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Southern California Edison Blower Door Breakpoint Study Target Sample Selection

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Creators of CheckMe!®

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INTRODUCTION

Southern California Edison (SCE) has committed to a study of blower door weatherization for low income customers. The Southern California Edison Blower Door Breakpoint Study will answer questions key to the design of future SCE weatherization programs. The primary purpose of this study is to determine where (which houses or apartments) blower door guided weatherization (BGW) would be cost effective. A scientifically valid test to make that determination has been started. The background literature search has been completed and reported. A combined study with Southern California Gas Company was completed. This document summarizes progress on sample selection for the electric only customers. Following this phase, a carefully controlled field test will be conducted. The field test will include pre-retrofit/post-retrofit measurement and evaluation.

SUMMARY

This report provides a profile of the portion of Southern California Edison's residential customer base that is on Low Income Rate Assistance (LIRA). The analyses determines that portion of electric bill that increases in the summer and winter months, termed Seasonal Energy Cost (SEC), which is dominated by air conditioning in the summer and space heating in the winter. The methodology for determining SEC is contained in Appendix B.

Figure 1 shows the continuum of Seasonal Energy Cost from high to low for low income residential customers.

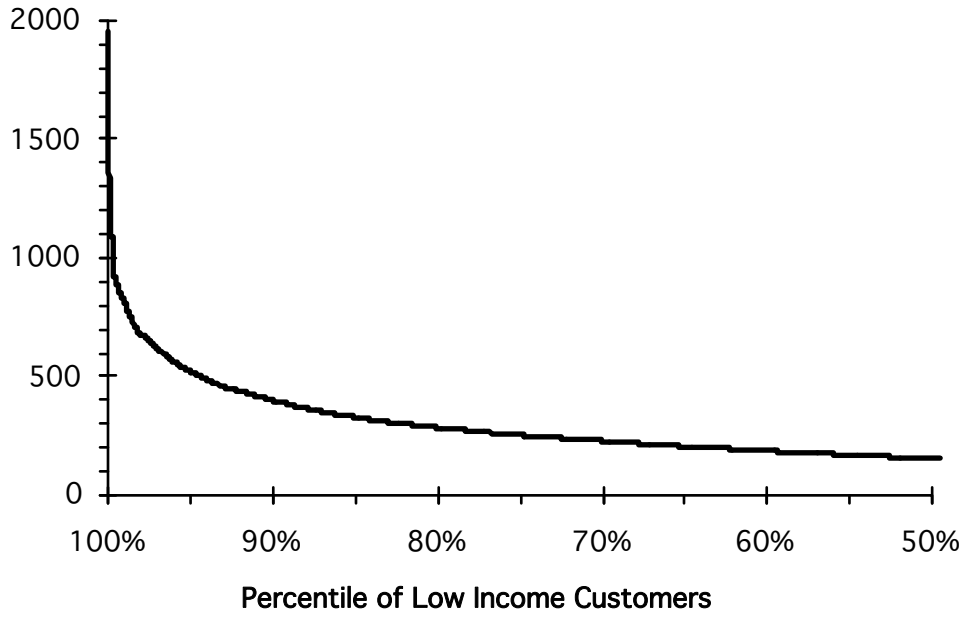

Figure 1. Annual Space Conditioning Cost Profile of Low Income Customers

Sample Selection

Since it is prohibitive to test BGW technology on every possible combination of housing type in the area, and since the purpose of this study is to determine the break point between where blower door guided weatherization (BGW) is sufficiently beneficial and where it is not, the test will be limited to a group that can help establish the economics of this form of weatherization. This group is the customers with combined space conditioning costs higher than the calculated breakpoint.

For the sample selection, the breakpoint was set at $357 (annual space conditioning cost). This is based on the following assumptions:

1) Based on field testing, the maximum expected savings from BGW on homes with ducted space conditioning systems is 20%.
   Note: homes without ducted systems would save substantially less.
2) The desired simple payback is 7 years or less.
3) The incremental cost of BGW including duct sealing is $500.

   ($500 ÷ 7 years ÷ 20% = $357 per year)

Approximately 13% of the sample paid over $357 for space conditioning, as shown in Figure 2.

