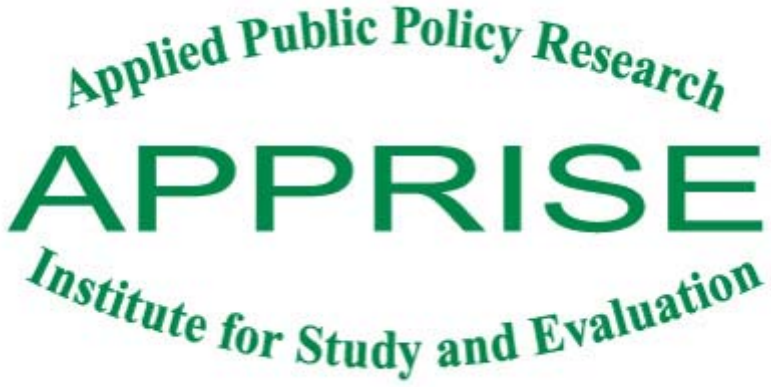

PECO Energy

2005 LIURP Evaluation

Final Report

April 2007

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Executive Summary

This report presents the findings from the Evaluation of PECO's 2005 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. 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 2005 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.

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 2005 was $6,475,000. In 2005, 7,695 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 conducts an energy

[1] CAP customers with usage above 500 kWh monthly are evaluated for LIURP services.

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 2005, 21,510 customers were evaluated for LIURP services. There were 2,883 customers who were ineligible for the program and 10,932 customers who were cancelled. In total, 7,695 customers received LIURP services in 2005.

Table ES-1 displays how program funds were expended in 2005. In total $6.474 million were spent. Approximately 64 percent was for weatherization measures, 25 percent was for audit and education, eight percent was for program administration, and four percent was for the photo-voltaic grant.

Table ES-1
2005 LIURP Expenditures
By Category

Category	Amount Spent	Percent of Funds
Weatherization Measures	$4,154,890	64%
Audit/Education	$1,586,354	25%
PECO Administration	$500,974	8%
PV Grant - PHA	$232,100	4%
TOTAL	$6,474,318	100%

Table ES-2 displays the distribution of 2005 LIURP jobs by job type. While nearly 75 percent of jobs are classified as baseload, meaning that measures primarily address electric baseload usage, these are lower cost jobs and represent approximately 30 percent of total costs. The average costs for measures on these jobs was $208. Gas heating jobs represent 18 percent of jobs and 57 percent of costs, averaging $1,643 in measure costs per home. Electric heating jobs averaged $1,824 per home.

Table ES-2
2005 LIURP Service Delivery and Expenditures
By Job Type

Job Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	5,657	74%	$1,177,822	29%	$208
Electric Heating	237	3%	$432,299	11%	$1,824
Gas Heating	1,388	18%	$2,280,001	57%	$1,643
Low Usage	25	<1%	$14,073	<1%	$563

Job Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Job Cost
Electric Heat Low Use	296	4%	$53,787	1%	$182
Solar Water Heat Maintenance	54	1%	$13,675	<1%	$253
Prior Year	38	<1%	$45,787	1%	$1,205
Total	7,695	100%	$4,017,443	100%	$522

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:* Nearly 40 percent of the customers served through LIURP use electric supplemental heat.
- *Air conditioning:* Air conditioning is used by over 90 percent of the LIURP participants.
- *Renters:* PECO's LIURP is successful in serving renters. Half of the customers served are renters.
- *Vulnerable households:* Nearly two-thirds of the customers had a child and 20 percent had an elderly member.
- *Poverty level:* Approximately 25 percent had income below 50 percent of the FPL, 40 percent had income between 51 and 100 percent of the FPL, 25 percent had income between 101 and 150 percent of the FPL, and 10 percent had income above 150 percent of the FPL.
- *CAP:* Almost three quarters 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 over 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 very similar to PRISM, but allowed for inclusion of a much larger number of homes.

Table ES-3 summarizes the overall usage impact results.

- *Baseload jobs* had average savings of approximately 1,100 kWh, or ten percent of pre-treatment usage.
- *Electric heat jobs* had average savings of approximately 1,600 kWh, or 7.4 percent of pre-treatment usage.
- *Gas heat jobs* had average savings of approximately 168 ccf, or 13.9 percent of pre-treatment usage.

Table ES-3
Average Usage and Savings[2]

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload (kWh)					
Non Normalized	4,551	10,602	9,537	1,065	10.0%
Degree Day Normalized	4,551	11,188	10,073	1,115	10.0%
Electric Heat (kWh)					
Non Normalized	197	21,106	18,448	2,658	12.6%
Degree Day Normalized	197	21,956	20,326	1,629	7.4%
Prism Normalized	161	21,943	20,291	1,652	7.5%
Gas Heat (ccf)					
Non Normalized	1,164	1,145	895	250	21.8%
Degree Day Normalized	1,164	1,206	1,039	168	13.9%
Prism Normalized	621	1,153	993	159	13.8%

We compared the usage impact results to historical savings results.

- Electric baseload jobs had somewhat higher average pre-usage and kWh savings than in 2004, and the 1999-2004 average, but the same savings percentage (10%) as in 2004 and the 1999-2004 average.
- Electric heat jobs had pre-treatment usage approximately the same as the 1999-2004 average, but kWh and percentage savings were somewhat lower, at 7.4 percent in 2005 compared to 8.6 percent for the six-year average. (Note: this is the smallest component of the Program with only three percent of all 2005 LIURP jobs and 11 percent of 2005 LIURP costs.)

[2] The degree day analysis method employed in this report used a 60 degree reference temperature for heating and a 70 degree reference temperature for cooling. As required in the data sent to Penn State, we used a 65 degree reference point temperature for heating. Using this method, average savings were 9.7 percent for baseload jobs, 8.2 percent for electric heat jobs, and 15.0 percent for gas heat jobs.

- Gas heat jobs had pre-treatment usage approximately the same as the 1999-2004 average, but ccf savings that were considerably higher than the average, and the same level as they were in 2004. Gas savings were 13.9 percent in 2005 and 2004, as compared to 11.4 percent for the six-year average.

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, insulation, duct/pipe insulation, and heating system work.

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 953 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. Additional research is needed to further disaggregate the savings.

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 only seven 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.

