



NJ Comfort Partners Seniors' Pilot Usage Impact Evaluation

Final Report

Prepared for the New Jersey Comfort Partners Working Group

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Executive Summary

This report presents the findings from the Usage Impact Evaluation of the New Jersey Comfort Partners Seniors' Pilot. In this evaluation, we analyzed program participants' electric usage to determine the impact of the energy services provided by the program.

Introduction

The New Jersey Residential Low Income Program Working Group has developed and implemented the Comfort Partners Program, a statewide collaborative utility residential low-income program that will improve energy affordability and energy efficiency for low-income households, while providing cost-effective DSM benefits to all New Jersey customers. The BPU has ordered that JCP&L conduct a pilot to expand the benefits offered under the Comfort Partners program to eligible seniors¹ in Monroe Township who do not meet the income guidelines for Comfort Partners and who have all electric homes.

The Comfort Partners Seniors' Pilot program was implemented in March 2003. Seniors with incomes between 151 percent and 400 percent of the poverty level and electric heat were eligible for the pilot program, and received the same services offered under the Comfort Partners program but with a \$1,500 cost ceiling. A "No-Cost" option was provided to those between 151 and 300 percent of the poverty level and a "Shared-Cost" option was provided to those between 301 and 400 percent of the poverty level. "Shared-Cost" jobs provided program subsidies for 50 percent of the cost of services up to \$1,500 per home.

Methodology

All participants who received complete treatments between March 2003 (when the pilot was implemented) and December 2003 were targeted as the group to be studied in this evaluation. Electric usage data were weather-normalized for variations in heating and cooling seasons using PRISM software. This software provides an estimate of each client's weather-normalized usage in the pre and post treatment periods in an average weather year.

Customers who received program services in 2004 were used as the comparison group. The change in usage for these participants in the two years preceding service delivery was compared to the treatment group's change in usage after receiving services.

¹ Seniors in Monroe Township were eligible for the pilot if they were 65 or older and had income between 151 percent and 400 percent of the Federal Poverty Level.

Client and Program Characteristics

The majority of households served in the program has income below 300 percent of poverty and received all program services at no cost (up to a cap of \$1,500). Approximately 15 percent of households have income between 301 percent and 400 percent of poverty, and were required to pay for some of the costs of the program treatments. Most homes treated by the program received air sealing and duct sealing and many received attic insulation. Slightly less than half of the customers received new refrigerators. The total cost of the measures averaged \$1,155 for the treatment group and \$1,356 for the comparison group. A large percentage of the homes treated received measures that had a total cost close to or equal to the \$1,500 limit. It is likely that many of these customers had their services limited by the expenditure cap, as additional services would have moved the total cost over the limit.

Electric Usage Impacts

The final analysis sample consisted of 305 treatment households and 90 comparison households. One hundred thirty-one customers were eliminated from the analysis because they did not have enough seasonal data or the PRISM estimate was not reliable.

Customers who participated in the program had a high mean pre-treatment, weather-normalized usage of 15,922 kWh. These households had a post-treatment, weather-normalized average usage of 15,364 kWh, for a gross savings of 558 kWh. This represents four percent of pre-treatment usage. The comparison group had an increase in usage of 685 kWh. Therefore, the net program impact was 1,243 kWh, or eight percent.

I. Introduction

The New Jersey Residential Low Income Program Working Group has developed and implemented the Comfort Partners Program, a statewide collaborative utility residential low-income program that will improve energy affordability and energy efficiency for low-income households, while providing cost-effective DSM benefits to all New Jersey customers. The BPU has ordered that JCP&L conduct a pilot to expand the benefits offered under the Comfort Partners program to eligible seniors in Monroe Township who do not meet the income guidelines for Comfort Partners and who have all electric homes.