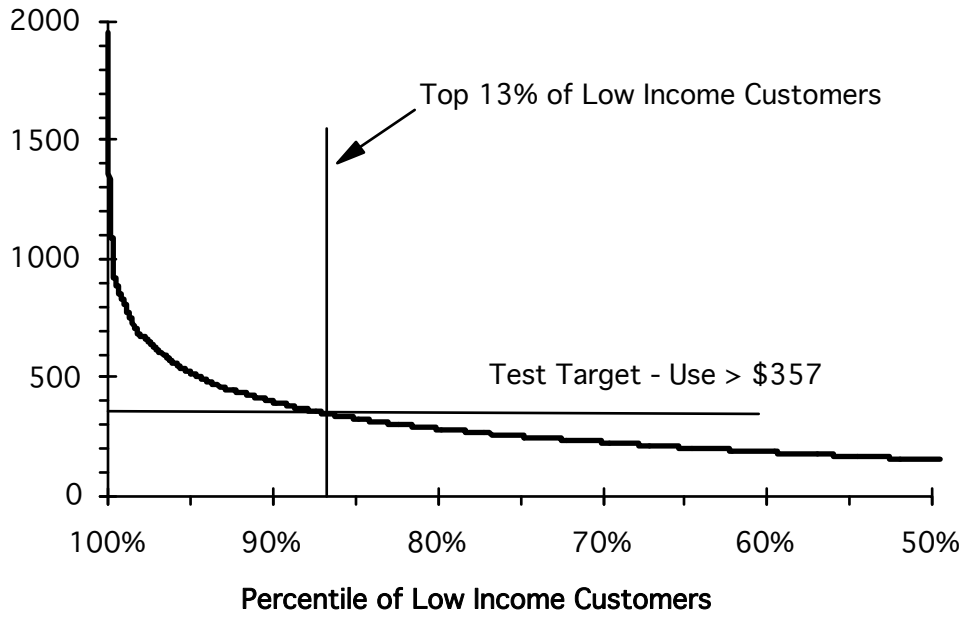

Figure 2. Breakpoint Test Target Customers

The characteristics of these customers and the characteristics of the low income customers as a whole are detailed in Appendix A of this report.

Customer Use by Fuel and Season

Customers with high Seasonal Energy Cost can be categorized by seasonal use. On 13% of the high SEC customers both electric heating alone and electric cooling alone exceeds $200. Winter electric heating only exceeds $200 on 68% of the high SEC customers. Electric cooling only exceeds $200 on 18% of the customers. Neither alone but both combined exceed $357 on 1%. This breakdown is shown in Figure 3.

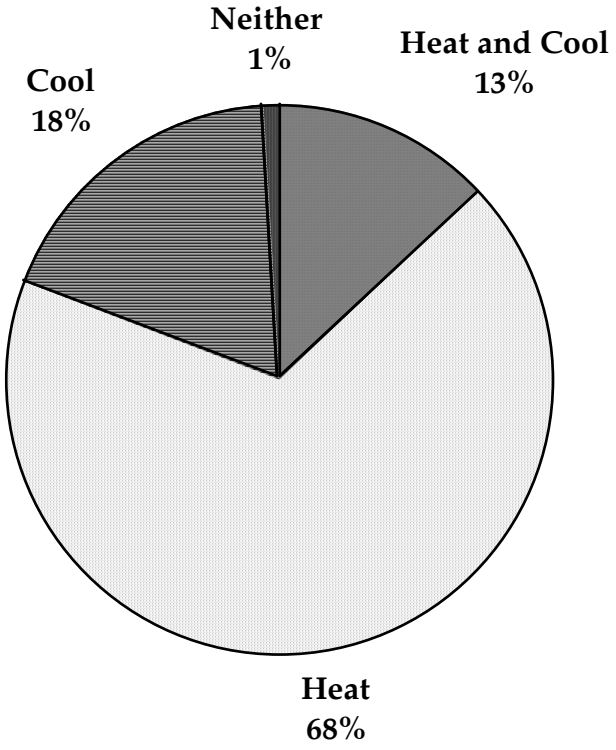

Figure 3. Space Conditioning Fuel Cost in Excess of $200

Target Customer Location

These high use target customers are disproportionally located in the hot desert climate outside of the Los Angeles basin and Sun City. (See Figure 4.) These areas are some of the hottest areas served by the utility. (Cooling degree days ≈ 3000 to 4300). The combination of building characteristics, occupancy, and climate creates a high percentage of high use customers among the low income population.