Table ES-4
Measure Savings Estimates

	Savings	Cost/Home	Cost/Unit Saved	Measure Life	Cost/Unit Saved Over Lifetime
Electric Baseload - kWh					
CFL Only	953 (±173)	$68/$274	$0.07/$0.29	5	$0.02/$0.07
Refrigerator	976 (±260)	$701	$0.72	12	$0.08
Gas Heat - ccf					
Gas Furnace	160 (±51)	$2,269	$14.18	15	$1.37
Boiler	167 (±49)	$2,952	$17.68	15	$1.70
Insulation	46 (±27)	$549	$11.93	15	$1.15
Duct/pipe insulation	29 (±25)	$156	$5.39	15	$0.52
Heating system work	25 (±24)	$350	$14.00	10	$1.81

[3] (60 watts – 13 watts)*.001 * 365 days * 4 hours/day * 4 bulbs = 274 kWh

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 9 cents per kWh saved, are cost-effective under the five-year measure life assumption. Gas heat savings probably have a 10-year to 15-year measure life. Under the 10-year measure life assumption, the cost per ccf saved is $1.37, a cost-effective rate at current retail 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)	4,551	1,115	$450	$0.40	$0.09	$0.05	$0.04
Gas (ccf)	27	75	$60	$0.80	$0.18	$0.10	$0.08
Electric Heat							
Electric (kWh)	197	1,629	$2,099	$1.29	$0.30	$0.17	$0.12
Gas Heat							
Electric (kWh)	1,153	615	$140	$0.23	$0.05	$0.03	$0.02
Gas (ccf)	1,164	168	$1,781	$10.60	$2.45	$1.37	$1.02

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 usage declined significantly over the time period studied, charges did not decline by nearly as much, due to increases in electric and gas rates over the time period studied. Total payments and credits did not change significantly. There was a small increase in the total bill coverage rate of 3.6 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	4,900	$1,540	$1,493	-$47	-3.1%
Total Payments and Credits		$1,343	$1,323	-$20	-1.5%
Total Coverage Rate		89.8%	93.4%	3.6%	4.0%

Key Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to over seven thousand customers in 2005, many of whom had vulnerable household members. They were successful in achieving large reductions in energy usage, as in previous years, because of successful targeting of high usage customers, effective service delivery, and reinforced energy education. We have the following recommendations to continue to delivery effective services and potentially improve savings.

1. *Targeting:* It is a challenge to continue to find high usage customers to treat in the program. PECO has been successful in this targeting over the past several years. PECO should continue to make this targeting a priority.

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 2006 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 2005 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 the process information that was collected as part of the 2006 Universal Program Evaluation and updated information where required.

- *Program Database Analysis:* We conducted analysis of the 2005 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 2005 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 a summary of the key findings and provides 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 2005, determined by the settlement agreement of PECO's electric restructuring case, was $6,475,000, with $875,000 earmarked for the LIURP Gas Program.

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 14 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 13 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 eight 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[4]
- Usage requirements
  - At least 600 kWh monthly for baseload customers[5]
  - 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

[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. 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:

- Received LIURP services within the past two years.
- Refused LIURP services.
- Has insufficient usage history.
- Has an inactive account.
- 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.[6]
- 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. Some landlords never respond to CMC inquiries. CMC estimates that they are unable to obtain landlord consent for about seven percent of renters.[7]

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 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.

[6] There are some hardship cases where PECO makes exceptions to the usage requirement.
[7] Landlords are not required to contribute to the cost of LIURP services.

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 procedures 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 2005, as well as the characteristics of the homes and the customers who were served by the Program.

A. 2005 Customer Participation

PECO screened 21,510 customers for LIURP services in 2005. Table III-1 shows that 2,883 customers were not eligible, 10,932 were cancelled, and 7,695 received Program services.

Table III-1
Customers Evaluated for Program Services

Category	Number	Percent of Total
Ineligible	2,883	13%
Cancelled	10,932	51%
Treated	7,695	36%
TOTAL Evaluated	21,510	100%

Table III-2 displays the reasons why customers were deemed ineligible for LIURP. The largest group, 39%, was not eligible due to usage that was below the guidelines for LIURP services. Twenty-eight percent had income that was above the eligibility guidelines, and 14 percent did not submit income verification. Ten percent had previously received LIURP services, and seven percent did not have a sufficient usage history.

Table III-2
Ineligible Customers

Category	Number	Percent of Total
Usage below guidelines	1114	39%
Over income	795	28%
Income verification not submitted	417	14%
Previously Treated in LIURP	296	10%
Insufficient Usage History	211	7%
Scope of Work Beyond Guidelines	26	1%
Commercial Account	24	1%
TOTAL Ineligible	2,883	100%

Table III-3 displays reasons why customers were cancelled. The largest group of customers, 40 percent, refused Program services. Another large group, 34 percent, did not respond to contact attempts. Twenty percent were cancelled because of a planned move and five percent were cancelled because landlord consent was not obtained.

Table III-3
Cancelled Customers

Category	Number	Percent of Total
Customer refused	4415	40%
No response to contact attempts	3749	34%
Customer moving	2199	20%
No landlord consent	516	5%
Other	53	<1%
TOTAL Cancelled	10,932	100%

B. 2005 LIURP Services

This section describes LIURP services that were delivered in 2005. The annual LIURP budget for 2005, determined by the settlement agreement of PECO's electric restructuring case, was $6,475,000, with $875,000 earmarked for the LIURP Gas Program. Table III-4 shows the distribution of this spending. Sixty-four percent of the funds were spent on weatherization measures and labor, 25 percent was spent on audits and education, 8 percent was spent on PECO administration, and 4 percent was spent on the photo-voltaic grant.

Table III-4
2005 LIURP Expenditures
By Category

Category	Amount Spent	Percent of Funds
Weatherization Measures	$4,154,890	64%
Audit/Education	$1,586,354	25%
PECO Administration	$500,974	8%
PV Grant - PHA	$232,100	4%
TOTAL	$6,474,318	100%

Table III-5 displays the distribution of LIURP jobs and expenditures by job type. While nearly 75 percent of jobs are classified as baseload, meaning that measures primarily address electric baseload usage, these are lower cost jobs and represent approximately 30 percent of total weatherization costs. The average cost for measures on these jobs is $208. Gas

heating jobs represent 18 percent of jobs and 57 percent of costs, averaging $1,643 in measure costs per home. Electric heating jobs average $1,824 per home.

