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Final Report

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Final Report

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REPORT SUMMARY

CONCLUSION

If consumers are given immediate feedback on their electricity consumption, will they make changes that reduce their consumption? That was the primary question the Energy Center of Wisconsin (Energy Center) sought to answer for Focus on Energy through a study of the PowerCost Monitor™ feedback device. The results are to be used to assess the feasibility of a full-scale Focus on Energy program.

As a result of this study, the Energy Center concludes that whether such a program would produce electricity savings sufficient to justify the cost of the program depends in large part on the program features and the behavior of individual participants. We cannot be confident that the electricity savings from a general program marketed to all customers, one that provided participants with a free or reduced price PowerCost Monitor, would meet the minimum level of savings necessary to justify the program. Overall, we found that savings attributable to the PowerCost Monitor for participant homes that successfully installed it to be modest (about 1.5% of pre-usage levels), and not statistically different from zero. Nevertheless, if such a program were targeted to mid- to high-usage customers, it would have a reasonable chance of exceeding minimum savings threshold. There is also a behavioral aspect to be considered. If Focus on Energy could identify customers upfront who would actively use the monitor our conclusion of electricity savings would only be strengthened. Requiring participants to pay part of the cost of the monitor, instead of providing it for free, may screen out those who have only a passing interest in such devices.

BACKGROUND

Focus on Energy retained the Energy Center to conduct a scientific study of the impact of a feedback device on residential electricity use. The device employed in our study was the PowerCost Monitor manufactured by Blue Line Innovations, Inc.¹ The equipment consists of a battery-operated radio signal device that attaches to a customer's electric meter and a battery-operated display device that is placed inside the customer's premises. The display device receives the signal, translating it into information about the customer's instantaneous and cumulative use of electric energy.

RESEARCH QUESTION

The primary research question for this study was whether providing customers with immediate feedback on electricity consumption would lead to reduced consumption. Previous research studies using similar feedback have produced mixed results, with some studies finding statistically-significant savings in the neighborhood of 5 to 10 percent, with others reporting essentially no savings.²

¹ Blue Line Innovations, Inc., 1st Floor, ICON Building, 187 Kenmount Rd, St John's, Newfoundland and Labrador Canada A1B 3P9 www.bluelineinnovations.com

² The other feedback studies are summarized later in this report.

STUDY DESIGN PARAMETERS

The combination of a random-digital-dial scheme and a screening survey produced an initial participant group of 735 households.³ All participants selected indicated that they were served by a major investor-owned utility in Wisconsin. The study group was limited to customers who stated that their primary space heating energy source was something other than electricity, and who stated that they were willing to pay at least \$25 to obtain a feedback device. The latter question was used to gauge willingness to pay. Participants were not actually charged for the device, nor were they told during the screening process that they would receive one.

The participants were split into treatment and control groups. The treatment group participants received: (1) a free PowerCost Monitor; (2) three tip sheets offering energy saving ideas; and (3) a mid-study survey and an end-of-study survey. The monitors were sent out in the spring and early summer of 2008. The tip sheets were sent to customers at three distinct times over the study period. The energy-saving information contained in the tip sheets related to the relevant season.

Control group participants received neither a monitor nor the tip sheets, although they were sent a survey instrument.

The study effectively ended in September 2009. All treatment and control group participants who completed the study, which included completing the associated survey(s), received a \$25 Visa[®] gift card.

EFFECTIVE SAMPLE SIZES

The effective sample sizes in the analysis were noticeably smaller than the original sample sizes due to participant withdrawals from the study, participant problems with installation of the device, and inability to obtain utility billing data, among other reasons. In the end, our study contained 153 effective⁴ treatment group participants and 95 effective⁵ control group customers.

THRESHOLD SAVINGS REQUIREMENT

Prior to the study, Focus on Energy estimated that the minimum amount of savings necessary to justify the development of a full-scale program promoting the PowerCost Monitor was 2.0 percent.

³ The Blackstone Group conducted participant recruitment under subcontract to the Energy Center.

⁴ For treatment customers, by “effective” we mean that the participants received monitors, and they reported that they installed them. It also means that the participants responded to our surveys, and that the participants’ utilities supplied billing data for our analysis.

⁵ For control group customers, by “effective” we mean that the participants responded to our final survey, and that the participants’ utilities supplied billing data for our analysis.

STUDY FINDINGS

The estimated median savings for treatment group participants relative to control group participants did not meet the threshold requirement, producing a median electricity savings of only 1.4 percent.⁶ We present an abbreviated summary of savings estimates from this study and the existing research in Table 1. Like all statistical estimates, that figure is subject to measurement error. To put the result in a statistical context, the probability that the true median savings met the minimum threshold requirement is only 35 percent.

Table 1: Summary Table of Focus on Energy Study Findings and Findings from Existing Research. Ninety Percent Confidence Intervals are Shown in Brackets.

Study	Range of Estimates	
	Percentage Savings (%)	Annual Energy Savings (kWh/yr)
Focus On Energy (2010)		
Overall Treatment Group	1.4 [-1.4, 4.6]	126 [-206, 489]
Participants in the Top Three Quartiles of Pre-Treatment Usage	3.4 [-0.3, 6.3]	360 [-12, 717]
Participants Stating That They Found the PCM Was Helpful in Saving Electricity	5.4 [2.5, 8.7]	576 [226, 937]
Previous studies involving PCM		
Hydro One (2006)	6.5	-
NSTAR/NGRID (2008) ⁷	2.7 [1.4, 4.4]	318 [157, 482]
Oregon Trust (2009)	Found No Statistically Significant Savings	

Certain subgroups of treatment group customers did, however, achieve savings that exceeded the threshold savings level in a statistical sense. If we exclude customers in the lowest quartile in terms of annual electricity use, the median savings relative to the control group rise to 3.4 percent. For this group, the probability that the true median lies above the minimum threshold is 77 percent. This suggests that a targeted program that is focused on mid- to high-usage customers has a reasonable chance to exceed program threshold requirements while a program marketed to all consumers is not likely to do so.

Other subgroups of treatment customers also produced savings that were markedly different from those for the general treatment group. Nevertheless, whether one can use the characteristics that separate these customers from the general class of treatment group customers to develop a targeted program remains an open question.

⁶ As a percentage of annualized pre-treatment usage. Savings are relative to the control group.

⁷ 95 percent Confidence Interval

For example, participants for whom the monitor was still operating at the end of the study, and who reported that they viewed the display device at least occasionally, reduced consumption by 3.4 percent.⁸ The probability that the true median savings for this group exceeded the minimum threshold was 81 percent. Note, however, that this subgroup represented only 44 percent of the effective treatment group customers.

Participants who reported that they found the monitor to be “helpful in saving energy” reduced consumption by 5.4 percent. The probability that the true median savings for this group exceeded the minimum threshold was 96 percent. Again, though, the size of the subgroup is relatively small, representing only 36 percent of the effective treatment group customers.

PARTICIPANT PAYMENT CONSIDERATIONS

In this study, participants paid nothing for the monitor (in fact, they were paid \$25 to participate). In an actual program, participants would likely have to pay part of the cost of the monitor (e.g., \$30). Requiring participants to pay for some of the cost of the device may restrict participation to those who would actually use the device. This suggests that participant savings for an actual program may exceed our median savings estimate for the overall treatment group.

TECHNOLOGY ISSUES

The study identified two issues related to the PowerCost Monitor that deserve mention. First, 17 percent of participants who received the monitor did not install it; of this group, about half indicated that they tried to install it, but could not succeed in getting the device to work. Second, 44 percent of those participants who successfully installed the device reported that it was not working at the end of the study. The first issue is one that relates, at least in part, to ease of installation. The second issue is most likely largely a function of battery life; however, given the experience of other programs with the PowerCost Monitor, it is possible that some of these devices failed for other reasons.

⁸ Unless otherwise noted, savings are median estimates and are relative to the control group.

INTRODUCTION

STUDY BACKGROUND

During 2008-2009, the Energy Center conducted a study for Focus on Energy to investigate the effectiveness of providing customers with a feedback device. The device selected for this study was the PowerCost Monitor™ manufactured by Blue Line Innovations, Inc. The equipment consists of a battery-operated radio signal device that attaches to a customer's electric meter and a battery-operated display device that is placed inside the customer's home. The display device receives the signal, translating it into information about the customer's instantaneous and cumulative use of electric energy; thus providing the user with real-time information about their home electricity use.

Initially five Wisconsin investor-owned electric utility service territories were included in this study, all Focus on Energy members: Alliant Energy, Madison Gas & Electric, We Energies, Wisconsin Public Service (WPS), and Xcel Energy. Although Alliant Energy and WPS customers were not in our treatment group, we had intended to retain those customers as part of the control group. We were able to obtain billing information for Alliant Energy customers.

The overlying objective of this study was to assess whether providing customers with immediate feedback of their home electric use would lead to reduced energy consumption in Wisconsin households. This information, in turn, will be used to assess the feasibility of a full-scale Focus on Energy program. A full-scale program would make a PowerCost Monitor available to households eligible for Focus on Energy services. The device would be accompanied by energy saving information that focuses on behavioral measures.

RESEARCH OBJECTIVES

We had three primary objectives for our study:

- Determine behavior change likely to result from a PowerCost Monitor program in Wisconsin
- Recommend a deemed energy savings amount to be assigned to participants in a PowerCost Monitor program in Wisconsin
- Obtain feedback on:
 - most promising target customer groups
 - information support requirements
 - likely household interaction with a PowerCost Monitor

This report presents results of the research effort.

LITERATURE REVIEW

Research in the topic of direct feedback displays has shown that savings for instantaneous feedback could be expected to be on order of 5 to 15 percent.⁹ However, three recent pilot programs specifically testing the PowerCost Monitor have shown that average savings are more likely to range from 0 to 7 percent. Responses from the three evaluations we examined mimicked several key trends and areas of concern that were drawn from our mid-study and end-of-study surveys. The commonalities between the evaluations include technical difficulties with the PowerCost Monitor device, overall participant attitudes toward the PowerCost Monitor as an energy saving device and PowerCost Monitor consultation rates (how often households check the display).

The three evaluations we reviewed specifically examining the PowerCost Monitor, listed chronologically in order of completion are:

- The Hydro One Real Time Monitoring Pilot¹⁰
- The National Grid, NSTAR Electric and Western Massachusetts Electric Company (WEMCO) Pilot¹¹
- The Oregon Energy Trust Pilot¹²

In its pilot, Hydro One distributed PowerCost Monitor devices free of charge to 500 randomly selected participants (stratified by service territory and pre-treatment usage levels).¹³ Results of the Hydro One pilot indicated overall savings attributable to the PowerCost Monitor were on the order of 7 percent.¹⁴ The pilot found that for some high end users, namely homes with electric domestic hot water but not electric space heating, savings were on the order of 16 percent. Conversely, homes with electric space heating (regardless of the configuration of remaining appliances) showed hardly any savings at all. The Focus on Energy study is similar to the Hydro One pilot in that the PowerCost Monitors were given to participants free of charge, although, as an added incentive to participate in its study, Focus on Energy gave participants \$25 gift cards in addition to the free PowerCost Monitor. The evaluation of the Hydro

⁹ Darby, S. (2008), *The Effectiveness of Feedback on Energy Consumption*. Oxford: Environmental Change Institute.

¹⁰ Mountain, D. (2006). *The Impact of Real-Time Feedback on Residential Electricity Consumption: The Hydro One Pilot*. Mountain Economic Consulting and Associates Inc.

¹¹ Norton, B. (2008). *PowerCost Monitor Pilot Program Evaluation*. Waltham: Opinion Dynamics Corporation.

¹² Sipe, B.; Castor, S. (2009). *The Net Impact of Home Energy Feedback Devices*. Portland: Energy Trust of Oregon.

¹³ The effective size of Mountain's billing analysis included 382 pilot homes and 42 control homes. Data records were removed from the billing analysis for a variety of reasons, to include mechanical failure of device and change in residence.

¹⁴ Statistically significant with critical value of .05.

One pilot, in addition to its billing analysis, surveyed participants about their attitudes toward the PowerCost Monitor and the frequency with which participants consulted the device. Trends in survey responses between the Hydro One and Focus on Energy studies are similar; although participants in the Focus on Energy study rated the PowerCost Monitor as slightly less useful in reducing electricity consumption, and also reported consulting the PowerCost Monitor less frequently than participants in Hydro One. In Hydro One, about 60 percent (53 percent for Focus on Energy) of users thought the monitor made a difference in reducing electricity use, and a little less than 40 percent (28 percent for Focus on Energy) reported consulting the device on at least a daily basis (answered at the end of the study).

The NGRID/NSTAR/WMECO pilot (hereafter “NSTAR”) distributed or sold 3,500 PowerCost Monitors to a combination of audit participants and the general public during the summer and fall of 2007. The evaluation of NSTAR’s pilot targeted 500 participants to complete mid-pilot and end-of-pilot surveys, as well as a billing analysis for estimating savings. Participant responses to NSTAR’s surveys show trends similar to Focus on Energy and the other evaluations, namely that frequencies for consulting the PowerCost Monitor and general attitudes toward the PowerCost Monitor degrade significantly over the first year of use. Regarding frequency of consultation, over 90 percent of NSTAR participants reported consulting the PowerCost Monitor at least daily immediately following installation, while only 32 percent reported daily consultation one year later. As in Focus on Energy and Hydro One, about half of the NSTAR participants thought that the PowerCost Monitor was useful in helping save electricity. NSTAR differs from Hydro One (and Focus on Energy) in that the billing analysis focused solely on participants who paid for the PowerCost Monitor and omitted those who received the PowerCost Monitor through an audit.¹⁵ Findings from NSTAR indicate that pilot participants purchasing the PowerCost Monitor device (albeit at a subsidized rate) saved an average of 2.7 percent (between 1.4 and 4.4 percent, with 95 percent confidence), or 318 kWh per year.

The Oregon Energy Trust’s (OET) evaluation of the PowerCost Monitor is unique in that it evaluated both 104 participants receiving a PowerCost Monitor during a home energy audit (i.e. without cost to the participant) and 96 participants ordering PowerCost Monitors online at a discounted rate (\$29.99). OET’s study compared each of the two groups against sizeable control groups; the early adopters were compared against a random sample of 490 Oregon homes not receiving a home energy audit, and pilot homes receiving the PowerCost Monitor (without cost) during a home energy audit were compared against 201 homes receiving an audit but not the PowerCost Monitor. No statistically significant savings were shown by the billing analysis. The researchers posited that the lack of savings may have been attributable to external forces; namely the economic recession and a contemporaneous electricity rate increase.

Oregon Energy Trust’s research is strengthened in part by the size of the control groups used for comparing savings. The size of the control group used in the Focus on Energy study is similar to Oregon Energy Trust’s research in this regard. Of the other two studies we have mentioned, NSTAR did not use a control group in its billing analysis, while Hydro One used a control group of a limited size (about 10 percent of the size of its treatment group).

¹⁵ The NGRID customers paid \$9.99 and the NSTAR customers paid \$29.99. The weighted average (based on utility share of participant pool) of the two buy-in rates was approximately \$25.

METHODS

We implemented three separate surveys with our study participants during the 2008-2009 time period:

- A telephone survey completed by 735 participants (all sent release forms);
- A mailed mid-study survey completed by 159 study participants; and,
- A mailed end-of-study survey completed by 303 study participants.

See Table 2 for a number break down of the release forms and surveys along with their corresponding response rates.

Table 2: Response Rates

	Sent out	Received	Response Rate
Release forms	735	453	61.6%
1 st round	635	381	60.0%
2 nd round	105	72	68.6%
Mid-study survey (treatment only)	230	159	61.1%
End-of-study survey	390	303	77.7%
Treatment	224	163	72.8%
Control	166	140	84.3%

TELEPHONE SURVEY

Participants were randomly selected for this study using a random-digit-dialing system (RDD)¹⁶ to ensure identification of a representative sample of the general population and were recruited through the use of a telephone survey.¹⁷ There were several layers of screening questions used to obtain participants that met our pre-determined characteristics (listed below).

¹⁶ The telephone survey was implemented through a subcontractor, the Blackstone Group, using a commercially available listed sample of Wisconsin households.

¹⁷ See Appendix A for detailed survey instruments including quantitative results and qualitative responses.

Criteria for Participation:

- Home ownership
- Single-family home
- Resided in home for more than a year
- Not using electricity for primary heat source
- Electric utility one of the following:
 - Round 1:
 - Alliant Energy
 - Madison Gas & Electric
 - We Energies
 - Wisconsin Public Service
 - Xcel Energy
 - Round 2:
 - Madison Gas & Electric
 - We Energies
 - Xcel Energy
- Willingness to pay \$25 for PowerCost Monitor
- Provide written permission for us to obtain two years of electric billing data from their utility
- Agree to respond to two surveys throughout the course of the study

The brand name of the monitoring device was never revealed to the participants nor were they told whether or not they should expect to receive one. Study participants were not required to pay the \$25, only indicate that they would be willing to pay for a described feedback device. Respondents were offered a \$25 Visa gift card for their participation, payable at the conclusion of the study (provided the surveys were completed). We received a total of 735 responses during two separate recruitment periods.¹⁸ After agreeing to participate in the study, respondents were asked if they had an additional few minutes to answer more directed questions. The majority (93 percent) of the respondents agreed to this request. Questions included: supplemental heating sources, water heating equipment, air conditioning, changes in home appliances, number of household members and demographics.

¹⁸ Shortly after the study was underway, Alliant Energy informed us that it had a safety concern regarding placing monitors onto electric meters and requested that we terminate the study in its service territory. In addition, we discovered that the PowerCost Monitor was incompatible with many electronic meters in the WPS service territory. We recruited an additional 105 people from the remaining three utilities to replace the lost participants, in addition to reallocating some study participants.

RELEASE FORMS AND GROUP ASSIGNMENT

Study participants were randomly assigned to the treatment and control groups based on their electric utility (geography) and the release forms¹⁹ giving us permission for utility data collection were sent out immediately following recruitment. We sent out separate release forms to the treatment and control groups, with the only difference being a mailing address section for the treatment group. We received 453 (62 percent) signed release forms back following an initial letter and a reminder letter. After release forms were returned to us, group assignments included 287 treatment group participants and 166 control group participants.

Over the spring and early summer of 2008, all 287 treatment group participants were sent a letter, a PowerCost Monitor, and a tip sheet with general energy saving ideas. We also included a postage-paid postcard for the participant to let us know the date they installed their PowerCost Monitor and any installation comments. We relied solely on participant feedback for installation information as we did not make any site visits to assist in installation or verify if the device was installed. The participant group was also sent two additional tip sheets, a summer tip sheet in August 2008 and a winter tip sheet in November 2008. These tip sheets offered season-appropriate energy saving tips.

The treatment group participants receiving both a PowerCost Monitor and a series of tip sheets is a design that mirrors the most likely full-scale program design for such a device. That is, participants would receive the type of information on the tip sheet if they participated in a full-scale program. The inclusion of the tip sheet with the monitor in the study does, however, require careful interpretation of the results. In a strict sense, any energy savings that treatment group participants manifested was due to the joint interaction of the PowerCost Monitor and the tip sheet. Our research design did not permit any disaggregation of the individual effects of the monitor and the tip sheets.

MID-STUDY SURVEY

Treatment group participants were sent a mid-study survey in September 2008.²⁰ We sent out 230 surveys and received 61 percent of them back following the initial survey and a reminder letter. We asked about energy use, tip sheet usefulness, PowerCost Monitor installation, and ease of installation. The timing of this survey was intended to give adequate time for the study participants to have installed their PowerCost Monitor's as well as gauge their initial usefulness. We also wanted to capture installation issues/concerns while still fresh in our participant's minds. In addition, this survey came out about a month following the summer tip sheet giving us timely information about that as well.

¹⁹ See Appendix C for release form examples.

²⁰ See Appendix A for detailed survey instruments including quantitative results and qualitative responses.

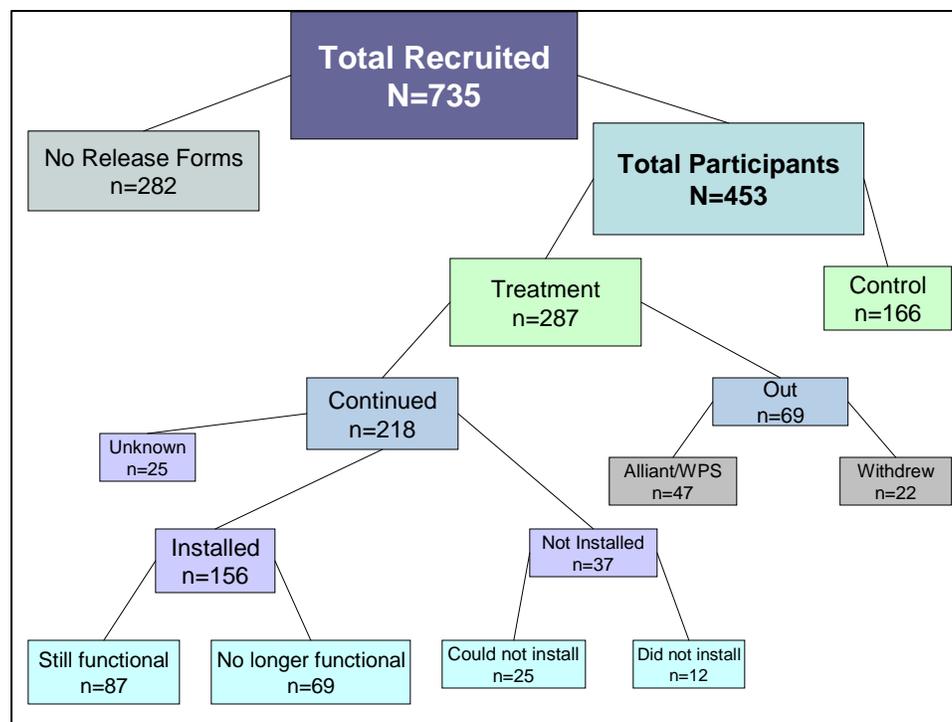
END-OF-STUDY SURVEY

All study participants were sent an end-of-study survey in June 2009.²¹ We sent out 390 surveys and received 78 percent of them back following the initial survey and a reminder letter. We asked all participants about their energy use, changes in appliances or household and general energy use assessments. In addition, we asked the participant group about their PowerCost Monitor and tip sheet usage and helpfulness. The timing of this survey was roughly a year after our treatment group study participants received their PowerCost Monitors. We wanted to determine the longevity of the PowerCost Monitor's usefulness over the course of a year, both in technical terms (was the PowerCost Monitor still functional) and behavioral terms (was the PowerCost Monitor being used).

EFFECTIVE SAMPLE SIZE

Through the information gathered from the mid-study and the end-of-study surveys we were able to categorize our study participants (see Figure 1). For our treatment group we lost 22 of our participants due to their withdrawal from the study for various reasons including: moving, incompatibility with TOU meters and electronic meters, and the PowerCost Monitor appearing too complicated. As we stated earlier in this report, we lost an additional 47 of our participants due to issues with their respective utilities. Thirty-seven participants indicated they did not install the PowerCost Monitor either because they were unable to install it or simply did not attempt installation. And finally 25 of our treatment group participants did not reply to either of the mailed surveys so their status remains unknown.

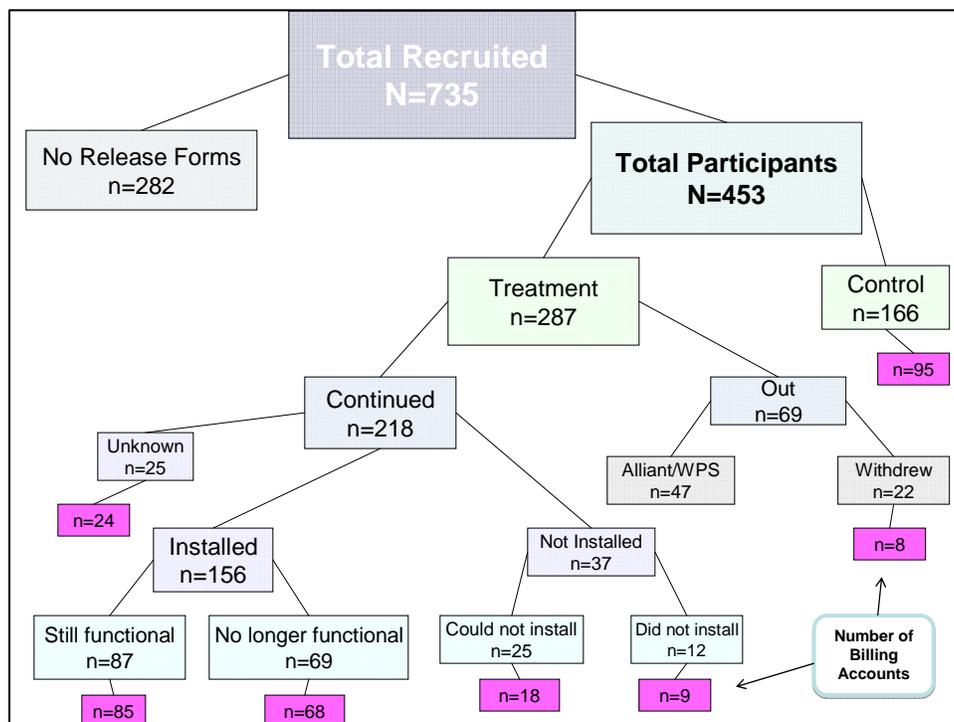
Figure 1: Study Participant Categorization



²¹ See Appendix A for detailed survey instruments including quantitative results and qualitative responses.

Taking into consideration all of the above reasons for losing treatment group participants, we were left with 156 study participants who installed the PowerCost Monitor. The effective sample size became slightly smaller for the treatment group and noticeably smaller for the control group when filtering for only those participants for whom we had billing data (see Figure 2). In the end, our study contained 153 effective²² treatment group participants and 95 effective²³ control group participants²⁴ for our billing analysis.

Figure 2: Billing Data



²² For treatment group participants, by “effective” we mean that the participants installed their PowerCost Monitor and the participants’ utilities supplied us with their monthly electric billing data for our analysis.

²³ For control group participants, by “effective” we mean their utility supplied us with their monthly electric billing data for our analysis.

²⁴ We were unable to obtain any billing data from Wisconsin Public Service. We have several WPS participants in the control group both from the initial random group assignment as well as a reallocation of WPS treatment group customers once we discovered the PowerCost Monitor was incompatible with electronic meters in their service territory.

BILLING ANALYSIS

SUMMARY OF RESULTS

Overall, we found that savings attributable to the PowerCost Monitor for participant homes that successfully installed it to be modest (about 1.5% of pre-usage levels), and not statistically different from zero.²⁵ The probability that true savings surpass a 2% savings threshold is 38%. We tested savings for several key subgroups (identified through survey response and pre-usage levels). We found that the probability of exceeding the 2% threshold for several subgroups was markedly higher than that of the overall treatment group, indicating that greater savings may be achieved if a suitable market segment can be identified.

ANALYTICAL APPROACH

We estimated energy savings attributable to the PowerCost Monitor by analyzing the usage patterns of 307 individual electric utility accounts. Of these, 212 belonged to homes receiving a PowerCost Monitor and 95 accounts belonged to the control group. We segmented the 212 treatment group accounts according to the ultimate status of the PowerCost Monitor at the end of the pilot: still functional (85 units), no longer functional (68 units) and never installed, unknown, or withdrawn (59 units). Our primary billing analysis concentrated on the participant homes where we could confirm that the PowerCost Monitor was installed (153 units) and the control group (95 homes).

SAVINGS ESTIMATES

We used a non-parametric bootstrap simulation modeling approach to test for electricity savings in homes that installed a PowerCost Monitor (see appendix for a more detailed description). All reported savings are treatment group savings (at the median), relative to control group savings. Our modeling approach allowed us to estimate savings for several subgroups within the treatment group. We narrowed our investigation to test for savings for several key subgroups:

- Test 1. Savings for treatment group homes that successfully installed the PowerCost Monitor against the control group homes.
- Test 2. Savings for treatment group homes for which the PowerCost Monitor was functional and was consulted (at least) occasionally at the time of the end-of-study survey.
- Test 3. Savings for treatment group homes for which the PowerCost Monitor was consulted (at least) as often at the time of the mid-study survey as when it was initially installed.
- Test 4. Treatment group homes that thought the PowerCost Monitor was useful in saving electricity.

²⁵ Specifically, 0.0% savings exists within a 90% confidence interval around the net median percentage savings for treatment homes, relative to the control group.

Test 5. The top three quartiles of treatment group energy users, compared against the top three quartiles of energy users within the control group.

Test 1: Savings for participants who successfully installed the PowerCost Monitor.

We estimated savings for study participants who self-reported as having successfully installed the PowerCost Monitor. There were 149 accounts (with sufficient billing data coverage) that met this criteria and represent about 70% of the entire treatment group. We compared usage for the 149 treatment accounts against the usage of 91 control homes. Table 3 shows that the distribution of annualized pre-treatment energy usage (expressed in kWh/yr) for the treatment and control groups are quite similar. The noticeable difference in mean and median levels for these two groups indicates that pre-treatment energy use is not necessarily normally distributed across participants, with average annualized usage weighted toward the right side of the distribution.

Table 3: Pre-treatment usage levels: Overall distribution and quartiles used in the analysis

	Sample Size ²⁶	Mean of Annualized Pre-Treatment Energy Usage (kWh) ²⁷	25 th Percentile (kWh)	Median (kWh)	75 th Percentile (kWh)
Treatment	n=149	11,253 ± 721	7,356	10,358	13,910
Control	n=91	11,112 ± 1,081	7,719	10,491	13,864

We did not find savings for this group to be statistically different than zero. Regardless, the point estimate for net median percentage savings for this group is 1.4%, or about 126 kWh/yr. The probability that savings for treatment homes successfully installing the PowerCost Monitor would exceed the 2% savings threshold is 38%.

Test 2: Savings for participants who successfully installed the PowerCost Monitor, the PowerCost Monitor was both functional and consulted (at least) occasionally at the time of the end-of-study survey.

As several pilot programs have demonstrated, our survey responses indicate that there is significant attrition (from installation to the end of the study) in the number of PowerCost Monitors remaining functional and/or how often participants were consulting it. We found that out of all PowerCost Monitors that were installed, 44% were functioning and (at least) being consulted occasionally at the time of the end of study survey. We estimate savings for this group to be 3.4%, or 440 kWh/yr. Savings for this

²⁶ Note that 153 treatment and 95 control homes were actually in the billing sample. However, several homes were withheld from savings calculations as a result of data cleaning procedures.

²⁷ Expressed as a 95% confidence interval.

subgroup fall within a 90% confidence interval of -0.4% and 6.1%.²⁸ We found the probability that savings for this group would exceed the 2% savings threshold is 81%.

Test 3: Savings for participants who successfully installed the PowerCost Monitor and consulted it (at least) as often as when initially installed.

Test 3 asks whether or not savings are statistically significant when participant interaction with the PowerCost Monitor persists at least several months after it was installed. We found that at the time of the mid-study survey, 41% of participants consulted the PowerCost Monitor at least as often as when it was initially installed. For these homes, we found savings to be 3.8% relative to the control group, or 416 kWh/yr. The estimate falls within a 90% confidence interval of -0.2% and 6.4%.²⁹ The probability that savings for this subgroup exceed the 2% savings threshold is 83%. As a comparison test, we evaluated savings for participants who reported consulting the PowerCost Monitor less frequently than when it was initially installed. We estimated savings for this group (55% of respondents) to be 0.1% (within a confidence interval of [-2.9%, 3.6%]). The comparison test within Test 3 provides another indication that real savings are in fact related to how frequently the PowerCost Monitor is consulted.

Test 4: Savings for participants who successfully installed the PowerCost Monitor and responded in the final survey that they thought it was helpful in reducing their electricity consumption.

Test 4 estimates savings for individuals that thought the PowerCost Monitor was helpful in reducing their electricity consumption, regardless of the status of the device at the end of the study, or whether or not it was consulted more or less frequently than immediately following the initial installation. Approximately 53% of respondents answered that the PowerCost Monitor was indeed helpful in saving electricity (21% said that it was not, and 26% said that they did not know). We estimated savings for participants answering in the affirmative, and found that savings for this group are 5.4%. Moreover, the lower bound of the 90% confidence interval for this estimate was greater than zero (the interval was [2.5%, 8.7%]). The probability that savings for this group would exceed the 2% threshold was 96%.

We further subdivided this group by how frequently participants consulted the PowerCost Monitor. The resulting sample size for participants who reported that they thought the PowerCost Monitor was helpful, and who reported consulting it (at the end of the study) at least several times per week, was 22 respondents. We found that savings for this subgroup are 6.4% and fell within a 90% confidence interval of 2.9% and 10.8%; however, such a small sample size may be inappropriate to analyze using our bootstrap estimation methodology. As a comparison, we tested savings for participants that self-identified as infrequent viewers of the PowerCost Monitor (but still thought it was helpful). This subgroup was also relatively small (29 respondents). Savings for this subgroup are 0.8% and fall within the 90% confidence interval of -3.9% of 5.9%. Our results from Test 4 reinforce the notion that savings attributable to the PowerCost Monitor are strongly related to the level of participant engagement.

²⁸ Expressed as a 90% confidence interval.

²⁹ Note that kWh savings for Test 3 are lower than those estimated for Test 2, even though Test 3 shows higher percentage savings. This is not unexpected when percentage estimates are close in value, as pre-usage levels (used as a basis for calculating percentage savings) vary with the combination of homes included in a given subgroup.

Unfortunately, Test 4 results only pertain to attitudes that study participants revealed *ex post*, and may not be useful to the program designer who is trying to identify a targeted population of program candidates *ex ante*.

Test 5: Do PowerCost Monitor savings vary by pre-treatment usage levels?

Test 4 provides a hint that significant savings may be achieved if a suitable type of participant can be identified *ex ante*. There is at least one participant trait that can be used for targeted marketing – pre-treatment usage levels. Test 5 examines whether or not savings are statistically significant for the treatment group homes that fell within our sample population’s top three quartiles of pre-treatment usage (when compared against the top three quartiles of the control group). We subdivided the billing sample into quartiles of pre-treatment usage levels.³⁰ Table 4 illustrates that the percentage share of homes falling within each quartile are remarkably similar across the two groups. Our savings estimates for this subgroup are indeed higher than the overall treatment group at 3.4%, or 360 kWh/year. Savings for this subgroup’s estimates fall within a 90% confidence interval of -0.3% and 6.3%. The probability that savings for the Test 5 treatment group exceed the 2% savings threshold is 77%.

