%	$514

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 13,000 smoke detectors were provided in over 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 764 homes and second refrigerators were removed in 66 homes.
- *Air conditioner replacement:* Window air conditioners were replaced in 268 homes.
- *Aerators and showerheads:* A total of 3,121 aerators were provided in 1,461 homes and 1,806 showerheads were provided in 1,467 homes.
- *Water heaters:* Electric water heater timers were provided in 203 homes and water heater replacements were provided in 84 homes.
- *Air sealing:* Air sealing was provided in approximately 1,000 homes. As expected, almost all of the customers who received air sealing also received a blower door test.
- *Insulation:* Insulation was provided in approximately 750 homes.
- *Heat system repair:* Approximately 350 homes received heating system repair work.
- *Heating system replacement:* Heat pumps were replaced in 14 homes, furnaces in 92 homes, and boilers in 125 homes.
- *Solar water heaters:* Three homes received solar water heater inspections and six received repairs.

Table III-7
2007 LIURP Service Delivery and Expenditures
By Measure Type

Measure	Number of Jobs	% of Jobs	Total Number
Smoke Detector	5,497	59%	13,433

Measure	Number of Jobs	% of Jobs	Total Number
Smoke Detector Battery	660	7%	1,214
CFLs	8,869	95%	35,460
Refrigerator Removal	66	1%	66
Refrigerator Replacement	764	8%	764
AC Maintenance	24	<1%	24
Air Conditioner Replacement	268	3%	309
Aerator	1,461	16%	3,121
Showerhead	1,467	16%	1,806
Water Heater Pipe Insulation	289	3%	289
Water Heater Tank Insulation	70	1%	70
Water Heater Labor	26	<1%	26
Water Heater Part	19	<1%	26
Electric Water Heater Timer	203	2%	205
Water Heater Replacement	84	1%	84
Blower Door Test	926	10%	926
Air Sealing	1,012	11%	1,012
Duct/Pipe Insulation	354	4%	354
Insulation	739	8%	739
Electric Labor	91	1%	91
Electrical Part	74	1%	1,909
Manual Thermostat	291	3%	318
Programmable Thermostat	156	2%	167
Other Thermostat	8	<1%	9
Heating System Labor	224	2%	224
Heating System Part	352	4%	624
Clean and Tune	295	3%	295
Furnace Filter	74	1%	76
Electric Baseboard	24	<1%	52
Heat Pump	14	<1%	14
Furnace	92	1%	92
Gas Boiler	125	1%	125
Solar Water Heater Inspection	3	<1%	3
Solar Water Heater Repair	6	<1%	6

C. 2007 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 10,919 kWh, electric heating customers had average usage of 21,017 kWh, and gas heating customers had average gas usage of 1,054 ccf.

Table III-8
Pre-Treatment Usage
Weather Normalized

Job Type	Number of Jobs	Jobs with Data	Electric Use (kWh)	Gas Use (ccf)
Baseload	6,107	4,198	10,919	791
Electric Heating	229	162	21,017	851
Gas Heating	1,040	854	9,095	1,054
Low Usage – CAP	1,382	932	6,977	532
Low Usage – Non-CAP	274	204	6,402	554
Electric Heat Low Use	255	166	10,562	-
Solar Water Heat Maintenance	7	6	12,987	-
Prior Year	35	29	10,562	954
Total	9,329	6,551	10,225	965

[1]There are only three electric heating jobs with gas usage and eight low usage jobs with gas usage.

Table III-9 displays the primary heating source for LIURP jobs by job type and overall. Approximately three quarters of the homes served have utility gas as their primary heating source. Fourteen percent use fuel oil and seven 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	4,714	77%	6	3%	1,025	99%	7,219	77%
Fuel Oil	1,100	18%	1	<1%	11	1%	1,293	14%
Electric	233	4%	222	97%	3	<1%	698	7%
Other	56	1%	0	0%	1	<1%	74	1%
Missing	4	<1%	0	0%	0	0%	45	<1%
Total	6,107	100%	229	100%	1,040	100%	9,329	100%