Table III-5
2005 LIURP Service Delivery and Expenditures
By Job Type

Job Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Job Cost
Baseload	5,657	74%	$1,177,822	29%	$208
Electric Heating	237	3%	$432,299	11%	$1,824
Gas Heating	1,388	18%	$2,280,001	57%	$1,643
Low Usage	25	<1%	$14,073	<1%	$563
Electric Heat Low Use	296	4%	$53,787	1%	$182
Solar Water Heat Maintenance	54	1%	$13,675	<1%	$253
Prior Year	38	<1%	$45,787	1%	$1,205
Total	7,695	100%	$4,017,443	100%	$522

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 10 percent received a refrigerator replacement. Approximately 20 percent received weatherization and approximately 20 percent received air sealing. Approximately 10 percent received insulation, and approximately 10 percent received a heating system tune-up.

Table III-6
2005 LIURP Service Delivery and Expenditures
By CMC Job Classification

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
Baseload	7,609	99%	$730,404	18%	$96
Refrigerator Replacement	780	10%	$550,711	14%	$706
Weatherization	1,362	18%	$459,404	11%	$337
Air Sealing	1,358	18%	$374,666	9%	$276
Insulation	814	11%	$558,225	14%	$686
Electrical	430	6%	$205,120	5%	$477
Heating System Replacement	211	3%	$687,561	17%	$3,259
Heating System Tune Up	833	11%	$301,123	7%	$361
Air Conditioner Replacement	125	2%	$42,215	1%	$338
Water Heater Replacement	149	2%	$95,550	2%	$641
Solar Water Heater Tune Up	52	1%	$12,463	0%	$240

Work Type	# of Jobs	% of Jobs	Total Cost	% of Costs	Average Cost
TOTAL			$4,017,443	100%	

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:* Nearly 13,000 smoke detectors were provided in over 5,000 homes.

- *Compact fluorescent light bulbs:* CFL's were provided to nearly all the homes services. 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 780 homes and second refrigerators were removed in 102 homes.

- *Air conditioner replacement:* Window air conditioners were replaced in 125 homes.

- *Aerators and showerheads:* A total of 4,435 aerators were provided in 2,052 homes and 1,821 showerheads were provided in 1,550 homes.

- *Water heaters:* Electric water heater timers were provided in 304 homes and water heater replacements were provided in 118 homes.

- *Air sealing:* Air sealing was provided in approximately 1,300 homes. As expected, almost all of the customers who received air sealing also received a blower door test.

- *Insulation:* Insulation was provided in approximately 1,000 homes. For the most part, the insulation was provided in the attic. Insulation costs averaged $549 per home.

- *Heat system repair:* Approximately 700 homes received heating system repair work, averaging $220 for labor and $130 for parts.

- *Heating system replacement:* Heat pumps were replaced in 20 homes, gas furnaces in 89 homes, boilers in 95 homes, and oil furnaces in four homes.

- *Solar water heaters:* Fifty homes received solar water heater maintenance and five received repairs.

Table III-7
2005 LIURP Service Delivery and Expenditures
By Measure Type

Measure	Number of Jobs	% of Jobs	Total Number
Smoke Detector	5,173	67%	12,945
Smoke Detector Battery	1,118	15%	1,714
CFLs	7,576	98%	30,272
Refrigerator Removal	102	1%	108
Refrigerator Replacement	780	10%	782
Air Conditioner Maintenance	14	<1%	14
Air Conditioner Replacement	125	2%	141
Aerators	2,052	27%	4,435
Showerheads	1,550	20%	1,821
Water Heater Pipe Insulation	695	9%	695
Water Heater Tank Insulation	565	7%	579
Water Heater Labor	32	<1%	32
Water Heater Part	93	1%	251
Electric Water Heater Timer	304	4%	304
Water Heater Replacement	118	2%	118
Blower Door Test	1,315	17%	1,315
Air Sealing	1,391	18%	1,391
Duct/Pipe Insulation	549	7%	549
Insulation	1,035	13%	1035
Electrical Labor	66	1%	66
Electrical Part	64	1%	3340
Line Voltage Thermostat	171	2%	619
Manual Thermostat	237	3%	247
Digital Thermostat	242	3%	244
Thermostat – Visually Impaired	74	1%	80
Unspecified Thermostat	2	<1%	2
Heating System Labor	219	3%	219
Heating System Part	686	9%	1,326
Clean and Tune	562	7%	562
Electric Baseboard	24	0%	79
Heat Pump	20	0%	20
Gas Furnace	89	1%	89
Boiler	95	1%	95

Measure	Number of Jobs	% of Jobs	Total Number
Oil Furnace	4	<1%	4
Solar Water Heater Inspection	50	1%	50
Solar Water Heater Tune Up	5	<1%	5

C. 2005 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 11,188 kWh, electric heating customers had average usage of 21,956 kWh, and gas heating customers had average gas usage of 1,206 ccf. These are high pre-treatment usage levels, which contribute to the high savings that are achieved by PECO's LIURP.

Table III-8
Pre-Treatment Usage
Weather Normalized

Job Type	Number of Jobs	Jobs with Data	Electric Use (kWh)	Gas Use (ccf)
Baseload	5,657	4,551	11,188	842
Electric Heating	237	197	21,956	2,042[1]
Gas Heating	1,388	1,164	8,965	1,206
Low Usage	25	18	7,990	996
Electric Heat Low Use	296	226	10,695	N/A
Solar Water Heat Maintenance	54	48	18,298	N/A
Prior Year	38	35	13,715	1,026
Total	7,695	6,229	11,158	1,222

[1]There are only three electric heating 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 eight percent have electric heat. Baseload jobs are distributed similarly, except that only two percent of these homes use electric heat. Most of the homes with electric heat are treated as electric heating jobs.

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	4,423	78%	5	2%	1,383	100%	5,850	76%
Fuel Oil	1,065	19%	0	0%	1	<1%	1,087	14%
Electric	112	2%	232	98%	2	<1%	618	8%
Other	57	1%	0	0%	1	<1%	140	2%
Total	5,657	100%	237	100%	1,387	100%	7,695	100%

Table III-10 describes the use of supplemental heating by jobs treated through LIURP. Overall, 39 percent of the customers who were treated by LIURP used supplemental heat, virtually all of whom used electric supplemental heat. Forty-five percent of the customers who had baseload services used electric supplemental heat.

Table III-10
Supplemental Heating

	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**
None Used	3,027	54%	216	91%	1,083	78%	4,681	61%
Electric	2,550	45%	9	4%	290	21%	2,901	38%
Other	80	1%	12	5%	15	1%	113	1%
Total	5,657	100%	237	100%	1,388	100%	7,695	100%

Table III-11 shows the type of air conditioning that LIURP recipients used. Most of the LIURP recipients, 93 percent, used some form of air conditioning. The most common type, with 53 percent, was a window unit. Twenty-one percent had central air conditioning. In some cases we could not distinguish between a window and a wall unit because of a previous, less detailed data collection form.