The Comfort Partners Seniors' Pilot program was implemented in March 2003. Seniors with incomes between 151 percent and 400 percent of the poverty level and electric heat were eligible for the pilot program, and received the same services offered under the Comfort Partners program. The Comfort Partners Seniors' Pilot, however, had a \$1,500 spending cap that limited the services that could be received by these households. A "No-Cost" option was provided to those between 151 and 300 percent of the poverty level and a "Shared-Cost" option was provided to those between 301 and 400 percent of the poverty level. "Shared-Cost" jobs provided program subsidies for 50 percent of the cost of services up to \$1,500 per home.²

This report provides estimates of the usage savings from this program. All participants who were treated in 2003 with adequate data were included in the usage analysis.

² Beginning in August 2003, households were given the opportunity to pay for an additional \$1,000 in services if the \$1,500 cost ceiling was reached. Only one customer took advantage of this opportunity.

II. Methodology

This section describes the selection of participants for the evaluation, how evaluation data were obtained, weather normalization procedures, and the use of a comparison group.

A. Study Group

All participants who received complete treatments between March 2003 (when the pilot was implemented) and December 2003 were targeted as the group to be studied in this evaluation. These participants were targeted because usage data would be available for pre and post-treatment for both the study group and a comparison group (participants treated in 2004).

B. Evaluation Data

JCP&L provided customer data, electric usage data, and program treatment data for the sample of participants in the treatment and comparison groups. These data were provided in an electronic format. Usage data were obtained for 6 to 23 months prior to service delivery and for 7 to 16 months after service delivery. The PRISM software normalizes the data to represent one year of electric usage.

C. Weather Normalization

Electric usage data were normalized for variations in heating and cooling season weather using PRISM software. This software provides an estimate of each client's weather-normalized usage in the pre and post treatment periods in an average weather year.

D. Comparison Group

When measuring the impact of an intervention, it is necessary to recognize other exogenous factors that can impact changes in outcomes. Changes in a client's energy usage, between the year preceding service delivery and the year following service delivery, may be affected by many factors other than program services received. Some of these factors include changes in household composition or health of family members, and changes in weather. The weather normalization process controls for changes in weather between the pre and post treatment periods. To control for other exogenous factors, we examine the change in outcomes for program participants compared to the change in outcomes for another group of households. This group of households is called a comparison group. The comparison group is designed to be as similar as possible to the treatment group, those who received services and who we are evaluating, so that the exogenous changes for the comparison group are as similar as possible to those of the treatment group.

In the evaluation of the Comfort Partners Seniors' Pilot, we use customers who participated in the program at a later date as the comparison group. These participants serve as a good control because they are lower income households who were eligible for the program and chose to participate. We use data for these comparison group participants for the two years preceding service delivery, to compare their change in usage in the years prior to receiving services to the treatment group's change in usage after receiving services.

Customers designated as the treatment group, those whose outcomes we evaluate in this report, received program services during 2003. Customers in the comparison group received program services during 2004. Customer usage data following treatment were not used for the comparison group.

In this evaluation, we examine pre and post-treatment usage statistics. The difference between the pre and post-treatment usage for the treatment group is considered the gross change. This reflects the actual change in behaviors and outcomes for those participants who were served by the program. Some of these changes may be due to the program, and some of these changes are due to other exogenous factors, but this change in energy use is the customer's actual experience. The net change in energy use is the difference between the change for the treatment group and the change for the comparison group, and represents the actual impact of the program, controlling for other exogenous changes.

III. Client and Program Characteristics

This section describes the client and program characteristics of customers in the treatment and comparison groups. We examine characteristics for all customers treated in 2003, as well as the full comparison group. We also examine characteristics for the subset of customers who are included in the usage impact analysis to determine whether there is a bias from excluding customers with incomplete data from the analysis.

Table 1 displays customer and home characteristics. This table shows that customers in the treatment and comparison group, and customers in the full sample and in the usage analysis sample, are very similar. This finding implies that the results presented in this report are not biased upwards or downwards due to sample selection.

The table shows that the average household size is about 1.5 occupants per home. This is expected, as the households treated in the Comfort Partners Seniors' Pilot consist of one or two elderly members. The majority of households have income below 300 percent of poverty and receive all program services at no cost (up to a cap of \$1,500)³. Approximately 15 percent of households have income between 301 percent and 400 percent of poverty, and are required to pay for some of the costs of the program treatments. Average household income is approximately \$23,000.