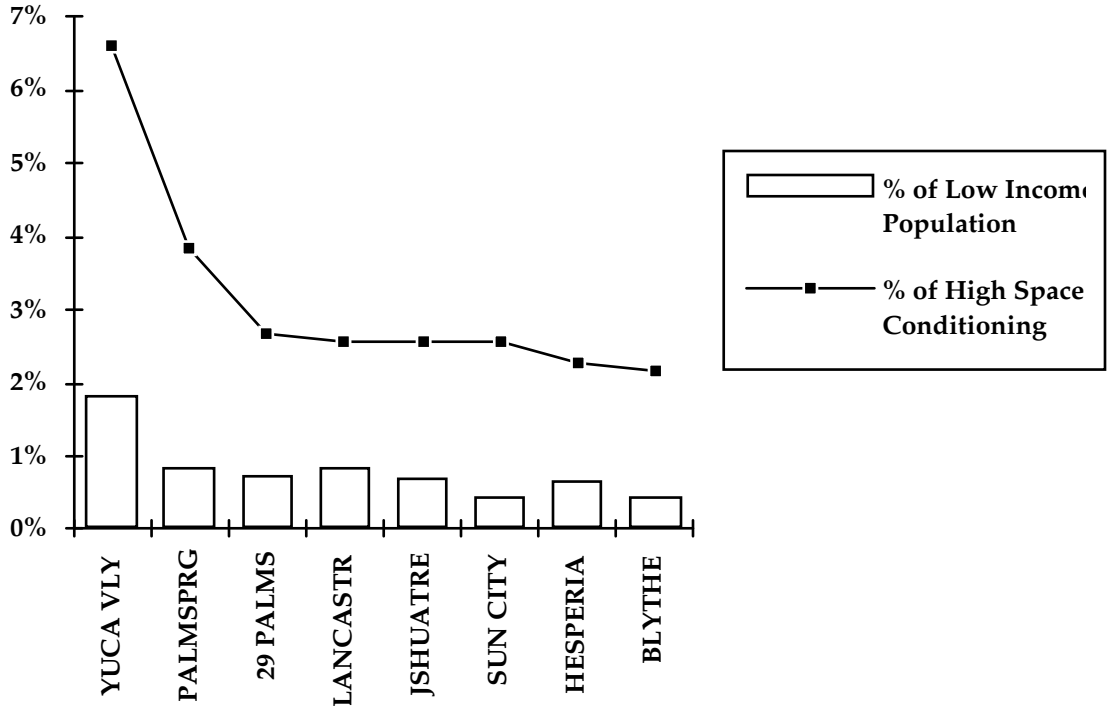

Figure 4. Towns with a Disproportionately High Percentage of High Use Customers among the Low Income Population

Next Steps

The next phase of this project involves the following tasks:

1) Determine the characteristics of the test customers and the population.
2) Finalize the research plan, based on building, customer, and climate characteristics.

The housing type and other characteristics (occupancy, etc.) of the test group is being determined in a search by Southern California Edison. This data will be compared with similar data for the low income population to determine the final test sample.

Appendix A
Characteristics of Low Income and Target Sample

Patterns of energy consumption and the geographical mix of low income customers in this sample were investigated.

TOTAL GAS AND ELECTRIC CONSUMPTION

Electric consumption for the typical all-electric LIRA customer in this sample is substantially less than the Edison residential population average [annual electric use of 5600 kWh for the sample compared to a population average of 8137 kWh (*Southern California Edison Residential Appliance End-Use Survey, Collection of Residential Appliance Time-Of-Use Energy Load Profiles, 1991 Results* , includes all multi-fuel as well as all-electric residential customers).