Table III-11
Air Conditioning

Air Conditioning	Number of Jobs	% of Jobs
None Used	540	7%
Window Unit	4,098	53%
Central Electric	1,584	21%

Air Conditioning	Number of Jobs	% of Jobs
Wall Unit	612	8%
Window/Wall Unit	604	8%
Central Heat Pump	252	3%
Portable Unit	5	<1%
Total	7,695	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	3,962	51%
Rent	3,733	49%

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

Table III-13
Home Age

	Number of Jobs	% of Jobs
<=25 Years	769	10%
26 – 50 Years	1,329	17%
51 – 75 Years	1,829	25%
76 Years or Older	3,690	48%
Missing	16	<1%
Mean	68 Years	

Table III-14 displays the dwelling type for the homes served under LIURP. The most common type was a row home, with 57 percent of homes served. Fourteen percent live in other types of single family homes, 12 percent live in multi-family homes, and ten percent live in duplexes.

Table III-14
Dwelling Type

	Number of Jobs	% of Jobs
Row	4,350	57%
Other Single Family	1057	14%
Multi	931	12%
Duplex	780	10%
Mobile	76	1%
Other	501	7%
Total	7695	100%

Table III-15 describes the heated square footage of the homes treated by LIURP. Homes averaged 1,120 square feet. Only 25 percent of the homes were greater than 1,200 square feet.

Table III-15
Heated Square Footage

	Number of Jobs	% of Jobs
<=800	1,303	17%
801 – 1,000	2,333	30%
1,001 – 1,200	2,144	28%
1,201 or more	1,915	25%
Mean	1,120	

D. 2005 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, 64 percent contain at least one child, and 19 percent contain at least one elderly member.

Table III-16
Household Composition

	Number of Jobs	% of Jobs
Female Household Head	5,640	73%
Male Household Head	2,055	27%
Child in Household (<18)	4,915	64%
Elderly in Household (>62)	1,432	19%

Table III-17 shows that the mean annual household income level was $13,793. Approximately 40 percent of the households served had annual income below $10,000. Only 21 percent had annual income above $20,000.

Table III-17
Annual Income

	Number of Jobs	% of Jobs
<=$5,000	843	11%
$5,001 - $10,000	2,282	30%
$10,001 - $15,000	1,858	24%
$15,001 - $20,000	1,110	14%
$20,001 or more	1,602	21%
Mean	$13,793	

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 10 percent had income above 150 percent of the FPL.

Table III-18
Poverty Level

	Number of Jobs	% of Jobs
<=25%	564	7%
26% - 50%	1,394	18%
51% - 100%	3,102	40%
101% - 150%	1,948	25%
151% or greater	687	9%
Mean	84%	

Table III-19 describes the account type of households who participated in the Program. Approximately 73 percent are CAP participants, seven percent are customer choice participants, and five percent have the off peak rate.

Table III-19
Account Type

	Number of Jobs	% of Jobs
CAP	5,587	73%
Customer Choice [1]	568	7%

	Number of Jobs	% of Jobs
Off Peak	368	5%

[1] Customer Choice data were missing for 1,289, or 16.8% of accounts.

Table III-20 displays the education level of the head of household. The majority of participants, 69 percent, have a high school education. Eleven percent have some high school, 13 percent have some college, and five percent have a college degree.

Table III-20
Education Level

	Number of Jobs	% of Jobs
No Formal Education	5	<1%
Some Grade School	38	<1%
Grade School	150	2%
Some High School	805	11%
High School	5,281	69%
Some College	984	13%
College Degree	397	5%
Some Graduate Work	7	<1%
Graduate Degree	28	<1%

Table III-21 displays the primary income source for the LIURP participants. The table shows that the largest sources of income were unemployment and disability. Twenty-seven percent had unemployment as their primary source of income, 19 percent had disability income, 24 percent had full-time work, 15 percent had a pension and/or retirement, and 12 percent had part-time work.

Table III-21
Income Source

	Number of Jobs	% of Jobs
Unemployment	2,052	27%
Disability	1,450	19%
Full Time Work	1,841	24%
Pension/Retirement	1,161	15%
Part Time Work	914	12%
Dependent on Another	99	1%
Public Assistance	43	1%
Self Employment	90	1%
Seasonal Employment	15	<1%

	Number of Jobs	% of Jobs
Other	30	<1%

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 2005 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 LIURP audit visit and for the year after Program 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 330 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. This is an excellent inclusion rate, as evaluations of this type often exclude 50 percent or more of the treated population.

Table IV-1
Usage Impact Data Attrition

	Electric Baseload	Electric Heating	Gas Heating	Total
Original Population	5,657	237	1,388	7,695
Not Enough Pre-Treatment Days	118	5	22	162
Not Enough Post-Treatment Days	620	26	97	773
Pre Usage Below 1200 kWh or 300 ccf	123	3	5	145
Post Usage Below 1200 kWh or 300 ccf	58	0	27	90
Change in Total Usage>65%	187	6	73	286
Final Sample	4,551	197	1,164	6,239
% Included in Analysis	80%	83%	84%	81%

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 very 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. However, we find below that average baseload savings are the same, whether or not they are weather normalized.

B. Energy Savings Impacts

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

- Baseload jobs had average savings of approximately 1,100 kWh, or ten percent of pre-treatment usage.

- Electric heat jobs had average savings of approximately 1,600 kWh, or 7.4 percent of pre-treatment usage.

- Gas heat jobs had average savings of approximately 168 ccf, or 13.9 percent of pre-treatment usage.

Table IV-2
Average Usage and Savings[8]

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload (kWh)					
Non Normalized	4,551	10,602	9,537	1,065	10.0%
Degree Day Normalized	4,551	11,188	10,073	1,115	10.0%
Electric Heat (kWh)					
Non Normalized	197	21,106	18,448	2,658	12.6%
Degree Day Normalized	197	21,956	20,326	1,629	7.4%
Prism Normalized	161	21,943	20,291	1,652	7.5%
Gas Heat (ccf)					
Non Normalized	1,164	1,145	895	250	21.8%
Degree Day Normalized	1,164	1,206	1,039	168	13.9%
Prism Normalized	621	1,153	993	159	13.8%

In the rest of the report we focus on the degree day normalized savings, which were shown to be very close to the non-normalized savings for the baseload jobs and very 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.