Table 4: Percentage of Treatment and Control Homes Falling within Quartiles of Pre-Treatment Usage Levels

Quartiles	Interval (kWh)	Treatment		Control	
		% n Within	Mean (kWh)	% n Within	Mean (kWh)
First	<= 7,715	26%	6,612	27%	5,817
Second	(7,715 -10,452]	25%	9,348	25%	9,316
Third	(10,452-13,734]	24%	12,174	23%	12,203
Fourth	> 13,734	25%	17,472	25%	18,366

³⁰ The quartiles shown in Table 4 were calculated using the entirety of the billing sample (n=308 accounts).

Table 5: Summary of Savings Estimates Based on Bootstrap Sampling³¹

Test	Savings (%)	Savings (kWh)	P(s>2%) ³² (%)
Test 1. Participants successfully installing the PowerCost Monitor [n _{treat} =149, n _{control} =91]	1.4 [-1.4, 4.6]	126 [-206, 489]	38%
Test 2. The PowerCost Monitor was functional at the time of the final survey and (at least) consulted occasionally at the time of the final survey. [n _{treat} =55, n _{control} =91]	3.6 [-0.6, 6.8]	440 [46, 755]	81%
Test 3. The PowerCost Monitor was consulted at least as often as when initially installed at the time of the mid-study survey. [n _{treat} =49, n _{control} =91]	3.8 [-0.2, 6.4]	416 [-4, 760]	83%
Test 4. Participant stated the PowerCost Monitor was helpful in reducing electricity consumption. [n _{treat} =70, n _{control} =91]	5.4 [2.5, 8.7]	576 [226, 937]	96%
Test 5. Participant is within the top three quartiles of pre-treatment usage levels. [n _{treat} =107, n _{control} =64]	3.4 [-0.3, 6.3]	360 [-12, 717]	77%

³¹ The % savings estimate is not simply the kWh savings estimate divided by the total usage. The savings (%) and savings (kWh) results are derived in separate analyses.

³² Where “s” is the percentage savings. Values indicate the probability that percent savings exceed the 2% savings threshold and are expressed as a real number between 0 and 1.

DISCUSSION

As we might expect, our findings clearly indicate that savings attributable to the PowerCost Monitor are linked to user behavior and attitudes toward the device. For example, as a group, those participants stating that they hardly ever consulted the device saved nothing, while more frequent viewers saved on the order of three to five percent at the median. The difficulty for a program designer comes with identifying who the frequent viewers will be *ex ante*, so that the program can focus its efforts on targeting such users directly. There may be several avenues of approach to achieve higher likelihoods of success.

ABOVE-AVERAGE ENERGY USERS

Targeting above average energy users could certainly be important. Our findings show that savings were negligible for participants described by our sample's lowest quartile of pre-treatment usage levels. Participants in the lowest quartile may already have been electricity "sippers" prior to the study, without much opportunity for additional savings. Lowest quartile users may already be vigilant about turning off lights, appliances and electronics when not in use, or already conservative in their use of electric resistance heating and air conditioning. These are all end uses that participants who thought the PowerCost Monitor was helpful in reducing electricity usage noted in our surveys.

BEHAVIOR CHANGE

Open ended responses to the mid-study and end-of-study surveys provide an indication of how participants used the PowerCost Monitor to save electricity. Participants were asked in both surveys whether or not they thought their electricity usage had changed since the PowerCost Monitor was first installed. Responses from both surveys were similar, with participants most often citing that the PowerCost Monitor helped them to conserve electricity in the following ways:

- The PowerCost Monitor led to a heightened general awareness of the household's electricity consumption and its associated costs.
- The PowerCost Monitor helped participants "zero in" and reduce usage of appliances that have a large impact on the home's overall power draw. Appliances mentioned most frequently by these participants were electric dryers, television sets and electric kitchen appliances (toasters, coffee pots, ranges).
- The PowerCost Monitor prompted participants to pursue changes in home lighting, by either turning off lights when not in use or prompting a household transition from incandescent to CFL light bulbs.
- The PowerCost Monitor was a frequent reminder to shut off devices that were drawing power but not being used in unoccupied parts of the house.
- The PowerCost Monitor prompted users to experiment with thermostat and appliance settings. Air conditioning, refrigerator/freezers and water heaters were the most frequently mentioned end uses.

Some of these responses may indicate that interaction with the PowerCost Monitor need not last over an extended period of time in order to reduce energy use, as many respondents reported using the device as an educational tool to isolate the appliances and end uses within the residence that draw the most power. However, some level of engagement, whether over an extended period or not, are certainly required to achieve any savings at all.

Finally, program designers should consider some social aspects of in-home feedback displays when providing advice and planning a marketing campaign. Some of the more prolific savers in the study (particularly homes with children) reported turning PowerCost Monitor consultations into a game, with family members competing against each other in reducing their usage levels. Competitive behavior may be extended to social groups external of the family, to include churches and other social organizations. Targeting social groups to distribute the PowerCost Monitor at official events could provide an added benefit to the program administrator; an opportunity to provide training and energy saving tips en masse.

TECHNOLOGICAL ISSUES

The PowerCost Monitor offers several technological advantages over other types of direct feedback displays. It is a relatively inexpensive device, retailing for under \$125. Even at its low cost, the PowerCost Monitor is informative. It provides near-instantaneous feedback on electricity use, and converts energy use directly into dollars and carbon equivalent emissions. Finally, participants require no assistance from trained technicians to install the device; it can be mounted by homeowners onto an outdoor utility electric meter and does not need to be connected to the home's electrical system.

However, our study identified three technical issues related to the PowerCost Monitor that deserve mention:

Despite being technologically simple, 36 percent of mid-study survey respondents found installing the PowerCost Monitor difficult. The two most reported sources of difficulty were: aligning the PowerCost Monitor's sensor to the electric meter's indicator disc and setting up the display monitor (particularly for electricity rates). In addition, 17 percent of end-of-study survey respondents did not install their PowerCost Monitor; of this group, roughly half indicated they attempted installation but were unsuccessful. Designers and administrators should consider these attrition rates when projecting a program's overall impact.

Secondly, 44 percent of those participants who successfully installed the device reported that it was not working at the end of the study. This issue is largely a function of the batteries, not only in terms of battery life but also in getting the PowerCost Monitor reset once batteries had been replaced. In fact, 67 percent of end-of-study survey respondents indicated that they changed batteries at least once, anywhere from less than a month to more than nine months after the PowerCost Monitor was initially installed.

Finally, some types of electric meters may not be compatible with the PowerCost Monitor's sensor technology. Programs considering the PowerCost Monitor should conduct a field study to ensure that it is compatible with the electric meters in local service areas.

PARTICIPANT PAYMENT CONSIDERATIONS

Payment and cost-sharing considerations may be an important driver in achieving savings. Although our study participants were required to express a willingness to pay for an in-home direct feedback device in order to be considered for the study, they were not required to share in the cost burden of the actual device. In fact, study participants were given a cash incentive, in addition to the PowerCost Monitor, in order to participate. It could be that requiring participants to purchase the PowerCost Monitor (even if at a subsidized price) would only attract homeowners who were serious about installing and using the device.

CONCLUSION

As a result of this study, we conclude that a program offering customers a PowerCost Monitor feedback device to produce electricity savings sufficient to justify the cost of the program depends in large part on the program features and the behavior of individual participants. We cannot be confident that the electricity savings from a general program marketed to all customers, one that provided participants with a free or reduced price PowerCost Monitor, would meet the minimum level of savings necessary to justify the program. Nevertheless, if such a program were targeted to mid- to high-usage customers and if the participants were required to pay part of the cost of the device, it would have a reasonable chance of exceeding minimum savings threshold. Additionally, if Focus on Energy could identify customers upfront who would actively use the monitor our assertion of electricity savings would only be increased due to the behavioral component of interacting with the PowerCost Monitor.

The study period of about a year provides an indication of the short-run savings that might flow from a PowerCost Monitor program. However, we cannot be sure whether these savings will remain the same, increase, or decrease over the long run. To draw such conclusions would require a longitudinal analysis, which is beyond the scope of this study.

APPENDIX A: SURVEY INSTRUMENTS AND RESULTS

INITIAL RECRUITMENT SURVEY:

Hello, may I please speak to *(insert name from sample?)* [IF NOT AVAILABLE, ASK TO SPEAK TO ANOTHER DECISION-MAKER IN HOUSEHOLD.] My name is _____. I am calling on behalf of the State of Wisconsin and the Focus on Energy program as part of a research project. Your household was randomly selected to complete this study. This is not a sales call and will only take 3-5 minutes now.

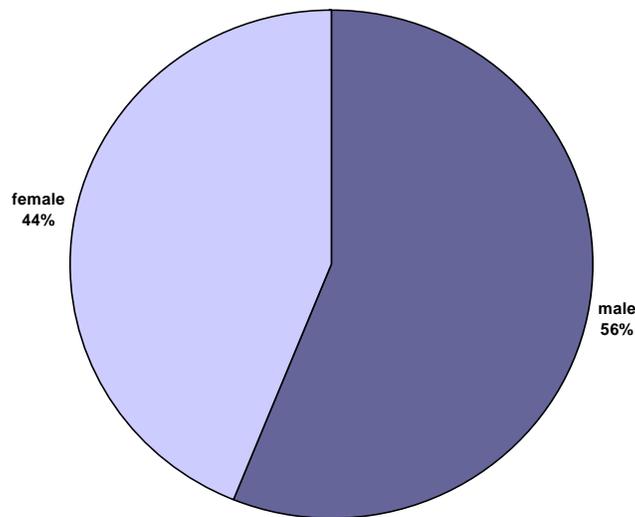
[IF RESPONDENT WANTS TO VERIFY THE VALIDITY OF STUDY] Please feel free to call the Focus on Energy call center at 1-800-762-7077, press 1 for residential, if you have any questions regarding this study. ==> SCHEDULE CALLBACK.

Q1. [IF RESPONDENT IS BUSY] When would be a better time to call?

- 1) DO NOT CALL BACK ==> MARK AS REFUSED.
- 2) DATE/TIME ==> RECORD: _____.

Q2. RECORD GENDER (DO NOT READ)

- 1) MALE n=413
- 2) FEMALE n=322



Q3. Do you own or rent your home? (RECORD ONE RESPONSE.)

- 1) Own n=735 (screening criteria)
- 2) Rent ==> SKIP TO END
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END

Q4. Have you lived in this home for more or less than a year? (RECORD ONE RESPONSE.)

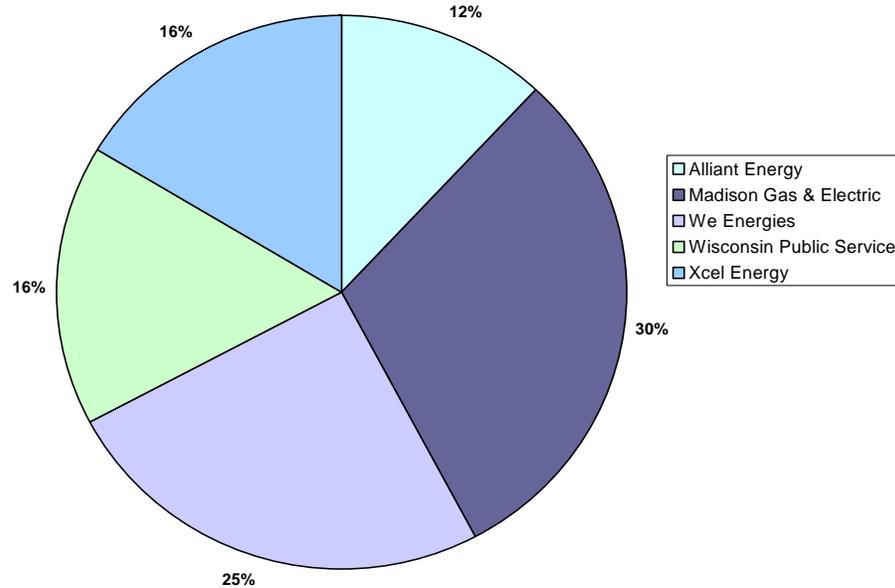
- 1) less than a year ==> SKIP TO END
- 2) one year or more n=735 (screening criteria)
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END

Q5. Is your home a single-family home, a duplex, a condominium, or something else? (DO NOT READ LIST. RECORD ONE RESPONSE.)

- 1) SINGLE FAMILY HOME n=735 (screening criteria)
- 2) DUPLEX ==> SKIP TO END
- 3) CONDOMINIUM ==> SKIP TO END
- 4) OTHER ==> SKIP TO END
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END

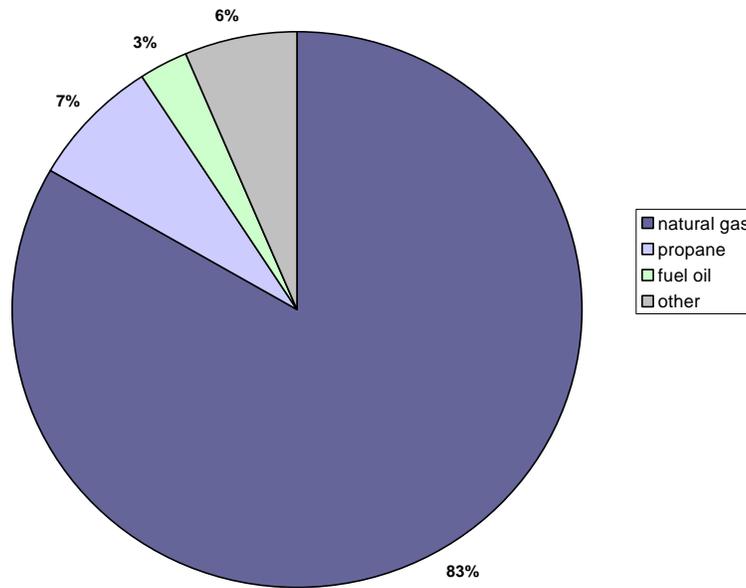
Q6. What company provides your electricity? (DO NOT READ LIST. RECORD ONE RESPONSE.)

- 1) ALLIANT ENERGY (AKA WISCONSIN POWER & LIGHT, WP&L) n=87
- 2) MADISON GAS & ELECTRIC (AKA MG&E) n=224
- 3) WE ENERGIES (AKA WEPCO, WISCONSIN ELECTRIC) n=184
- 4) WISCONSIN PUBLIC SERVICE (AKA WPS, PUB SERVICE) n=120
- 5) XCEL ENERGY (AKA NORTHERN STATES POWER, NSP) n=120
- 6) OTHER ==> SKIP TO END
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END



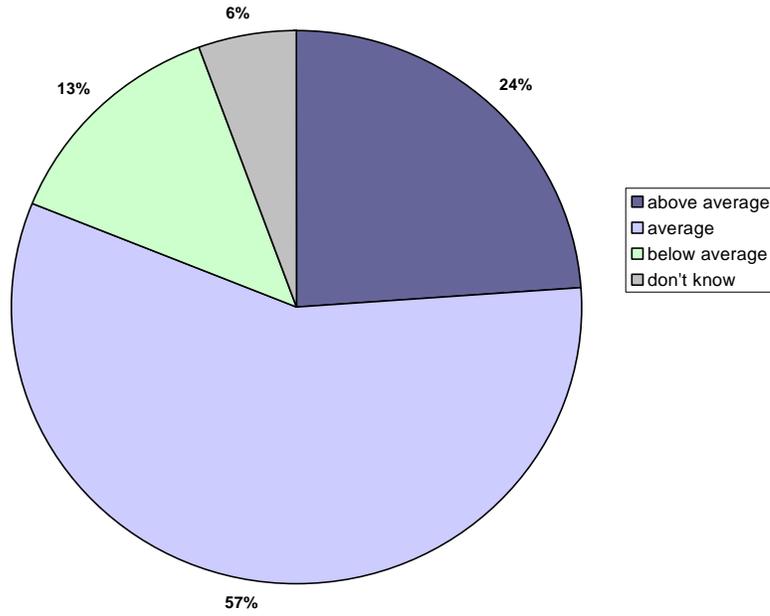
Q7. What kind of fuel do you primarily use to heat your home? (READ LIST. RECORD ALL THAT APPLY.)

- 1) natural gas / gas n=613
- 2) propane n=55
- 3) fuel oil n=20
- 4) electricity ==> SKIP TO END
- 5) other n=47
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END



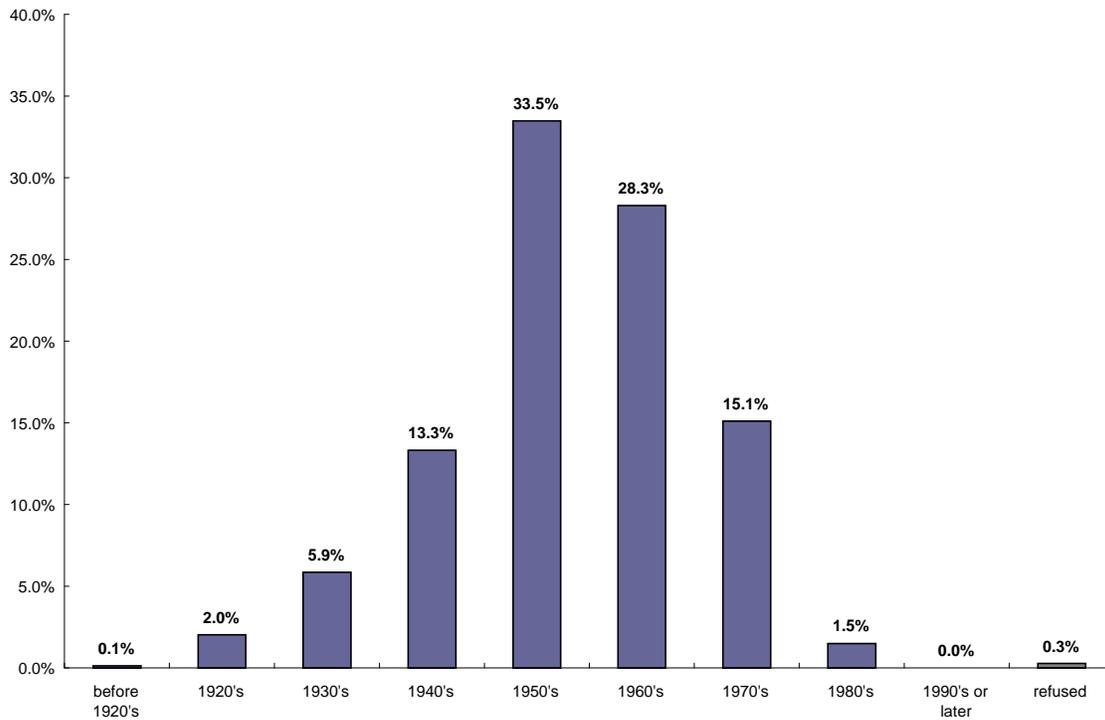
Q8. How do you think your household’s electricity usage compares to the average household electricity consumption in the state? Is it...? (READ LIST. RECORD ONE RESPONSE.)

- 1) above average n=175
- 2) average n=422
- 3) below average n=97
- 8) DON'T KNOW n=41
- 9) REFUSED



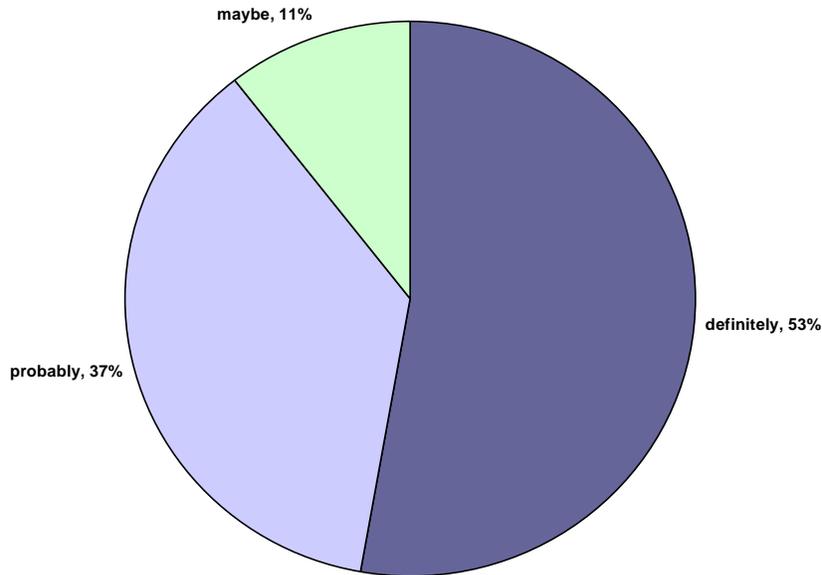
Q9. In what decade were you born? (DO NOT READ. RECORD ONE RESPONSE.)

- 1) BEFORE 1920 n=1
- 2) 1920's n=15
- 3) 1930's n=43
- 4) 1940's n=98
- 5) 1950's n=246
- 6) 1960's n=208
- 7) 1970's n=111
- 8) 1980's n=11
- 9) 1990's OR LATER n=0
- 99) REFUSED n=2



Q10) Now, I am going to describe a device to find out whether this is something your household would consider if it were offered in your area. The device would send a signal from your electricity meter to a portable read-out you could place anywhere in your home to see how much electricity you are using at any time. So, instead of getting only your monthly electric bill, you could see at a glance at any time how much you have spent so far that month, how much you are spending that hour, and how your electric usage compares to the recent past. It has been suggested that this kind of feedback causes households to reduce their electric usage and thereby save on their electric bill. Would you or someone in your household find such a device useful? (READ LIST. RECORD ONE RESPONSE.)

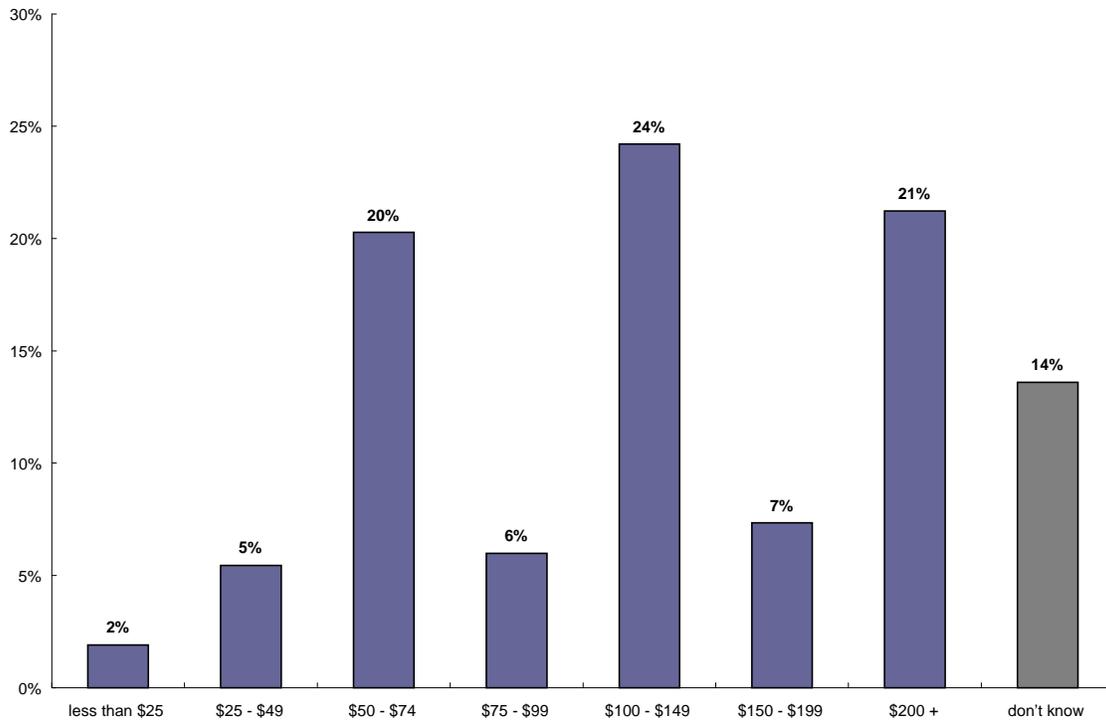
- 1) definitely n=387
- 2) probably n=270
- 3) maybe n=78
- 4) probably not
- 5) definitely not
- 8) DON'T KNOW
- 9) REFUSED



Q11) How much do you think such a device would cost? [DO NOT READ. RECORD RESPONSE. PROBE IF NECESSARY TO NARROW RESPONSE DOWN TO A SINGLE CATEGORY]

- 1) less than \$25 n=14
- 2) \$25 - \$49 n=40
- 3) \$50 - \$74 n=149
- 4) \$75 - \$99 n=44
- 5) \$100 - \$149 n=178
- 6) \$150 - \$199 n=54
- 7) \$200 or more n=156
- 8) DON'T KNOW n=100
- 9) REFUSED

[PROGRAMMING NOTE: IF (Q10 = 4 OR Q10 = 5 OR Q10 = 8 OR Q10 = 9) SKIP TO END]
(negative on device)



Q12) Do you think you or someone in your household would buy one at \$50? [DO NOT READ. PROBE IF NECESSARY. RECORD ONE RESPONSE.]

- 1) YES ==> SKIP TO Q14 n=426 (screening question)
- 2) PROBABLY ==> SKIP TO Q14 n=309 (screening question)
- 3) MAYBE
- 4) PROBABLY NOT
- 5) NO
- 8) DON'T KNOW
- 9) REFUSED

Q13) Do you think you or someone in your household would buy one at \$25? [DO NOT READ. RECORD ONE RESPONSE.]

- 1) YES n=735 (screening question)
- 2) PROBABLY ==> SKIP TO END
- 3) MAYBE ==> SKIP TO END
- 4) PROBABLY NOT ==> SKIP TO END
- 5) NO ==> SKIP TO END
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END

Q14. Would you be willing to participate in a research project concerning electricity usage in Wisconsin homes? All you would need to do is sign a form to authorize your utility to release two years of your monthly usage data to our research team and answer a couple short surveys during the coming year. Participants will receive a \$25 Visa gift card. (DO NOT READ. RECORD ONE RESPONSE.)

- 1) YES ==> SKIP TO Q17 n=735 (screening question)
- 2) NO ==> SKIP TO END
- 3) MAYBE

Q15. Can one of our researchers from the Energy Center of Wisconsin contact you or someone else in the household to tell you more or answer any questions you may have? (DO NOT READ. RECORD ONE RESPONSE.)

- 1) YES
- 2) NO ==> SKIP TO END
- 8) DON'T KNOW ==> SKIP TO END
- 9) REFUSED ==> SKIP TO END

Q16. Whom should they contact and what number would be best? When is the best time to reach you? (RECORD INFORMATION AND VERIFY)

Name: _____

Telephone Number: _____

Time of day: _____

[PROGRAMMING NOTE: SKIP TO END AFTER Q16. ENTER SPECIFIC CALLBACK DISPOSITION.]

Q17a. Terrific, someone from the Energy Center of Wisconsin will be contacting you in a few weeks on behalf of this Focus on Energy research project. Could I please get your complete mailing address? (RECORD INFORMATION.)

Street: _____
Street2: _____
City: _____
Zip Code: _____
Phone: _____

Q17b (INSERT VERIFICATION SCREEN) Just to make sure I have your information correct let me read this back to you. Please correct me if you hear any errors. (READ INFORMATION. MAKE NECESSARY CHANGES.)

Street: ____ (INSERT ANSWER FROM Q17B)
Street2: ____ (INSERT ANSWER FROM Q17B)
City: ____ (INSERT ANSWER FROM Q17B)
Zip Code: _ (INSERT ANSWER FROM Q17B)
Phone: ____ (INSERT ANSWER FROM Q17B)

Q18. And to whom shall we address our correspondence? (RECORD INFORMATION. VERIFY.)

Title (Mr., Ms., Dr. etc.): _____
First: _____
Last: _____

Q19. If you are willing to be contacted via e-mail for this project only, please tell me what that email address would be. We will not use your e-mail address for any other purpose.

[INTERVIEWER: READ BACK E-MAIL ADDRESS TO CONFIRM]

E-mail: _____

9) REFUSED

Q20. If you have another 5 minutes, I would like to ask you the questions for the first of the study's surveys right now. Would that be alright? (DO NOT READ. RECORD ONE RESPONSE.)

1) YES ==> SKIP TO Q21 n=681

2) NO n=53

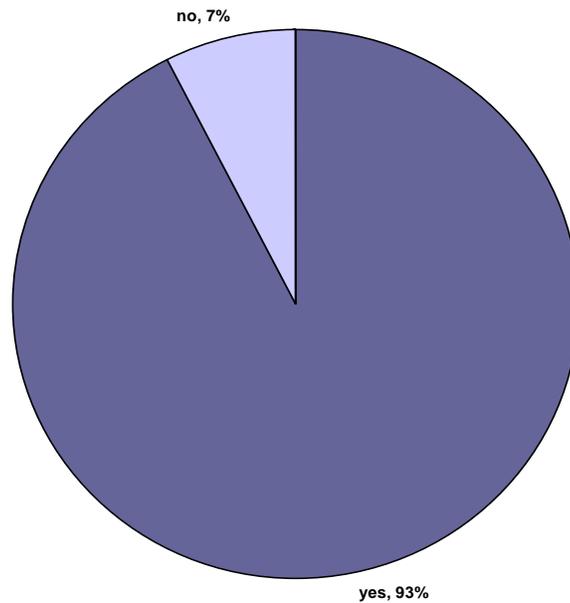
8) DON'T KNOW

9) REFUSED n=1

VALIDATION. Please hold one moment while I ask my supervisor to validate your survey participation. VALIDATOR: Hello. First of all, thank you for agreeing to participate in this important study. I just want to remind you that we will be counting on your responses to our surveys. Can we count on you to complete this study?

1) YES ==> SKIP TO END #2 n=735 (screening question)

2) NO ==> THANK AND TERMINATE



Q21. Including yourself, how many people in each of the following age categories live in your household?

___ under 6 years old n=131

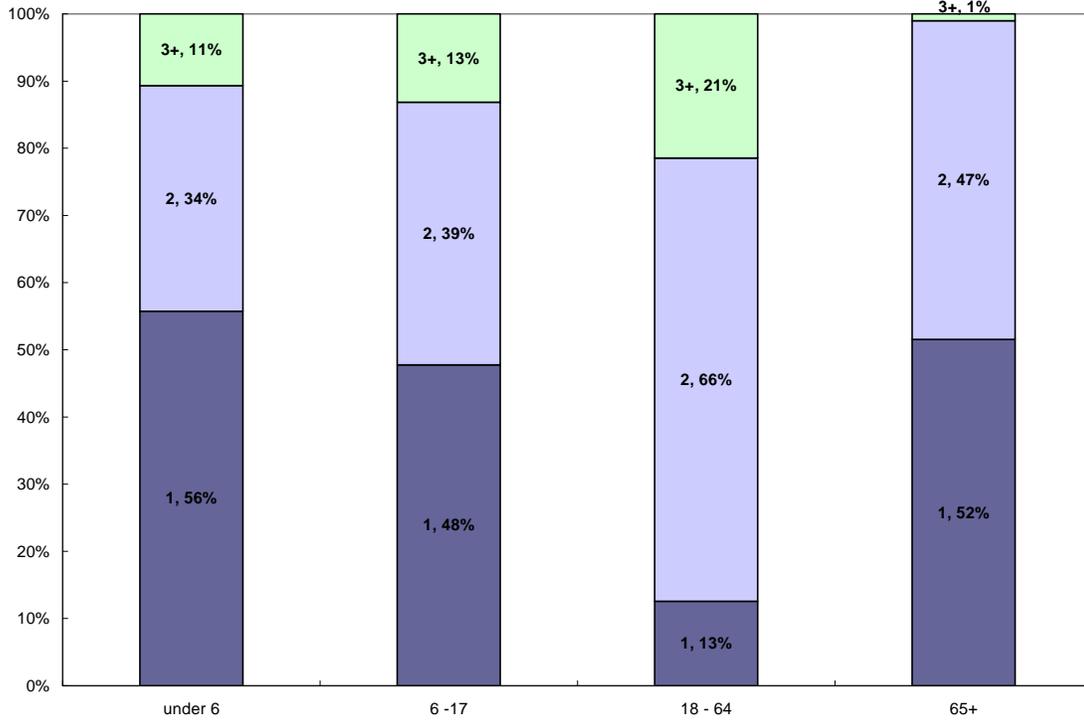
___ 6 through 17 n=289

___ 18 through 64 n=620

___ 65 and above n=97

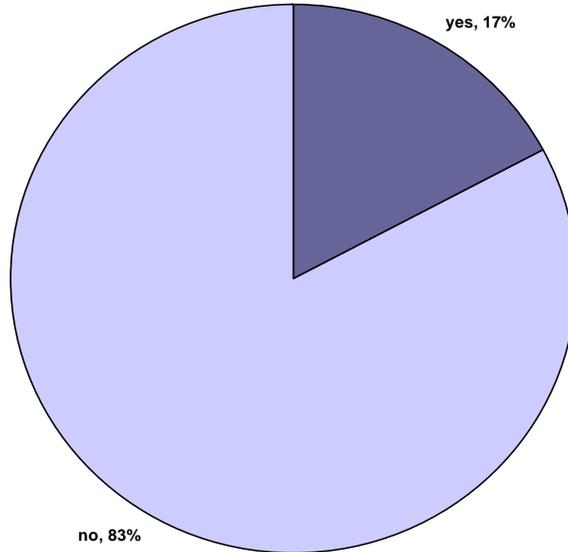
98) DON'T KNOW

99) REFUSED



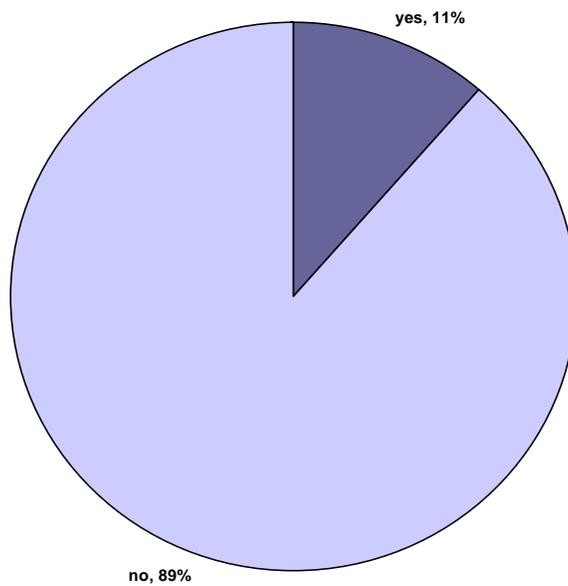
Q22. Have there been any changes in the number of people living in your home during the past 12 months? (READ LIST. RECORD ONE RESPONSE.)