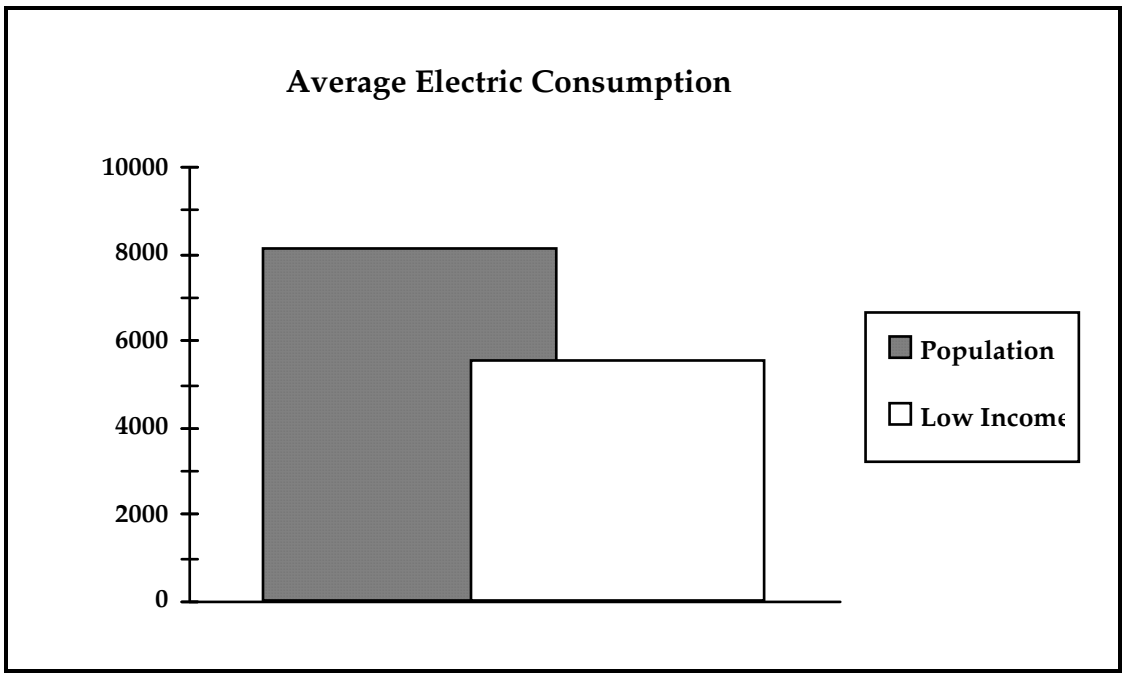

Figure 5. Average Residential Energy Use: All-Electric Customers
(all end uses)

SEASONAL GAS AND ELECTRIC CONSUMPTION

Seasonal electric consumption statistics for the low income population sample and the target group are tabulated in Table A.

Table A. Seasonal Consumption

		Low Income Sample n=7,920	High Use Sample n=1,011
Winter Electric (kWh)	**Mean**	**1042**	**2920**
	Std. Dev.	*1056*	*1562*
Summer Electric (kWh)	**Mean**	**617**	**1520**
	Std. Dev.	*705*	*1352*

GEOGRAPHIC LOCATION OF LOW INCOME AND TARGETED CUSTOMERS

The location of the sampled low income customers and the location of high use customers is compared in Table B.

Table B Location of Low Income Sample and High Use Target Population (by %)

City	Space Conditioning > $357	Low Income
YUCA VLY	6.61%	1.83%
LAGHILLS	4.44%	4.29%
PALMSPRG	3.85%	0.85%
LONG BCH	3.16%	7.51%
29 PALMS	2.67%	0.73%
LANCASTR	2.57%	0.85%
JSHUATRE	2.57%	0.71%
SUN CITY	2.57%	0.44%
SEAL BCH	2.37%	5.35%
HESPERIA	2.27%	0.67%
BLYTHE	2.17%	0.47%
TORRANCE	1.88%	2.50%
CYN LAKE	1.78%	0.25%
SAN BDNO	1.68%	1.76%
DESHTSPR	1.68%	0.38%
PLMDESRT	1.58%	0.44%
VISALIA	1.48%	0.39%
APPLEVLY	1.38%	0.48%
INGLWOOD	1.28%	1.77%
CAMARILO	1.28%	1.10%
1000 OAK	1.18%	1.00%
LKISBELA	1.18%	0.38%
HEMET	1.09%	0.83%
PALMDALE	1.09%	0.48%
CALCITY	1.09%	0.27%
CTHDRLCY	0.99%	0.27%
SANTAANA	0.89%	2.32%
PERRIS	0.89%	0.44%
ALHAMBRA	0.79%	1.34%
HUNT BCH	0.79%	1.19%
ONTARIO	0.79%	0.97%
PRTERVIL	0.79%	0.49%
GRDNGROV	0.69%	1.28%
UPLAND	0.69%	0.78%
ELSINORE	0.69%	0.27%
BISHOP	0.69%	0.20%
MRNGOVLY	0.69%	0.18%
FULERTON	0.59%	1.17%
TUSTIN	0.59%	0.86%
RIALTO	0.59%	0.81%
GOLETA	0.59%	0.63%
HANFORD	0.59%	0.21%
OJAI	0.59%	0.14%
BELLFLWR	0.49%	2.22%
OXNARD	0.49%	1.36%
STABARBA	0.49%	1.29%
WHITTIER	0.49%	1.20%