Table III-10 describes the use of supplemental heating by jobs treated through LIURP. Overall, 34 percent of the customers who were treated by LIURP used supplemental heat, virtually all of whom used electric supplemental heat. Forty 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	3,578	59%	203	89%	853	82%	6,130	66%
Electric	2,470	40%	16	7%	184	18%	3,112	33%
Other	59	1%	10	4%	3	<1%	87	1%
Total	6,107	100%	229	100%	1,040	100%	9,329	100%

Table III-11 shows the type of air conditioning that LIURP recipients used. Most of the LIURP recipients, 96 percent, used some form of air conditioning. The most common type, with 64 percent, was a window unit. Twenty-two percent had central air conditioning.

Table III-11
Air Conditioning

Air Conditioning	Number of Jobs	% of Jobs
None Used	329	4%
Window Unit	5,936	64%
Central Electric	2,063	22%
Wall Unit	686	7%
Window/Wall Unit	1	<1%
Central Heat Pump	300	3%
Portable Unit	14	<1%
Total	9,329	100%

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

Table III-12
Home Ownership

	Number of Jobs	% of Jobs
Own	5,139	55%
Rent	4,190	45%

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.

Table III-13
Home Age

	Number of Jobs	% of Jobs
<=25 Years	844	9%
26 – 50 Years	1,389	15%
51 – 75 Years	3,325	36%
76 Years or Older	3,769	40%
Missing	2	<1%
Mean	69 Years	

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, 13 percent live in multi-family homes, and 11 percent live in duplexes.

Table III-14
Dwelling Type

	Number of Jobs	% of Jobs
Row	5,311	57%
Other Single Family	1,310	14%
Multi	1,208	13%
Duplex	1056	11%
Mobile	87	1%
Other	357	4%
Total	9,329	100%

Table III-15 describes the heated square footage of the homes treated by LIURP. Homes averaged 1,150 square feet. Only 33 percent of the homes were greater than 1,200 square feet.

Table III-15
Heated Square Footage

	Number of Jobs	% of Jobs
<=800	1,540	17%
801 – 1,000	2,348	25%
1,001 – 1,200	2,346	25%
1,201 or more	3,095	33%
Mean	1,150	

D. 2007 LIURP Customer Characteristics

The Program also captures detailed information on the characteristics of households who participate in the Program. Table III-16 shows that 73 percent of the households are female-headed, 56 percent contain at least one child, and 25 percent contain at least one elderly member.

Table III-16
Household Composition

	Number of Jobs	% of Jobs
Female Household Head	6,818	73%
Male Household Head	2,511	27%
Child in Household (<18)	5,242	56%
Elderly in Household (>62)	2,358	25%

Table III-17 shows that the mean annual household income level was $14,234. Approximately 40 percent of the households served had annual income below $10,000. Only 22 percent had annual income above $20,000.

Table III-17
Annual Income

	Number of Jobs	% of Jobs
<=$5,000	1,000	11%
$5,001 - $10,000	2,791	30%
$10,001 - $15,000	2,198	24%
$15,001 - $20,000	1,303	14%
$20,001 or more	2,037	22%
Mean	$14,234	

Table III-18 displays the household poverty level. Approximately 25 percent of the households had income below 50 percent of the Federal Poverty Level (FPL) and approximately ten percent had income above 150 percent of the FPL.

Table III-18
Poverty Level

	Number of Jobs	% of Jobs
<=25%	793	9%
26% - 50%	1,399	15%
51% - 100%	3,974	43%
101% - 150%	2,205	24%
151% or greater	958	10%
Mean	85%	

Table III-19 describes the account type of households who participated in the Program. Approximately 80 percent are CAP participants, less than one percent are customer choice participants, and three percent have the off peak rate.

Table III-19
Account Type

	Number of Jobs[1]	% of Jobs
CAP	7,447	80%
Customer Choice	39	<1%
Off Peak	288	3%

[1] Customer Choice data were missing for 74 customers. CAP and Off Peak data were missing for 39 accounts.

Table III-20 displays the education level of the head of household. The majority of participants, 55 percent, have a high school education. Fifteen percent have some high school, 17 percent have some college, and eight percent have a college degree.