The vast majority of customers who received program services are homeowners. They live in one to two story homes, ranches, and multi-family homes in three communities developed in the 1970's. Approximately half of the homes were built before 1980 and about forty percent were built between 1980 and 1989. About five percent were built between 1990 and 1997. Homes averaged 1,100 to 1,300 square feet. Most homes had central air conditioning.

³ Beginning in August 2003, households were given the opportunity to pay for an additional \$1,000 in services if the \$1,500 cost ceiling was reached. Only one customer took advantage of this opportunity.

Table 1
Customer and Home Characteristics

	Full Sample		Sample Included in Usage Analysis	
	Treatment	Comparison	Treatment	Comparison
Sample Size	387	139	305	90
Household Size	1.5	1.4	1.5	1.4
Poverty Group				
151%-200%	23%	18%	23%	19%
201%-300%	63%	65%	66%	67%
301%-400%	14%	17%	11%	14%
Income	\$23,844	\$23,344	\$23,846	\$23,140
Home Ownership				
Owners	98%	89%	98%	92%
Renters	1%	1%	1%	1%
Data Missing	1%	10%	1%	7%
Structure Type				
1-2 Story	11%	32%	10%	37%
Ranch	67%	55%	68%	53%
Multi-family	21%	4%	21%	3%
Data Missing	1%	10%	1%	7%
Year Home Built				
Before 1980	50%	42%	51%	44%
1980-1989	43%	42%	42%	41%
1990-1997	5%	6%	6%	7%
Data Missing	2%	11%	2%	8%
Square Footage	1,131	1,246	1,126	1,286
Air Conditioning				
Central	79%	78%	77%	78%
Heat Pump	10%	12%	10%	16%
Window	10%	0%	11%	0%
Missing	1%	10%	1%	7%

Table 2 displays the measures that were provided, as listed in the WARM database, under the Comfort Partners Seniors' Pilot program. Households in the treatment and comparison groups and in the full sample and the usage analysis sample received similar measures, reinforcing the assumption that the groups are comparable.

About 90 percent of the homes received air sealing. Homes in the comparison group were somewhat more likely to receive attic insulation and duct sealing. Thirty-four percent of the homes in the treatment group received attic insulation and 57 percent of the homes in the comparison group received attic insulation. Sixty-five percent of the homes in the treatment group received duct sealing and about 79 percent of the homes in the comparison group received duct sealing. Slightly less than half of the customers received new refrigerators, and four percent agreed to have an extra refrigerator or freezer removed. The total cost of the measures averaged \$1,155 for the treatment group and \$1,356 for the comparison group.⁴

A large percentage of the homes treated received measures that had a total cost close to or equal to the \$1,500 limit. Half of the treatment group had costs greater than \$1,300 and three quarters of the comparison group had measure costs greater than \$1,300. It is likely that many of these customers had their services limited by the expenditure cap, as additional services would have moved the total cost over the limit.

Table 2
Measures Provided

	Full Sample		Sample Included in Usage Analysis	
	Treatment	Comparison	Treatment	Comparison
Sample Size	387	139	306	95
Air Sealing	94%	84%	93%	89%
Attic Insulation	34%	57%	36%	63%
Floor Insulation	9%	4%	9%	4%
Duct Sealing	65%	79%	63%	86%
Duct Insulation	6%	9%	5%	10%
Number of CFLs	1.2	.7	1.3	.7
Refrigerator	44%	42%	44%	41%
Refrigerator Removal	4%	1%	4%	2%
Total Cost	\$1,155	\$1,356	\$1,163	\$1,338

⁴ Due to the \$1,500 cost ceiling, contractors questioned the feasibility of returning to homes that had failed their inspection but were near the limit. Due to an agreement with the Board, contractors did return to these homes later in the program. This may be the cause of the higher costs for the comparison group.