City	Space Conditioning > $357	Low Income
POMONA	0.49%	1.12%
FONTANA	0.49%	1.04%
RDNDOBCH	0.49%	0.69%
MRNO VLY	0.49%	0.59%
COVINA	0.49%	0.49%
EL MONTE	0.49%	0.44%
MTCLAIR	0.49%	0.44%
CYPRESS	0.49%	0.35%
WSTLKVIL	0.49%	0.25%
LUCRNVLY	0.49%	0.19%
COMPTON	0.49%	0.16%
RDGCREST	0.49%	0.16%
TULARE	0.49%	0.15%
PHELAN	0.49%	0.14%
KERNVILL	0.49%	0.11%
ORANGE	0.39%	1.21%
MNTEBELO	0.39%	1.15%
W COVINA	0.39%	0.95%
BREA	0.39%	0.74%
BODFISH	0.39%	0.15%
WOFDHGTS	0.39%	0.14%
PEARBLSM	0.39%	0.10%
ROMOLAND	0.39%	0.10%
TEHACHPI	0.39%	0.10%
PALOVRDE	0.39%	0.08%
R MIRAGE	0.39%	0.08%
ADELANTO	0.39%	0.06%
LLANO	0.39%	0.05%
WSTMNSTR	0.30%	0.98%
ARCADIA	0.30%	0.68%
VCTRVILL	0.30%	0.45%
REDLANDS	0.30%	0.37%
CORONA	0.30%	0.29%
STANTON	0.30%	0.24%
FTN VLY	0.30%	0.23%
TEMECULA	0.30%	0.23%
LA VERNE	0.30%	0.18%
MOJAVE	0.30%	0.15%
QUAILVLY	0.30%	0.14%
WHTEWATR	0.30%	0.06%
CALIMESA	0.30%	0.05%
LEMNCOVE	0.30%	0.05%
LOSANGLS	0.20%	2.32%
SIMI VAL	0.20%	0.76%
HAWTHORN	0.20%	0.66%
DOWNEY	0.20%	0.64%
BUENA PK	0.20%	0.62%

Table 1 Location of Low Income Sample and High Use Target Population (by %)

City	Low Income	Space Conditioning > $357
MNTERYPK	0.20%	0.61%
CUCAMNGA	0.20%	0.59%
MONROVIA	0.20%	0.47%
LKFOREST	0.20%	0.42%
PARAMONT	0.20%	0.42%
SANGABRL	0.20%	0.40%
LA HABRA	0.20%	0.37%
HIGHLAND	0.20%	0.30%
CLARMONT	0.20%	0.27%
LOSALMTS	0.20%	0.27%
MSN VIEJ	0.20%	0.27%
LAPUENTE	0.20%	0.24%
NEWHALL	0.20%	0.24%
LAMIRADA	0.20%	0.21%
LOMALNDA	0.20%	0.19%
PICORIVA	0.20%	0.16%
SPASDENA	0.20%	0.14%
VALENCIA	0.20%	0.14%
WOODLAKE	0.20%	0.14%
AGOURA	0.20%	0.10%
INYOKERN	0.20%	0.10%
MALIBU	0.20%	0.10%
RIPLEY	0.20%	0.10%
AVALON	0.20%	0.09%
LITLERCK	0.20%	0.09%
BARSTOW	0.20%	0.06%
FRAZEPRK	0.20%	0.06%
WNCHESTR	0.20%	0.06%
GRNDTERR	0.20%	0.05%
WILDOMAR	0.20%	0.05%
CHATSWTH	0.20%	0.04%
CRDELMAR	0.20%	0.04%
LINDSAY	0.20%	0.04%
TOPANGA	0.20%	0.04%
SILVRADO	0.20%	0.03%
TRONA	0.20%	0.03%
STAMNICA	0.10%	1.92%
IRVINE	0.10%	0.87%
CULVERCY	0.10%	0.68%
ROWL HTS	0.10%	0.42%
NPORTBCH	0.10%	0.40%
CYN CTRY	0.10%	0.39%
PTHUENME	0.10%	0.33%
LOMITA	0.10%	0.30%
NORWALK	0.10%	0.29%
RANCHOPV	0.10%	0.29%