Table III-20
Education Level

	Number of Jobs	% of Jobs
No Formal Education	26	<1%
Some Grade School	41	<1%
Grade School	261	3%
Some High School	1,413	15%
High School	5,116	55%

	Number of Jobs	% of Jobs
Some College	1,581	17%
College Degree	709	8%
Some Graduate Work	11	<1%
Graduate Degree	24	<1%
Missing	147	2%

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. Twenty-eight percent had public assistance as their primary source of income, 25 percent had full time work, 23 percent had a pension and/or retirement, and 12 percent had part-time work.

Table III-21
Income Source

	Number of Jobs	% of Jobs
Public Assistance	2,594	28%
Full Time Work	2,319	25%
Pension/Retirement	2,147	23%
Part Time Work	1,118	12%
Dependent on Another	394	4%
Self Employment	17	<1%
Seasonal Employment	17	<1%
Other	723	8%

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 2007 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, and the gas impacts for customers who were treated as gas heating jobs.

Energy usage was analyzed for the year prior to the completion of service delivery 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 270 and 400 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 70 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	6,107	229	1,040	9,329
Not Enough Pre-Treatment Days	842	9	25	1,189
Not Enough Post-Treatment Days	588	29	82	863
Pre Usage Below 1200 kWh or 300 ccf	161	6	12	215
Post Usage Below 1200 kWh or 300 ccf	28	1	10	45
Change in Total Usage>65%	290	22	57	466
Final Sample	4,198	162	854	6,551
% Included in Analysis	69%	71%	82%	70%

[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 887 kWh, or 8.1 percent of pre-treatment usage.

- Electric heat jobs had average savings of approximately 1,129 kWh, or 5.4 percent of pre-treatment usage.

- Gas heat jobs had average savings of approximately 89 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	4,198	10,415	9,865	550	5.3%
Degree Day Normalized	4,198	10,919	10,032	887	8.1%
Prism Normalized	2,372	10,734	9,945	789	7.4%
Electric Heat (kWh)					
Non Normalized	162	20,757	19,523	1,234	5.9%
Degree Day Normalized	162	21,017	19,888	1,129	5.4%
Prism Normalized	130	21,091	20,001	1,190	5.6%
Gas Heat (ccf)					
Non Normalized	854	1,038	938	100	9.6%
Degree Day Normalized	854	1,054	965	89	8.4%
Prism Normalized	506	1,055	968	87	8.2%

In the rest of the report we focus on the degree day normalized savings, which were shown to be somewhat higher than the non-normalized savings for the baseload jobs and similar to 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 2007 electric baseload jobs had higher savings than in 2006, but lower than the historical average. Savings were 8.1 percent in 2007 compared to the historical average of 9.7 percent. Weatherization spending, at $240 in 2007, was also approximately the same as in the recent history of the Program.

- Electric heat jobs had pre-treatment usage and average savings that were lower than the 1999-2006 average. Savings were 5.4 percent in 2007 compared to 8.2 percent for the eight-year average. Costs for 2007 were approximately the same as the eight-year average.

- Gas heat jobs had pre-treatment usage and savings that were significantly lower than the 1999-2006 average. Pre-treatment usage was 1,054 compared to the eight year average of 1,227, more than 14 percent lower. Gas savings were 8.4 percent in 2007, as compared to 11.2 percent for the eight-year average. Gas heat measure costs were somewhat greater than the eight-year average.

Table IV-3
Time-Series Comparison of Usage Savings

	Pre-Use	Post-Use	Savings	Percent Savings	Wx Cost
Electric Baseload (kWh)					
2007	10,919	10,032	887	8.1%	$240
1999-2006 Average	10,214	9,225	989	9.7%	$227
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)					
2007	21,017	19,888	1,129	5.4%	$1,735
1999-2006 Average	22,339	20,505	1,834	8.2%	$1,723
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 (ccf)					
2007	1,054	965	89	8.4%	$1,914
1999-2006 Average	1,227	1,089	138	11.2%	$1,686
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. 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 while electric baseload and electric heating jobs had significant baseload and heating savings, they had increases in cooling usage. Gas heat households had nearly 70 percent of their savings from heating usage and the remainder from baseload usage.