IV. Electric Usage Impacts

Table 3 displays the data attrition that was experienced for the usage analysis. Customers were eliminated from the analysis because they did not have enough seasonal data or the PRISM estimate was not reliable.⁵ The final analysis sample consisted of 305 treatment households and 90 comparison households, representing nearly 80 percent of the treatment group and 65 percent of the comparison group. These are relatively low attrition rates compared to what is often seen in similar evaluation studies. The low attrition rates can be attributed to the thoroughness of data supplied by First Energy, and their willingness to manually provide data for comparison group customers whose histories did not extend back far enough on their extractable information system.

Table 3
Data Attrition

	Treatment	Comparison
Original Population	387	139
Not Enough Seasons or Days	7	23
Unreliable PRISM Estimate	74	26
Change in Total Usage > 65%	1	0
Final Sample	305	90

Table 4 displays the usage impact results. Customers who participated in the program had a high mean pre-treatment, weather-normalized usage of 15,922 kWh.^{6, 7} These households had a post-treatment, weather-normalized average usage of 15,364 kWh, for a gross savings of 558 kWh. This represents four percent of pre-treatment usage. The comparison group had an increase in

⁵ Participants were required to have at least 180 days of usage data, 500 winter heating degree days, 100 summer cooling degree days, and 28 baseload days to be included in the analysis. They were also required to have reliable PRISM estimates, defined as an r-squared of at least .7 and the standard error of Normalized Annualized Consumption less than 20 percent. Participants whose data did not meet these criteria were eliminated from the analysis.

⁶ Average electric consumption for electric heating households in the Northeast was 13,563 kWh in 2001. Average electric consumption for LIHEAP electric heating households in the Northeast was 13,357 kWh in 2001. Source: 2001 RECS.

⁷ Honeywell DMC, the implementation contractor, noted that these high use customers differ from the high use customers treated in the Comfort Partners Program. While high use Comfort Partners participants had deteriorated housing stock that contributed to their high usage, these customers' homes were in good condition, but they had high energy usage as a result of behavioral choices and appliances in the home.

usage of 685 kWh.⁸ Therefore, the net program impact was 1,243 kWh, or eight percent. These results are consistent with the Working Group's saving projection protocols.

Table 4
Electric Usage and Savings – kWh per Participant

Average Usage and Gross Savings					Net of Comparison	
	Units	Pre-Use	Post-Use	Savings	Net Savings	Net % Savings
Treatment Group	305	15,922	15,364	558	1,243 (+/- 359)	8%
Comparison Group	90	16,303	16,988	-685		

Note: all differences are significant at the 99 percent level.

Table 5 displays electric savings by pre-treatment electric usage. This table shows that customers with higher pre-treatment electric usage have higher electric savings. Households with pre-treatment usage of under 14,000 kWh have net savings of 1,011 kWh. Households with pre-treatment usage of 14,000 to 18,000 kWh have savings of 1,252 kWh. Households with pre-treatment usage of over 18,000 kWh have savings of 1,549 kWh. However, the percentage savings declined as usage increased. This may be related to the limits on service delivery costs.

Table 5
Electric Usage and Savings
By Pre-Treatment Usage

Pre-Use Category	Units	Net Electric Savings (kWh)	Net Percent Savings
<14,000 kWh	109	1,011	9%
14,000 kWh – 18,000 kWh	109	1,252	8%
>18,000 kWh	87	1,549	7%

Note: all differences are significant at the 99 percent level.

⁸ An increase in electric baseload usage for non-treated households has been found in recent usage impact studies.

V. Summary

The Comfort Partners Seniors' Pilot program provided energy efficiency services to eligible households in Monroe Township who exceeded the income limits for the Comfort Partners program. These households had fairly high electric usage, averaging about 16,000 kWh annually.⁹ The program provided treatments to these customers including air sealing, attic and floor insulation, duct sealing, duct insulation, replacement refrigerators, CFLs, and energy education. Net savings averaged eight percent of pre-treatment usage or 1,243 kWh.

⁹ Average electric consumption for electric heating households in the Northeast was 13,563 kWh in 2001. Average electric consumption for LIHEAP electric heating households in the Northeast was 13,357 kWh in 2001. Source: 2001 RECS.

Appendix