- 1) YES --> PROBE TO DESCRIBE (RECORD VERBATIM) n=117
- 2) NO n=561
- 8) DON'T KNOW
- 9) REFUSED



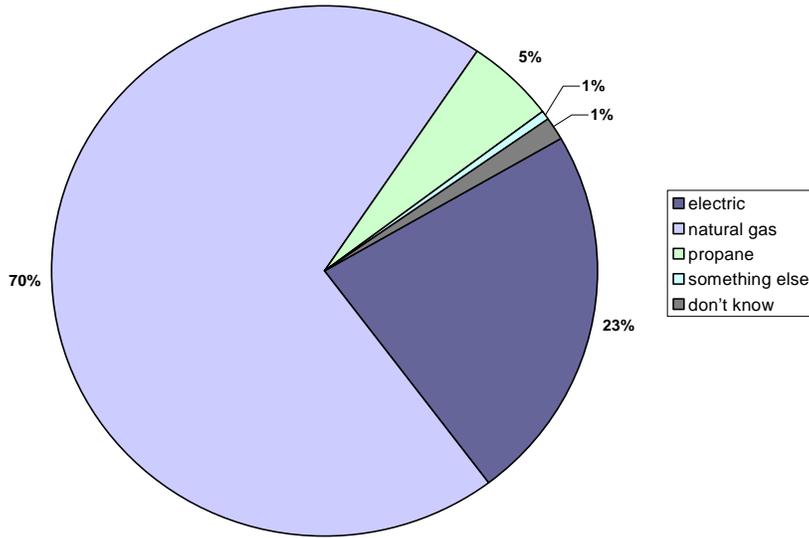
Q23. Has anyone been absent for more than a month at a time during the past 12 months? (READ LIST. RECORD ONE RESPONSE.)

- 1) YES --> PROBE TO DESCRIBE (RECORD VERBATIM) n=77
- 2) NO n=601
- 8) DON'T KNOW
- 9) REFUSED



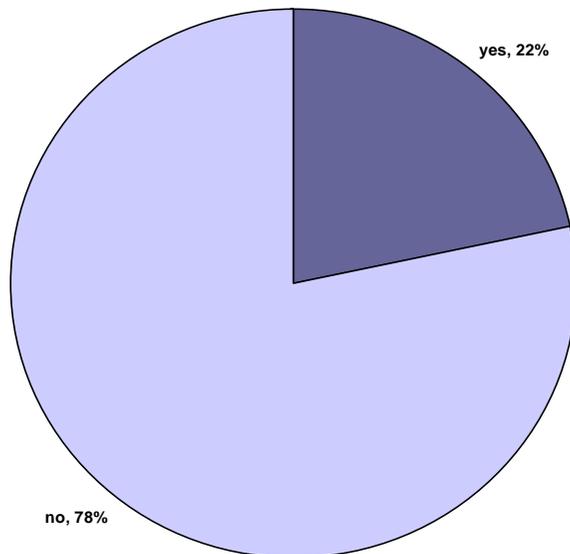
Q24. What kind of water heater do you have? (READ LIST. RECORD ONE RESPONSE.)

- 1) electric n=156
- 2) natural gas n=475
- 3) propane n=35
- 4) something else n=4
- 8) DON'T KNOW n=10
- 9) REFUSED



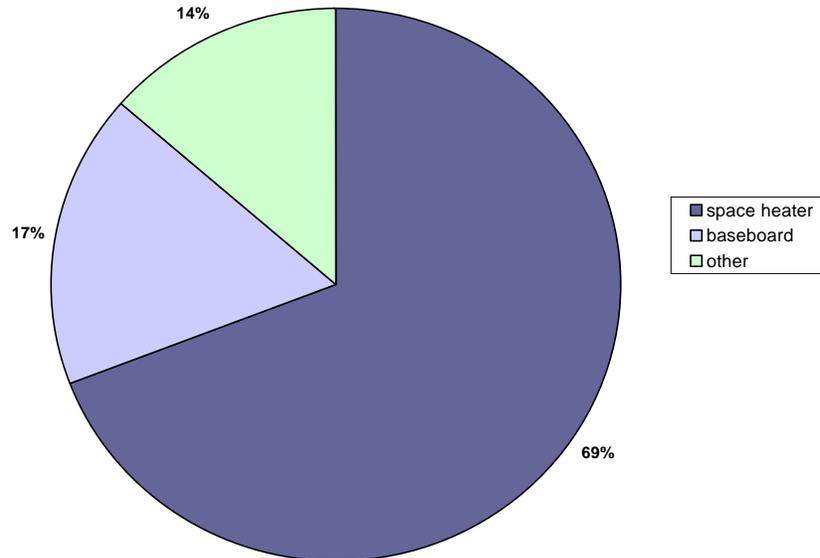
Q25. Do you use electric space heating for any part of your home? This would include regular use of electric space heaters?

- 1) yes n=148
- 2) no n=531
- 8) DON'T KNOW
- 9) REFUSED



Q26. What kind of space heating do you use? [DO NOT READ. RECORD ALL THAT APPLY.]

- 1) one or more electric space heaters n=97
- 2) electric baseboard heating in one or more rooms n=24
- 3) other - (SPECIFY) n=19
- 8) DON'T KNOW
- 9) REFUSED



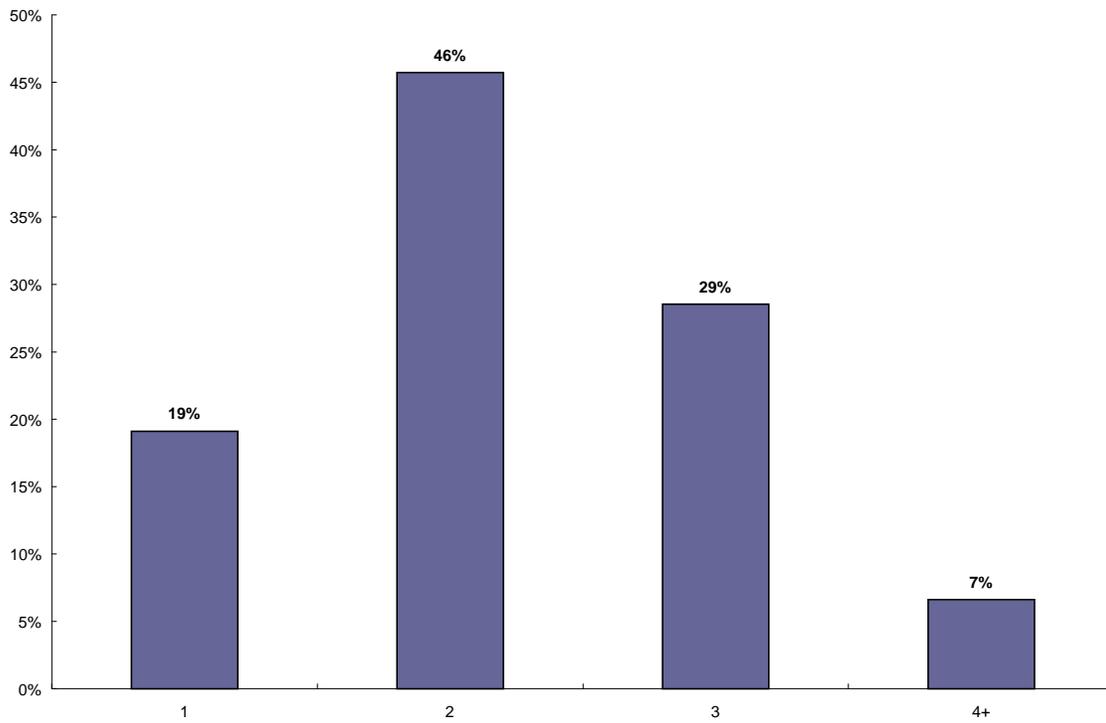
Other responses:

- A built in panel in the wall with a thermostat elsewhere in the wall.
- A heavy duty space heater used in the rec-room, this area of the home operates off of a different meter.
- Combination light fixture, and heat.
- Eden pure.
- Electric fire place and gas fireplace.
- Electric portable in basement.
- Electric space heater.
- Fan-augmented baseboard, not on a thermostat, used intermittently.
- Filled with gel or oil.
- Floor type electric heater.
- In wall thermostatically controlled.
- Little radiator heaters that are filled with oil.
- Mounted heated ceiling fan, exhaust fan and light.
- Nursery.
- On the back porch-to stay above freezing in the chicken coop-it's legal.
- One ceramic space heater, used only at night, in the bedroom.
- One portable oil-heater.
- One small heater in the bathroom.
- One space heater in the bathroom, that I use about 6 times a year.
- Part of an exhaust fan.
- Radiant heat.
- Some baseboard heating in the basement that we don't use any more.
- Two oil filled radiators.
- When my furnace was out, I used a space heater to substitute.

Q27. How many refrigerators and/or stand-alone freezers are plugged in right now?

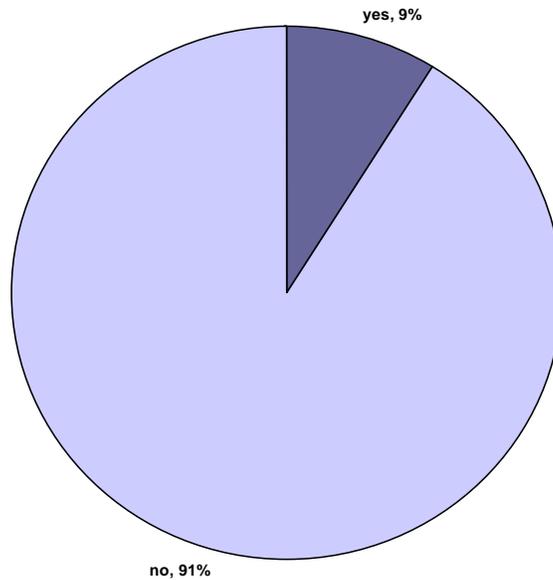
RECORD NUMBER

1 - n=130 2 - n=311 3 - n=194 4 - n=45



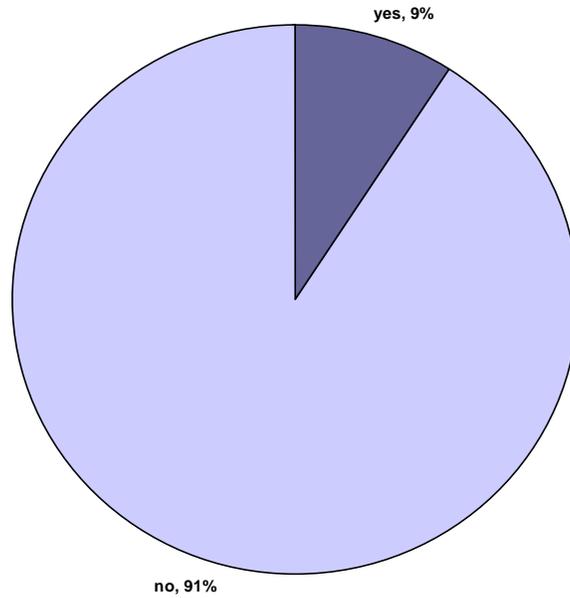
Q28. In the past 12 months, has there been any change in the number of refrigerators and/or standalone freezers you have plugged in?

- 1) yes n=60
- 2) no n=620
- 8) DON'T KNOW
- 9) REFUSED



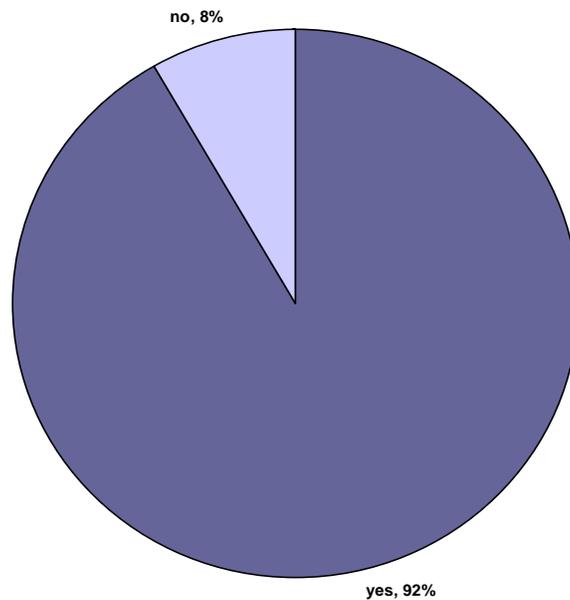
Q29. Have you replaced any refrigerators or stand-alone freezers in the past 12 months?

- 1) yes n=62
- 2) no n=618
- 8) DON'T KNOW
- 9) REFUSED



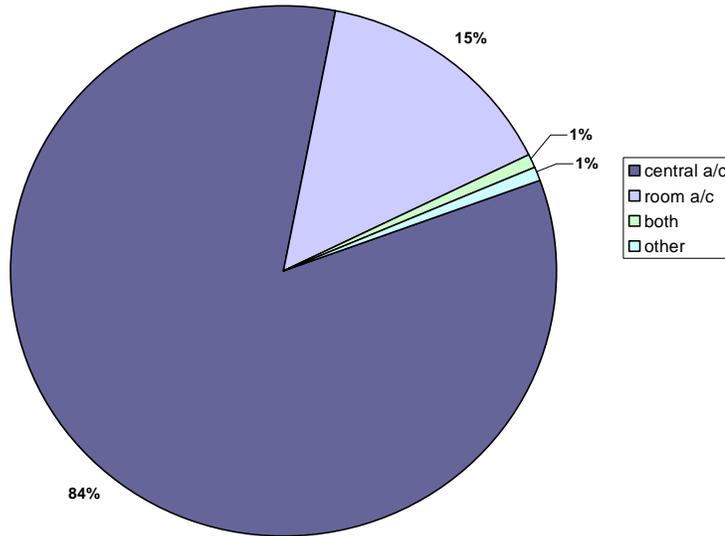
Q30. Does your home have air conditioning of any kind?

- 1) yes n=623
- 2) no ==> SKIP TO Q32 n=57
- 8) DON'T KNOW ==> SKIP TO Q34
- 9) REFUSED ==> SKIP TO Q34



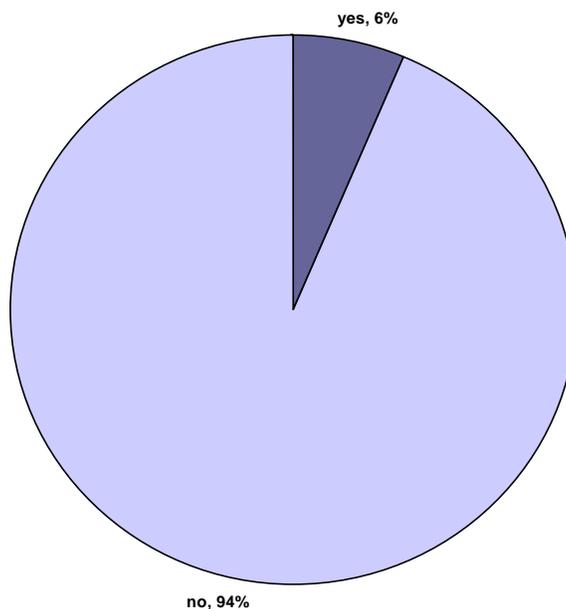
Q31. What kind of air conditioning do you have? (READ LIST. RECORD ONE RESPONSE.)

- 1) central air conditioner n=521
- 2) room air conditioner(s) / window unit(s) n=91
- 3) BOTH n=5
- 4) OTHER n=6
- 8) DON'T KNOW
- 9) REFUSED



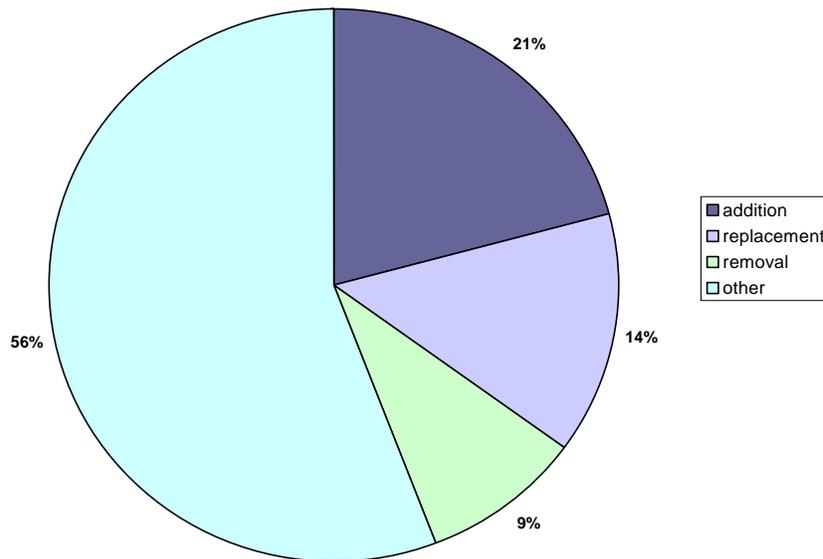
Q32. Has there been any change in your air conditioning in the past 12 months? A change could be replacement of your equipment, the addition of air conditioning, or the removal of air conditioning. (DO NOT READ. RECORD ONE RESPONSE.)

- 1) YES n=43
- 2) NO ==> SKIP TO Q34 n=636
- 8) DON'T KNOW ==> SKIP TO Q34
- 9) REFUSED ==> SKIP TO Q34



Q33. What kind of change was it? [DO NOT READ. RECORD ONE RESPONSE.]

- 1) addition of central AC to the home n=9
- 2) replacement of a prior central AC system n=6
- 3) removal of central AC from the home n=4
- 4) other – SPECIFY n=24
- 8) DON'T KNOW
- 9) REFUSED

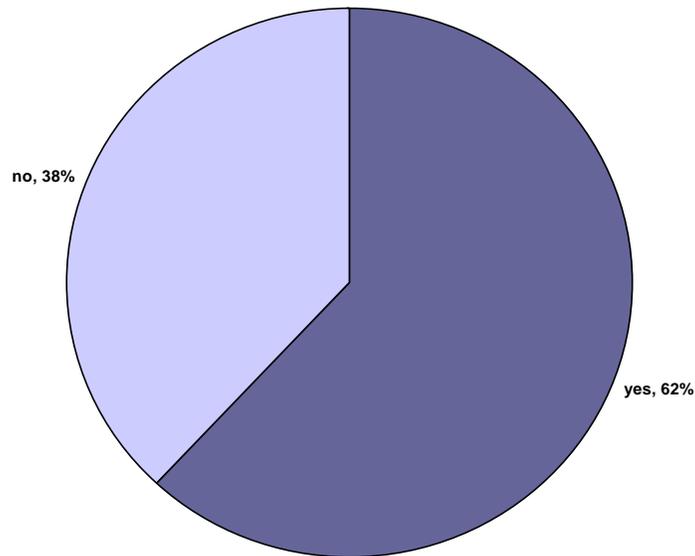


Other responses:

- Add air conditioner upstairs.
- Added a room. (2)
- Additional unit.
- Bought a new one last summer.
- Central air not currently working, and have not had it repaired. We then added a window unit.
- Had compressor replaced outside.
- I take the window units out in the winter.
- I use them according to the seasons.
- Installed a new coil and a tune-up to the air conditioner.
- It's not working.
- Put in new furnace for the air conditioning.
- Removal of one window unit.
- Repair of equipment.
- Replaced air conditioning and the furnace.
- Replaced furnace and air conditioner.
- Replaced with a high efficiency central air.
- Replacement of air conditioner.
- Seasonal use of a window air conditioner in one room.
- The air conditioner stopped working.
- We had it fixed.
- We have a window mount that we use in the summer in the upper part of the house.
- We have taken them out for the winter.
- We just take it out in the winter. We have a special needs child that needs the air in the summer.

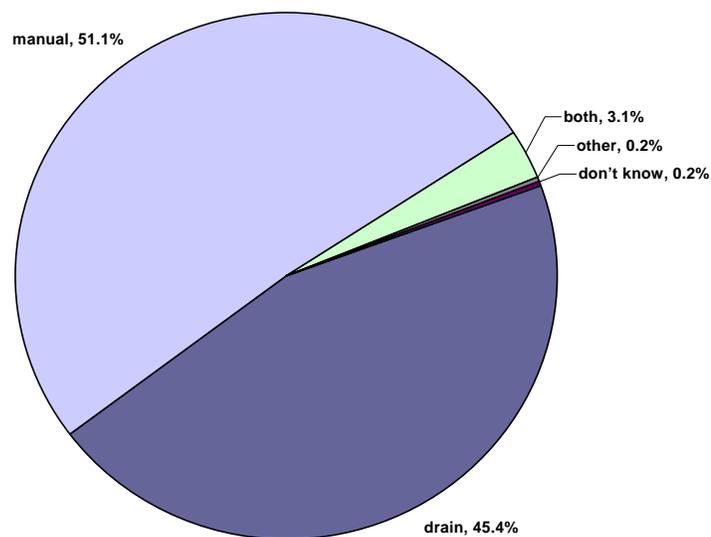
Q34. Do you use any dehumidifiers in your home?

- 1) yes n=421
- 2) no ==> SKIP TO Q36 n=259
- 8) DON'T KNOW ==> SKIP TO Q36
- 9) REFUSED ==> SKIP TO Q36



Q35. Are the dehumidifiers connected to a drain or do you have to empty them manually? (DO NOT READ. RECORD ONE RESPONSE.)

- 1) DRAIN n=192
- 2) MANUAL n=216
- 3) BOTH n=13
- 4) OTHER n=1
- 8) DON'T KNOW n=1
- 9) REFUSED



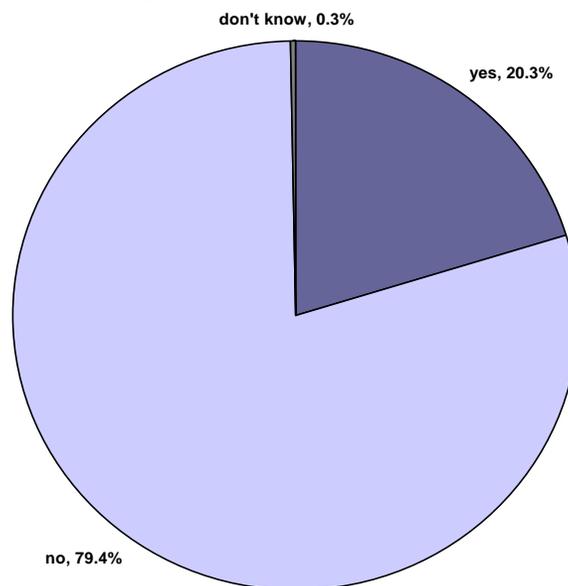
Q36. Have there been any other changes in your home in the past 12 months that might have had a substantial effect on your electrical usage?

1) yes $n=138$

2) no ==> SKIP TO END Q38 $n=539$

8) DON'T KNOW ==> SKIP TO END Q38 $n=2$

9) REFUSED ==> SKIP TO END Q38



Q37. In just a few words, please describe these changes. [RECORD VERBATIM]

- 3 months ago we replaced the 1/3 or the incandescent bulbs with fluorescent.
- 95% of bulbs in home used are florescent.
- A hot tub.
- A new dishwasher. (2)
- A new dryer.
- A new furnace last year and a new water heater.
- A new gas heater.
- A new TV.
- A new washing machine. (2)
- A new water softener.
- Added a three season room, which has resulted, in keeping the kitchen cooler in the summer and warmer in the winter; which has made a big difference, in terms of running the air conditioner in the summer.
- Added air-to-air unit.
- Added insulation to attic. (2)
- Addition of a room to the home.
- A lot of christmas lights.
- Another computer, small refrigerator, stereo, DVD, TV, christmas tree.
- Another computer.
- Appliance change refrigerator and freezer.
- April air humidifier.
- Bought an outdoor wood burner, which uses electricity to move the air thru the air-ducts.
- Bought new dehumidifier.

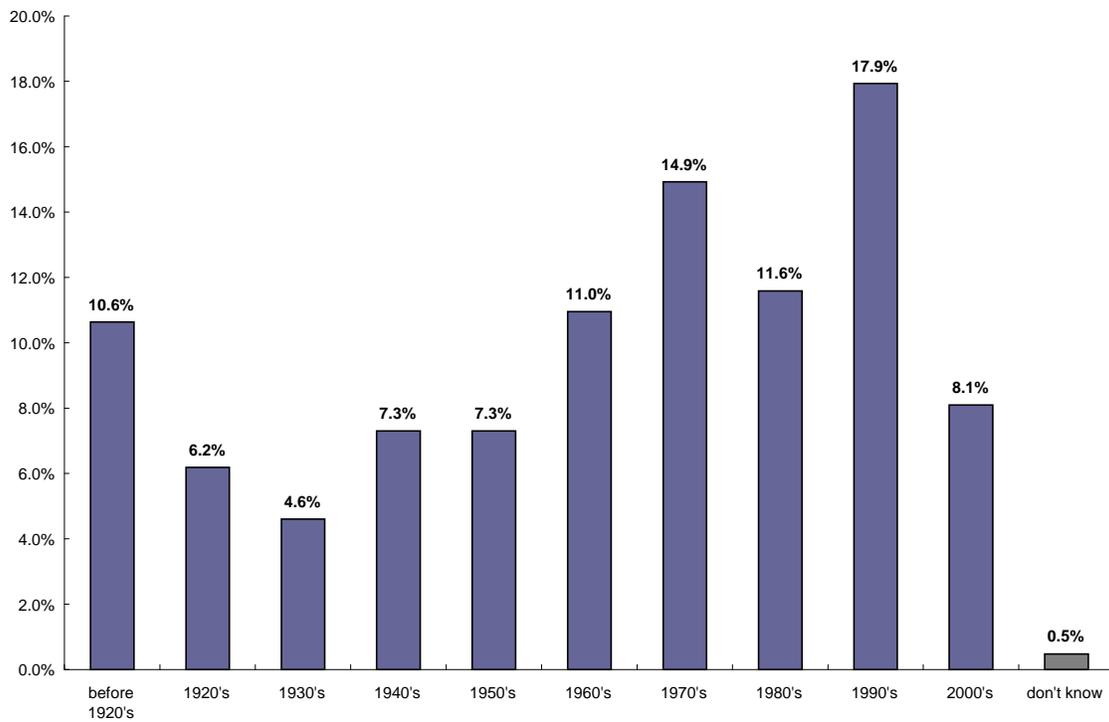
- Changed five windows in the home.
- Changed light bulbs to the energy efficient light bulbs.
- Changed the light bulbs to save energy and replaced the furnace in the home.
- Christmas holiday lights being left turned on.
- Christmas lights. (2)
- Converting from an electric to a gas water heater.
- Corn burner.
- Daughter lived at home for three months, affecting electricity, water etc.
- Dehumidifier died 6 months ago and a new furnace.
- Did not have dryer for 5 summer months.
- Dishwasher recall and it was fire hazard so she had to have that repaired about a week ago.
- During holidays, specifically, christmas, and halloween the house is decorated, and hence, an additional amount of electricity is consumed.
- Finishing our basement.
- Fish tanks.
- For half of the year at least 3 of the children are gone, so we use less. and when they come home we use more.
- Furnace had a panel replacement.
- Got a new gas water heater in July 2007.
- Got a new stove and dish washer.
- Got a water softener and a water dispenser/cooler.
- Got both a 72 gal. and 20 gal. aquarium.
- Got rid of the water bed. The heater drew a lot of electricity.
- Got some kind of hospital bed that has some kind of air flow in it and some extra air purifiers.
- Had a hot tub up and running last year but we turned it off for the winter to save energy.
- Have replaced light bulbs w/more efficient light bulbs (the curly ones). Have unplugged appliances not used on a daily basis, and have gone back to using "manual" appliances instead of the electric (i.e. have gone back to manual can-opener).
- High def TV.
- Home theatre HDTV.
- Hot tub hooked up last winter.
- I bought a front load washer, and a water softener, charge on demand and changed all bulbs to the florescent bulbs.
- I got a new stove, a more energy efficient dryer, and we did add another computer.
- I got a new water heater that vents outside; that electric fan (on the new water heater) runs often. I had new roofing, siding, insulation, and tyvek sheeting for wind installed.
- I had a new furnace with a filter put in and I ran it thru the summer to keep air circulating thru my home.
- I have a pool that runs outside.
- I have changed to energy saving light bulbs.
- I have visitors and my son travels.
- I just put in 14 energy saver bulbs.
- I no longer sleep with TV on.
- I put in a new boiler over the summer.
- I replaced a water-40 gallon tank with 50.
- I'm using the new kind of light bulbs. I don't remember the name but they are supposed to be the energy efficient ones.
- In winter we have a water heater for animals.

- Increase number of people in the home.
- Installed a new big-screen television, as well as a new front-loading washer w/gas-dryer.
- Installed different furnace (pulse).
- Just did some remodeling in our home.
- Just insulation in the attic.
- Just redid a family room with more insulation. New windows as well, six to be exact.
- Laid off in November so mostly I'm home all the time.
- Lighting fixtures thru out the house.
- Medical equipment.
- More cautious about turning off lights.
- More people.
- My furnace went out, so three weeks with no heat and we used 3 space heaters.
- My son has a new video game, so the TV it's hooked up to is on more.
- New washer and dryer, less than 11 months ago.
- New water heater and clem was added to the home.
- New windows and siding.
- New windows were put in. a drop in electrical usage was noted by the homeowner.
- Our hot tub quit on us.
- Our hot-tub broke broke and we noticed a fifty dollar decrease in our bill.
- Our neighbor's son plugged in his truck in our unit and made our plug.
- Pellet stove. (2)
- Plasma television.
- Put another building.
- Put in new high efficiency gas furnace.
- Put siding w/insulation on home.
- Putting in a new furnace. (4)
- Re-did a room, and have not yet installed electrical outlet covers, hence significant amount of outside air is blowing in.
- Reinsulated the attic.
- Remodeled the basement floor.
- Remodeling of the home, addition of space.
- Remodeling with power tools.
- Removed my dishwasher.
- Replaced old front loading machine with new one.
- Replaced propane water heater with a electric one.
- Replaced the heating system.
- Replaced water heater. (5)
- Replaced water heater and added insulation to the attic.
- Replaced windows.
- Replacement of lighting in many rooms in the home to fluorescents.
- Roof was replaced.
- Seasonally we have an in-ground pool; have changed light bulbs to fluorescent; have new washer & dryer.
- Some remodeling.
- That I turn my heat down to 63 at night now that I'm working during the day i also return that to 63 during the 5 to 6 hours that I'm gone during the day.
- The compact fluorescent bulbs were installed.
- The dehumidifier was this past summer.

- The two boys moving out.
- There are two more TVs in the home now.
- Two new windows, 4 rooms with new installation.
- Up-graded to a 20 cubic feet upright freezer.
- We added a room. (2)
- We added an air purifier in our basement.
- We added energy star insulation in our home.
- We changed bulbs to fluorescent.
- We changed our light bulbs to the low energy kind.
- We did install low voltage exterior lighting in our home.
- We have a welder in the garage.
- We just got two computers. (2)
- We just had our windows replaced.
- We replaced our electric cooktop with a gas range, and we replaced our old dishwasher with a new, and also replaced a wall oven with a much newer electric one. We added a warming drawer too. We took out a bathroom.
- We sealed the windows prior to the start of this winter.
- We switched to a 12 volt water heater in our outdoor pond (old heater voltage?) i don't know; it's probably just standard voltage, 120.
- When the air was working plus I use 3 ceiling fans, keep one in kitchen on low. Also I went downstairs and opened a vent.
- Whole house air exchanger, needs fixing.
- Wood pellet stove ran by electric, during the heated season end of October and regular fans.
- Work being done on home early this year. A lot of equipment was being used for three weeks straight.
- Wood burning also.

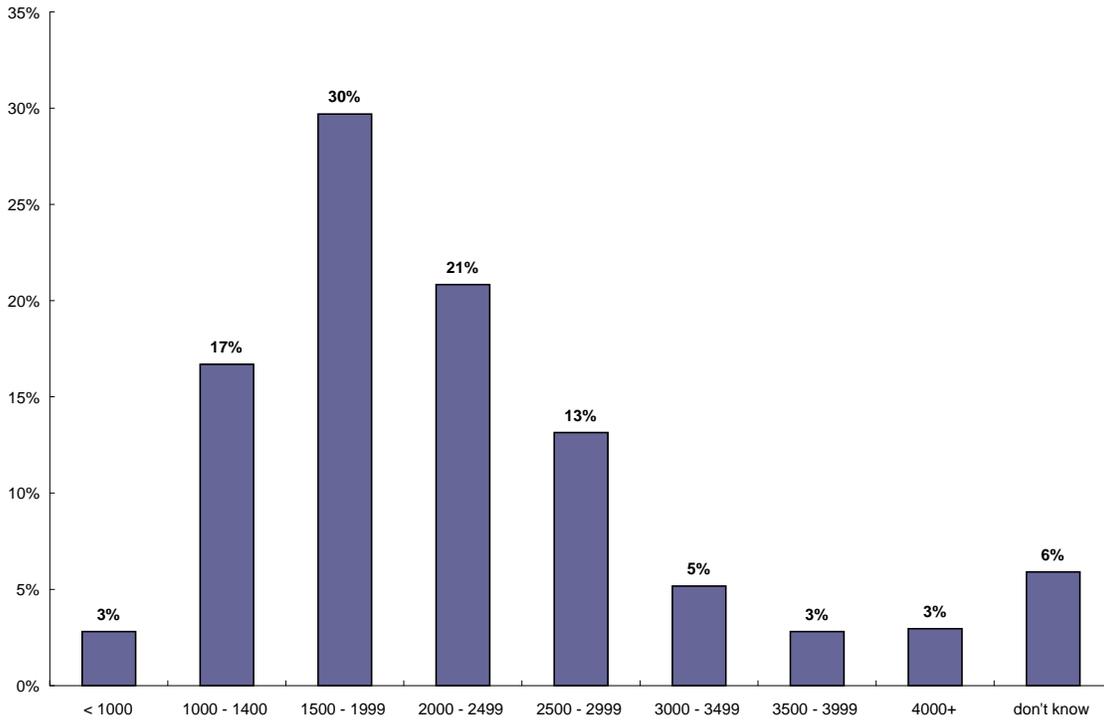
Q38. In what decade was your home built? Your best estimate is fine. (DO NOT READ. RECORD ONE RESPONSE.)