Table IV-4
Seasonal Usage Analysis

	#	Pre-Use	Post-Use	Savings	% Savings	Share of Savings
Electric Baseload (kWh)						
Baseload	4,198	7,474	6,639	835	11.2%	94%
Heating		1,625	1,503	122	7.5%	14%
Cooling		1,819	1,890	-71	-3.9%	-8%
Electric Heat (kWh)						
Baseload	162	11,185	10,631	554	5.0%	49%
Heating		8,634	7,941	693	8.0%	61%
Cooling		1,198	1,316	-118	-9.8%	-10%
Gas Heat (ccf)						
Baseload	854	267	238	29	10.9%	32%
Heating		769	707	62	8.1%	68%

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 2007 PECO LIURP savings are consistent with this expectation.

- Baseload jobs with pre-treatment usage over 12,000 kWh have savings of ten percent, compared to savings of 7.9 percent for baseload jobs with pre-treatment usage between 8,000 and 12,000 kWh, and 2.9 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 18 cents per kWh saved, as compared to a cost of 1.04 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 8.1 percent, compared to jobs with usage between 16,000 and 26,000 kWh that had average savings of 5.1 percent and jobs with usage below 16,000 kWh had savings of 1.5 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 11.8 percent, compared to average savings of 8.3 percent for jobs with usage between 800 and 1,400 ccf, and 3.7 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	834	7,177	6,972	205	2.9%	$214	$1.04
8,000 – 12,000 kWh	2,213	9,616	8,852	764	7.9%	$221	$0.29
> 12,000 kWh	1,151	16,134	14,518	1,616	10.0%	$294	$0.18
Electric Heat							
< 16,000 kWh	56	13,050	12,849	201	1.5%	$1,553	$7.73
16,000 – 26,000 kWh	71	21,217	20,135	1,082	5.1%	$1,593	$1.47
> 26,000 kWh	35	33,360	30,651	2,709	8.1%	$2,315	$0.85
Gas Heat							
< 800 ccf	191	702	676	26	3.7%	$1,448	$55.69
800 – 1,400 ccf	554	1,044	957	87	8.3%	$1,964	$22.57
> 1,400 ccf	109	1,717	1,515	202	11.8%	$2,479	$12.27

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 pre-treatment usage and savings are somewhat lower for CAP participants. The difference in savings by CAP participation for electric baseload and gas heating jobs was statistically significant.

It is important to emphasize that energy savings measures are applied in accordance with the opportunities that are found in the home. While CAP customers have lower savings, they also have lower service delivery costs.

Table IV-6
Change in Usage
By CAP Participation

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved
Electric Baseload							
CAP	3,318	10,703	9,850	853	8.0%	$229	$0.27
Non-CAP	880	11,731	10,720	1,011	8.6%	$279	$0.28
Electric Heat							
CAP	83	20,215	19,199	1,046	5.0%	$1,475	$1.41
Non-CAP	79	21,860	20,613	1,247	5.7%	$2,009	$1.61

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved
Gas Heat							
CAP	520	1,038	962	76	7.3%	$1,804	$23.74
Non-CAP	334	1,078	971	107	9.9%	$2,084	$19.48

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 were not statistically significantly.

Table IV-7
Change in Usage
By Customer Choice

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload					
Choice	15	9950	8,966	984	9.9%
Non-Choice	4,183	10,922	10,036	886	8.1%
Electric Heat[1]					
Non-Choice	162	21,017	19,888	1,129	5.4%
Gas Heat					
Choice	5	1,069	869	200	18.7%
Non-Choice	849	1,054	966	88	8.3%

[1]Electric heating jobs contain no 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 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	139	13,740	12,533	1,207	8.8%
Not Off-Peak	4,059	10,822	9,947	875	8.1%
Electric Heat					
Off Peak	9	14,925	13,493	1,432	9.6%
Not Off-Peak	153	21,376	20,265	1,111	5.2%

	#	Pre-Use	Post-Use	Savings	% Savings
Gas Heat (electric usage)					
Off Peak	26	11,755	10,980	775	6.6%
Not Off Peak	815	9,010	8,467	543	6.0%

Thirteen 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 7.3 percent, compared to average savings of 8.7 percent for owners and measure costs that average only $99, as compared to measure costs that average $338 for owners. None of the renters received refrigerator replacement, a major source of savings for baseload homes.