City	Low Income	Space Conditioning > $357
BEVHILLS	0.10%	0.25%
SNJACNTO	0.10%	0.25%
DELANO	0.10%	0.23%
CALBASAS	0.10%	0.20%
CHINO	0.10%	0.20%
YORBLNDA	0.10%	0.16%
VENICE	0.10%	0.15%
HACNDAHT	0.10%	0.14%
SO GATE	0.10%	0.14%
ROSEMEAD	0.10%	0.13%
ARTESIA	0.10%	0.11%
LYNWOOD	0.10%	0.11%
MAMTHLKS	0.10%	0.11%
RIVRSIDE	0.10%	0.09%
AZUSA	0.10%	0.06%
BANNING	0.10%	0.06%
MENTONE	0.10%	0.06%
BEAUMONT	0.10%	0.05%
CABAZON	0.10%	0.05%
IDYLWILD	0.10%	0.05%
ALTADENA	0.10%	0.04%
EXETER	0.10%	0.04%
NWBURYPK	0.10%	0.04%
SAUGUS	0.10%	0.04%
TERABELA	0.10%	0.04%
THRERVRS	0.10%	0.04%
WELDON	0.10%	0.04%
AROWBEAR	0.10%	0.03%
BENTON	0.10%	0.03%
DAGGETT	0.10%	0.03%
FORSTHME	0.10%	0.03%
HAVASULK	0.10%	0.03%
HOMELAND	0.10%	0.03%
OROGRAND	0.10%	0.03%
PINOHLS	0.10%	0.03%
BORON	0.10%	0.01%
CALIENTE	0.10%	0.01%
CRESTLIN	0.10%	0.01%
LAKEVIEW	0.10%	0.01%
LKHUGHES	0.10%	0.01%
LYTLECRK	0.10%	0.01%
NUEVO	0.10%	0.01%
QTZ HILL	0.10%	0.01%
TUJUNGA	0.10%	0.01%
TWIN PKS	0.10%	0.01%

Appendix B Methodology

This analysis consists of drawing a random sample, calculating the SEC, sorting and compiling the results.

SAMPLE SELECTION

The initial sample included 10,000 all electric LIRA customers supplied by Edison. The analysis is based on the energy use in two minimum use billing periods as an estimate of the base use for that fuel. In order to use this methodology a number of screens must first be applied to the data. The primary screen is that the two lowest readings must be within ± 20%; zeros in data also excluded customers but this occurred in less than one percent of the cases. In the end the sample was reduced to 7,920 households (79% of the original sample). The necessary use of these screens in this quick analysis may introduce some bias, however this bias is small in comparison with the usefulness of the results.

ESTIMATING SEASONAL ENERGY COST

The use (the Daily Base) that is not attributable to space conditioning (heating and cooling) and other seasonally variable end-uses was estimated from spring and fall data. The Daily Base was calculated as the minimum average daily use from the Spring or Fall. The Daily Base includes average lighting, refrigeration, clothes drying, cooking, water heating, etc.

The energy use for the summer billing periods were summed to total summer use. Summer seasonal energy use was computed as the total summer use minus the Daily Base times the number of days in the summer.

The summer seasonal electric use for these households includes air conditioning and any change in refrigerator use or other electrical appliances. For households without air conditioning this number will be small. The electric summer cooling cost was estimated as the summer seasonal electric use times the marginal LIRA rate (12¢ per kWh).

Winter seasonal electric use includes space heating and changes in lighting or other electrical appliances. For households without electric heating this number will be small. The cost was estimated based on a marginal rate of 12¢ per kWh.

For this sample selection no weather normalization was used. Data obtained in the final study will be weather normalized.