- 1) BEFORE 1920 n=67
- 2) 1920's n=39
- 3) 1930's n=29
- 4) 1940's n=46
- 5) 1950's n=46
- 6) 1960's n=69
- 7) 1970's n=94
- 8) 1980's n=73
- 9) 1990's n=113
- 10) 2000's n=51
- 98) DON'T KNOW n=3
- 99) REFUSED



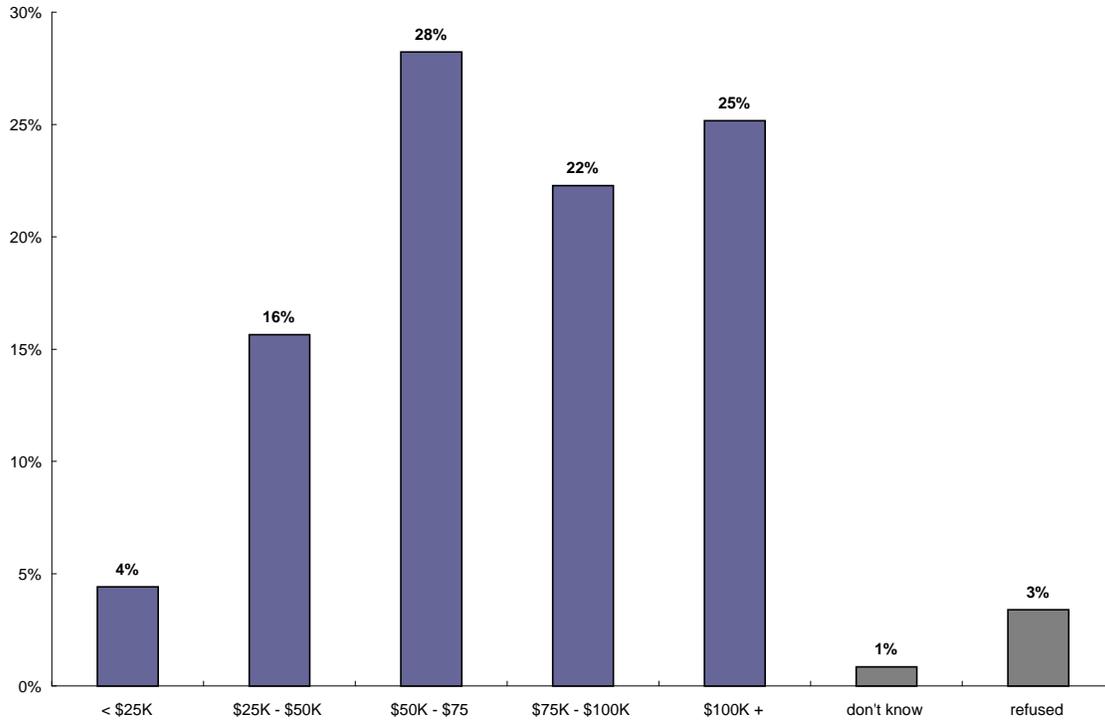
Q39. How many square feet of finished space are there in your home? (DO NOT READ. RECORD ONE RESPONSE.)

- 1) less than 1,000 square feet n=19
- 2) 1,000-1,499 square feet n=113
- 3) 1,500 - 1,999 square feet n=201
- 4) 2,000 - 2,499 square feet n=141
- 5) 2,500 - 2,999 square feet n=89
- 6) 3,000 - 3,499 square feet n=35
- 7) 3,500 - 3,999 square feet n=19
- 8) 4,000 square feet or more n=20
- 98)DON'T KNOW n=40
- 99) REFUSED



Q40. Which of the following income categories best describes your total annual household income in 2007, before taxes? Please stop me when I get to the right category. [READ LIST.]

- 1) Less than \$25,000 n=26
- 2) \$25,000 to less than \$50,000 n=92
- 3) \$50,000 to less than \$75,000 n=166
- 4) \$75,000 to less than \$100,000 n=131
- 5) \$100,000 or more n=148
- 8) DON'T KNOW n=5
- 9 REFUSED n=20



[PROGRAMMING NOTE: GO TO END #2]

END: THANK AND TERMINATE

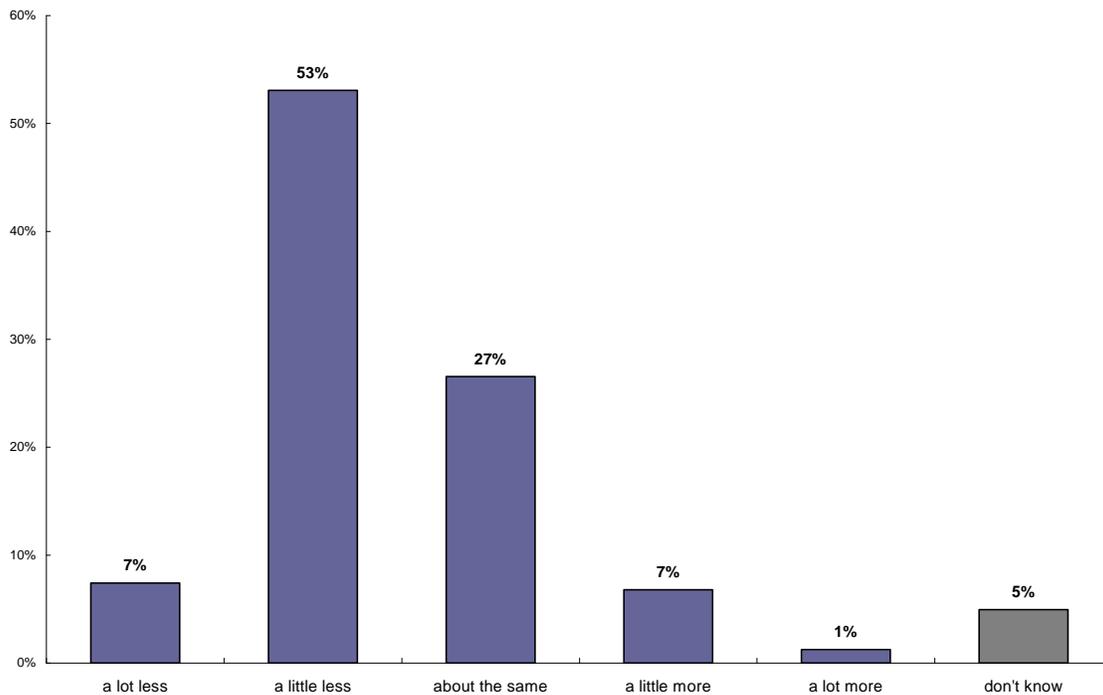
END #2: THE RESEARCH TEAM WILL BE IN CONTACT SOON. THANK YOU FOR BEING PART OF THE STUDY.

MID-STUDY SURVEY:

Sent to treatment group participants in September 2008. (n=159)

1. Do you think there has been a difference in the amount of energy you have used in your household the *last few months* compared to the same time last year? Has your usage been...

- a lot less n=12
- a little less n=86
- about the same (jump to question #3) n=43
- a little more n=11
- a lot more n=2
- don't know (jump to question #3) n=8



2. Why do you think there has been a difference?

- I have been pregnant this summer so I think we used the air a bit more than normally we would have. Also, now with two children (second one born end of August) we seem to be doing a lot more laundry.
- I switched light bulbs in most of my lights and I now have a new, more efficient, central air conditioner. With the monitor it is easy to see where the power is being used.
- The monitor and prices.
- My wife now stays home with two children in the house. This was not the case last year.
- Seeing how much additional power is used by the dryer and a/c has caused me to really try to limit their use.
- We watch the monitor all the time. We make a point to turn off power to appliances that are not in use (computer, TV). We dry clothes on a line more in summer. We use the major appliances later in day or overnight (dishwasher/clothes washer).
- The meter is on the kitchen counter so when we see a high rate/hr we think about turning stuff off.

- I do watch the monitor to try to conserve energy. Jan through April were down; May, June, July were up; Aug was down.
- I believe that we can now see what it is costing us with the meter. We are able to tell what appliances use more energy. It has helped us to turn off lights more frequently when not in use.
- We have been making a more concerted effort to use less energy by being less wasteful when not in a room (i.e. turning items off) and by using energy efficient light bulbs. The use of our monitor showed us what waste was occurring especially when we could have been turning things off when not in use.
- We are much more aware of the cost of using different appliances, etc.
- People in the house are more aware that there is a cost to energy we use.
- I am more aware of the consumption of electricity in my house. This reminds me more of the energy price I pay more often than seeing the monthly bill. I turn off lights more often than before.
- We didn't use any a/c this year and we have converted to cfl's. We also started drying our clothes outside on clothes lines.
- Cooler summer.
- We have shut things down when not in use.
- Watching the power cost monitor and being more careful about using electricity.
- Because now we can see how much everything costs.
- Turn off lights more regularly, limited use of a/c, turn off computer & printer when away for weekend.
- We are all focused on our energy use. Our kids especially like to watch the meter & see the numbers decrease as they work to save energy by turning things off.
- It was a relatively cool summer and we used ac far less. Controlling lights on/off and changing to low watt bulbs. Controlling dishwasher or clothes washing usage. But our sump pump has had to run more because of flooding.
- The summer wasn't as hot so the ac didn't run as much.
- We used our ac much less also I hang my clothes outdoors in the summer although I have always done this. I don't bake as much during the summer.
- We have turned off the lights more while we are home. We have also changed most of the standard light bulbs with cfl's. We also have been turning off the computer more and have also been grilling out more due to the nice weather. I have also unplugged all of our electronic devices that aren't used to reduce the amount of leakage current used by all of those devices.
- Cooler summer temperatures mean we used the air less often, new dehumidifier.
- I can see the spikes of usage better.
- We keep the monitor above the TV set so we see what it is doing all the time. When it increases we think about what is on at the time.
- I constantly watch the power monitor. We also replaced 90% of the light bulbs in our house with fluorescent bulbs.
- I guess the awareness of energy use has affected behavior; turning off lights, for example.
- My bill indicates. We Energies shows the difference.
- We watch the meter and we are more aware of what usage is happening and turn off things.
- Change over to hi efficiency bulbs.
- No longer use dryer, very careful about turning off lights, replaced all bulbs with cfl's.
- More energy conscious.
- We could see what it was costing; everyone was better about turning off lights, etc.
- Have been more aware of what we are using.

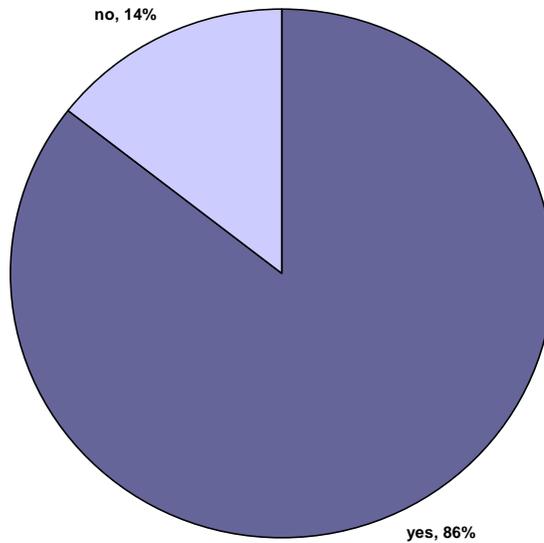
- Keeping close tabs on daily consumption.
- The energy monitor is making us more aware of the amount of energy we use. It has been interesting to watch the monitor as we use certain appliances or varying combinations of appliances. It has certainly made us much more aware of our energy consumption.
- Cooler summer so not as much a/c plus noticing the monitor helps remind us to turn things off.
- Effort to use less i.e. use a/c less and shut off lights.
- I was home all day due to an injury.
- Trying to conserve energy costs.
- Cost of fuel has risen and we are more careful about what we use, but energy prices keep rising.
- We monitor usage much more.
- My wife and I were away from the house for 4 weeks, milder summer (less a/c), 1 less person living in our house.
- We are using the clothes dryer less, also the air conditioning.
- I have lung problems and have to run my oxygen machine all night and my nebulizer machine 6 times a day.
- Greater consciousness of energy conservation & I think the monitor caused us to be slightly more interested in seeing the numbers be lower.
- The TV isn't on as much. Use the ceiling fans only when someone is in the room.
- We are trying to watch our usage.
- I'm paying more attention to usage, and have also installed more cfl's.
- I watch that monitor all the time.
- Switched 3 overhead lights to saver bulbs, ran a/c for very short times, unplugged all unused appliances.
- Turning off lights more often.
- The monitor you provided has made us more conscious of energy use; cooler summer
- Survey has made me more aware how many appliances are being used at the same time and how that affects energy use.
- I can see the cost of the energy used at the time we are using it. The display is on the mantle for everyone to notice.
- I watch the Power Cost Monitor and find out what is on and costing me money.
- We installed some cfl's in a few high usage light fixtures. It was also a cooler summer than last year so we didn't use our air conditioning as much.
- Eliminated some things when not needed such as lower level refrigerator, also have a new energy efficient furnace.
- Decision last winter to not cool the house as much this summer as last summer, seeing the current usage as I walk past the display and then going to see what is turned on, cooler summer, gone for two weeks in July (turned off ac).
- We use the a/c less and open windows more. We already have cfl's but we tend to turn it off more.
- My daughter has been using the window a/c more and taking longer showers.
- All the water in the basement required a dehumidifier.
- We've been more conscious of the cost of our energy usage and try to make better decisions about the use of the devices that cause our usage to spike upward.
- Watching consumption and how it affects our cost, replacing some lighting w/ compact fluorescents.
- We have it in plain view and are much better about turning things off and unplugging when we leave for the weekend. (some months were cut in half from last year)

- Paid attention to cost of appliances ran due to power meter. Also considered brochures sent regarding ways to save electricity.
- Didn't use our air conditioner as much.
- Was not indoors as much.
- Not as hot so did not use a/c.
- You become aware of exactly how much electricity you are using at any given time. It's an eye opener.
- More careful watching.
- Really watching usage, different bulbs.
- We started drying clothes outside.
- More people in household. Workers repairing house - much confusion.
- Cost of energy has gone up. Home more, off work because of surgery.
- Less use of window air conditioner because of cooler weather, less canning and freezing of garden produce compared to last year, making a conscientious effort to do fuller loads in washer, dryer, and & dishwasher. Conscientious effort to turn off lights not in use.
- More effort to conserve energy.
- Put in new windows.
- Because I can see the rolling total of my energy usage. I am more conscience of my usage.
- We really worked at not using the air conditioning. We used fans. We also installed three ceiling fans, we had the meter and everyone took notice of it. We actively worked at shutting off lights made sure the dishwasher was full. Didn't toast just one piece of toast.
- Watching the energy monitor, especially our children.
- Awareness of energy use.
- Cost - trying to keep lights turned off, not using unnecessary energy.
- We are more aware of lights left on and other electricity that we are wasting.
- More aware of energy use.
- It has made us more aware of the energy we use by being conscious we turn more lights off and don't use as much energy.
- We watch the monitor, and if it goes up, we find things to turn off.
- We are more aware of each bulb or appliance. We watched the monitor as we turned devices & lights on and off.
- We have noticed the amount being used on the meter and try to lower the real-time amount by turning things off. Also, we installed a new ac/furnace.
- We try to remember to shut off lights that are not needed.
- Try to keep extra lights out, and turn off coffee pot etc.
- I am very conscious of energy-saving tricks.
- Aware of what certain appliances use.
- We have put all of our appliances video/audio & gaming centers on power strips and turn them all off when not in use. We have also replaced all of our incandescent light bulbs with fluorescent.
- We watch the monitor that tells the \$/hour and go see what is running at the time. We've also been trying to turn off lights when leaving rooms.
- We've been more conscious about power usage and have tried to cut corners to get it down
- We look at the unit and try to reduce that # of watts of energy used by shutting off lights, etc
- We realized our motor on our hot tub was bad.
- Cost of energy.
- More conscious of reducing waste.

- Being able to see the consumption amount fluctuate on the monitor was very big. we were able to go throughout the house and turn off stuff and unplug items that were not being used.
- Switched to programmable thermostat, fewer landscape floodlights.
- We're paying closer attention & we have only one child at home, we had two.
- I'm more aware of the energy that I am using and I have lowered my thermostat and unplugged a lot of my appliances.
- We watched the #'s go up and down reflecting usage by turning off equipment to watch the #'s fall.
- Daily temperature, more aware of usage.
- Because everyone can look at the energy meter and see the results from turning things off.
- I am more aware of energy usage.

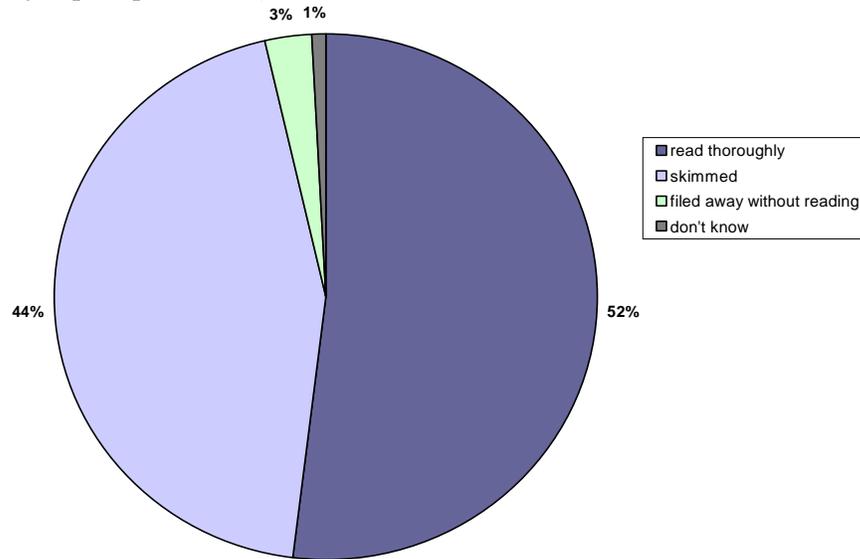
3. Do you recall getting the energy fact sheet that was included with your monitor?

- yes n=137
- no (jump to question #7) n=23



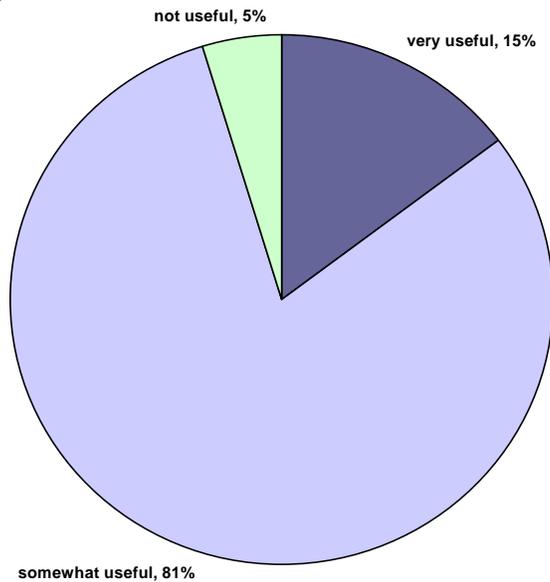
4. What did your household do with it?

- read thoroughly n=70
- skimmed n=60
- filed away without reading (jump to question #7) n=4
- discarded without reading (jump to question #7) n=0
- don't know (jump to question #7) n=1



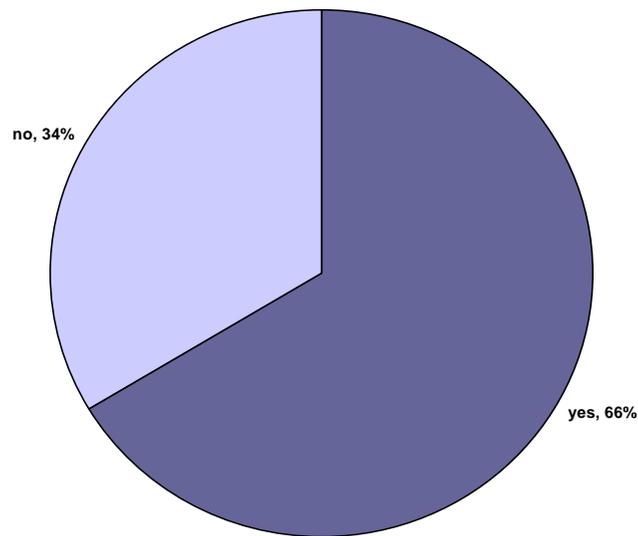
5. How useful was the fact sheet to your household?

- very useful n=19
- somewhat useful n=105
- not useful n=6
- don't know n=0



6. Did you try any of the suggestions?

- yes, n=79
- no n=40



Please describe:

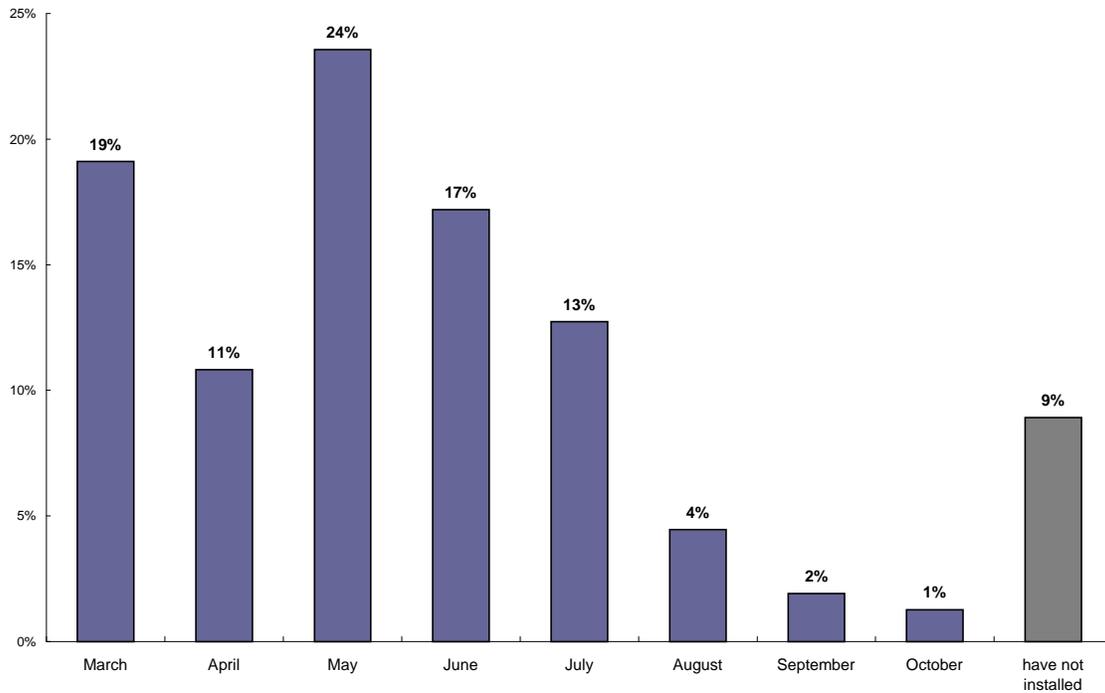
- Was more careful about turning off things like the computer monitor, etc., when not in use.
- We discussed and tried unplugging certain things that weren't used daily, like our computer printer and external hard drives.
- Basically, unless I have it mixed up with another sheet you sent, I changed bulbs, turned off fans when I left the rooms, tried to use my dehumidifier less, did a lot of outdoor grilling.
- Switch to compact fluorescent lamps and led night lights.
- Programmable thermostat.
- Turn off computer each time we are done using (on 1 hr/day vs. 24 hrs). Use ceiling fan, darkened rooms to conserve cool air.
- Adjusted heat, turn off high energy items, unplugged things like cell phone chargers, energy efficient light bulbs, using ceiling fans.
- We turn lights off more often, turned down the spa thermostat, do laundry when I have full loads, ran pool less hours during day, conditioner on 72 rather than 70, turned air off when we weren't home.
- I only wash in cold water now.
- Try to turn of a/c less frequently.
- I said yes, but we were already practicing many of the things already before we received the fact sheet.
- Shutting things down when not in use.
- Unplugging appliances when not in use, turning off computer, keeping central air temp lower at nights and higher during the day.
- We installed energy efficient light bulbs and now use power strips which turn off when not in use.
- Computer turned off.
- Turning off computers when not in use, unplugging cell phone cords when phones not plugged in.

- I have shut all of the blinds on the south and west sides of the house to keep the amount of sunlight out of the house to keep it cooler. We have also kept our thermostat at 76-77 during the entire summer during the day and lowered it a little more at night since the ac cools the house better and won't run as much. I have also been changing the air filter every month to lower the cost of the furnace running.
- Used ceiling fans more often.
- Turning off lights, lowered temp on water heater, added insulation to attic laundry, etc. at night time.
- Not really, but did think about the ideas.
- Most all suggestions were already being done. We still need to replace all the light bulbs in the house.
- It was nothing we didn't already know just had to be more diligent.
- Unplugged appliances not in use, line dried clothes, turned off lights.
- Installed cfl's, bought a lcd TV, added a programmable thermostat.
- Changed a few light bulbs to compact fluorescent turned thermostat up to 75 in summer 68 in winter.
- This is a "kind of" yes answer. Many of the suggestions we have recently implemented. I replaced old windows, installed a programmable thermostat. I did "up" the thermostat a few degrees as suggested in the mailing.
- Changed to mostly cfl's, changed the setting on our lcd TV, turned down the hot water heater.
- Use a/c less, shut blinds, use fans and cross ventilate shut off things not used – unplugged timers, set back thermostat.
- We already use many of the suggestions, such as running appliances at non-peak times, using a programmable thermostat, and turning off fans & lights when no one is in the room.
- Not running multiple appliances during high energy usage times.
- Turning off lights more often. Turning up the thermostat during the summer.
- Conscious effort to turn off all lights, turn Computer off.
- Turning temp down when not home, shades during heat.
- CFL's.
- We unplugged everything from the wall when we left our house for a month.
- I think we'd already done some things - energy saving bulbs, turn thermostat down at night.
- Line dry everything, take shorter showers.
- Shutting & unplugging appliances.
- Turn off unneeded lights.
- I was already doing most of them already.
- Switch bulbs, unplugged items, ran fans to pull cold air in at night, used curtains.
- Unplugging unused products, not using house fan.
- Turned thermostat up at night to decrease usage when sleeping, run dishwasher at night once house was cooled off.
- Have already been doing some, can't remember what else.
- Switching to cfl's.
- Programmable thermostat.
- Not using things when not needed, new furnace.
- Fluorescent bulbs.
- Thermostat setting, compact fluorescent lights, shut down some equip (computers).
- Programmable thermostat, unplug small appliances.
- Tried to turn off lights when room was vacated.

- Were already implementing some of the suggestions including lowering/raising the temp when running the heat/air, opening windows when cold at night. Also implemented new ones such as paying attention to the direction of our fans, and shutting them off when not in the room.
- Energy saving light bulbs.
- Low energy lights.
- Different light bulbs, thermostat.
- I knew most already and had already done some of them - don't remember specially what was on the sheet that we weren't already doing.
- Hanging out clothes, shutting off TV, unplugging small appliances we were not using, unplug computer when not using.
- Switching to more cfl's, using room fans wisely, doing more cooking on outdoor grill.
- Use more cfl's, turn off lights not needed, turn off TV when not used, have a conservation type water softener.
- Turned off my computer when not in use.
- Well we looked at the face sheet and also looked at the MG and E web site. We got the power meter from the library and noted different appliances. This made us all more aware. Purchased ceiling fans and installed. Replaced some of our light bulbs and have made a goal of replacing any new bulbs with compact fluorescents. Unplugged appliance that we aren't using. Used fans instead of air conditioning.
- Most of the suggestions were common sense and we were aware of them but the material reminded us to use them again. I do not have the material as I passed it on to a neighbor so I cannot identify the specifics.
- Wash a full load of laundry/dishes, turn off lights, turn off electronics (computers, heat), close shades in summer.
- Turn off lights, time of day use, used air more wisely.
- Timer for lights and energy efficient bulbs.
- Insulated our crawlspace, sealed cracks in external walls of the house.
- Unplug things not used everyday, change light bulbs to energy bulbs.
- Doing laundry loads consecutively.
- CFL's and unplugging electronics.
- We set our thermostat and air conditioner so it would only run at certain times.
- Raise a/c temp.
- Turning off lights, ac lower.
- Lowering the thermostat, we were already doing a lot of the suggestions.
- I am already practical. I replaced bulbs w/ fluorescent.

7. When did you install your PowerCost Monitor?

- have not installed (jump to question #12) n=14
- March n=30
- April n=17
- May n=37
- June n=27
- July n=20
- August n=7
- September n=3
- October n=2



8. On a scale from 1 to 5, how easy was the installation process with 1 being very easy and 5 being very difficult? _____

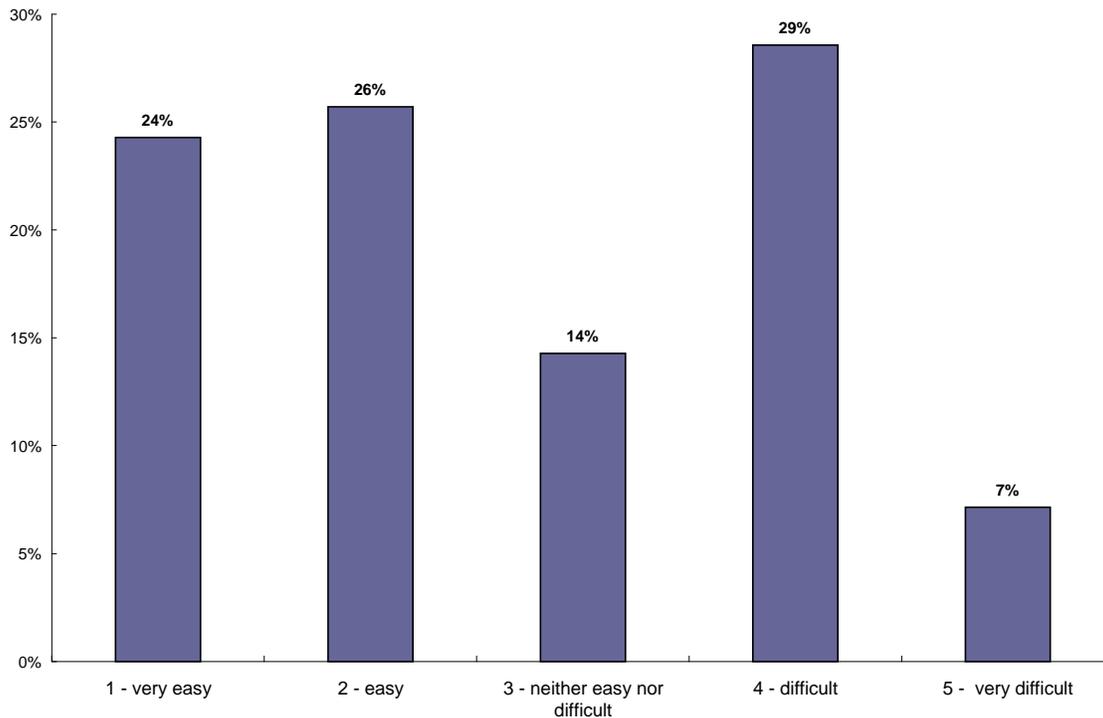
1- very easy n=34

2- easy n=36

3 - neither easy nor difficult n=20

4 - difficult n=40

5 - very difficult n=10



If installation was difficult, what issues did you run into:

- Poor signal from meter. Very snowy and cold conditions. The monitor did not work with direct sun light on it.
- It was hard to align the bar with the dial.
- Our meter was not one of the choices. Our power plan is not one of the program choices. We use the monitor but it is not in sync with our program.
- The directions seemed confusing and inadequate. There were not enough written descriptions (step by step directions) to go with the pictures. The device itself seemed easily breakable during set-up. For instance, on one step of the set-up it almost seemed the part would break off or the directions weren't clear that part shouldn't have been pulled.
- Directions were unclear on how to set up the monitor. We needed to call the help line.
- Not understanding the set-up process and figuring out our kw value.
- But getting meter reading in the house took several attempts.
- Just the mechanical parts of it.
- It took numerous times to get the monitor installed.
- I couldn't get it properly mounted to detect the usage. It gave me the outdoor temp but wouldn't register the \$ usage. I threw it away when it failed due to moisture from June flooding.
- Had a hard time with the monitor to set it up, quite didn't understand the instructions and I haven't been able to reset.