Table IV-9
Change in Usage
By Home Ownership

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost Per Unit Saved
Electric Baseload							
Owner	2,477	11,336	10,354	982	8.7%	$338	$0.34
Renter	1,721	10,317	9,569	748	7.3%	$99	$0.13
Electric Heat							
Owner	121	22,529	21,242	1,287	5.7%	$1,995	$1.55
Renter	41	16,555	15,893	662	4.0%	$967	$1.46
Gas Heat							
Owner	709	1,064	969	95	8.9%	$2,094	$22.04
Renter	145	1,004	946	58	5.8%	$1,031	$17.78

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 10.5 percent, compared to average savings of 6.2 percent for baseload jobs without supplemental heat. 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	1,709	11,774	10,536	1,238	10.5%	$246	$0.20
No Supp Heat	2,489	10,331	9,686	645	6.2%	$235	$0.36
Electric Heat							
Supplemental Heat	22	23,936	23,741	195	0.8%	$1,519	$7.79
No Supp Heat	140	20,559	19,283	1,276	6.2%	$1,769	$1.39
Gas Heat							
Supplemental Heat	144	1,119	1,056	63	5.6%	$2,036	$32.32
No Supp Heat	710	1,040	947	93	8.9%	$1,889	$20.31

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 15 percent of baseload jobs received major measures. Costs for these jobs, averaging $857, were significantly higher than costs for baseload jobs that did not receive major measures, averaging $122. Savings for

baseload jobs with major measures averaged 12.5 percent, as compared to savings that averaged 7.2 percent for baseload jobs that did not receive major measures.

- Electric Heat Jobs: Seventy-five percent of electric heat jobs received major measures. Savings for jobs that received major measures averaged 6.2 percent, as compared to average savings of 2.2 percent for jobs that did not receive major measures. Spending on jobs that received major measures averaged $2,088, compared to average spending of $660 for jobs that did not receive major measures.

- Gas Heat Jobs – Gas Measures: Approximately 80 percent of gas heat jobs received major measures aimed at reducing gas usage. Gas savings for jobs with major measures averaged 9.0 percent, compared to average savings of 5.9 percent for jobs that did not receive major measures. Costs for gas jobs with major measures averaged $2,113 compared to average costs of $930 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 14.9 percent compared to 3.8 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	3,541	10,711	9,936	775	7.2%	$122	$0.16
Major	647	12,055	10,551	1,504	12.5%	$857	$0.57
Electric Heat							
Basic	40	17,446	17,064	382	2.2%	$660	$1.73
Major	122	22,188	20,814	1,374	6.2%	$2,088	$1.52
Gas Heat – ccf							
Basic	151	1,077	1,013	64	5.9%	$930	$14.53
Major	703	1,054	959	95	9.0%	$2,113	$22.24
Gas Heat – kWh							
Basic	641	8,838	8,499	339	3.8%	$1,661	$4.90
Major	100	11,422	9,717	1,705	14.9%	$3,071	$1.80

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

- *Refrigerator*: Baseload participants who received a refrigerator had higher savings (15.5%) than those who did not (7.2%). Gas heat customers who received a refrigerator had higher electric savings (15.3%) than those who did not (4.8%).

- *Electric Water Heater Timer*: Participants who received an electric water heater time did not have savings that were significantly different from those who did not.

- *Insulation:* Gas heating customers who received insulation had higher savings (10.0%) than those who did not (6.1%).