- Electric baseload jobs had somewhat higher average pre-usage and savings than in 2004, and the 1999-2004 average, but the same ten percentage savings as in 2004 and the 1999-2004 average. Weatherization spending, at $208 in 2005, was also approximately the same as in the recent history of the Program.

- Electric heat jobs had pre-treatment usage approximately the same as the 1999-2004 average, but savings were somewhat lower, at 7.4 percent in 2005 compared to 8.6 percent for the six-year average. (Note: this is the smallest component of the Program with only three percent of all 2005 LIURP jobs and 11 percent of 2005 LIURP costs.) Costs for 2005 are also somewhat higher than the six-year average.

- Gas heat jobs had pre-treatment usage approximately the same as the 1999-2004 average, but savings that were considerably higher than the average, as they were in 2004. Gas savings were 13.9 percent in 2005 and 2004, as compared to 11.4 percent for the six-year average. Gas heat costs were approximately the same as the six-year average.

[8] The degree day analysis method employed in this report used a 60 degree reference temperature for heating and a 70 degree reference temperature for cooling. As required in the data sent to Penn State, we used a 65 degree reference point temperature for heating. Using this method, average savings were 9.7 percent for baseload jobs, 8.2 percent for electric heat jobs, and 15.0 percent for gas heat jobs.

Table IV-3
Time-Series Comparison of Usage Savings

	Pre-Use	Post-Use	Savings	Percent Savings	Wx Cost
Electric Baseload (kWh)					
2005	11,188	10,073	1,115	10.0%	$208
1999-2004 Average	9,971	8,963	1,009	10.1%	$232
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)					
2005	21,956	20,326	1,629	7.4%	$1,824
1999-2004 Average	22,478	20,542	1,936	8.6%	$1,719
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)					
2005	1,206	1,039	168	13.9%	$1,643
1999-2004 Average	1,248	1,106	142	11.4%	$1,701
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-4 displays the seasonal analysis of energy savings by job type. The table shows that electric baseload jobs had over half of the savings from baseload usage, about one quarter from heating usage, and about one fifth from cooling usage. Electric heating jobs had almost two-thirds of their savings from heating usage, about one-third from cooling usage, and less than ten percent from baseload usage. Gas heat households had nearly 80 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	4,551	7,434	6,834	600	8.1%	54%
Heating		1,939	1,641	298	15.4%	27%
Cooling		1,814	1,598	216	11.9%	19%
Electric Heat (kWh)						
Baseload	197	10,750	10,269	481	4.5%	30%
Heating		10,061	9,030	1,031	10.2%	63%
Cooling		1,144	1,027	117	10.2%	7%
Gas Heat (ccf)						
Baseload	1,164	301	264	37	12.3%	22%
Heating		905	775	131	14.5%	78%

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 2005 PECO LIURP savings are consistent with this expectation.

- Baseload jobs with pre-treatment usage over 12,000 kWh have savings of 12.9 percent, compared to savings of 8.6 percent for baseload jobs with pre-treatment usage between 8,000 and 12,000 kWh, and 2.7 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 11 cents per kWh saved, as compared to a cost of 76 centers per kWh saved for the lowest pre-usage jobs.

- Electric heat jobs with pre-treatment usage over 26,000 kWh had average savings of 8.3 percent, compared to jobs with usage between 16,000 and 26,000 kWh that had average savings of 7.0 percent and jobs with usage below 16,000 kWh that had average savings of 6.4 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 15.8 percent, compared to average savings of 13.2 percent for jobs with usage between 800 and 1,400 ccf, and 9.3 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	386	7,200	7,003	197	2.7%	$149	$0.76
8,000 – 12,000 kWh	2,988	9,409	8,598	811	8.6%	$206	$0.25
> 12,000 kWh	1,177	17,009	14,822	2,187	12.9%	$245	$0.11
Electric Heat							
< 16,000 kWh	46	13,869	12,987	882	6.4%	$1,335	$1.51
16,000 – 26,000 kWh	98	20,352	18,932	1,420	7.0%	$1,793	$1.26
> 26,000 kWh	53	31,939	29,274	2,664	8.3%	$2,320	$0.87
Gas Heat							
< 800 ccf	138	735	667	68	9.3%	$1,276	$18.76
800 – 1,400 ccf	725	1,074	932	142	13.2%	$1,590	$11.20
> 1,400 ccf	301	1,741	1,466	275	15.8%	$1,967	$7.15

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 for all job types, savings are somewhat lower for CAP participants, and the difference is statistically significant for the baseload jobs. CAP participants who received baseload services had savings that are 155 kWh lower than non-CAP participants. Regression analysis that controls for the measures installed and other home and occupant characteristics finds that CAP participants have statistically significant lower savings for baseload jobs, about 193 kWh lower than non-CAP participants.

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 baseload savings, they also have lower service delivery costs. Therefore, the cost-effectiveness, measured by the cost per kWh saved, is approximately the same for CAP and non-CAP households.

Table IV-6
Change in Usage
By CAP Participation

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved
Electric Baseload							
CAP	3,449	11,111	10,033	1,077	9.7%	$200	$0.19
Non-CAP	1,102	11,429	10,196	1,232	10.8%	$247	$0.20
Electric Heat							
CAP	127	22,278	20,680	1,598	7.2%	$1,865	$1.17
Non-CAP	70	21,370	19,685	1,686	7.9%	$1,760	$1.04

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost/Unit Saved
Gas Heat							
CAP	748	1,214	1,052	162	13.3%	$1,589	$9.81
Non-CAP	416	1,193	1,016	178	14.9%	$1,760	$9.89

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 between the choice and non-choice participants are not statistically significant.

Table IV-7
Change in Usage
By Customer Choice

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload					
Choice	351	10,991	9,836	1,155	10.5%
Non-Choice/No Data	4,200	11,204	10,092	1,112	9.9%
Electric Heat					
Choice	4	17,791	15,723	2,068	11.6%
Non-Choice/No Data	193	22,042	20,422	1,620	7.3%
Gas Heat					
Choice	163	1,185	1,022	163	13.8%
Non-Choice/No Data	1,001	1,210	1,042	168	13.9%

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. Differences in savings between customers who did and did not have the off-peak rate were not statistically significant.