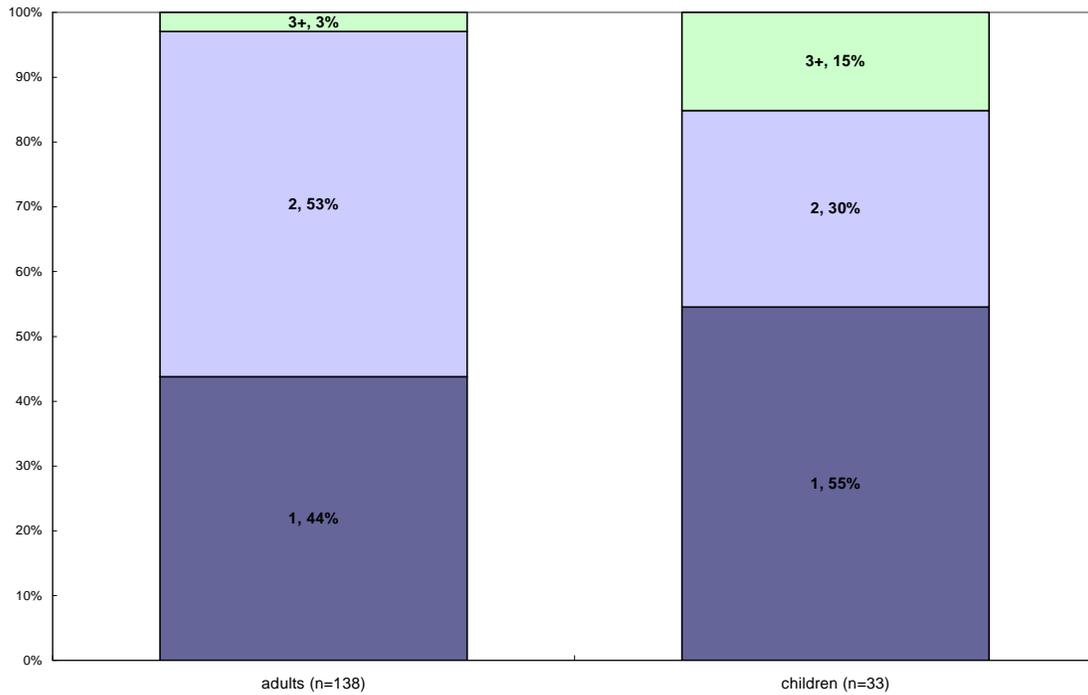
- Difficult to align sensor with spinning wheel.
- Time of usage metering was hard to remove monthly so the power company could scan meter.
- Overall, once I got the "jist", it went fast. I did need to watch the dvd several times. Deciphering my MGE bill was more complex. I had to call MGE to get more accurate information to set the kilowatt per hour charge. The kilowatt per hour charge was not exactly clear on my bill.
- We still do not know what info it gives - it has time, temp, and some running amounts \$.
- Aligning the sensor.
- Trying to get the sensor in the right spot to read the digital readout.
- I am still having problems because we are on time of use and I can't get the device to accurately price our usage.
- The sensor had a hard time detecting the meter.
- The power company gave me the cost per hour in decimal equivalent that the meter wouldn't read.
- We had an issue with the strength of the signal initially.
- Installing it is easy. But setting the monitor is hard. Why is there so many rates? I don't know if I need all of them? Also the kwh, do I need all of those?
- It was difficult strapping it onto the meter and the video was not useful. But it still look less than 20 minutes.
- Only thing that was hard was trying to figure out how much I pay for elec. on my bill.
- Had to mount on top of meter, difficult to align. Rays of the sun seemed to interfere with monitor reading.
- Had a hard time programming it. Never sure if it worked properly. Within the last month or so it cleared itself and was never able to reset.
- Getting the thing that attached to the meter to fit right, getting the monitor to receive a signal, and programming the monitor.
- My meter was changed from mechanical to electro magnetic - part way through this study - had to redo installation & lost all accumulated data in the process.
- Placement of reader on meter, interpretation of monitor.
- Had trouble lining it up on the meter and had trouble getting them to work together and the batteries do not last very long.
- Setting the position of sensor to the wheel. Had a hard time getting it to recognize the wheel and black stripe.
- I feel that it probably is not set right.
- Trying to get it to read the monitor and the directions were confusing.
- The cd you included did not identify the type of meter I had, as well as determining the amount we were charged for energy usage.
- Instructions were a little confusing.
- I perform most home repairs and consider myself "handy". Aligning the sensor was a son of a gun....I had to improvise and shim the sensor to achieve alignment. Of course it was about 10 degrees out and it was night...so that did not help.
- Could not time the unit, also my unit ate up the batteries.
- Not that difficult to install, but setting up the program and getting it dialed in was difficult.
- While trying to set up the monitor, if you hit a wrong button, there was nothing that told you how to go back (or forward) to fix it.
- Just took a few tries to get monitors connected, hard to determine rate on our bill.
- Took a lot of adjustments in position and orientation to get it to read.
- Setting up the display & how to read my bill.

- I had a VERY hard time positioning the sensor unit on the box so that it was successfully reading the spinning disk. I had to pull the sensor arm out as far as it would go, and actually put it at an angle relative to the disk.
- It was hard to determine which type of setting to put the unit on. If they were preset to the energy usage in a particular area - people would not become frustrated setting it up.
- I cannot recall but I received good help over the telephone. I believe it had to do w/ syncing the monitor problems.
- The monitor did not pick up the signal so i needed to get another one from the company.

9. How many members of your household check the monitor on a regular basis?

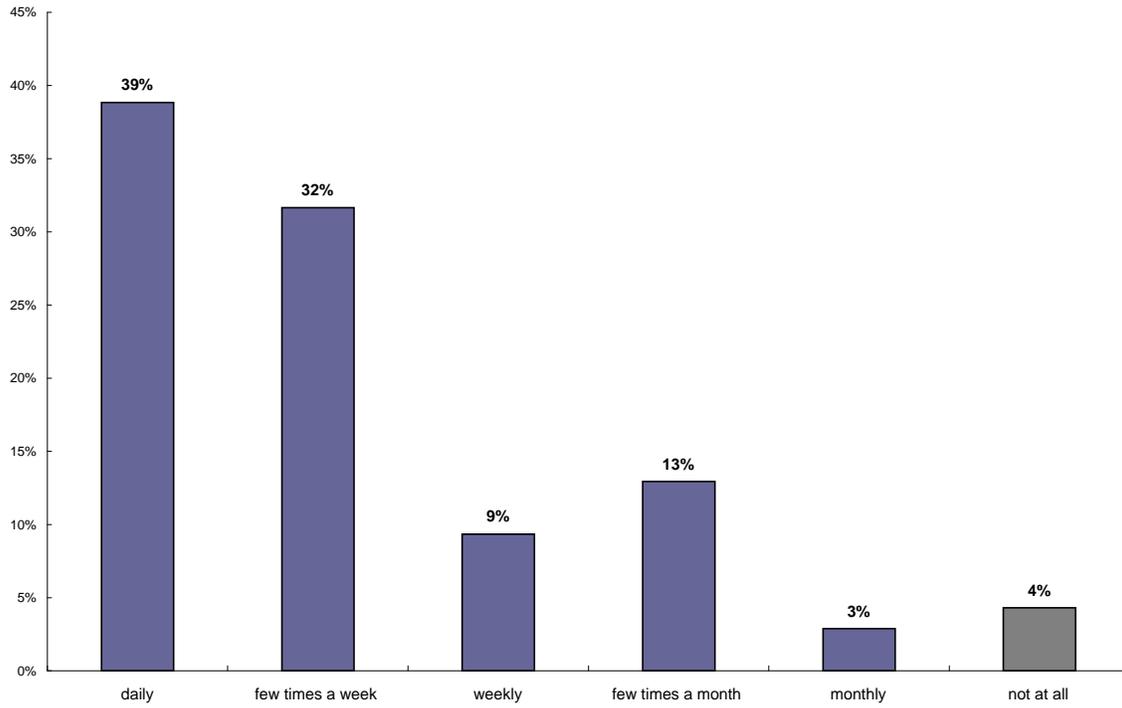
adults _____ n=138

children _____ n=33



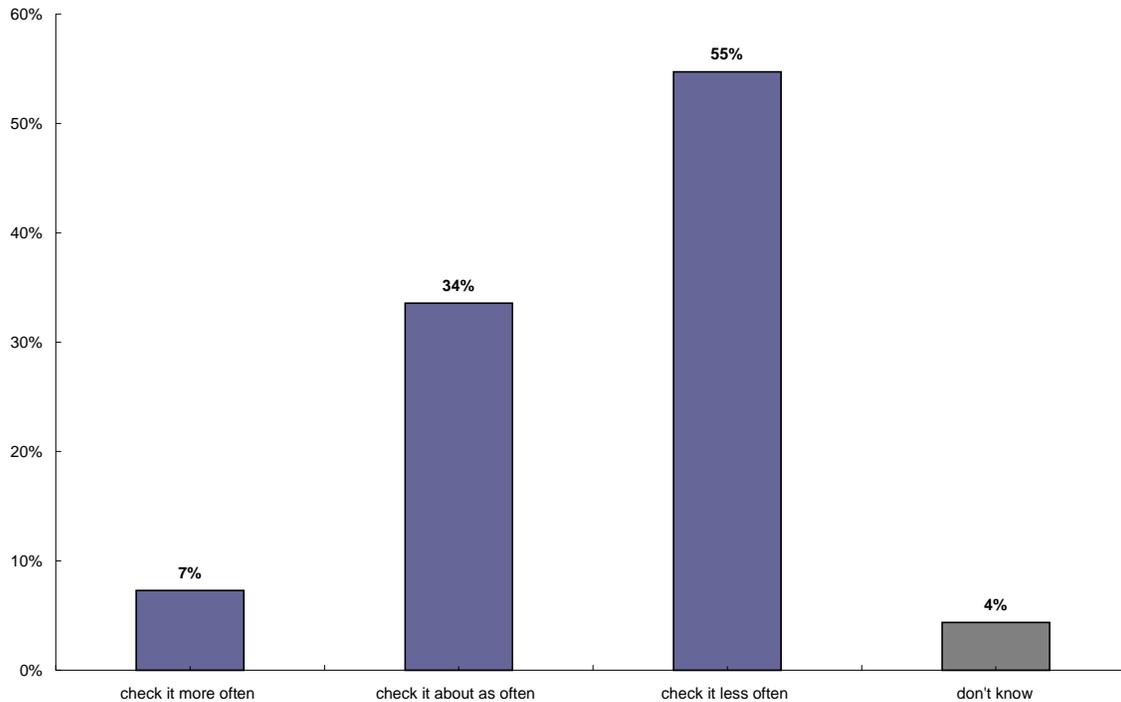
10. How often do members of your household check the monitor?

- not at all n=6
- monthly n=4
- few times a month n=18
- weekly n=13
- few times a week n=44
- daily n=54



11. How often does your household check the monitor now compared to the first week after you installed it? Do you...

- check it more often n=10
- check it about as often n=46
- check it less often n=75
- don't know n=6



12. Have you learned anything useful about your electricity usage by having the monitor?

- The dramatic energy use that heat producing appliances use.
- It was interesting to find out what the usage is even when we don't think/realize anything is on. Then we thought it was cool to see how much it went up when we turned the air conditioning on or when we did a load of laundry. It definitely made me even more resistant to using air conditioning (although I did give in a lot due to being pregnant and needing to be more comfortable).
- I can see where my electrical use is going at any given time. I notice the oven, after we shower, (hot water), even things like the toaster or fry pan.
- What things are using a lot of energy to run.
- That the dishwasher and dryer take way more electric than I originally thought, and I thought they would take a lot.
- How much is cost to run refrigerators, my welders and the washer and dryer.
- I have a much better feel for where the biggest power hogs are.
- We make sure it is at 4 cents/hr before we go to bed or go through the house and turn off unnecessary power. I've told co-workers about it - they want one.
- A/C, dehumidifier, pool pump & clothes dryer suck a lot of electricity.
- What items cost the most to run and how to monitor and save energy.
- It shows us how much we are using and is providing us with information on how to save. Turning off lights, running clothes dryer more efficiently.
- That there are times during the day when we are wasteful w/ our energy usage and with a few steps we can lower our usage cost.

- The pool and spa are expensive to run.
- It really makes a difference to even turn off one light.
- Awareness of the cost.
- What time of the day we use the most and what takes the most.
- How much electricity some things take i.e. clothes dryer and refrigerator.
- The dryer costs the most to run out of anything in our house.
- Know that many devices cycle & have high then constant use, see effect of turning on or leaving on excess lights.
- Oven used more electricity than we anticipated.
- We have watched usage surge w/ ac use and are more conscious of it. When we see spikes we attempt to identify the cause. We have noticed differences when many lights are on.
- The difference between running ac, fans and dehumidifier.
- What I learned is that in our house the electricity usage is generally from the larger appliances such as the washer, dryer, oven, fridge, dehumidifier, and central air.
- How inefficient our 10 year old dehumidifier was.
- The dryer and ac take a tremendous amount of energy.
- It's easy to conserve when you see what it is doing, before it was always a surprise when we got our bill.
- Watching the rate when you know certain devices turn on, such as the oven or water heater.
- For the first month, I tracked daily usage, correlating it with what appliances were being used. I kept a table of the records. There was a baseline usage, with spikes for when the washer/drier was use being most noticeable.
- So much more aware of what it takes to run things especially washer and dryer.
- Time of day makes a difference for running things like the dishwasher.
- My old fridge does take a lot of electricity as indicated in your fact sheet.
- Aware of how different appliances use energy.
- How much energy we use, how we can save money.
- What my actual usage is at any given time.
- Learned which appliances use the most energy. Learned what our house base rate is when nothing major is on.
- Oven uses a lot more electricity than we thought.
- Learned to put timer on certain appliances, coffee maker, dvr, so they are not using electricity when not in use.
- I get surprised how much certain appliances use. Our washer/dryer (HE machines) use a lot of energy. I also notice how certain times of the day our usage is high.
- Obviously certain appliances greatly affect the usage for example - clothes dryer - so we put up a clothes line outside and hung more clothes outside this summer.
- We had contacted Xcel 4 times to get prior year readings in a summary form and they NEVER responded.
- What usage makes it spike higher.
- Higher usage when a/c runs.
- I think we've learned how much power by appliances is used in relation to one another - for example, that our central air conditioner uses more electricity than most of our other major appliances combined.
- How much cost increases when multiple appliances are in use. ie; dryer and air conditioner.
- That air conditioning triples the amount of electricity use when it's on.
- We are fairly efficient in our usage, but it still adds up.
- We learned that certain appliances really impact usage.

- I realized how much energy we actually use!
- Our oven & dryer use a considerable amount of electricity.
- I now know the individual costs of each appliance.
- Showers are huge.
- Living here alone I have time clock so hot hot water is only on from 6-8am and 8-10pm. Dry some clothes on clothes line.
- We became more aware of the energy used by one appliance vs. another. Our dryer sure is an energy hog!
- I would if I new it was setup correctly.
- During certain times of the day the cost is higher. Certain types of appliances cause the cost to go up.
- The dryer doesn't use much power as thought.
- How to try & cut down on usage.
- It sure makes me reluctant to turn on the a/c - costs about 75 cents/hr. But the monitor is quite insensitive at the low end, never dropping below 3 kw even when the sensor is displaced and not reading.
- My bathroom lights use a lot of electricity.
- We ran a baseline of 3 cents/hr - I assume it's the fridge. I was surprised the tv doesn't add as much as I thought.
- Which appliances take more energy to run.
- The amount specific appliances use (e.g. elec stove uses a lot).
- Basically saving energy or trying to.
- Learned to control usage.
- The large energy users really make the numbers climb high, dehumidifiers, stove, washer & dryer and furnace/ac really change the number. I have noticed that if I think nothing is on but the monitor is showing high, I will go and look for items to shut off.
- Elec stoves cost a lot when you first turn them on. I learned that I should buy a energy efficient dishwasher.
- The dryer uses a lot - it's the worst appliance to use.
- How much some things use electricity such as electric oven, tv, freezer, etc.
- I was able to see what the big power hogs were in the house and am now much more aware of making sure that they don't run too much.
- You learn what the larger appliances use when they switch on. We keep the monitor on the living room coffee table. It has indicated when an appliance (stove) has been on inadvertently.
- The dehumidifier takes a lot of energy.
- We have it next to the thermostat. When I see electricity usage is high, I go around turning off lights/appliances.
- Somewhat unreliable readings.
- We have used the monitor to determine the cost of running various electrical items so we can make better choices about how they are run.
- A/C is expensive to run, amount of energy used when everything is supposedly shut off - refrigerator, freezer, clocks, water heater - draw power when no one is home.
- What things truly use more (i.e. a/c).
- That our dryer seems to use the most energy.
- Watched how the major appliances create large spikes in the usage, and have tailored our use of these items to be more efficient when possible.
- Know what triggers the high numbers (dryer, hot tub).
- How much ac costs, that we're at the low end much of the day.

- Greater awareness of peak usage times.
- How much you use with the TV and dryer running, they use too much.
- It hurts to see the dollars go up! And how different times of the day we see a spike in energy costs.
- The toaster uses a lot of energy. When the refrigerator is running, our energy use increases. Our dishwasher (it is old) uses a lot of energy. We use to have a very old refrigerator in our garage. It was especially handy to have during the holidays but usually it was basically empty. It was old and used a lot of electricity. We decided to get rid of it. So we put it to the curb. Making small changes does make a difference. When we first get up the meter is at 4 cents as we use things like hairdryers, computers, etc. You can see it go up. I think the monitor has taught us to be more conscious of our use.
- What items make energy usages spike the most.
- The oven and clothes dryer are large users. The house uses about 5cents per hour when it is shut down at night...so we have tried to find and turn off the 9 volt pirates.
- Major appliances require a lot of energy.
- Just made us aware of usage.
- I never knew how much energy my washer and dryer, dishwasher, and stove used. It is always interesting to see how much energy things draw.
- The stove takes as much energy as the dryer. Although sometimes the meter goes up for no apparent reason.
- It goes up when the microwave is on, increase with heat on.
- The cost effect of each device or light, eg our TV and players use about \$7 a month.
- There are certain times it runs less and by shutting off, even one extra light, energy usage can go down.
- Even a light bulb uses a lot of energy.
- That certain appliances use a lot of energy.
- Basically learned the cost of operating my household appliances.
- We need to use less at peak times when possible.
- Which appliances use the most power.
- I like the monitor installed. It tells me when too many things are running.
- When it worked - very difficult to install - doesn't function now.
- I learned which appliances are the biggest consumers, and just how much they use. Also, learned how much energy we are just using all of the time. Having actual numbers puts things in perspective.
- We have learned which appliances use the most electricity. We have been much more conscience of how much energy is being used.
- The family is more aware of when to turn lights on & off and also what to set the water heater and other appliances at.
- Always consuming some energy.
- When we use more.
- We learned many ways to conserve energy. Turning off the simplest plug can save big over the long run!
- Turn the dishwasher on after 11pm, the use of some appliances either later in the evening or early morning.
- Which appliances use more; which less.
- That we use a lot more energy in the evenings than in the daytime.
- When you know the number at night when everyone is sleeping & watch how it goes up when things are on it was an awesome learning tool.
- Opening of doors, unplugging charging units.

- It makes you think.

13. Have you made any changes in your household because of the monitor? If so, please describe.

- I've tried to keep the many items that use a small amount of energy constantly, like computers and printers and rechargers, off when not in use.
- We are more aware of the impact of seemingly small adjustments, like turning off lights. Our basement was just finished this spring and we have a nine recessed lights on one switch and two sets of track lighting on another and it makes a big difference if we don't turn either of these off (I probably should have noted this in the beginning as something different from the previous year).
- I keep lights off longer, I used the oven less this summer, turned off things with standby lights. I have cut back on use somewhat but I don't think I really had a lot to cut down on. I tried not to waste before I received the monitor and I think the rise in my bill has been due mainly to rate increases by Xcel. When they came and installed a new meter this summer the service person took the information for the meter back to the office and one of the people in the office ordered his own meter.
- Not really, I do not think we waste too much energy.
- Limit use of dryer and a/c.
- I only want to buy electric products that have a complete shut down switch. In addition to all the things I already mentioned - turning off appliances, drying clothes on clothesline, using electricity later in the day.
- Less a/c usage and dehumidifier dialed to run less often.
- I am always checking what is on.
- I am more sensitive to turning lights off and appliances off when out of a room now. All I have to do is get my wife to do so as well.
- Changed to cfl's, getting clothes out of dryer when they are done the first time instead of letting run longer. Using microwave more and eclectic stove less.
- Simply under taking this study/survey has encouraged us to be more knowledgeable about our usage & make a few changes to lower usage/cost. In general it has encouraged us to be less wasteful & try things such as energy-efficient light bulbs.
- More lights off, less a/c.
- Unfortunately I haven't put a lot of thought into how to use it to change my consumption habits.
- We shut things off like the TV when not watching. Shut down the computer when not being used at night. Unplug charging devices when not in use. Shut the range off and let the heat that it has left finish the cooking.
- Shorter showers, turn off lights and TV, use clothes dryer less, use all energy star light bulbs.
- We turn off power strips, we keep our thermostat off, we hang our clothes on the clothes line, we sweep instead of vacuum.
- Turn off more lights, turn off computer & printer when gone, used fan more & a/c less, introduced monitor to friends who were very interested.
- More conscientious about turning off lights & appliances not in use.
- Use less ac. Turn off lights when not needed. Make sure dish/clothes washing loads are full.
- Turned off ac more often rather than letting the thermostat control it.
- Programmable thermostat, cfl's, turn off computer, not using dryer 8 months of the year. But we were already doing all of these things.
- We have removed a chest freezer that we really haven't been using as much anymore since our daughter moved out to go to college. We also use the microwave more and seem to use

our dishwasher less. We also have less laundry to do and have been hanging a few loads of clothes outside to dry rather than using the dryer.

- To make additional changes would be to purchase newer items. Will do this as needed in the future. I do feel this study has some flaws. 1) getting meter reading from local power company and your test on the same page 2) also the weather factor 3) amount of guests in your home and how they consume energy.
- Not really - we already were mindful of turning our lights, changing to cfl's etc.
- We don't use the dryer, ac and iron all at once.
- We hang dry clothes and wait for full loads to wash. Use setback thermostat and use ceiling fans instead of a/c.
- New water heater. Just try to cut down power usage in general.
- Turning off lights. That is the easiest thing, of course. I plan to start replacing light bulbs when they burn out with compact fluorescents but haven't gotten very far yet. Haven't modified other things much, but I feel I am much more aware of issues. Keep thinking about this.
- I really wanted this thing to work but I just couldn't get it going! It never worked properly from the start, so this was a total waste of time.
- More aware of what is running. It sits on ledge in kitchen by sink - we look at it all the time. People even ask what it is.
- I know using hi efficiency bulbs they do save me money. Plan to replace most of regular bulbs with these.
- I unplug appliances, run the dishwasher at night, trying to replace light bulbs.
- It has become a "video game" - how low can we go!
- I began turning the temperature higher in summer or off so air conditioning wasn't used. Open windows at night to cool down house and closed cool air in during the day.
- Put plastic on basement windows for winter, sealed front door for drafts, used outdoor grill, use night lights.
- Put blinds up, turning off extra lights, unplug chargers when they are not in use.
- Nothing major. We had already changed a number of lights.
- Try to turn off lights when not in use.
- Placed a lock on thermostat for constant temperature. Installed cfl's. Installed 6 inch filter on furnace. Installed attic fan and cut 6 vents in overhang for ventilation. Added 6 inches insulation to attic. Put in new windows at a cost of \$3000.
- Overall, I feel my family has been more aware of monitoring our energy use. I have been able to show my daughter how our energy use translates into dollars. The monitor allows us to tangibly see our energy use. I think we are all more aware. We've also made a better effort to turn lights off, computers off, etc.
- In addition to the clothes line, we have made sure that all new appliances we bought have the energy star logo and we have focused on only having on what we need on and unplugging things when we go away.
- We ran the a/c NOT at all this summer and only used ceiling fans while we were in that room. Installing new heating unit this week. Hope to keep bills down this winter - we had gas hot water boiler upright cast iron radiators.
- I think we used our central air a little less than we normally would have, and did not turn it down quite as low when we did use it. I think we also have been more diligent about turning off fans & lights when we're not in the room - and are teaching our children to do the same.
- We try to run the air conditioner less.
- Getting R50 insulation in the attic.
- We are more aware of what we can do to reduce consumption.

- We are more mindful of lights being on and the time duration we use the stove.
- Using clothes dryer less. We use an outside clothesline and an indoor rack.
- Shorter showers, use dryer less - as little as possible, turn off lights.
- All lights are cfl's except dining room and 1 bath.
- No, we haven't. We feel pretty ok with our amount of energy usage, at least with the appliances & home we currently have. I feel that we could cut our energy costs with significant investment in new appliances, but it doesn't seem worth paying for that/those at this time.
- Turn off more lights - resisted using ac during September - shorter showers and less dishwasher usage.
- Yes, cutting down on usage.
- Less a/c use.
- I make sure all lights are turned off if they don't have to be on.
- Insist my daughter be more responsible. Am working on reducing more (replacing bulbs as they burn out). Trying to get solar installed.
- We already conserve - so many of the suggestions we were already following.
- Not really - just try not to leave stuff on when needed/ in use.
- Yes - we use the stove less.
- Think more about how to use less energy.
- Added cfl's to every room (except kitchen lights and bathroom mirror). Made sure dehumidifier and computer does not run constantly.
- Bought a new refrigerator, old one was wasting energy.
- Yes, we started using cfl's. When our appliances need to be replaced we are replacing with energy star.
- No - had cfl's installed. Can't cut usage from stove, fridge, TV, and a/c.
- I now make sure that room lights and fans do not get left on if someone isn't in the room. We have installed more fluorescent bulbs.
- We turn lights off more often now that are not in the room we are in. We changed how we use the a/c. Used open windows more and did not use the a/c during the days while we were at work.
- Cut down of use of a/c, dishwasher, dryer.
- Mostly more cognizant of lights being on that are not being used. When I see power usage of more than 0.50 an hour, I wonder why and look for what's causing it. I think it is a very useful tool. If it weren't for my teenage daughter, we would be using less energy.
- While I can't say I've made any changes at this time the monitor has made me conscious of my energy use.
- Yes, we have probably run the a/c a lot less, have turned out lights more often, and have not left computers running all the time. We really do check it all the time and our guests think that it's a great device.
- Trying to be more careful of our consumption, run central a/c less.
- Previously stated & also air off and windows open more in the summer - especially my husband - he was an air hog! never wanted windows open until he saw the deal whipping around! Thanks.
- Just trying to keep lights to a minimum in rooms that are not in use.
- We tend to run larger loads in our clothes and dish washers to reduce the number of times they run. Use the ceiling fans differently. Try to conserve on the air/heat when practical.
- We have become more aware of conserving, for example, turning off lights, tv. All of our lights inside are compact fluorescent.

- We try to turn things off when not in use, especially lights & fans. Basically it has taught us how to be more conservative.
- Lights off more.
- We were a little slower to turn on the ac this summer.
- Trying to do better job turning off lights. Almost all light bulbs switched to CFLs.
- Sorry - not too responsive. Related cause: we had signs of damage to the house and workers have been in and out for months. We continue though to desire to decrease usage of electricity. Please excuse lack of helpful info.
- Try to cut back on tv, dryer, turn off lights, hang out sheet and blankets.
- Monitor not yet installed because I could not do it alone. I want to use it, and have asked a son for his help. As a new widow, energy costs are important to me!
- I installed the outside monitor, the calibrating of the inside meter is very time consuming. I called the phone # given but received little help with the installation. When I have more time, I have to review instructions & make a new attempt.
- I check all the bedrooms to make sure all the TV's are off when we leave the home. We are conscious of leaving lights turned on.
- Besides what I have already spoken about, I would say we are more conscious of ways that we have wasted resources in the past, whether its gas use or food waste. We try to be better stewards of these resources. I would also say that our monitor broke. We recently got a replacement and were so happy to have it.
- More conscientious about turning off items.
- Turn off when not in use: computer, lights and TVs, switching to CFL's and placed yard light on a hourly timer rather than the dusk to dawn sensor.
- Have not installed it - tried one day and it was confusing & I didn't get finished. So I want my husband to help me and he has been super busy and out of town a lot. We probably won't get it installed until next month.
- Full loads in dishwasher etc., air dry laundry, don't use ac as much.
- I turn off the lights if out in the room and I would turn up the air when the house was cool. Since I pay the bill I was more aware of the usage.
- Yes, we bought a new washer and dryer. We also watch our energy usage more than ever. We have reduced our energy bill by 12% since installing.
- When we see the # go up on the monitor we look for things to turn off. We now keep the computer, monitor, and printer turned off.
- No, we didn't turn on our ac all summer so we felt like we had some room to play. We have a sign posted on basement door as a reminder for kids to turn off the lights.
- Looking to replace/downsize or get rid of our freezer, use dryer more wisely, no small loads of 1-5 items, unplug TV, satellite receiver, players when gone more than 2 days.
- Much more attentive to leaving lights on.
- Couldn't ever get the monitor to work, even after repeated efforts to set it up. Never registered correctly with the monitor.
- We try to remember to turn off the lights when they are not needed.
- Change light bulbs, unplug things, cover windows.
- I must have my son install.
- Yes, using clothes line more and take shorter showers.
- We do more dishes by hand and use the dishwasher less. We try not to do laundry until after midnight.
- We also put our spa on the 'economy' setting.
- Run the dryer for shorter periods of time, unplug things when not in use, keep the heat lower (not electricity, but it's a matter of awareness).

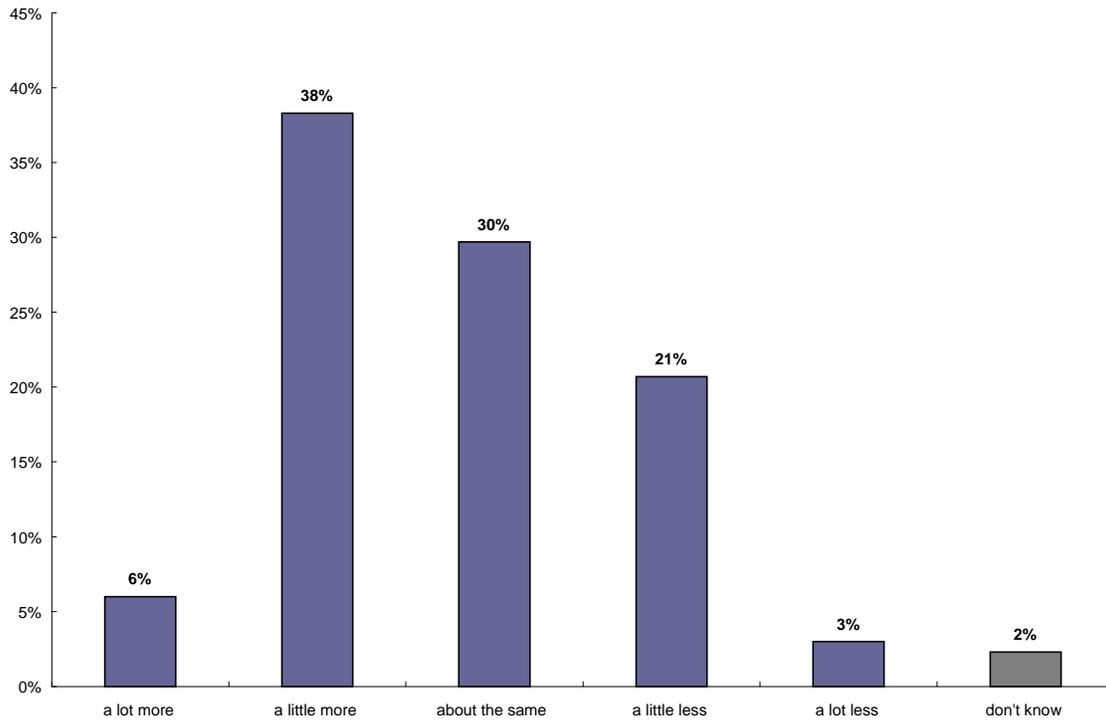
- No - plan to monitor closely after 1/1/09.
- Yes - we do shut off more lights than before. We try to shut off fans & appliances & use alternate ways to keep cool and dry clothes, etc.
- Became more aware of energy savings.
- Visited home remodel show to learn about energy saving furnace/heat pump & energy efficient windows.
- Turn off lights, lower a/c.
- Of course. We are constantly trying to keep the numbers low. We search the house for the things that do not need to be plugged in & we shorten the usage on things that consume large amounts of electricity.
- Turn dishwasher on after 11pm, try to do laundry before 8a, switch to some solar landscape floods vs. standard flood lights.
- We will install the monitor asap. I'm sorry but we are a very busy family & tend to procrastinate.
- I am more conscious of energy usage & turn off lights; put thermostat on hold when not at home and a lower temperature. The problem is I think I was quite aware before.
- Was working out of town, not installed yet.
- Yes and no, we were already doing a lot of the things that were provided as a cost savings, but I do now keep my thermostat at a lower level and in the summer i did not use central air as much as in the past.
- We are considering a "on demand" water heater. We heat our water from a wood boiler - electric back up heater. So... I have seen the #'s go up when showering so I know it takes a lot to shower and do laundry. Our electric is \$120 per month with the pumps on the wood stove going year round for just water. I think the water heater vs. the pumps and wood yearly will be less. This was an awesome experience. I apologize for being slow on this data. I was out on business for 8 weeks and my husband didn't know anything about the results. Also I had the guys from Xcel Energy very upset by the monitor - they thought we were tampering with the meter. We explained "what" it was and they themselves wanted to participate! Thank you!
- Using power cords to turn off equipment not in use.

END-OF-STUDY SURVEY:

Sent out to control and treatment group participants in June 2009. (n=303)

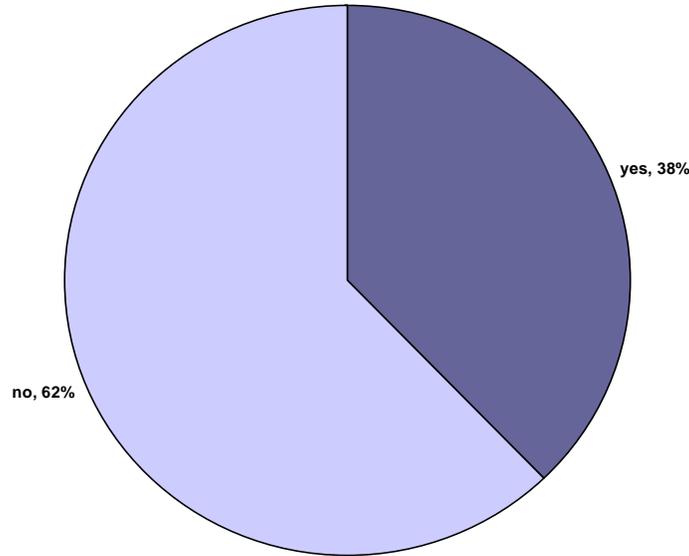
1. How do you think your home’s energy use in the past 12 months compares to the previous year?