- *Furnace:* Gas heating customers who received a new furnace had higher savings (18.9%) 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	165	11,417	10,534	883	7.7%	$933
No Air Conditioner	4,030	10,900	10,013	887	8.1%	$211
Refrigerator	447	11,521	9,732	1,789	15.5%	$935
No Refrigerator	3,748	10,849	10,069	780	7.2%	$157
Air Conditioner/Refrigerator	36	11,911	10,581	1,330	11.2%	$1,522
Air Conditioner/ No Refrigerator	129	11,279	10,521	758	6.7%	$769
No Air Conditioner/ Refrigerator	411	11,487	9,658	1,829	15.9%	$884
No Air Conditioner/ No Refrigerator	3,619	10,834	10,053	781	7.2%	$135
Electric Water Heater Timer	78	17,015	15,851	1,164	6.8%	$631
No Electric Water Heater Timer	4,117	10,805	9,923	882	8.2%	$232
Electric Heat						
Refrigerator	21	19,276	17,348	1,928	10.0%	$2,446
No Refrigerator	141	21,277	20,267	1,010	4.7%	$1,629
Blower Door Test	86	21,829	20,637	1,192	5.5%	$2,020
No Blower Door Test	76	20,099	19,042	1,057	5.3%	$1,413
Electric Water Heater Timer	47	24,158	22,882	1,276	5.3%	$2,138
No Electric Water Heater Timer	115	19,734	18,665	1,069	5.4%	$1,571
Insulation	82	22,496	20,756	1,740	7.7%	$2,127
No Insulation	80	19,502	18,999	503	2.6%	$1,334
Gas Heat - ccf						
Blower Door Test	639	1,059	967	92	8.7%	$2,057
No Blower Door Test	215	1,038	960	78	7.5%	$1,489
Insulation	497	1,047	942	105	10.0%	$2,242

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost
No Insulation	357	1,063	998	65	6.1%	$1,457
Furnace	63	1,006	816	190	18.9%	$4,003
No Furnace	791	1,057	977	80	7.6%	$1,748
Gas Heat - kWh						
Refrigerator	78	11,259	9,532	1,727	15.3%	$3,177
No Refrigerator	763	8,874	8,444	430	4.8%	$1,795

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 658 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.[12] 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 $0.09. 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.

Table IV-13
Measure Savings Estimates

	Savings	Cost/Home	$/Unit Saved	Measure Life	$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	658 (±114)	$73/$264	$0.11/$0.40	5	$0.03/$0.09
Refrigerator	949 (±238)	$744	$0.78	12	$0.09
Gas Heat - ccf					
Gas Furnace	122 (±47)	$2,405	$19.71	15	$1.90
Boiler	147 (±41)	$3,081	$20.96	15	$2.02
Insulation	52 (±28)	$692	$13.31	15	$1.28

[12] (60 watts-13 watts)*0.001*365 days*4 hours/day* 4 bulbs=274 kWh

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 $0.50 for baseload jobs, $1.74 for electric heat jobs, and $0.37 for gas heat jobs. The cost per ccf saved is $10 for electric baseload jobs and $21.76 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)	4,198	887	$225	$179	$40	$444	$0.50
Gas (ccf)	157	3	$15	$12	$3	$30	$10
Electric Heat							
Electric (kWh)	162	1,129	$1,735	$191	$43	$1,969	$1.74
Gas Heat							
Electric (kWh)	841	550	$181	$18	$4	$203	$0.37
Gas (ccf)	854	89	$1,735	$163	$39	$1,937	$21.76

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 six 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)	4,198	887	$444	$0.50	$0.12	$0.06	$0.05
Gas (ccf)	157	3	$30	$10	$2.31	$1.30	$0.96
Electric Heat							
Electric (kWh)	162	1,129	$1,969	$1.74	$0.40	$0.23	$0.17
Gas Heat							

	#	Average Savings	Average Total Cost	Cost Per Unit Saved	5-Year Measure Life	10-Year Measure Life	15-Year Measure Life
Electric (kWh)	841	550	$203	$0.37	$0.09	$0.05	$0.04
Gas (ccf)	854	89	$1,936	$21.76	$5.02	$2.82	$2.10

V. Bill and Payment Impacts

This section of the report examines the bill and payment impacts for 2007 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. This requirement is more stringent than that which was used for the usage analysis. More stringency is required with the payment analysis because of the fluctuation in customer payment patterns during the year due to assistance availability and shutoff practices.