Table IV-8
Change in Usage
By Peak Service

	#	Pre-Use	Post-Use	Savings	% Savings
Electric Baseload					
Off-Peak	184	16,229	14,860	1,369	8.4%
Not Off-Peak	4,367	10,975	9,871	1,104	10.1%
Electric Heat					
Off Peak	21	24,598	23,101	1,497	6.1%
Not Off-Peak	176	21,640	19,995	1,645	7.6%

	#	Pre-Use	Post-Use	Savings	% Savings
Gas Heat (electric usage)					
Off Peak	38	11,426	10,491	935	8.2%
Not Off Peak	1,115	8,879	8,274	604	6.8%

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

Table IV-9 displays the change in usage by home ownership status. Approximately half of the customers who received baseload services were renters. Renters have baseload savings that average 8.3 percent, compared to average savings of 11.5 percent for owners. Renters have measure costs that average only $93, as compared to measure costs that average $329 for owners. None of the renters received refrigerator replacement, a major source of saving 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	2,281	11,551	10,217	1,333	11.5%	$329	$0.25
Renter	2,270	10,823	9,927	896	8.3%	$93	$0.10
Electric Heat							
Owner	129	22,749	20,999	1,750	7.7%	$2,250	$1.29
Renter	68	20,450	19,050	1,399	6.8%	$1,026	$0.73
Gas Heat							
Owner	875	1,219	1,049	171	14.0%	$1,822	$10.65
Renter	289	1,167	1,009	158	13.5%	$1,129	$7.15

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 12.3 percent, compared to average savings of 7.8 percent for baseload jobs without supplemental heat. Electric heat jobs with supplemental heat have savings of only 1.7 percent, compared to savings of 8.0 percent for customers without supplemental heat. However, there are only a small number of electric heat jobs that have supplemental heat.

Table IV-10
Change in Usage
By Supplemental Heat

	#	Pre-Use	Post-Use	Savings	% Savings	Measure Cost	Cost Per Unit Saved
Baseload							
Supplemental Heat	2,047	11,946	10,471	1,475	12.3%	$246	$0.17
No Supp Heat	2,504	10,568	9,747	821	7.8%	$183	$0.22
Electric Heat							
Supplemental Heat	17	23,955	23,545	410	1.7%	$2,777	$6.77
No Supp Heat	180	21,767	20,022	1,744	8.0%	$1,738	$1.00
Gas Heat							
Supplemental Heat	257	1,278	1,119	159	12.4%	$1,817	$11.43
No Supp Heat	907	1,186	1,016	170	14.3%	$1,603	$9.43

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 $831 were significantly higher than costs for baseload

jobs that did not receive major measures, averaging $105. Savings for baseload jobs with major measures averaged 16.5 percent, as compared to savings that averaged 8.7 percent for baseload jobs that did not receive major measures.

- Electric Heat Jobs: Almost 90 percent of electric heat jobs received major measures. Savings for jobs that received major measures averaged 8 percent, as compared to average savings of 2.8 percent for jobs that did not receive major measures. Spending on jobs that received major measures averaged $1,986, compared to average spending of $742 for jobs that did not receive major measures.

- Gas Heat Jobs – Gas Measures: Almost 90 percent of gas heat jobs received major measures aimed at reducing gas usage. Gas savings for jobs with major measures averaged 14.6 percent, compared to average savings of 8.4 percent for jobs that did not receive major measures. Costs for gas jobs with major measures averaged $1,766 compared to average costs of $755 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 19.9 percent compared to 5.5 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	3,885	10,983	10,028	955	8.7%	$105	$0.11
Major	666	12,383	10,334	2,049	16.5%	$831	$0.41
Electric Heat							
Basic	25	19,339	18,807	532	2.8%	$742	$1.39
Major	172	22,336	20,547	1,789	8.0%	$1,986	$1.11
Gas Heat - ccf							
Basic	134	1,148	1,051	97	8.4%	$755	$7.78
Major	1,030	1,214	1,037	177	14.6%	$1,766	$9.98
Gas Heat – kWh							
Basic	1,086	8,637	8,158	478	5.5%	$1,596	$3.34
Major	67	14,242	11,408	2,834	19.9%	$2,561	$0.90

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 (15.0%) than those who did not (9.9%).

- *Refrigerator*: Baseload participants who received a refrigerator had higher savings (18.4%) than those who did not (8.7%). Electric heat customers who received a refrigerator had higher savings (11.7%) than those who did not (6.4%). Gas heat customers who received a refrigerator had higher savings (20.5%) than those who did not (5.6%).

- *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.

- *Blower Door Guided Air Sealing:* Electric heating customers who received blower door guided air sealing had higher savings (9.6%) than those who did not (4.4%). Gas heating customers who received blower door guided air sealing had higher savings (14.7%) than those who did not (8.7%).

- *Insulation:* Electric heating customers who received insulation had higher savings (9.2%) than those who did not (5.2%). Gas heating customers who received insulation had higher savings (15.6%) than those who did not (10.7%).

- *Furnace:* Gas heating customers who received a new furnace had higher savings (24.9%) than those who did not (13.3%).

Table IV-12
Change in Usage
By Major Measures

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost
Electric Baseload						
Air Conditioner	83	12,000	10,200	1,801	15.0%	$982
No Air Conditioner	4,468	11,172	10,070	1,102	9.9%	$197
Refrigerator	552	11,685	9,529	2,155	18.4%	$927
No Refrigerator	3,999	11,119	10,148	971	8.7%	$113
Air Conditioner/Refrigerator	45	12,459	10,254	2,205	17.7%	$1,449
Air Conditioner/ No Refrigerator	38	11,457	10,135	1,321	11.5%	$428
No Air Conditioner/ Refrigerator	507	11,616	9,465	2,151	18.5%	$881
No Air Conditioner/ No Refrigerator	3,961	11,116	10,148	968	8.7%	$109
Electric Water Heater Timer	97	17,861	16,174	1,688	9.5%	$515
No Electric Water Heater Timer	4,454	11,042	9,940	1,103	10.0%	$205
Electric Heat						
Refrigerator	37	23,074	20,365	2,708	11.7%	$2,873
No Refrigerator	160	21,697	20,317	1,380	6.4%	$1,586
Blower Door Test	106	23,773	21,492	2,281	9.6%	$2,398