- a lot more n=18
- a little more n=115
- about the same n=89
- a little less n=62
- a lot less n=9
- don’t know n=7



2. Did your household add or replace any major energy-using appliances in the past 12 months? (Major energy-using appliances include furnaces, water heaters, air conditioners, refrigerators, freezers, and dehumidifiers.)

- yes n=113
- no (jump to question #3) n=188



2a. Please complete the table below to indicate what changes you made.

Appliance	no change	replaced an existing one	added a new one
furnace	<input type="checkbox"/> n=3	<input type="checkbox"/> n=18	<input type="checkbox"/> n=5
water heater	<input type="checkbox"/> n=5	<input type="checkbox"/> n=19	<input type="checkbox"/> n=4
central air conditioner	<input type="checkbox"/> n=4	<input type="checkbox"/> n=7	<input type="checkbox"/> n=3
room air conditioner	<input type="checkbox"/> n=3	<input type="checkbox"/> n=4	<input type="checkbox"/> n=2
refrigerator	<input type="checkbox"/> n=3	<input type="checkbox"/> n=22	<input type="checkbox"/> n=2
freezer	<input type="checkbox"/> n=3	<input type="checkbox"/> n=10	<input type="checkbox"/> n=6
dehumidifier	<input type="checkbox"/> n=5	<input type="checkbox"/> n=16	<input type="checkbox"/> n=4
other	<input type="checkbox"/> n=5	<input type="checkbox"/> n=34	<input type="checkbox"/> n=7

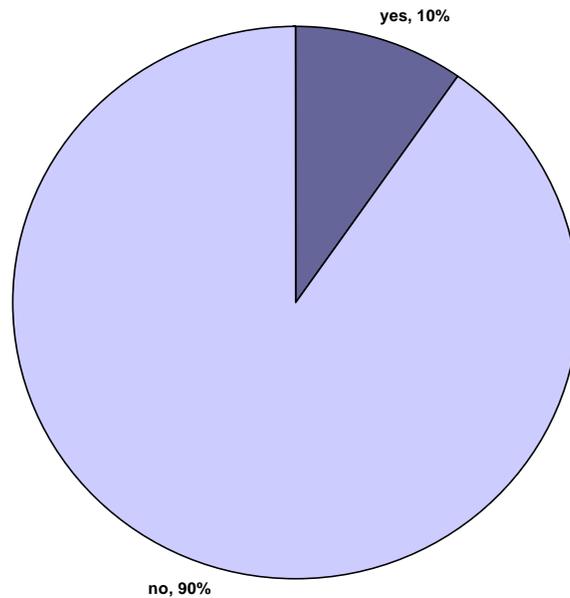
2b. Please identify any appliances described as “other” above.

- 25 year old dishwasher.
- 3 new ceiling fans, new garage door opener, replaced dishwasher.
- Added a 5-gallon fish tank.
- Added a wood burner/water boiler for heating - gasification wood burner. Added solar panel PV.
- Added outdoor hot tub in Aug 2008.
- Dishwasher. (2)
- Dishwasher - was careful to select energy saving model.
- Dishwasher and stove.
- Dryer.
- Electric downdraft cooktop.
- Energy less air conditioner.
- Front loading washing machine.

- Kitchen aid side by side with through door ice & water dispenser.
- Maytag front load energy efficient washer.
- Modified/replaced recirculation pump in outdoor pond, new washer & dryer.
- New G.E. washer.
- New roof and vents.
- New washer & dryer High efficiency.
- Outside wood boiler also heat water with wood boiler.
- Oven. (4)
- Pool heater.
- Portable electric heater.
- Range, dishwasher.
- Replaced 3 window units with 1 high efficiency central unit.
- Replaced a humidifier.
- Replaced electric stove with gas, old dishwasher with new, added a under-counter beverage refrigerator (indicated by the "added new one" above).
- Replaced oil furnace & central a/c with ground-source geothermal heat pump.
- Small fans.
- Stove - new stove is gas, previous stove was electric.
- TV & DVD player.
- Washer - replaced with front load.
- Washer & Dryer. (5)
- Washer machine. (2)
- Washing machine, TV.
- Water softener. (2)
- We added a solar hot water system for domestic hot water.
- We bought an energy efficient set of washer & dryer
- We replaced an old electric water heater w. gas-high efficiency but it was a little more than 12 mos. Ago. Replaced old TV/VCR w. large flat screen, surround-sound system. Must use more energy`

3. Did your household eliminate any major energy-using appliances without replacing them?

- yes n=29
- no (jump to question #4) n=271

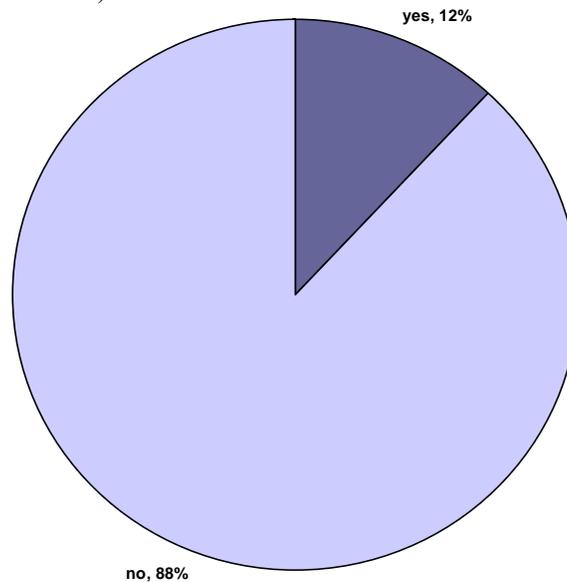


3a. Please check the appliance(s) you eliminated?

- central air conditioner n=0
- room air conditioner n=4
- secondary refrigerator n=13
- stand-alone freezer n=3
- dehumidifier n=7
- other n=3

4. Did your household experience any extended absences (more than a month) by one or more household members?

- yes n=36
- no (jump to question #5) n=264

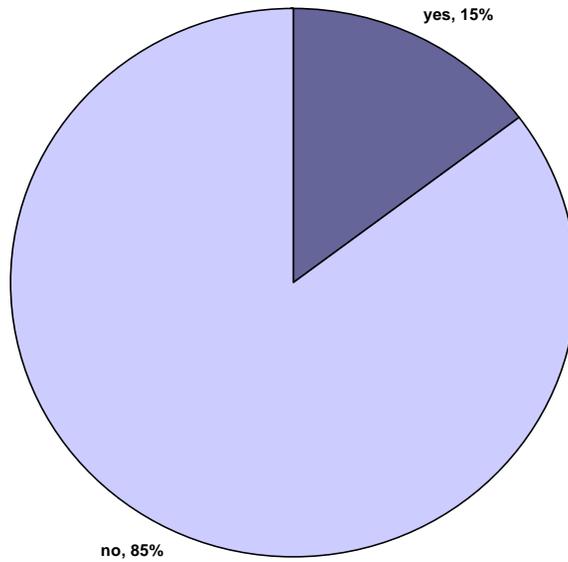


4a. Please describe number of people and approximate length of absence (in months).

- My eldest child moved out of my home in Aug. 2008 to live on campus.
- One person gone for 3 months.
- One person one month, twice.
- Our son - 6 months.
- Son at college.
- Son moved out to his own home.
- Son off to school - 9 mo.
- Vacation for a five-week period in June-July 2008.
- We moved out in November & we just kept it heated as not to freeze pipes, but did spend time there periodically.

5. Has there been any change in the number of people living at this household within the past 12 months?

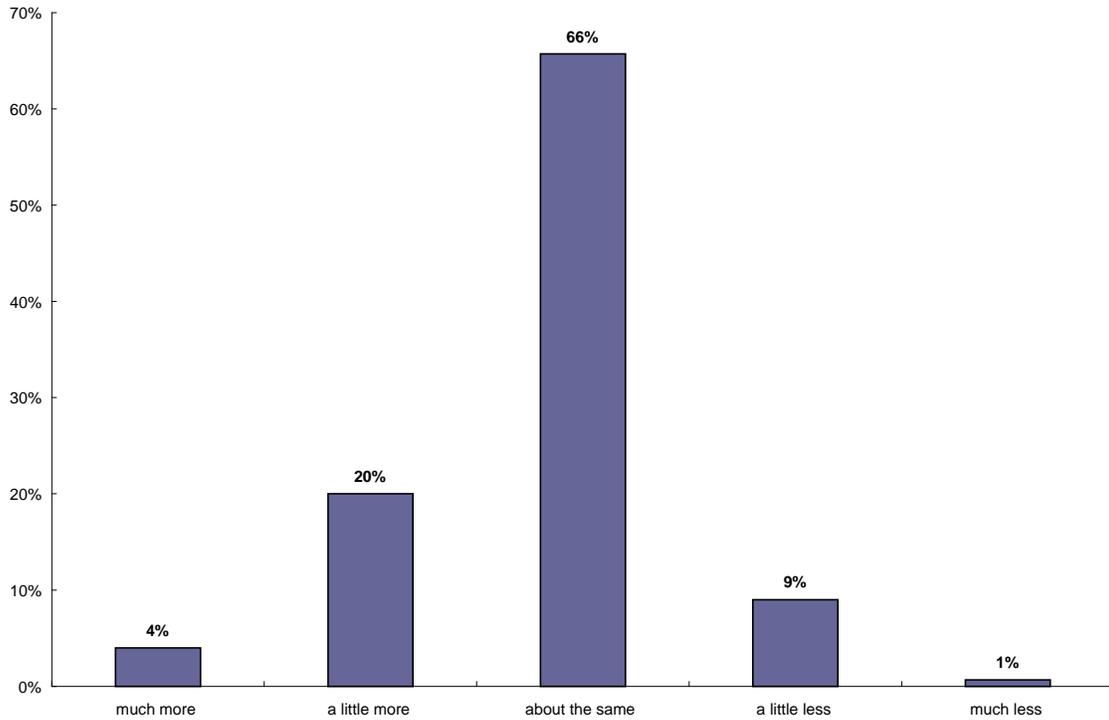
- yes n=44
- no (jump to question #6) n=255



5a. How many people moved in or out of the household?
moved in: ___ (24)
moved out: ___ (23)

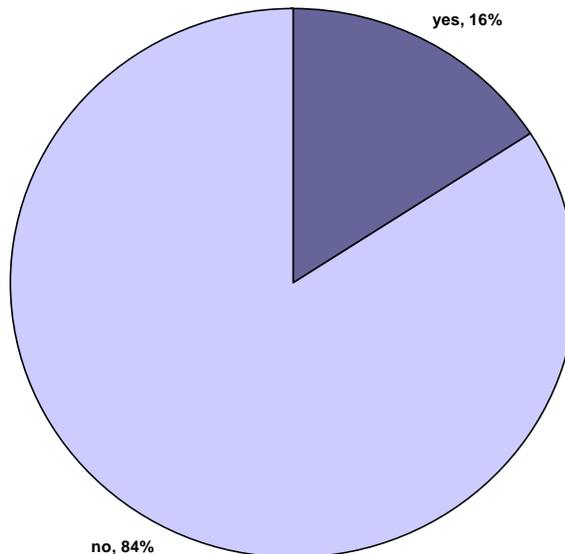
6. Compared to a year ago, how much time does your household spend at home?

- much more n=12
- a little more n=60
- about the same n=197
- a little less n=27
- much less n=2



7. Have you undertaken any major remodeling of your home in the past 12 months?

- yes n=47
 no (jump to question #8) n=253

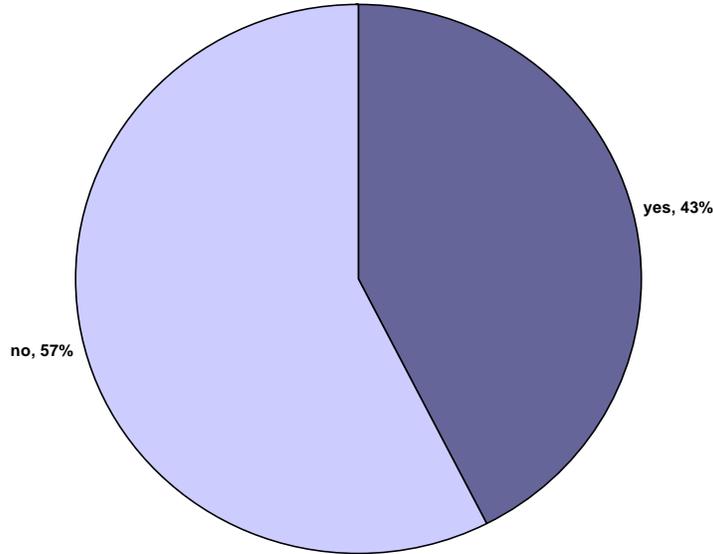


7a. Please describe:

- Remodeled basement.
- Remodeled family room.
- Remodeled kitchen, electric stove to gas.
- Remodeled the bathroom in basement.
- Remodeled the big room in the basement, new dry wall, insulation, floor and ceiling.
- Replaced 2 skylights (which leaked) with new energy efficient ones.
- Replaced 5 windows.
- Replaced old windows with new pella windows, 14 windows in all - will make a difference.
- Replaced windows. (3)
- Replacing entire kitchen - remodel began March 09.
- Re-sided & reinsulated house, replaced all windows, added solar panels, added wood boiler-gasification burner.
- The roof was replaced last year.
- Trim & seaked around all windows, except 4.
- Water saving toilets installed, bathtub removed & walk in shower installed.
- We have installed 10 energy efficient windows throughout the house.
- We have updated one of our main bathrooms adding ceramic tile, new cabinets and fixtures. Also insulated all hot water pipes.
- We refinished our basement.
- Wood heater added, new doors, new windows.

8. Do you recall choosing one product over another during the past 12 months because it uses less energy?

- yes n=126
- no (jump to question #9) n=170



8a. In the table below, please list the purchases you made that were most influenced by energy considerations. If you recall, please indicate where you first learned that this was an energy-saving product.

Product Type	Where did you learn that this was an energy-saving product?

Product Types:

- Air cleaner.
- Air Conditioner.
- Btyro foam insulation.
- Ceiling fan.
- Ceiling fan with heater.
- Central a/c. (2)
- CFL's. (48)
- Christmas LED Lights.
- Coffee maker.
- Computer. (3)
- Computer back-up.
- Dehumidifier. (8)
- Dishwasher. (2)
- Dryer. (3)
- Eco line oilan.
- Edan Pure Heater.

- Eden Pure electric heater.
- Electric hot water heater.
- Energy Doors.
- Energy Lo E Glass window.
- Flat Screen TV.
- Freezer. (2)
- Front load washer.
- Furnace & water heater.
- Furnace. (7)
- Furnace-water heater window- Navien.
- Gas dryer.
- GE Profile dryer. (2)
- GE Profile Fridge.
- GE Profile Washer.
- Geothermal heat pump.
- Hanging clothes outside vs. using dryer.
- Hot water heater. (2)
- Iron.
- Kenmore dryer.
- Kenmore Elite washer & dryer.
- Kill-a-watt.
- LCD TV. (3)
- LED rope light.
- LED TV.
- Low flow toilets. (2)
- Mercury vapor lights.
- Outdoor yard light.
- Patio door.
- Pellet stove.
- Pond pump.
- Pool heater.
- PV solar.
- Refrigerator. (14)
- Room air conditioner.
- Tankless water heater. (2)
- TV. (2)
- Using toaster oven vs oven.
- Vinyl low-e windows.
- Vinyl, double pane.
- Washer. (9)
- Water Heater. (4)
- Water softener.
- Window shades.
- Windows. (6)

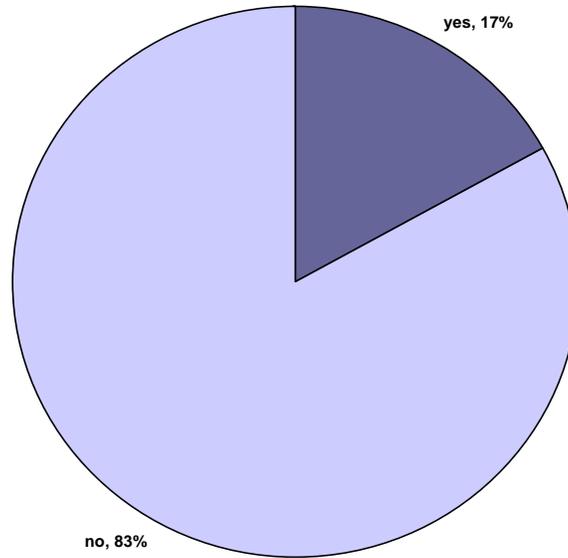
Where did you learn that this was an energy-saving product?

- 25 yrs ago.
- Advertisements. (2)
- All american do it center.
- All over, at stores.
- Appliance store, Energy Star information.
- At Sears.
- At sears - less energy, less water.
- Auto shut off, thermal pot-self.
- Books, magazines, sales-lit.
- Box.
- Carpenter.
- Checked 4 energy star from plumber.
- Conserves on gas.
- Conserves on water.
- Consumer Reports.
- Cost compound various stores/web.
- Dealer. (8)
- Energy bill insert.
- Energy guide. (3)
- Energy Star. (7)
- Energy Star/Sears.
- ENT doctor.
- Family friend/installer.
- Focus site.
- Friends & family & internet.
- Friends who had units unstalled/internet.
- From appliance store and news, advertisement.
- From literature.
- From plumber - ads on TV/magazines.
- From salesman.
- From the supplier.
- General knowledge thru provider flyers.
- General media.
- Good morning America.
- Goodman.
- High efficiency website.
- Home show.
- In store – TV.
- Installer. (3)
- Internet. (11)
- Labels.
- Letters from power.
- Lowes.
- Magazines. (4)
- Manufacturer/Energy Star label.
- Many places.
- Mass marketing.

- Maybe from my parents.
- Media.
- Media, energy saving public service meetings.
- Menards. (5)
- MG&E/Sears Energy Star Label.
- News media.
- News, TV.
- News, work.
- News/MG&E newsletter.
- On the box, Energy Star.
- On the packaging.
- Online energy comparisons.
- Online reviews.
- Packaging.
- Packaging and research.
- Pamphlets & information provided by contractors/bidders.
- Picked model based on numbers from vendor.
- Plumber - Howard Bros.
- Preble High School in Green Bay Band Fundraiser.
- Product label.
- Ran pellet stove all winter to cut down on furnace usage.
- Read that LCD uses less electricity than plasma - consumer reports.
- Reading information in the media, etc. we now use almost all energy efficient bulbs.
- Research on web.
- Store. (20)
- The energy star sticker and sales person.
- The manual.
- This TV system was more energy than our old TV, but in choosing LCD vs. Plasma, energy use was a big factor.
- Through advertisements and demonstrations by the window companies.
- Through magazine ads.
- Tim Wood - contractor, Oregon, WI.
- Tomah.
- TV – magazines.
- TV & Menards.
- TV & newspaper ads\
- TV (4)
- TV, neighbors
- TV, paper
- TV/newspapers
- TV-direct mail
- Uses less energy.
- Vendor.
- We found that our oven is a huge energy user w/ the meter you gave us.
- We found that we saved approx \$1 for every load w/ your meter.
- Website of manufacturer. (2)
- Will replace within a month and I'm carefully checking energy usage.
- Word of mouth.

9. Do you recall receiving any rebates for purchases of energy-efficient products in the past 12 months?

- yes n=50
- no (jump to question #10) n=170

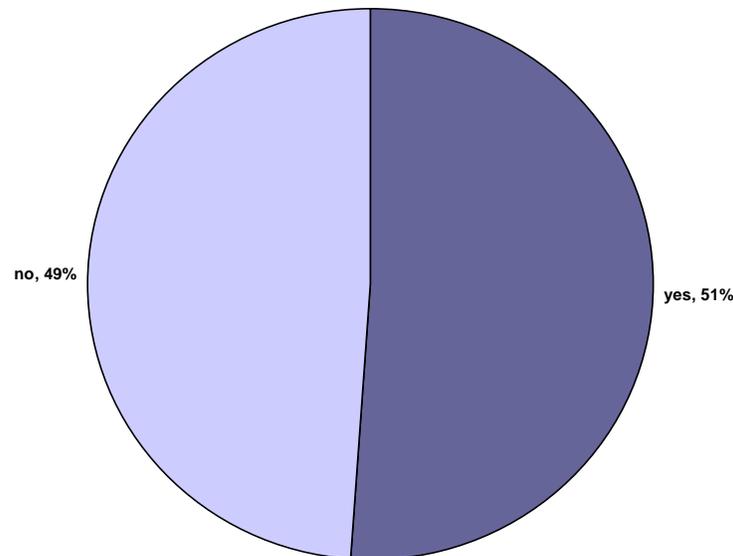


9a. In the table below, please list the purchases for which you received energy-related rebates and (if you recall) the source of the rebate.

Product Type	Focus on Energy	Product Manufacturer	Store where purchased	Other
	<input type="checkbox"/> n=27	<input type="checkbox"/> n=17	<input type="checkbox"/> n=14	<input type="checkbox"/> n=1
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. In the past 12 months, has your household done anything not already mentioned above to reduce your electricity usage?

- yes n=151
 no (jump to question #11) n=146



10a. What did you do?

- 1) energy efficient light bulbs 2) adjusted heating & cooling set points on programmable thermostat 3) made effort to turn off lights & appliances when not in use.
- 1. We turn thermostat to 62 at night during cold weather. 2. Weather stripped bottom of doors to outside of the house. 3. Clean furnace filters more often/schedule dates on calendar.
- Added insulation, basement and attic.
- Added more cfl's, will be replacing windows soon.
- Air drying laundry to reduce dryer usage. Hand washing some cooking utensils to lessen dishwasher usage.
- All household light fixtures now have energy saving bulbs.
- Be more careful turn out lights, lower heat, raise a/c temp.
- Been more conscious in regard to leaving lights, fans, TV, etc. on when not in the room.
- Bought a plug that turns off at the outlet so the TV & CD player are only 'on' when I use them.
- Bought a sprinkler timer.
- Bought energy saving light bulbs.
- Burning more wood.
- Cfl change outs.
- Cfl's, no a/c.
- Change all lamps to cfl's and added some motion sensors.
- Change to LED exterior christmas lights and summer deck lighting.
- Changed all light bulbs, added automatic on/off switches.
- Changed exterior house lights to cfl's, post yard light to cfl & removed dusk-dawn timer.
- Installed an hourly timer. Installed a solartube in kitchen replacing a light fixture.
- changed to compact lightbulbs.
- Changed to energy efficient bulbs, made effort to turn off lights & computer when not in use.
- Used clothes line instead of dryer. Use grill & microwave more.

- Conscious use of lights, TV, computer, furnace, a/c settings, washing and drying loads of clothes. Also being aware of things that plug-in but are not on or in use.
- Conserved energy.
- Continue to consciously turn off lights & appliances, use programmed thermostat. Dry clothes outside on rack whenever possible.
- During hot times, opened windows at night to cool house and closed all windows and blinds at just the right time in the morning to avoid/reduce a/c usage. More/smarter ceiling fan usage for both heat/cool. Unplugging electronics, though not as much since our roommate moved in.
- Energy saver bulbs, turn off lights, move in rooms with electric baseboard heat, lower thermostat.
- Everyone makes sure that appliances, lights are turned off when not in use.
- Fluorescent bulbs in many light.
- Gradually adding cfl's.
- Hang clothes out whenever possible.
- Hang clothes outside instead of the dryer.
- I feel that with the monitoring device we are all more aware of the amount of energy we use.
- It has been a good tool to help make our daughter more aware of the impact that leaving lights, computers, TV's and stereos on.
- In March, Advocap came and started to insulate and replace light bulbs they just finished in May.
- Install more compact florescent light bulbs.
- Installed time of use meter.
- Installed vacancy sensor for some lights, turn off more lights when leaving room.
- Insulated.
- Insulated crawlspace.
- Just paid attention to turning off light, minimizing use oof fans, electronic devices.
- Just watch the meter and see what is on when it is high!
- Keep light usage down, turn up the thermostat.
- Keep most lights off at night, only do laundry 1 time a week including dryer, use less hot water, unplug any electric items not in use, tv, radio, cell phone adapter.
- Keep the thermostat turned down more.
- Key thermostat at 66 in winter. Replaced lightbulbs with energy savers. Bought LED Christmas lights. Turn off lights when leaving rooms.
- LCD TV.
- LED lights, compact fluorescent lighting, LED christmas lights. Purchased a kill-a-watt power consumption meter to educate kids on power usage.
- Less a/c use, turning off lights more often.
- Less electrical usage-ex. Turning lights out, turning computer off etc. lowering house heating temperature when away & at all times.
- Lower temperature settings.
- Lowered heat in winter, kept house at 65 rather than 68, put up fewer xmas lights - ran them on timer.
- Lowered temp on hot tub, kept heat off in spring - put on more sweatshirts.
- Lowered the temperature in winter, raised indoor temperature in summer or don't use a/c at all, turn off lights/electronics, replaced lightbulbs with cfl's..
- Made sure lights were turned off when not needed.
- Mainly turning items off when not in use, ie computes, lights, other power supplies.

- Make sure lights are out if not in use, unplug items not in use, put plastic on our windows in the winter season.
- Make sure things are turned off & unplugged.
- More concerned w/ turning off lights & other equip when not in use, we don't run the furnace fan continuous & use fans & windows open for cooling when possible also this winter we average about 3 degrees lower house temp.
- More conscious of turning off lights.
- More conscious of turning off lights, hang clothes - rarely use dryer. Used our monitor/all aware. The monitor broke, we got it replaced by you! That one broke too, I really wish we still had it. We all watched it. Used towels more than once for showering. We also watch & read things on MG&E website. Unplug things. Rarely use a/c, we use fans instead. Replacing bulbs with cfl's. Shut off computers.
- More conscious of use, unplugging "phantom" plugs.
- More fluorescent lighting.
- More insulation in attic.
- Much greater use of fluorescent bulbs-turn off lights, TV, radio when not needed; don't keep computer running.
- Note - we plan on replacing all of our "canned" lighting to fit more energy efficient bulbs.
- All fixtures need to be changed out because the "bulbs" do not fit.
- Our grown daughter would come to our home once a week to wash & dry her clothes, we bought her her own washer & dryer about 2 mths ago.
- Our son lined window spaces with plastic sleeves from newspapers to keep cold out & therefore use less energy.
- Programmable thermostat. We actually did better without it! Found it complicated! Easier to turn down when we left and up when coming home or constant 67 degrees with the old one. Have set new one at 67 and do turn it down when we leave in winter.
- Purchased 2 power strips that turn off peripherals when TV is turned off. Replaced 2 bulbs with energy efficient ones.
- Purchased a new (better) programmable thermostat.
- Purchased energy savings lightbulbs.
- Purchased some energy efficient light bulbs.
- Put computer and peripherals on a powerstrip to turn off power to transformers when not in use. Did the same for TV, digital convertor box, and DVD player. More aware of turning off lights when not needed.
- Put in 3 way switches to turn lights off that are not in use.
- Put in more cfl's.
- Put plastic on all windows and doors, and temp on 70 only.
- Reduce energy at home.
- Reduce laundry, lights on, computer of at night, auto lights.
- Reduce the use of oven and more conscious to turn lights off when not in room. Also made sure all computer equipment turned off when not in use. Learned power saved on desktop computer was about \$25-30/mth. Used grill and microwave oven more and also lowered heat to 66-68 degrees normally.
- Reduced usage-cut down on D/C usage & lowered winter thermos.
- Reminded children to turn off lights when exiting rooms.
- Replace old insulation with new.
- Replaced all light bulbs in major lighting area with lower wattage energy bulbs.
- Replaced all light bulbs with low energy bulbs.

- Replaced incandescent bulbs with CFLs, yard light with fluorescent and sodium instead of mercury vapor, supplement with wood for home & water heating.
- Replaced most light bulbs with CFLs.
- Replaced most of our incandescent light bulbs with fluorescents. Use central air less.
- Replaced upstairs windows (5) w/energy efficient, double paned vinyl windows.
- Replacing incandescent to fluorescent lighting (also installed programmable thermostat).
- Routinely disconnect-shut down electrical appliances when gone for a period of time, computer, air purifier. Changed more lights to energy efficient type.
- Set back thermo on furnace, turn off lights not necessary.
- Shorter showers, burn more wood in a small burner in side the house that doesn't take power to run it, versus the outside wood stove that takes power.
- Shut down computer at night, unplug cell phone chargers, turn down temp in house in winter and rise them in the summer, put in energy star light bulbs.
- Shut lights off.
- Signed up for the time-of-use program and used more energy during off peak time.
- Started turning off more lights.
- Switched light bulbs, unplug unused electronics.
- Thermostat down on furnace in winter, turn the thermostat up on a/c in summer.
- Training family to turn off lights, not working for teenaged son. Pull the plug on cable TV Box.
- Tried to be more cognizant of lights being left on/turned off.
- Tried to be more conscientious about turning off lights, etc. Used energy saving light bulbs.
- Turn down temperature in cold weather months, etc.
- Tried to be more conservative.
- Tried to do household chores during time of use energy discount rates in the winter.
- Tried to fix any leaks, door frames, windows, etc. (We have a house over 100 yrs. Old -shut off any lights in rooms not being used).
- Tried to keep the heat down more, kept it colder in the house, tried to be better at turning off lights.
- Tried to reduce the number of lights on.
- Try to reduce lights burning & TV usage, reduce a/c use.
- Try to remember to turn lights off.
- Trying to use less AC, try to turn more things off-meaning unplugged, when not in use.
- Turn down the heat at nights to 65, 68 during the day.
- Turn dryer off, use lower setting in dryer, turn lights off, turn a/c setting to 78 when no one is home.
- Turn lights off when leaving a room set air conditioner at 78 during hot weather. Turn A/C off at night, purchase some energy efficient light bulbs.
- Turn off all electrical things when not in house.
- Turn off appliances not needed (TV, PC, etc.). Makes a difference.
- Turn off computer when not in use.
- Turn off lights consistently, unplug toaster & cell phone chargers when not in use.
- Turn off lights more, replaced incandescent with CFL.
- Turn off two outside motion lights.
- Turn temp down watched the on lights unplugged unused items.
- Turn things off when not in use, lights, computer, TV, etc.
- Turned (air conditioning) thermostat up a degree or two.
- Turned off all extra electronics when not in use (stereos, etc).

- Turned off lights more often, put electronics on switchable surge strips for non-use times, started replacing cfl's with led bulbs.
- Turned our heat down, used our AC less.
- Turned the a/c off during weekday work time hours. Turned the spare refrigerator in the basement off.
- Turned thermostat down
- Turning lights off when not being used. Remove secondary refrigerator, use of cfl's.
- Unplug battery toothbrush charger until needed, turn off power to entertainment center, turn off computer. Replaced all light bulbs w/ energy star.
- Unplug items not in use
- Unplug small appliances when not in use, avoid using a/c, substitute energy efficient light bulbs.
- Unplugged items such as chargers and any items that were not used on a regular basis
- Unplugging things-turning things off.
- Use fluorescent light bulbs in most light fixtures.
- Use less a/c.
- Use lights less or not at all, reduce thermostat.
- Use more new light bulbs, turn lights off when not in use, computer unplugged when not used.
- Used curtains to keep the house cooler during the daytime last summer.
- Used dryer less, hung clothes out more, shut off lights more.
- Used less heating during day, less a/c, turning off lights, replaced all bulbs w/ energy savers, turned down temp of spa.
- Used our energy monitor to determine which appliances were the biggest drain on our electricity. Then we tried to unplug those appliances and others to reduce our footprint.
- Very conscious of turning off lights, using power strips, unplugging "wall warts", motion detector porch lights, switching light bulbs.
- Was more diligent about turning off "stand by" mode of computer, printer, etc.
- Wash clothes in cold water, line dry whenever we can, purchased thermal drapes.
- Watch the meter and try to figure out how to save money. Turn computer off at night.
- We had all new energy efficiency windows installed throughout the entire house.
- We modified when we ran the washer and dryer. We tried to hang more clothes on clothes line and started getting on the kids to turn lights off.
- We reduced our use of heat & air. We reduced our use of water and electricity throughout the house.
- We replaced our home front entry door and storm door with more energy efficient doors.
- We turned down the heater on our hot tub - it runs half as often as it did last year. We are more vigilant about turning off lights, etc.
- We watch how much usage is then try to figure out what is on and what we can do to reduce usage.
- Weatherstripping, plastic windows during winter.
- We're unplugging appliances when not in use.
- When leaving a room, the lights are to be off. Shades are pulled during hot days
- When not in use, we turn it off.

10b. Where did you hear of these actions as ways to save energy?

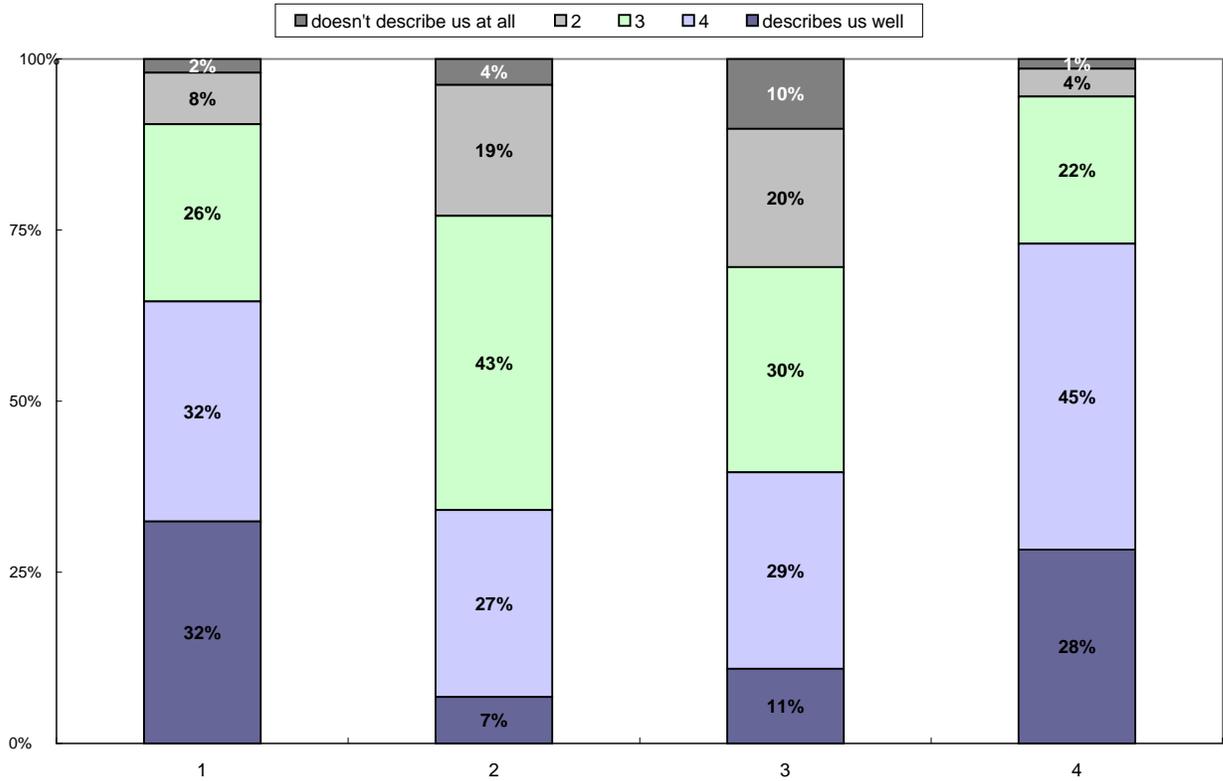
- A friend recommended 5 star energy consultants
- A newspaper story about phantom electricity - how little know it is but what it uses
- A refrigerator magnet sent by our utility.