PECO implemented a new IT system in October 2006. As a result, there is a gap in data availability for the billing and payment data (but not the usage data) between mid-October 2006 and the end of 2006. This gap makes it difficult to analyze the one year of billing and payment immediately preceding service delivery in 2007, as almost all of the 2007 participants would require at least some data during this time period. To provide for one continuous year of pre-treatment billing and payment data, we used the period of October 2005 through October 2006 for all program participants. This is not immediately preceding service delivery, but provides as close as possible to a full year of pre treatment data for a large percentage of program participants.

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	6,107	229	1,040	9,329
Not Enough Pre-Treatment Days	2,334	84	349	3,552
Not Enough Post-Treatment Days	1,440	46	226	2,058
Data Outliers	103	2	51	162
Final Sample	2,230	97	414	3,557
% Included in Analysis	37%	42%	40%	38%

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 revenue increased due to increases in prices between the pre and post periods. Overall electric revenue increased by an average of $42 or four percent. Gas revenue increased by $25 or ten percent. Total revenue increased by five percent.

Table V-2
Billing Revenue

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Electric Revenue	4,198	$1,126	$1,144	$18	1.6%
Gas Revenue		$93	$110	$17	18.3%
Total Revenue		$1,219	$1,254	$35	2.9%
Electric Heat					
Electric Revenue	162	$1,872	$1,920	$48	2.6%
Gas Revenue		$30	$22	-$8	-26.7%
Total Revenue		$1,902	$1,942	$40	2.1%
Gas Heat					
Electric Revenue	854	$1,291	$1,418	$127	9.8%
Gas Revenue		$1,436	$1,537	$101	7.0%
Total Revenue		$2,727	$2,955	$228	8.4%
All Job Types					
Electric Revenue	6,551	$1,060	$1,102	$42	4.0%
Gas Revenue		$255	$280	$25	9.8%
Total Revenue		$1,315	$1,382	$67	5.1%

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. As noted above, the pre treatment transactions data are from an earlier time period and are available for a smaller group of households than for the usage analysis. Table V-3 shows that total charges declined by 0.6 percent for electric baseload jobs, increased by 1.7 percent for electric heat jobs, and declined by 10.9 percent for gas heat jobs.

Table V-3
Bills and Total Charges

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Electric and Gas Charges	2,230	$1,265	$1,257	-$8	-0.6%
Other Charges		$0	<$1	<$1	--
Total Charges		$1,265	$1,257	-$8	-0.6%
Electric Heat					
Electric and Gas Charges	97	$1,871	$1,903	$32	1.7%
Other Charges		$0	$0	$0	0%
Total Charges		$1,871	$1,903	$32	1.7%
Gas Heat					
Electric and Gas Charges	414	$2,517	$2,237	-$280	-11.1%
Other Charges		$0	$5	$5	--
Total Charges		$2,517	$2,242	-$275	-10.9%
All Job Types					
Electric and Gas Charges	3,557	$1,303	$1,267	-$36	-2.8%
Other Charges		$0	$1	$1	--
Total Charges		$1,303	$1,268	-$35	-2.7%

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 three 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.

3) The transactions analysis is based on a different pre-treatment time period than the revenue analysis based on the usage data.

Table V-4 displays payment statistics for the 2007 LIURP participants. The average number of payments made increased by about one half 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	2,230	8.4	8.8	0.4	4.8%
Cash Payments		$1,106	$1,158	$52	4.7%
Assistance Payments		$54	$50	-$4	-7.4%
Other Credits		$2	$3	$1	50.0%
Total Credits		$1,162	$1211	$49	4.2%
Electric Heat					
# Payments	97	9.1	9.5	0.4	4.4%
Cash Payments		$1,685	$1,770	$85	5.0%
Assistance Payments		$65	$50	-$15	-23.1%
Other Credits		$0	$5	$5	--
Total Credits		$1,750	$1,825	$75	4.3%
Gas Heat					
# Payments	414	9.6	10.1	0.5	5.2%
Cash Payments		$2,284	$2,122	-$162	-7.1%
Assistance Payments		$81	$71	-$10	-12.3%
Other Credits		$1	$1	$0	0.0%
Total Credits		$2,266	$2,194	-$72	-3.2%
All Job Types					
# Payments	3,557	8.6	9.0	0.4	4.7%
Cash Payments		$1,149	$1171	$22	1.9%
Assistance Payments		$60	$53	-$7	-11.7%
Other Credits		$2	$3	$1	50.0%
Total Credits		$1,211	$1,227	$16	1.3%

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 a 12 percent decrease in assistance payments. Non-CAP customers had a seven percent increase in cash payments. Total credits declined by two percent for CAP customers and increased by seven percent for non-CAP customers.