	#	Pre-Use	Post-Use	Savings	% Savings	Total Measure Cost
No Blower Door Test	91	19,839	18,969	870	4.4%	$1,163
Electric Water Heater Timer	124	21,812	20,127	1,685	7.7%	$2,008
No Electric Water Heater Timer	73	22,200	20,664	1,535	6.9%	$1,522
Insulation	100	23,449	21,289	2,160	9.2%	$2,478
No Insulation	97	20,416	19,334	1,082	5.3%	$1,157
Gas Heat - ccf						
Blower Door Test	991	1,215	1,036	179	14.7%	$1,782
No Blower Door Test	173	1,157	1,056	101	8.7%	$897
Insulation	765	1,205	1,017	188	15.6%	$1,890
No Insulation	399	1,210	1,081	129	10.7%	$1,190
Furnace	64	1,222	918	304	24.9%	$4,080
No Furnace	1,100	1,205	1,046	160	13.3%	$1,509
Gas Heat - kWh						
Refrigerator	62	14,156	11,257	2,899	20.5%	$2,634
No Refrigerator	1,091	8,667	8,182	486	5.6%	$1,596

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 4 CFLs, and no data were available on the type of CFLs provided. Therefore, we attempt to estimate the savings due to CFL installation by examining savings for the 843 Electric Baseload jobs that only received CFLs. The table shows that these savings averaged 953 kWh, much 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.[9] Therefore, we expect that a significant part of these savings is due to education and resulting changes in behavior. Additional research would need to be conducted to further disaggregate the savings. 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 is only $0.29. 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 furnaces, boilers, insulation, duct/pipe insulation, and heating system work.

[9] (60 watts-13 watts)*0.001*365 days*4 hours/day* 4 bulbs=274 kWh

Table IV-13
Measure Savings Estimates

	Savings	Cost/Home	$/Unit Saved	Measure Life	$/Unit Saved Over Lifetime
Electric Baseload					
CFL Only	953 (±173)	$68/$274	$0.07/$0.29	5	$0.02/$0.07
Refrigerator	976 (±260)	$701	$0.72	12	$0.08
Gas Heat - ccf					
Gas Furnace	160 (±51)	$2,269	$14.18	15	$1.37
Boiler	167 (±49)	$2,952	$17.68	15	$1.70
Insulation	46 (±27)	$549	$11.93	15	$1.15
Duct/pipe insulation	29 (±25)	$156	$5.39	15	$0.52
Heating system work	25 (±24)	$350	$14.00	10	$1.81

D. Cost Effectiveness

This section examines the cost-effectiveness of the Program services delivered by job type. Measure costs are allocated to electric and gas costs, and 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 $0.40 for baseload jobs, $1.29 for electric heat jobs, and $0.23 for gas heat jobs. The cost per ccf saved is $0.80 for electric baseload jobs and $10.60 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)	4,551	1,115	$211	$182	$57	$450	$0.40
Gas (ccf)	27	75	$28	$24	$8	$60	$0.80
Electric Heat							
Electric (kWh)	197	1,629	$1,828	$206	$65	$2,099	$1.29
Gas Heat							
Electric (kWh)	1,153	615	$120	$15	$5	$140	$0.23
Gas (ccf)	1,164	168	$1,530	$191	$60	$1,781	$10.60

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 many of the investments are cost-effective at current retail rates if the measures have a life of at ten years. For example, assuming a 10-year measure life, electric baseload services cost five cents for each kWh saved and gas heat services cost $1.37 for each ccf 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)	4,551	1,115	$450	$0.40	$0.09	$0.05	$0.04
Gas (ccf)	27	75	$60	$0.80	$0.18	$0.10	$0.08
Electric Heat							
Electric (kWh)	197	1,629	$2,099	$1.29	$0.30	$0.17	$0.12
Gas Heat							
Electric (kWh)	1,153	615	$140	$0.23	$0.05	$0.03	$0.02
Gas (ccf)	1,164	168	$1,781	$10.60	$2.45	$1.37	$1.02

V. Bill and Payment Impacts

This section of the report examines the bill and payment impacts for 2005 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. As with the usage impact analysis, accounts were required to have between 330 and 390 days of transactions data to be included in the analysis. Due to an IT conversion during the post-treatment period, it was necessary to align data between the two systems. A small number of additional accounts were removed from the analysis when the gap between the old and new data was larger than 60 days. Table V-1 displays the data attrition statistics. Somewhat fewer data were available for the billing and payment analysis than for the usage analysis. However, 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	Total
Original Population	5,657	237	1,388	7,695
Not Enough Pre-Treatment Days	437	14	132	617
Not Enough Post-Treatment Days	1,379	62	281	1,810
Gap Between Old and New IT System Billing	247	14	79	368
Final Sample	3,594	147	896	4,900
% Included in Analysis	64%	62%	65%	64%

B. Billing and Payment Impacts

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

Table V-2 shows that overall electric revenue declined by an average of $138 or 11.7 percent, lower than the reduction in usage due to a general increase in electric prices between the pre and the post-treatment period. Gas revenue increased by $11 or 3.7 percent, despite the reduction in gas usage, due to increases in gas rates between 2004/2005 and 2005/2006. Total revenue declined by approximately nine percent.

Table V-2
Billing Revenue

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Electric Revenue	4,551	$1,198	$1,042	-$157	-13.1%
Gas Revenue		$69	$78	$10	14.5%
Total Revenue		$1,267	$1,120	-$147	-11.6%
Electric Heat					
Electric Revenue	197	$1,765	$1,587	-$178	-10.1%
Gas Revenue		$34	$31	-$2	-5.9%
Total Revenue		$1,798	$1,618	-$180	-10.0%
Gas Heat					
Electric Revenue	1,164	$1,021	$945	-$76	-7.4%
Gas Revenue		$1,282	$1,301	$18	1.4%
Total Revenue		$2,304	$2,245	-$58	-2.5%
All Job Types					
Electric Revenue	6,239	$1,175	$1,038	-$138	-11.7%
Gas Revenue		$295	$306	$11	3.7%
Total Revenue		$1,470	$1,344	-$127	-8.6%

Table V-3 displays the change in customer electric and gas bills and total charges, between the pre and the post-treatment periods. Total charges declined for baseload and electric heat jobs, and increased for gas heat jobs.