- Advertisements.
- Advertising in newspaper & TV.
- All over-newspapers, M-Power program, Focus on Energy, Folks on Public Radio
- Between periodicals and magazines for work as well as small brochures from MG&E included with our bills. Also read literature received from Focus on Energy. My husband is the engineering manager for an HVAC sensor manufacturer in Middleton.
- Common sense. (14)
- Don't know.
- Doors needed replacement as we had air leakage-research at business and internet.
- Electric co, newsletter.
- Energy saving tips (2)
- Focus on Energy & utility.
- From a colleague.
- From my mother, who is 90!
- From the info you sent us and research on the Internet.
- General knowledge - but the power monitor proved it.
- General media, awareness.
- Had energy audit form Wisconsin Focus on Energy (Energy Star Evaluation Report) (Dave Geissler on site performance testing).
- I read a lot, TV promos... I try to be a good steward of the Earth.
- In info sent with this project and television infomercials.
- In store advertisements, parents, books & articles in newspaper.
- In store, on TV.
- In the electric bill flyers.
- Info with bills.
- Inserts in electric bill.
- Just knew about the technology - TV commercials I guess.
- Just more aware/electric bill insert.
- Lighting Bill.
- Literature about energy savings literature, TV, you guys.
- Magazines, newsletters.
- Magazines, TV, insert in electric bill.
- Magazines, TV, mail.
- Mailed to me with my Wis Public Service bill.
- Many places.
- Media.
- MG&E website, got monitor from library - learned all of this from fliers/misc websites.
- MGE flyers.
- Mostly in your flyer/mailing.
- Mother Earth News.
- Need to replace old one over 30 years.
- News. (2)
- Newspaper. (2)
- Newspapers, magazines, TV-everywhere!
- Not sure.
- Not sure - perhaps from your materials.
- Nowhere.
- On my own idealism.

- On the news and newspapers.
- Online.
- Online, pamphlet sent by Focus on Energy.
- Other people.
- Pamphlets from Xcel.
- Pamphlets sent by this study, friends (light bulbs), pamphlets given by contractors (furnace/water heater replacements).
- Product packaging, internet.
- PSA's.
- Radio & TV.
- Radio, in electric pamphlets, TV.
- Radio, TV, newspaper, magazines.
- Reading.
- Reading, TV, stores.
- Realized loss of heat via cracks.
- Research.
- Saw it on our energy monitor, information sent.
- So many places: newspapers, magazines, radio, TV.
- Some from your fliers & some just common sense.
- Stein's ad.
- Store - energy star.
- Television Ads, family members.
- Television, MGE Brochure.
- This study, television, general info.
- Thought of it all by myself!
- Through Focus on Energy program.
- Through your flyers with our energy bill and TV adds.
- Through your letters.
- Tip sheets. (3)
- Tip sheets, and power meter reader.
- TV (9)
- TV – Oprah.
- TV ads & Store display.
- TV Ads & WPS flyers.
- TV ads, newspaper articles, in-store promotion at hardware store.
- TV, in store.
- TV, newspaper.
- TV, radio. (2)
- TV, read about.
- Various mailings, pamphlets, at least some of which from MG&E.
- Various media's, TV, radio & print.
- Watching the monitor.
- We Energies. (2)
- We received energy assistance and they referred us for help.
- Would save on our appliances plus reduce our energy.
- Xcel Energy. (2)
- Xcel/internet/common knowledge.
- Your information & TV.

11. How well do the following statements describe your household?

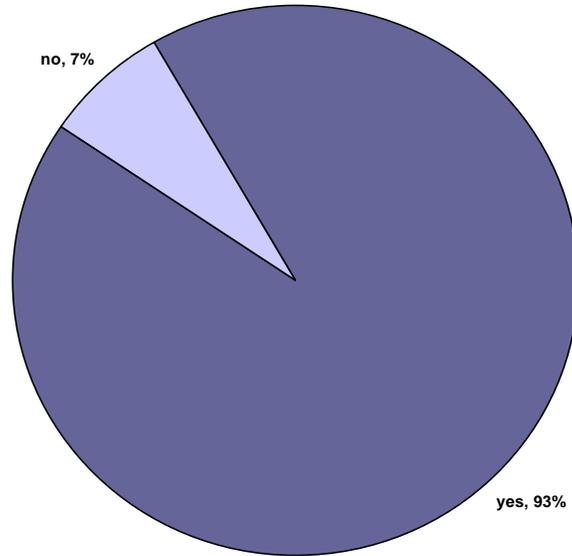
Statement	Describes us well 5	4	3	2	Does not describe us at all 1
1. We made efforts to cut back on household expenses during the past year.	<input type="checkbox"/> n=95	<input type="checkbox"/> n=94	<input type="checkbox"/> n=76	<input type="checkbox"/> n=22	<input type="checkbox"/> n=6
2. We have more control over energy costs than most other types of expenses.	<input type="checkbox"/> n=20	<input type="checkbox"/> n=80	<input type="checkbox"/> n=126	<input type="checkbox"/> n=56	<input type="checkbox"/> n=11
3. We track our energy costs closely.	<input type="checkbox"/> n=32	<input type="checkbox"/> n=84	<input type="checkbox"/> n=88	<input type="checkbox"/> n=59	<input type="checkbox"/> n=30
4. We know what we can do to save energy in the home.	<input type="checkbox"/> n=83	<input type="checkbox"/> n=131	<input type="checkbox"/> n=63	<input type="checkbox"/> n=12	<input type="checkbox"/> n=4



The following questions were asked to the treatment group only:

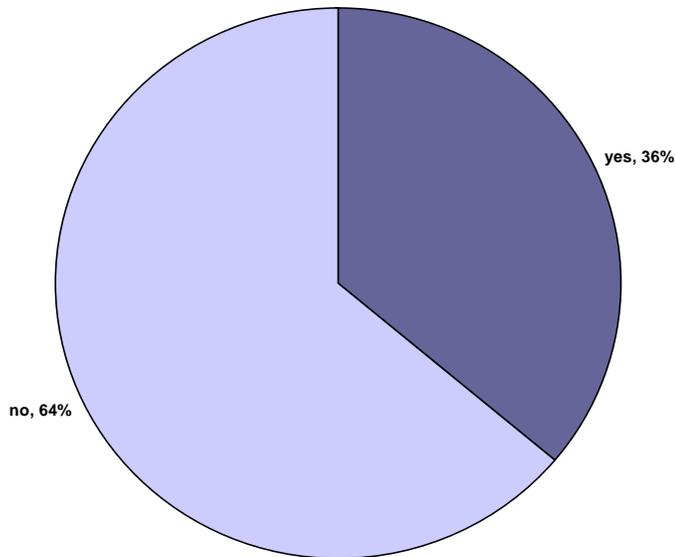
12. Do you recall receiving energy-saving tip sheets in the mail in the past 12 months?

- yes n=142
- no (jump to question #13) n=11



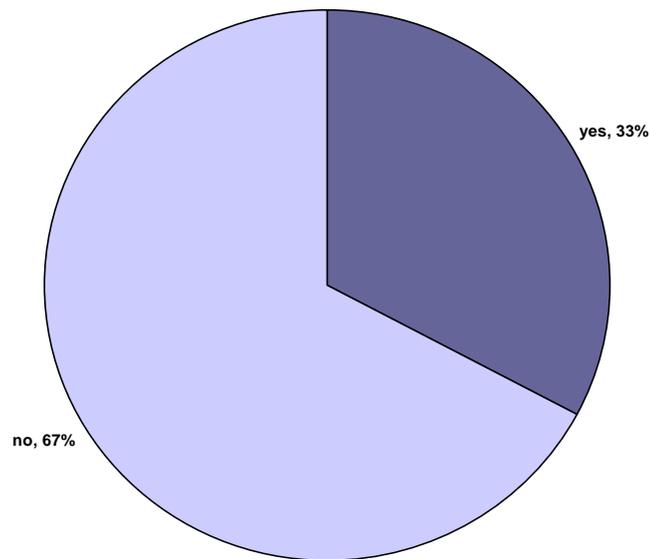
12a. Do you recall any suggestions on the tip sheets that you did not already know?

- yes n=50
- no n=89



12b) Did you try any suggestions on the tip sheets for the first time?

- yes n=45
 no (jump to question #13) n=92



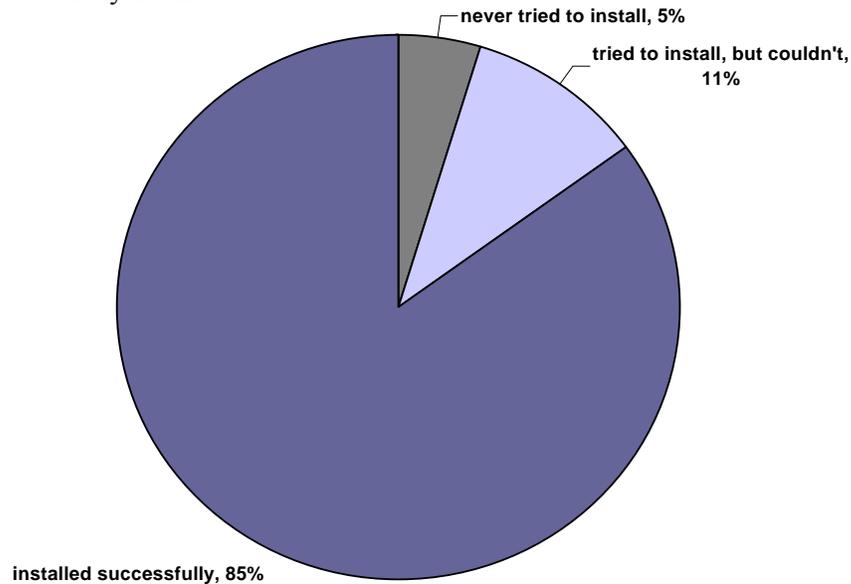
12c) Which ones did you try?

- This may not have been on the tip sheet, can't remember, improved ceiling fan usage, even for heating.
- Bulbs & insulating pipes.
- Cannot recall.
- CFL's. (7)
- CFL's, monitor from library, no dryer, unplug cell phone chargers, non-used appliances, signed up for green energy.
- Delay start of dishwasher to late evening.
- I'm having memory problems, but I cut up the tip sheets and placed them on the fridge. I did several of them, but I can't remember which exact ones.
- Insulate hot water pipes - have materials to do but haven't completed it yet.
- Insulation pads for wall outlets, replacement of old exterior caulk at doorways.
- Keeping curtains shut during hot days.
- Less indoor cooking on warm days - simple, but never really thought about it, also used smaller cooking appliances more conscientiously.
- Light bulbs, using ceiling fans.
- Lights, computer.
- Low energy lamps, cut back on heat & a/c.
- Lower heat settings.
- Made more of an effort to follow tips everyday.
- New energy bulbs, unplug appliances when not in use (computer).
- Plugging tv's and entertainment centers into light strips.
- Power strips for devices using transformers.
- Reducing how hot the water heater was, fridge and freezer temps.
- Reducing temp on water heater, changing out light bulbs.
- Replacing light bulbs w/ cfl's, lowering temp in winter (not deviateing from set thermostat plan).
- Sealed basement windows.

- Setting water heater form 140 to 120.
- Suggestions named in 10a.
- Switching ceiling fan directions for different seasons.
- Turning lights off, unplugging items when not using.
- Turning off "stand by" mode, use microwave instead of stove to heat water.
- Turning off appliances, turning fan opposite direction (for air flow).
- Unplug appliances & chargers when not in use.
- Unplug phone adapters, unnecessary lights, turn the heat down while away.
- Unplug unnecessary appliances, chargers, etc.
- Unplugging appliances, computers, etc. when not in use.
- Unplugging small appliances - until he read it from you my husband didn't believe me! We do it at home and at our cabin.
- Unplugging the entertainment center and appliances when not in use.
- Unplugging unnecessary plugs.
- Unplugging unused electronics.
- Using cfl's everywhere we use light often.
- We have replaced most of the light bulbs in our home with high efficiency fluorescent lights, purchased high efficiency 2 stage natural gas furnace.

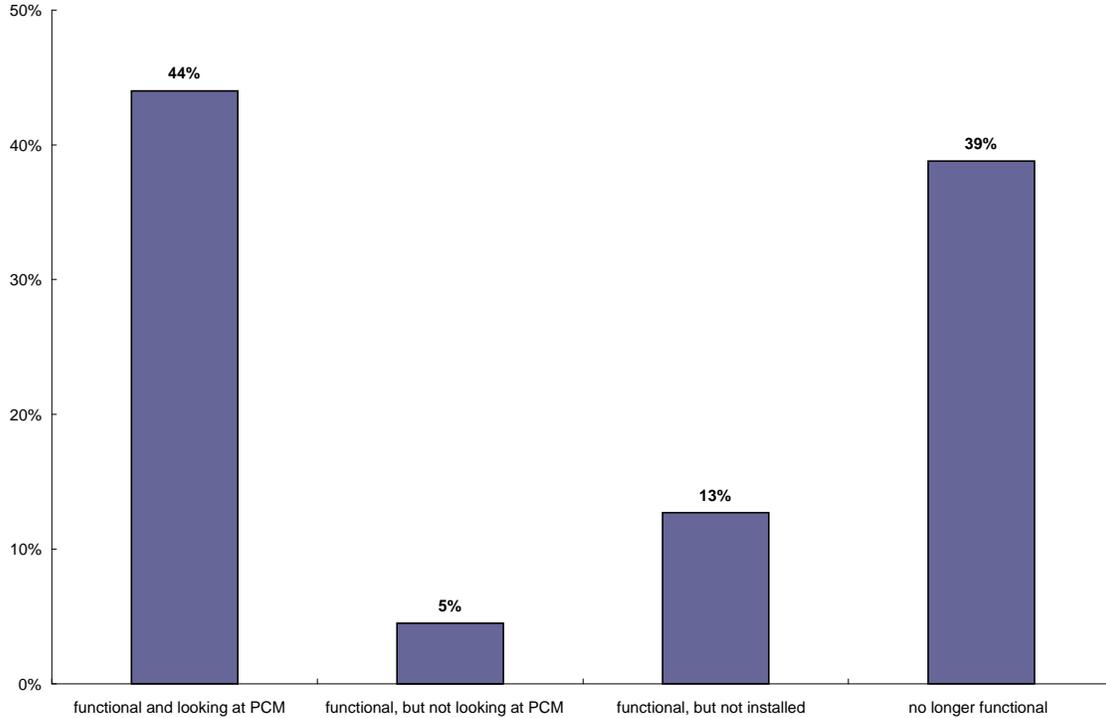
13. What did you do with the PowerCost Monitor we sent you as part of this study?

- never tried to install (jump to question #19) **n=7**
- tried to install, but did not get it to work (jump to question #16) **n=16**
- installed successfully **n=129**



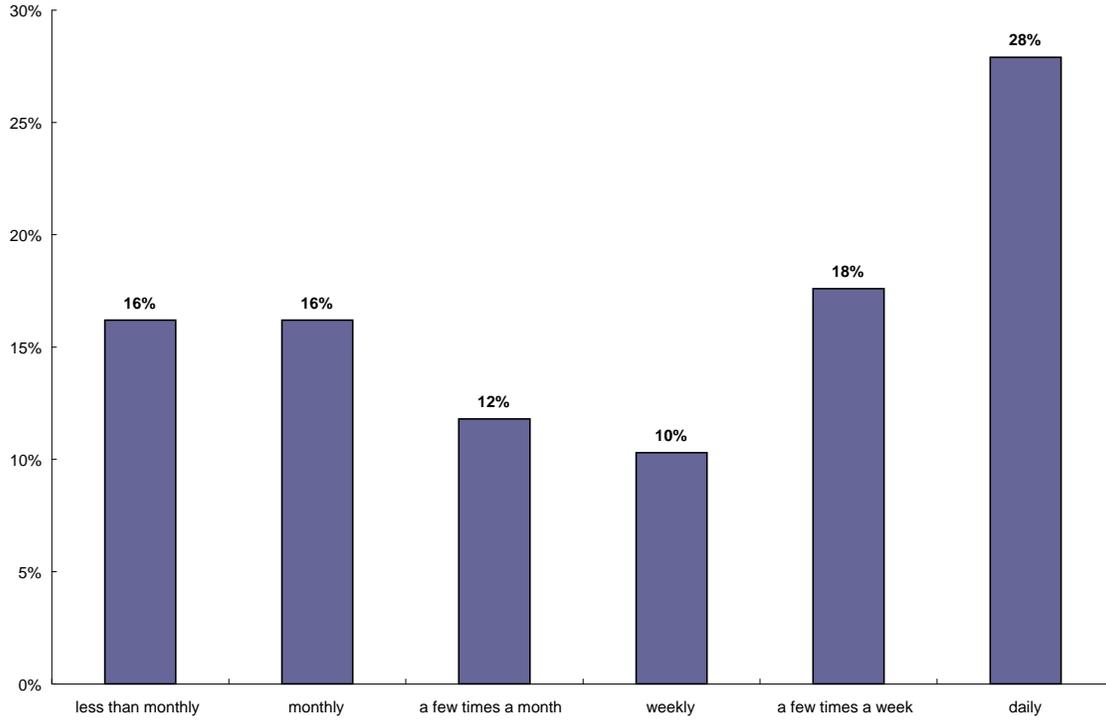
13a. Which of the following best describes the current status of the monitor?

- still operating with someone looking at it at least occasionally n=58
- still operating, but no one is looking t it (jump to question #14) n=6
- still functional, but no longer installed (jump to question #14) n=17
- no longer functional (jump to question #14) n=52



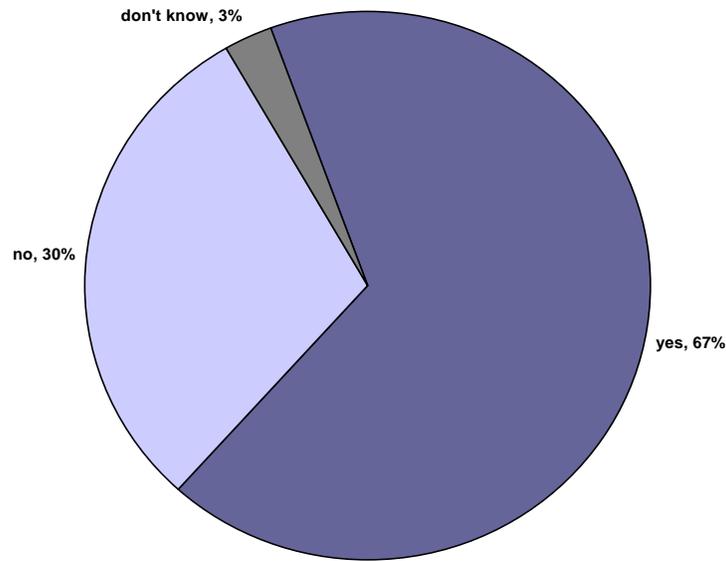
13b. About often does someone in your household look at the PowerCost Monitor now?

- less than monthly n=11
- monthly n=11
- a few times per month n=8
- weekly n=7
- a few times per week n=12
- daily n=19



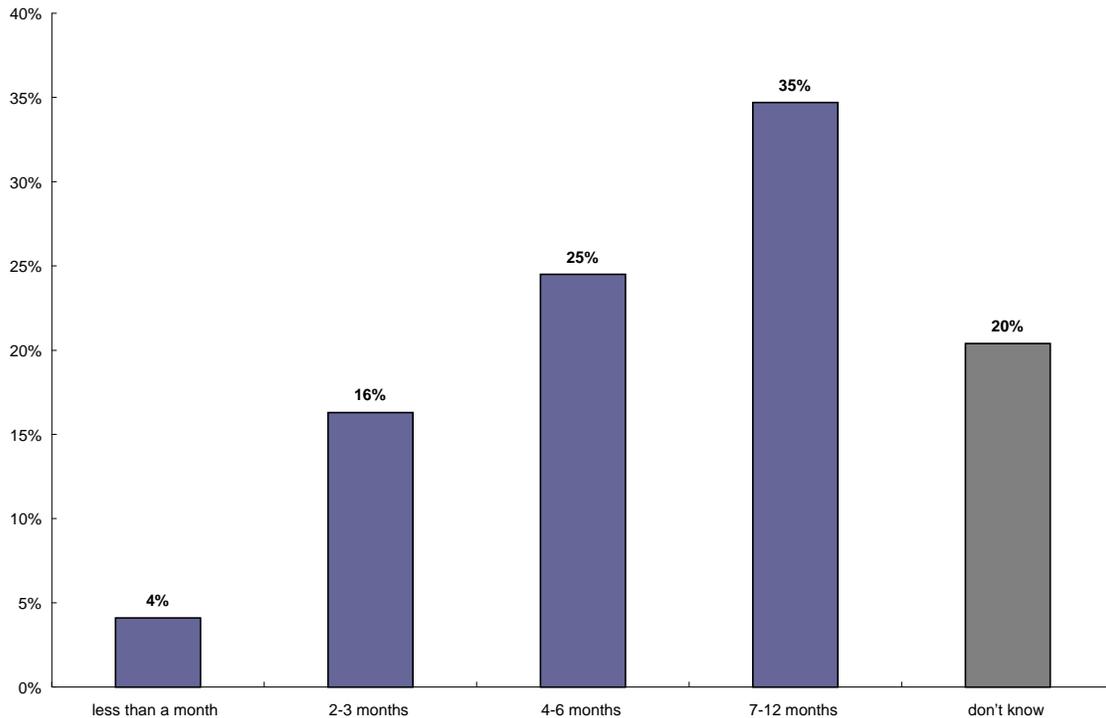
14. Did you replace the batteries at any time?

- yes n=92
- no (jump to question #15) n=41
- don't know / don't remember (jump to question #15) n=4



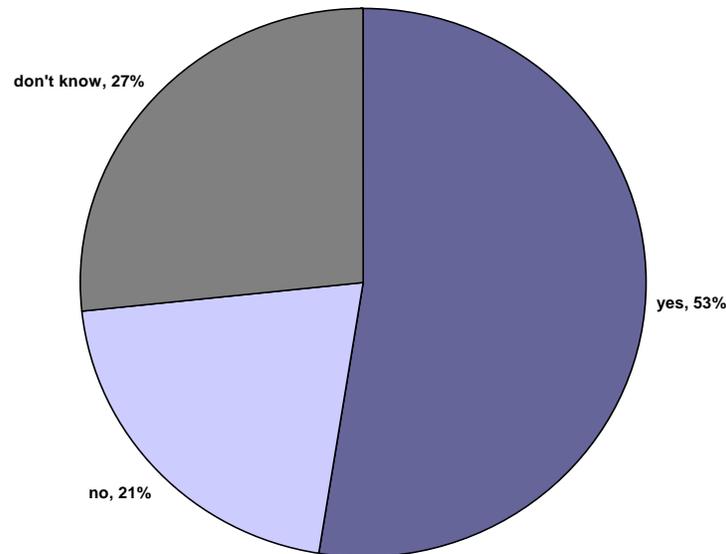
14a. How long did the first set of batteries last?

- less than a month n=4
- 2-3 months n=16
- 4-6 months n=24
- 7-12 months n=34
- don't recall n=20



15. Has using the PowerCost Monitor helped you save electricity?

- yes n=73
- no (jump to question #16) n=29
- don't know (jump to question #16) n=37



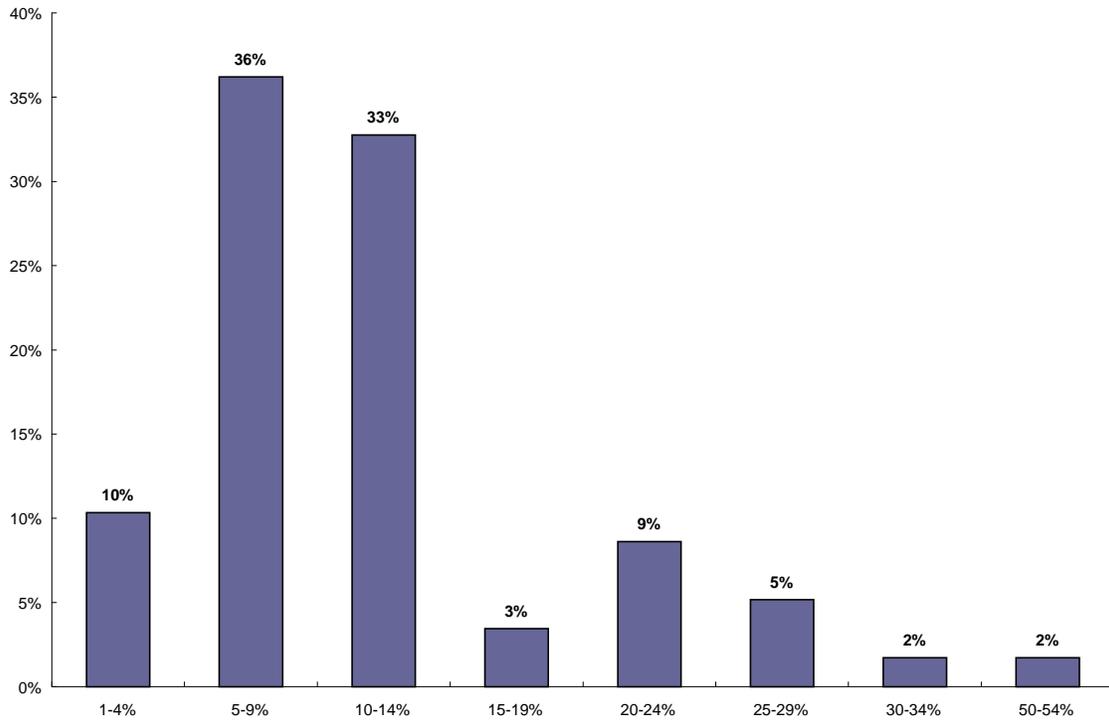
15a. In what ways?

- A/C is very expensive - I see it in the meter. Also, whole house fan uses more than I realized.
- Could look to see what was being used and how much that was. Monitor stopped working when the seal went bad and rusted out.
- Discontinued old fridge, turn off lights when not needed.
- Electric bill went down somewhat.
- Energy cost awareness.
- Gives you a better idea of what electricity you use.
- Helps realize how much electric power is used and where to cut back.
- I can actually see what my electric usage is. When I turn on appliances (furnace, dryer, oven) I can see what they are using.
- I needed it a few years earlier when I had all my children living at home. Then I would have used it as a learning tool for them on how much electricity they used.
- I sort of answered this question in #10. I believe the monitor has made our electricity consumption much more tangible and explicit.
- I think it has made us more aware of when we have left things on that could be turned off.
- I watch what I turn on and do not leave my christmas lights on as long.
- It allowed us to look at each item that uses energy to determine what uses the most electricity.
- It allows me to monitor my energy electrical usage, it is a great device, I like it very much, it is handy.
- It gave me information on how much electricity different appliances used.
- It has become a family challenge - - how low can we go!
- It has made us a little more conscious of wasting energy.
- It helped us determine which appliances were the biggest drain. We then either unplugged certain items or have plans to replace "high drain" items.
- It helps to have a visual confirmation of energy use and also to be able to show others in the household your efforts for saving energy.

- It keeps everyone in the house more energy conscious. When you looked over and saw it you wanted to make the number smaller.
- It made the suggestions of the tips a reality. It was very immediate the advantages of unplugging or turning off unneeded lights/power. You could see it on the monitor. When it was functioning we loved it and checked it daily - it was checked throughout the day.
- It reminds you of what your energy costs are and how much you are using.
- It showed what appliances used more energy when running.
- It totally made us aware of how much we were using at what times of the day. We can't get it to work anymore & we miss it. We have it sitting on the kitchen sink area so we can always see what's going on.
- It was great to see what energy we were using when the energy meter worked... then Xcel Energy replaced the outside meter type and since then we cannot get the meter to work.
- It's a great visual of real time power consumption.
- just made us aware of costs to run different items
- Just monitoring the numbers.
- Just more conscious of energy consumption being able to see the \$/hr being used.
- Lights, TV off, fridge & freezer temp.
- Looking at what sucked up energy (our stove - we will replace when we can) and trying to modify.
- Made me aware of usage at different times of day and month.
- Made us aware of energy being used, we turn off lights more often, and heat and air all the time.
- Made us aware of the energy we used ie. a/c.
- Made us aware of when energy usage was high.
- Made us more aware - my husband really tuned in when the air conditioner kicked in "wow look at that dial spin!" he paid more attention to the energy bills also.
- Made us more aware of energy being used so we could shut off unnecessary things.
- Made us more aware of how much energy we were wasting and helped us remember to make an effort to take steps to reduce our expenditure.
- Made use more conscience of being energy efficient.
- Makes everyone more aware of cost. Especially when set to \$ instead of kw.
- Makes me realize when things are turned on downstairs and everyone is upstairs.
- Makes us more aware of our usage.
- Making me more aware of the costs.
- More aware of usage.
- More aware of using power surge cords, unplug TVs when not in use.
- Much more conscious of usage.
- Our family would like to make a game out of it by seeing how low we could get our energy consumption down.
- Saw how much hot water heater drew.
- See where and when we are using a lot of electricity.
- Showed cost of using electric clothes dryer.
- The monitor has made us aware of which appliances use energy & we have tried to reduce our usage of those or use them more judiciously.
- Think about what is on that should not be on, when to do some task like washing or dishwasher, type of exterior landscape lighting.
- To use a/c - dehumidifier in ways to reduce overlap.
- Try to monitor usage, could tell when the hot water heater turned on.

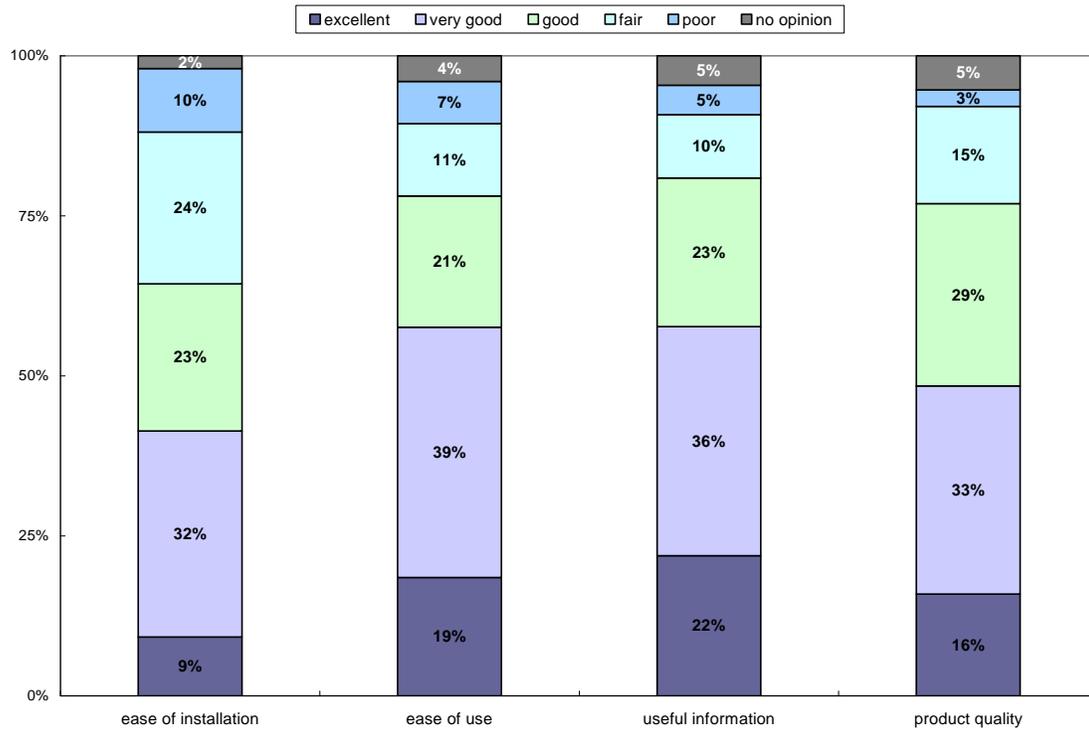
- Turn off lights not used - turn off TV when not in use, unplugged coffee pot.
- Turning thermostat up in summer, seeing usage when older refrigerator is running.
- Unplugging appliances & drying clothes outside.
- Use larger loads of dishes/laundry to run less loads, turn off cpu's more often.
- Very little - we were able to determine how much it costs to run some electronics. We have a device that plugs into receptacle, then reports electrical use of electronics plugged into it. We use this more often.
- We are budgeting to purchase new appliances.
- We are much more conscientious about turning off lights and appliances not actually needed - even for short periods of time.
- We became aware of things that increase usage like the toaster. We stopped running it for one piece of toast.
- We can see how much each appliance uses.
- We now know which appliances use the most energy & we try to avoid and/or decrease the use of these appliances.
- We run washer/dryer at non peak time we do a lot of laundry in a week - we do foster care.
- We turn lights off in the house except the room we are occupying. It has reminded me that I didn't turn off the oven!
- We were a low user anyway, but it helped us learn where the power jumps are (toaster oven) and made us more aware on reducing use like buying a low E - electric blanket.
- We were able to see when we were spending over our normal average, and then find out what we needed to turn off.
- We were able to see which appliances used the most energy and focus our efforts to reduce their usage.
- When it was working - I would go around and turn off lights.
- When the monitor was using higher energy, we looked for things to shut off.
- When we first installed the monitor we checked it all the time in order to note the effect on various items had. As a result we turn off computers, lights, etc. more often.