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

	#	Pre	Post	Change	Percent Change
CAP Customers – All Job Types					
# Payments	2,709	8.3	8.8	0.5	6.0%
Cash Payments		$933	$921	-$12	-1.3%
Assistance Payments		$77	$68	-$9	-11.7%
Other Credits		$2	$3	$1	50.0%
Total Credits		$1,012	$992	-$20	-2.0%
Non-CAP Customers – All Job Types					
# Payments	848	9.3	9.8	0.5	5.4%
Cash Payments		$1,841	$1,970	$129	7.0%
Assistance Payments		$4	$6	$2	50.0%
Other Credits		$1	$0	-$1	-100.0%
Total Credits		$1,845	$1,976	$131	7.1%

Table V-6 displays a more detailed analysis of the types of assistance payments received in the pre and the post-treatment periods by 2007 LIURP participants. The table shows that the amount of assistance received was 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	2,230	$31	$33	$2	6.5%
LIHEAP Crisis		$22	$18	-$4	-18.2%
Total Assistance		$53	$51	-$2	-3.8%
Electric Heat					
LIHEAP Cash	97	$53	$41	-$12	-22.6%
LIHEAP Crisis		$12	$8	-$4	-33.3%
Total Assistance		$65	$49	-$16	-24.6%
Gas Heat					
LIHEAP Cash	414	$76	$55	-$21	-27.6%
LIHEAP Crisis		$5	$17	$12	240.0%
Total Assistance		$81	$72	-$9	-11.1%
All Job Types					
LIHEAP Cash	3,557	$40	$37	-$3	-7.5%

	#	Pre	Post	Change	% Change
LIHEAP Crisis		$20	$17	-$3	-15.0%
Total Assistance		$60	$54	-$6	-10.0%

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 about five percent.

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

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Cash Coverage Rate	2,230	86%	94%	7.4%	8.6%
Total Coverage Rate		93%	100%	7.4%	8.0%
Electric Heat					
Cash Coverage Rate	97	89%	92%	2.8%	3.1%
Total Coverage Rate		94%	96%	1.7%	1.8%
Gas Heat					
Cash Coverage Rate	414	90%	93%	3.7%	4.1%
Total Coverage Rate		94%	98%	3.6%	3.8%
All Job Types					
Cash Coverage Rate	3,557	87%	93%	5.9%	6.8%
Total Coverage Rate		94%	100%	5.4%	5.7%

Table V-8 displays changes in customer balances. The table shows that balances increased during both the pre and post treatment periods. However, balances at the end of the post treatment period were lower than those at the end of the pre treatment period.

Table V-8
Change in Customer Balance

	#	Start	End	Change	Percent Change
Electric Baseload					
Pre Balance	2,230	$294	$397	$103	35%
Post Balance		$150	$197	$47	31%
Electric Heat					
Pre Balance	97	$156	$277	$121	78%
Post Balance		$91	$168	$77	85%
Gas Heat					
Pre Balance	414	$305	$456	$151	50%
Post Balance		$136	$185	$49	36%

	#	Start	End	Change	Percent Change
All Job Types					
Pre Balance	3,557	$251	$344	$93	37%
Post Balance		$128	$170	$42	33%

VI. Summary of Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to over nine thousand customers in 2007, 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 baseload savings were higher than in 2006. 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 pre-treatment 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 2007 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 should modify LIURP procedures to evaluate each customer's lighting usage, and provide CFLs for any bulb used more than 2 hours per day. This may require the use of a broader range of CFLs than are currently used, but would probably be a very cost-effective investment.

- *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.