Table V-3
Bills and Total Charges

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Electric and Gas Charges	3,594	$1,230	$1,188	-$43	-3.5%
Other Charges		$115	$82	-$33	-28.7%
Total Charges		$1,345	$1,270	-$75	-5.6%
Electric Heat					
Electric and Gas Charges	147	$1,935	$1,817	-$118	-6.1%
Other Charges		$100	$76	-$24	-24.0%
Total Charges		$2,035	$1,893	-$143	-7.0%
Gas Heat					
Electric and Gas Charges	896	$2,218	$2,300	$81	3.7%
Other Charges		$131	$99	-$32	-24.4%
Total Charges		$2,349	$2,399	$50	2.1%

	#	Pre	Post	Change	Percent Change
All Job Types					
Electric and Gas Charges	4,900	$1,428	$1,409	-$19	-1.3%
Other Charges		$112	$84	-$28	-25.0%
Total Charges		$1,540	$1,493	-$47	-3.1%

Table V-4 displays payment statistics for the 2005 LIURP participants. The number of payments made increased for all groups of participants between the pre and post-treatment years. Changes in payments were generally small, but the general trend shown in the data is a decline in cash payments, an increase in assistance payments, and a decline in the total credits made to the account.

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

	#	Pre	Post	Change	Percent Change
Electric Baseload					
# Payments	3,594	9.2	9.7	0.5	5.4%
Cash Payments		$1,015	$948	-$67	-6.6%
Assistance Payments		$39	$55	$16	41.0%
Other Credits		$100	$136	$36	36.0%
Total Credits		$1,154	$1,140	-$14	-1.2%
Electric Heat					
# Payments	147	9.8	10.3	0.5	5.1%
Cash Payments		$1,585	$1,457	-$129	-8.1%
Assistance Payments		$85	$78	-$7	-8.2%
Other Credits		$187	$121	-$66	-35.3%
Total Credits		$1,857	$1,656	-$202	-10.9%
Gas Heat					
# Payments	896	10.1	11.1	1.1	10.9%
Cash Payments		$1,854	$1,845	-$10	-0.5%
Assistance Payments		$62	$93	$31	50.0%
Other Credits		$172	$136	-$36	-20.9%
Total Credits		$2,088	$2,074	-$15	-0.7%
All Job Types					
# Payments	4,900	9.4	10.0	0.6	6.4%
Cash Payments		$1,179	$1,121	-$58	-4.9%
Assistance Payments		$49	$66	$17	34.7%
Other Credits		$115	$136	$21	18.3%
Total Credits		$1,343	$1,323	-$20	-1.5%

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 decreased their cash payments by an average of $86 or 8.6 percent. However the decline in cash payments was largely balanced out by an increase in assistance payments and other credits. Non-CAP customers had an insignificant change in cash payments.

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

	#	Pre	Post	Change	Percent Change
CAP Customers – All Job Types					
# Payments	3,492	9.1	9.6	0.6	6.6%
Cash Payments		$1,004	$919	-$86	-8.6%
Assistance Payments		$63	$87	$24	38.1%
Other Credits		$139	$172	$33	23.7%
Total Credits		$1,206	$1,178	-$28	-2.3%
Non-CAP Customers – All Job Types					
# Payments	1,408	10.2	11.0	0.8	7.8%
Cash Payments		$1,613	$1,623	$10	0.6%
Assistance Payments		$13	$15	$1	7.7%
Other Credits		$56	$45	-$11	-19.6%
Total Credits		$1,683	$1,683	$0	0.0%

Table V-6 displays a more detailed analysis of the types of assistance payments received in the pre and the post-treatment periods by 2005 LIURP participants. The table shows that increases in assistance payments resulted from increases in both LIHEAP cash and crisis payments.

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

	#	Pre	Post	Change	% Change
Electric Baseload					
LIHEAP Cash	3,594	$14	$25	$11	78.6%
LIHEAP Crisis		$25	$30	$5	20.0%
MEAF		$0	<$1	<$1	-
Total Assistance		$39	$55	$16	41.0%
Electric Heat					
LIHEAP Cash	147	$19	$5	-$13	-68.4%
LIHEAP Crisis		$67	$73	$6	9.0%
MEAF		-	-	-	-

	#	Pre	Post	Change	% Change
Total Assistance		$85	$78	-$7	-8.2%
Gas Heat					
LIHEAP Cash	896	$4	$11	$7	175.0%
LIHEAP Crisis		$58	$82	$24	41.4%
MEAF		-	-	-	-
Total Assistance		$62	$93	$31	50.0%
All Job Types					
LIHEAP Cash	4,900	$13	$22	$10	76.9%
LIHEAP Crisis		$36	$44	$8	22.2%
MEAF		$0	$0	$0	0.0%
Total Assistance		$49	$66	$17	34.7%

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 baseload jobs and declined for electric heat and gas heat jobs.

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

	#	Pre	Post	Change	Percent Change
Electric Baseload					
Cash Coverage Rate	3,594	77.3%	77.3%	0.0%	0.0%
Total Coverage Rate		89.2%	95.3%	6.1%	6.8%
Electric Heat					
Cash Coverage Rate	147	79.0%	77.4%	-1.6%	-2.0%
Total Coverage Rate		92.1%	88.0%	-4.1%	-4.5%
Gas Heat					
Cash Coverage Rate	896	79.4%	77.4%	-2.0%	-2.5%
Total Coverage Rate		90.6%	87.1%	-3.5%	-3.9%
All Job Types					
Cash Coverage Rate	4,900	77.5%	76.7%	-0.8%	-1.0%
Total Coverage Rate		89.8%	93.4%	3.6%	4.0%

Table V-8 displays changes in customer balances. Balances increased at a lower rate between the beginning and the end of the pre period than they did between the beginning and the end of the post period.

Table V-8
Change in Customer Balance

	#	Start	End	Change	Percent Change
Electric Baseload					
Pre Balance	3,594	$296	$399	$104	35.1%
Post Balance		$376	$417	$41	10.9%
Electric Heat					
Pre Balance	147	$440	$465	$25	5.7%
Post Balance		$390	$488	$97	24.9%
Gas Heat					
Pre Balance	896	$429	$546	$117	27.3%
Post Balance		$523	$645	$122	23.3%
All Job Types					
Pre Balance	4,900	$320	$416	$97	30.3%
Post Balance		$392	$449	$57	14.5%

VI. Summary of Findings and Recommendations

PECO's LIURP cost-effectively delivered energy efficiency services and energy education to over seven thousand customers in 2005, many of whom had vulnerable household members. They were successful in achieving large reductions in energy usage, as in previous years, because of successful targeting of high usage customers, effective service delivery, and reinforced energy education. We have the following recommendations to continue to delivery effective services and potentially improve savings.

- *Targeting:* It is a challenge to continue to find high usage customers to treat in the program. PECO has been successful in this targeting over the past several years. PECO should continue to make this targeting a priority.

- *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 2006 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.