15b. Roughly what share of your home’s electricity do you think you saved? __n=58
1-4% n=6 5-9% n=21 10-14% n=19 15-19% n=2 20-24% n=5
25-29% n=3 30-34% n=1 50-54% n=1



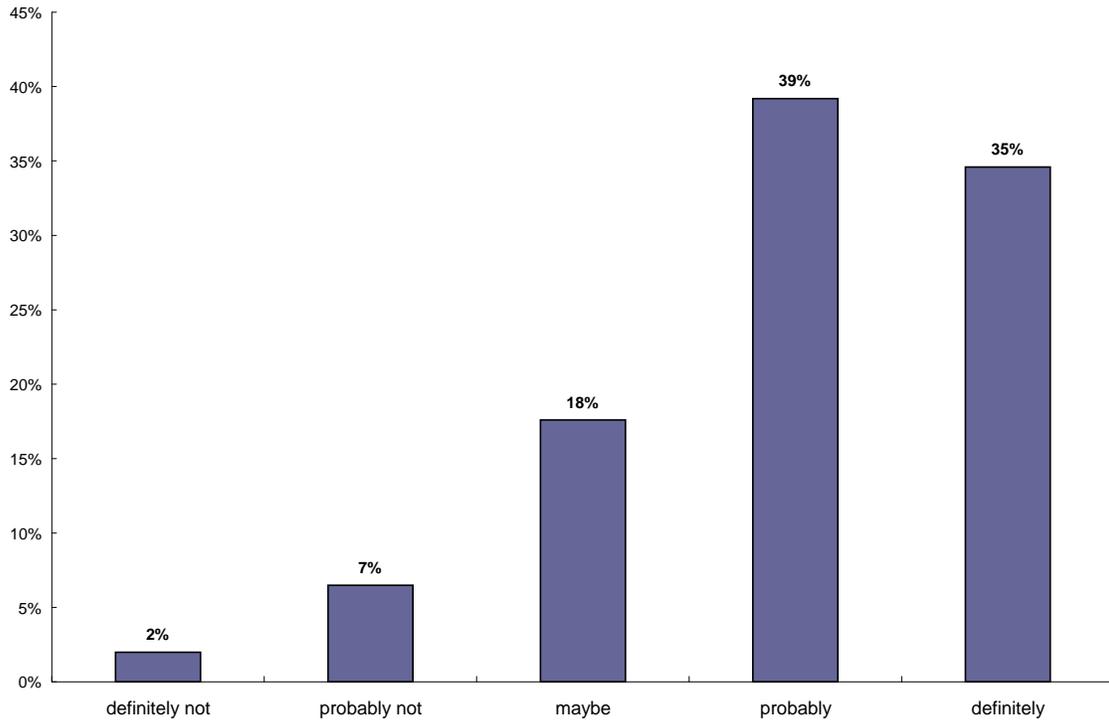
16. How would you rate the PowerCost Monitor on the following?

	excellent	very good	good	fair	poor	no opinion
ease of installation	<input type="checkbox"/> n=14	<input type="checkbox"/> n=49	<input type="checkbox"/> n=35	<input type="checkbox"/> n=36	<input type="checkbox"/> n=15	<input type="checkbox"/> n=3
ease of use	<input type="checkbox"/> n=28	<input type="checkbox"/> n=59	<input type="checkbox"/> n=31	<input type="checkbox"/> n=17	<input type="checkbox"/> n=10	<input type="checkbox"/> n=6
providing useful information	<input type="checkbox"/> n=33	<input type="checkbox"/> n=54	<input type="checkbox"/> n=35	<input type="checkbox"/> n=15	<input type="checkbox"/> n=7	<input type="checkbox"/> n=7
overall product quality	<input type="checkbox"/> n=24	<input type="checkbox"/> n=49	<input type="checkbox"/> n=43	<input type="checkbox"/> n=23	<input type="checkbox"/> n=4	<input type="checkbox"/> n=8



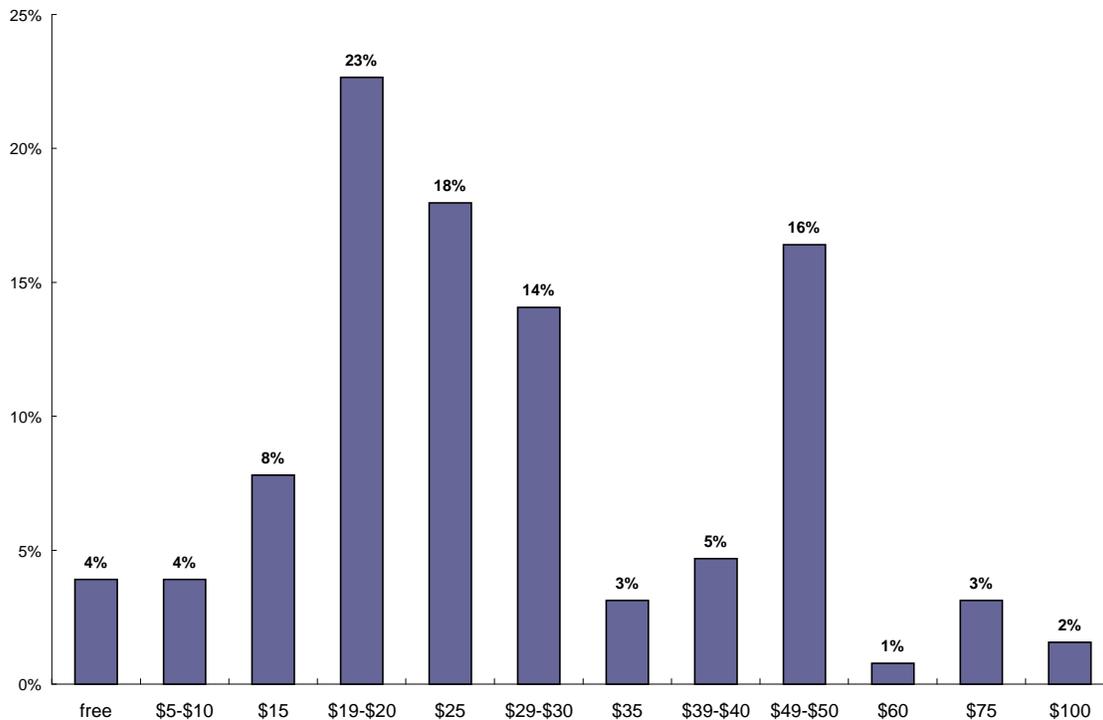
17. Would you recommend the PowerCost Monitor to friends and neighbors who are interested in tracking their energy usage?

- definitely n=53
- probably n=60
- maybe n=27
- probably not n=10
- definitely not n=3



18. What do you think is a fair price for the PowerCost Monitor if offered at a discount to encourage people to reduce their energy usage? _____ n=128

free n=5 \$5-\$10 n=5 \$15 n=10 \$19-\$20 n=29 \$25 n=23 \$29-\$30 n=18
\$35 n=4 \$39-\$40 n=6 \$49-\$50 n=21 \$60 n=1 \$75 n=4 \$100 n=2



19. What could we have done to make the PowerCost Monitor more useful to you?

- 1) Zigbee based that talked with thermostat 2) incorporated right into power meter (I have seen both of these) 3) be nice to talk to it from computer to be able to save data over time and look at it.
- A more simplified understanding of why the cost/hr can jump around depending of use and time of day and how this can be applied to effective energy conservation. Often our monitor would jump form \$1.25/hr to 30 cents/hr in a matter of seconds.
- A repair man had to change out the meter and after that I couldn't find the instructions for replacement. Maybe offer a log sheet to be filled in at different times of the day or during specific tasks to keep us focused on its usage.
- A second setting so that you could reset for a week while still keeping track for the month like the double odometer settings on many cars.
- Able to plug into regular electric source vs. batteries.
- An individual appliance power cost monitor would be a better idea as it would pinpoint the appliance that is costing the most money to operate.
- Better directions on use of product and easier install. I got it to work but then it just would not read when installed.
- Better explanation of usage.
- Better information about set up and kwh/price. Seemed to need a lot of adjustments. Batteries needed to be changed - and did not know you had to change ALL batteries at same time! Looking forward to the gift card, we thought it was coming long ago!
- Better instructions on use.

- Bug me more to install it; it just became a low priority.
- Called me to remind one of your availability & number. I really wish I had fully understood the mechanism & how to get it going again when the battery ran out.
- Clearer instruction regarding resetting the unit when batteries changed.
- Could make it audible to tell you time & temp and energy use in spoken english.
- Do not recall ever receiving a PCM though would positively put it to work. We have thermal shades on many of our windows and they are a big help keeping the cold and heat out. With the reconstruction our one very large thermal shade no longer was able to be used and the company that made them is no longer in business, hence a large window area presently is bare. Thank you too for your interest and concern! We have an outdoor grill that we use throughout the year. My husband prefers to grill our meat.
- Easier install, better details on our energy costs (how to find kilowatt hour cost).
- Easier installation. (4)
- Easier instructions on how to set it for your particular usage calculation - we didn't know what type of calculation our City had.
- Easier set up and installation. Otherwise it was useful in at least reminding us to preserve energy & keep costs down.
- Easier to install and have it work properly. Both me and my husband tried and my husband is somewhat mechanically inclined.
- Easier to install, easier to program.
- Easier to install, I had a hard time understanding parts of the installation & I took too much time to set & keep trying.
- Easy to install on our new digital meter, very hard to get working on our old dial meter. Our meter was replaced in April.
- Follow up closer on installation & ease of usage, problems encountered. Better help with instructions w/o use of much time.
- For its intended purpose I don't know if it could have been made anymore useful. I know there are devices that measure individual appliances but for this purpose it was more than adequate. This was a great device that I will continue to use.
- Have a way to determine which appliance uses how much power.
- Have an auto reset based on billing cycle for electricity.
- Have it still working, loved the temp monitor on it.
- Have MG&E display the rate on the bill more clearly.
- Have some type of non-audible (flashing light) if energy usage goes over a daily limit.
- Have someone call to help with install. The hours of operation for help to call were not helpful for me. I am very good with electronics, but we are on the time of use with Xcel and I could never get the monitor to record this.
- Have the dial reader a bit larger to pick up the blackmark on the dial a little easier. It was touchy to set.
- Having it synced in better. Having it pre-programmed with utility rates. Maybe have utility distribute it. It worked for about 6 months but then I could not get it to work again. I tried new batteries and tried to re-sync it again last weekend but could not.
- Help install it. (2)
- Humidity reading.
- I believe it would have been easy enough to install, I just set it aside and forgot to install it.
- I changed batteries and couldn't get it to transmit again.
- I don't know that I use it particularly well - mainly just look at overall ups and downs - very clear how heat producing devices use lots of power - that was helpful to see how dramatic that is.

- I found the monitor to be of little value since it had no way of knowing where electricity is used within home. I've always tracked gas & electricity use by month and year.
- I had trouble initially calculating the kw/h from the MG&E bill to set the device. Really wasn't the devices' fault it was interpreting the MG&E bill.
- I should have called for additional help after my monitor stopped working after 3 weeks but time passed too quickly - someone should call back to customer 1 week after install to check if any problems.
- I think the seal around the battery housing should be a lot better, mine went bad.
- I tried many times to make it work right. I used the instructions but found them complicated. I could have used the help of an energy consultant to help me understand it more. I would like to have someone help me to use it again. I think it is a good thing.
- I used an individual watt-a-meter to monitor certain appliances for small differences. The PowerCost Monitor showed larger trends in energy usage.
- I wish I could get it back working again.
- I would use again if had instructions about battery replacement. What size battery(s) and where they are. Battery life was big issue with product (1-2 weeks). I don't know where batteries are that need to be replaced in device or transmitter.
- If it would give us cumulative data on when in the day, week, or month we used the most electricity or how much each major appliance is using per month.
- I'm pretty tech savvy, but installation wasn't at all intuitive. Establishing the RF link should be simpler.
- Improve reliability when used with rotary type meter. (Our meter was changed/upgraded & monitor was not re-installed). With the type of meter we now have (not needing meter reader) I would like to see real time account info over the internet - like a small window constantly open on the screen. Didn't seem to work as well in the cold winter temps.
- Installed a wider field for the sensor to the meter. Indicate lithium batteries installed.
- Instead of it displaying a kw output it would be more interesting to see a dollar figure per minute or hour. To the general public it could be difficult to put it in terms they understand - keep it simple.
- Instructions on how to better interpret the information it provides, power companies need to monitor their rates so that consumers feel their efforts are worth it!
- Instructions simpler for finding the problem I'm having. Help telephone # to call.
- It did not stay synchronized with the meter which meant what it showed was much higher than reality. None the less using it was very helpful and I compared the numbers from month to month in hopes that the inconsistency was, umm consistent. :)
- It was a bit finicky to get it to read the meter. Would probably be most useful for people w/ many electronic devices - our household is electrically fairly simple. Moreover, I already was keeping fairly close watch on our energy usage by comparing usage by month for last 3 year period.
- It was a little difficult to install and did stop working a couple of times.
- It was a little hard to understand on how to set it & it was not easily set. Our batteries died & we replaced them but we can't reset it (lost instructions) but thought we could figure it out but couldn't and we really do miss it!! Thought it was a great product. People would always question us on what it was and what it did. It really makes you aware of your usage and what you can do to make changes! Everyone loves to save money! I think if we conserve it's better for environment.
- It was broken by the meter reader which was very disappointing because we really liked using it!! Very upset it broke! Maybe because the unit broke so easily it could be made to be more durable.

- It was difficult to change the batteries outside in the deep snow and cold.
- It was hard to install on our meter (the kind w/ a dial). It seemed to be just a touch too small. I couldn't get the sensor placed exactly right because it didn't come out far enough, and the band fit around the "dome" in a place where it was slightly curved. So when it stopped working, I assumed it was bumped or something, but now I realize it may have been the batteries... no way to know but to go wrestle w/ it.
- It was somewhat interesting to use and see the cost rise when certain appliances were operating, but I'd say that it didn't change our energy behavior because we feel that we are pretty low-level users. I think we might be more prone to change our electricity behavior if the device could help us compare the electricity we're using with more energy-efficient models of the same appliances. I also think an "energy audit" would cause us to change our electricity behavior. Also, if the device was smaller and could be wall mounted easily - like a thermostat - I think that would help.
- It was very hard to set up the inside monitor and program it to your energy rate.
- It worked very well.
- It works fine and was easy to set up so for me not much more. Others might pay a little to have someone come out and set it up or include that service in the cost if you are selling the monitors.
- It would be helpful to have something on it that would say that the batteries were low & needed to be replaced.
- It would make more sense if you didn't have to change the batteries... maybe it could plug in or be rechargeable?
- Longer battery life
- Longer life. Download information to computer - spreadsheets of what we use.
- Make it more reliable.
- Maybe a higher end version that feeds data to an ongoing report, like an energy diary. I'd be interested in being able to note which appliances, etc. were on at various times in order to pinpoint what causes spikes. Then if that info could be graphed against billing data it would provide an interesting picture. This would make a great on-demand web report.
- Maybe slightly smaller size - but only if readouts were kept larger enough and bright enough for easy viewing (preferably from across a room). Easy reading contributes to more frequent and better usage.
- Money calculation/programming is difficult because of variable rates from MG&E. Also - meter didn't seem to show electric use of smaller items (lights, small appliances, etc.) making it seem as if those items were unimportant in overall power consumption (though we're told that they are important).
- More easy to install, understand and read.
- More info on how to figure out what is causing the monitor to show a high reading. When you turn things off - it's not always an immediate change in the reading so it's hard to relate a high reading to a specific appliance.
- More sensitive to smaller fluctuations in power.
- Move it around more.
- My electrical box is updated, so I'm not sure whether it is your equipment or We Energies. I try to help when I can with tracking.
- My son hooked up the system and then something happened to the monitor and I did not know how to hook it up again. I was not able to follow the energy use.
- Need a reference to measure energy use changes. Running total does not help identify energy saving reason.

- Never worked for us - tried calling, no one returned phone call. Maybe installing product for families.
- Not really sure - for some people if you could make it easier to understand.
- Not really user friendly, ate batteries, even Duracel. Installation was not that easy location was not easy. My wife gave up on it. Nice idea the meter unit was hard to install. Thank you.
- Nothing really. It turned out that our household is not that motivated to reduce energy costs.
- Nothing, it did what it says it would do.
- Nothing. (4)
- Nothing... people need to be open to this. I think the information provided in the letters has been useful. In our case, once we got to see the energy being used, it tuned us in to take action (small steps) to reduce consumption.
- Our electric box was converted to digital - we no longer have the instructions therefore we were unable to use for several months.
- Our meter was switched to a digital read out and we were not able to get it to work. (Happened about 5 mths into survey.) The power cost monitor was very useful. Although I found it difficult to determine which of our appliances were energy hogs. What I would have found to be more useful would be a monitor that I could place on each appliance to see what it consumes. We have a 15 year old refrigerator and a 25 year old freezer. I know we should replace them but it's hard to justify the initial cost when they are "still working well". If I could see hard facts about the amount of energy it uses over a year, it would make that decision a lot easier. If I knew we could recoup the cost (or part) in a few years, I would replace them.
- Our problem was that it died. It worked great, we loved it. Then all of a sudden, we noticed that the numbers never changed. There was no way that we had moved to always spending 3 cents/hour. It never moved off 3 cents. This happened about four months into the experiment. We would love to try another one.
- People may need to help with installation and help troubleshooting problems. It broke too quickly.
- Place instruction pocket or sticker on the back, especially after battery replacement. It is easy to misplace instructions. Or maybe a website address sticker. Our monitor stopped working in the last two weeks!
- Plug in model... batteries a problem.
- pre-program it (utility rates, etc.), also batteries leaked & corroded recently so it has been off a few weeks
- Provide a better tracking device that would record info over a period of time and a printed read out.
- Provide a chart to translate to my energy bill. The monitor did not work reliable where the sun was shining on the monitor or meter socket.
- Provide a more simple method to install.
- Provided benchmarks or goals. Explained average household energy use. Give examples of how to monitor/what to look for.
- Put it on.
- Put on some kind of form to keep track of usage.
- Really simple instructions - my daughter does most of the monitor buttons (I can't zero it out). We have been having battery and moisture problems that I'm trying to work out with outside connection.
- Send extra batteries.
- Sent monthly updates and/or tips.
- Show a direct link between usage and cost savings.

- Some functions listed in the directions were not enabled on the model we had. It would have been nice to track the max/min usage dates & times to give a base comparison. Also, it was hard to reset it so you could track total use over time compared to month by month. Having both values to review would have been nice. Also, the kwh rate entry was hard to decipher from MG&E website.
- Some of the programming was tedious. At 50 years we have always been somewhat "techno" challenged and didn't really "get" all the features. Didn't want to take the time to study the manual although I tried several times to understand it - my husband is a "plug it in" and watch it work kind of guy. We Energies changed to remote reading, and the meter went to digital and we were disappointed that it wouldn't work anymore. Before the meter change we looked at it daily. It was in our kitchen and was very visible and we liked it!
- Sometimes it's complicated to reset or zero and its hard to know when to reset when meters are read.
- The initial installation was difficult - so you may want to consider assistance to those who are not able to install. Provide rate information and specific instructions to load that information & subsequent follow ups if the rate changes.
- The install instructions could be a little more informative.
- The PowerCost Monitor was of use by allowing me to see the operating cost of each individual energy consuming appliance.
- There was nothing wrong with the monitor - my wife has health issues that make her feel cold all the time. She tends to use heat when I do not feel the need for it.
- They have installed digital meters and the monitor does not fit.
- This has been great, keep us in mind for other studies!
- To allow us to have the power monitor to be able to download the info our computer for statistical tracking of the data.
- To see a pay back or savings chart for updating appliances, lighting, etc. online for various products.
- Toll free support in getting it hooked up.
- Unfortunately I never got my monitor to work properly, even after a few hours of putzing around with it. I'm still not sure if the problem is with the machine or my incompetence. But I fully support the idea of the power monitor and hope that I'll be able to use one.
- watch it more closely
- We are on time of use so I don't know how much more we can do to save because we have to use what we have for appliances.
- We could not put in our rate cost. We have one rate for night and one for day unless we go over, then 3rd rate. The fact that it didn't last long was upsetting. Would like a new one! I want to purchase Energy Star equipment that turns off completely - even the new TV is in standby mode 24/7, unless we turn off the wall switch. I don't need 6 clocks in the kitchen on unused appliances. It's not convenient to unplug all the time. I want Energy Star to lobby manufacturers to modify their switches or products.
- We made changes in our household due to this monitor being located there. Even though we are not monitoring it much at all anymore, we have changed small things that use electricity. I now set a timer to turn on electric hair setter on just before I need it and not an hour before. I use timers for the crockpot setting. We use a/c only at night and the clothes dryer is on air only for most drying cycles.
- Well since we had two and they broke quickly, I don't know what to say. I would pay \$150 for one that lasted, maybe more. Money is tight right now so hard to think about buying it now. I will definitely buy one. I hope you can send me a new one!

- What would be really cool is if you could tell me the power output from each of my outlets. This way I can track everything else (besides major appliances). Plus, tie the power monitor use into my monthly bill and show details. Fyi, we had 3 friends go buy one.
- Worked great, after the batteries went dead couldn't get it to reprogram. I would love to use it at all times as a good tool for my family. Is it possible to get a new one?
- Would loved to have been able to use it - could have made a difference but after two three hour attempts to install it & get it to read indoors I gave up. Too frustrating & a waste of my time. Decided to go "green" with rain gardens, native plants, cut back in disposable items like paper towels. Would like to have assessment done for alternative energy - solar, geothermal, & wind.
- You need individual monitors for big appliances to do a better job of tracking energy usage.

APPENDIX B: BILLING ANALYSIS

OVERVIEW

We estimated energy savings attributable to the PowerCost Monitor by analyzing the usage patterns of 307 individual electric utility accounts. Of these, 212 of accounts belonged to homes participating in the pilot and 95 accounts belonged to the control group. We segmented the 212 treatment group accounts according to the ultimate status of the PowerCost Monitor at the term of the study: still functional (85 units), no longer functional (68 units) and never installed or unknown (59 units). Our primary billing analysis concentrated on the participant homes where we could confirm that the PowerCost Monitor was installed (153 units) and the control group (95 homes).

We used a non-parametric bootstrap simulation modeling approach to estimate confidence intervals for savings estimates and to test for overall net savings for treatment homes (relative to the control population). Our simulation model serves two primary functions: 1) a means to derive confidence intervals for savings estimates and 2) a means to randomly select and assign pseudo-treatment dates to control homes. The control group is assumed to account for factors exogenous to the effects of the pilot program itself, to include weather, appliance use patterns or other uncontrollable factors.

Our simulation approach uses the following algorithm:

1. We select a bootstrap sample of treatment and control homes (sampling with replacement) from the original treatment and control sample populations.
2. We sample treatment and control homes with replacement; therefore, treatment and control homes may appear freely within each bootstrap sample multiple times. We randomly select treatment dates from the bootstrap sample of treatment homes and randomly assign these to control homes as pseudo-treatment dates. We use pseudo treatment dates to determine pre/post periods for the bootstrap sample control homes. Note that this technique allows a control home to appear within a bootstrap sample multiple times, with each occurrence having a randomly assigned pseudo treatment date.
3. Using assigned treatment dates (and pseudo-treatment dates for the control group), we identify pre- and post-treatment periods for each of the bootstrap sample treatment and control homes.
4. We calculate annualized consumption (kWh) for pre- and post-treatment periods for each of the bootstrap sample homes.
5. We calculate savings (as the difference between pre- and post-treatment consumption levels) for each of the bootstrap sampled homes. We calculated percentage savings, relative to pre-treatment usage levels) for each of the bootstrap sample homes. We calculate the median savings (kWh) and percentage savings for the treatment and control groups.
6. We then calculate the difference between treatment and control group savings estimates (both kWh and percentage savings). These are the “net” savings estimates for the bootstrap sample

in iteration “*i*”. We store the “net” savings estimates for the bootstrap iteration and repeat for $N=1000$ iterations. In this respect, percentage savings and kWh savings are calculated independently (i.e. kWh savings are not simply the percentage savings multiplied by the average annualized consumption levels for each group/sub-population).

7. We use the 1000 stored bootstrap net savings estimates to estimate average values and associated confidence intervals. Specifically, we employ Efron’s percentile method to derive confidence intervals for our “net” savings estimates.¹

DATA CLEANING AND DATA LIMITATIONS

We prepared the billing account information using several standard data cleaning practices to treat for instances of:

1. Estimated meter readings
2. Abnormally short and long periods between meter read dates (less than 10 days or more than 70 days)
3. Insufficient coverage for either the pre- or post-treatment periods (those being described by less than 180 days of data).

To ensure that time periods described by the pre- and post-treatment periods are seasonally balanced, we constrain pre-treatment usage data to span only those periods within the calendar year covered by the post-treatment period. Post-treatment periods include billing records that fall at least 30 days after reported installation dates. By way of example, consider a PowerCost Monitor device that was installed on July 2nd, 2008. The monthly fuel usage data for the same example participant shows that the last recorded billing period was June 5th, 2009. We assign any meter reading falling between August 1st, 2008 and June 5th, 2009 as belonging to the post-treatment period. Accordingly, meter readings occurring between August 1st, 2007 and June 5th, 2008 were assigned to the pre-treatment period.

Our set of billing data has one notable limitation (although this limitation is typical across similar pilot program evaluations). The recent nature of the pilot program allows for only one year of post-treatment information. In many cases, post-treatment time periods are described by time periods exceeding 180 days but less than a full year. One implication of the limited post-treatment data is that savings estimates may not necessarily be indicative of long term savings (at least in excess of one year). As such, we should take care to characterize our savings as those that may be achievable up through one year post-treatment, and not beyond.

¹ Efron, “Intro to the Bootstrap”, Chapman & Hall, New York, 1993. Efron’s percentile method ranks bootstrap estimates in order of magnitude and assigns the $\alpha\%$ and $100-\alpha\%$ percentiles to define a $2*\alpha\%$ confidence interval.

SAVINGS ESTIMATES

We used a non-parametric bootstrap simulation modeling approach to test for electricity savings in homes that installed a PowerCost Monitor (see appendix for a more detailed description). All reported savings are treatment group savings (at the median), relative to control group savings. Our modeling approach allowed us to estimate savings for several subgroups within the treatment group. We narrowed our investigation to test for savings for several key subgroups:

- Test 1. Savings for treatment group homes that successfully installed the PowerCost Monitor against the control group homes.
- Test 2. Savings for treatment group homes for which the PowerCost Monitor was functional and was consulted (at least) occasionally at the time of the end-of-study survey.
- Test 3. Savings for treatment group homes for which the PowerCost Monitor was consulted (at least) as often at the time of the mid-study survey as when it was initially installed.
- Test 4. Treatment group homes that thought the PowerCost Monitor was useful in saving electricity.
- Test 5. The top three quartiles of treatment group energy users, compared against the top three quartiles of energy users within the control group.

Test 1: Savings for participants who successfully installed the PowerCost Monitor.

We estimated savings for study participants who self-reported as having successfully installed the PowerCost Monitor. There were 149 accounts (with sufficient billing data coverage) that met this criteria and represent about 70% of the entire treatment group. We compared usage for the 149 treatment accounts against the usage of 91 control homes. Table 3 shows that the distribution of annualized pre-treatment energy usage (expressed in kWh/yr) for the treatment and control groups are quite similar. The noticeable difference in mean and median levels for these two groups indicates that pre-treatment energy use is not necessarily normally distributed across participants, with average annualized usage weighted toward the right side of the distribution.

Table 1: Pre-treatment usage levels: Overall distribution and quartiles used in the analysis

	Sample Size ²	Mean of Annualized Pre-Treatment Energy Usage (kWh) ³	25 th Percentile (kWh)	Median (kWh)	75 th Percentile (kWh)
Treatment	n=149	11,253 ± 721	7,356	10,358	13,910
Control	n=91	11,112 ± 1,081	7,719	10,491	13,864

We did not find savings for this group to be statistically different than zero. Regardless, the point estimate for net median percentage savings for this group is 1.4%, or about 126 kWh/yr. The probability that savings for treatment homes successfully installing the PowerCost Monitor would exceed the 2% savings threshold is 38%.

² Note that 153 treatment and 95 control homes were actually in the billing sample. However, several homes were withheld from savings calculations as a result of data cleaning procedures.

³ Expressed as a 95% confidence interval.

Test 2: Savings for participants who successfully installed the PowerCost Monitor, the PowerCost Monitor was both functional and consulted (at least) occasionally at the time of the end-of-study survey.

As several pilot programs have demonstrated, our survey responses indicate that there is significant attrition (from installation to the end of the study) in the number of PowerCost Monitors remaining functional and/or how often participants were consulting it. We found that out of all PowerCost Monitors that were installed, 44% were functioning and (at least) being consulted occasionally at the time of the end of study survey. We estimate savings for this group to be 3.4%, or 440 kWh/yr. Savings for this subgroup fall within a 90% confidence interval of -0.4% and 6.1%.⁴ We found the probability that savings for this group would exceed the 2% savings threshold is 81%.

Test 3: Savings for participants who successfully installed the PowerCost Monitor and consulted it (at least) as often as when initially installed.

Test 3 asks whether or not savings are statistically significant when participant interaction with the PowerCost Monitor persists at least several months after it was installed. We found that at the time of the mid-study survey, 41% of participants consulted the PowerCost Monitor at least as often as when it was initially installed. For these homes, we found savings to be 3.8% relative to the control group, or 416 kWh/yr. The estimate falls within a 90% confidence interval of -0.2% and 6.4%.⁵ The probability that savings for this subgroup exceed the 2% savings threshold is 83%. As a comparison test, we evaluated savings for participants who reported consulting the PowerCost Monitor less frequently than when it was initially installed. We estimated savings for this group (55% of respondents) to be 0.1% (within a confidence interval of [-2.9%, 3.6%]). The comparison test within Test 3 provides another indication that real savings are in fact related to how frequently the PowerCost Monitor is consulted.

Test 4: Savings for participants who successfully installed the PowerCost Monitor and responded in the final survey that they thought it was helpful in reducing their electricity consumption.

Test 4 estimates savings for individuals that thought the PowerCost Monitor was helpful in reducing their electricity consumption, regardless of the status of the device at the end of the study, or whether or not it was consulted more or less frequently than immediately following the initial installation. Approximately 53% of respondents answered that the PowerCost Monitor was indeed helpful in saving electricity (21% said that it was not, and 26% said that they did not know). We estimated savings for participants answering in the affirmative, and found that savings for this group are 5.4%. Moreover, the lower bound of the 90% confidence interval for this estimate was greater than zero (the interval was [2.5%, 8.7%]). The probability that savings for this group would exceed the 2% threshold was 96%.

We further subdivided this group by how frequently participants consulted the PowerCost Monitor. The resulting sample size for participants who reported that they thought the PowerCost Monitor was helpful, and who reported consulting it (at the end of the study) at least several times per week, was 22 respondents. We found that savings for this subgroup are 6.4% and fell within a 90% confidence interval of 2.9% and 10.8%; however, such a small sample size may be inappropriate to analyze using our bootstrap estimation methodology. As a comparison, we tested savings for participants that self-identified as infrequent viewers of the PowerCost Monitor (but still thought it was helpful). This

⁴ Expressed as a 90% confidence interval.

⁵ Note that kWh savings for Test 3 are lower than those estimated for Test 2, even though Test 3 shows higher percentage savings. This is not unexpected when percentage estimates are close in value, as pre-usage levels (used as a basis for calculating percentage savings) vary with the combination of homes included in a given subgroup.

subgroup was also relatively small (29 respondents). Savings for this subgroup are 0.8% and fall within the 90% confidence interval of -3.9% of 5.9%. Our results from Test 4 reinforce the notion that savings attributable to the PowerCost Monitor are strongly related to the level of participant engagement. Unfortunately, Test 4 results only pertain to attitudes that study participants revealed *ex post*, and may not be useful to the program designer who is trying to identify a targeted population of program candidates *ex ante*.

Test 5: Do PowerCost Monitor savings vary by pre-treatment usage levels?

Test 4 provides a hint that significant savings may be achieved if a suitable type of participant can be identified *ex ante*. There is at least one participant trait that can be used for targeted marketing – pre-treatment usage levels. Test 5 examines whether or not savings are statistically significant for the treatment group homes that fell within our sample population’s top three quartiles of pre-treatment usage (when compared against the top three quartiles of the control group). We subdivided the billing sample into quartiles of pre-treatment usage levels.⁶ Table 4 illustrates that the percentage share of homes falling within each quartile are remarkably similar across the two groups. Our savings estimates for this subgroup are indeed higher than the overall treatment group at 3.4%, or 360 kWh/year. Savings for this subgroup’s estimates fall within a 90% confidence interval of -0.3% and 6.3%. The probability that savings for the Test 5 treatment group exceed the 2% savings threshold is 77%.

Table 2: Percentage of Treatment and Control Homes Falling within Quartiles of Pre-Treatment Usage Levels

Quartiles	Interval (kWh)	Treatment		Control	
		% n Within	Mean (kWh)	% n Within	Mean (kWh)
First	<= 7,715	26%	6,612	27%	5,817
Second	(7,715 -10,452]	25%	9,348	25%	9,316
Third	(10,452-13,734]	24%	12,174	23%	12,203
Fourth	> 13,734	25%	17,472	25%	18,366

⁶ The quartiles shown in Table 4 were calculated using the entirety of the billing sample (n=308 accounts).

APPENDIX C: RELEASE FORMS

CONTROL GROUP:

**Energy Center of Wisconsin
Customer Information Release Form**

The Energy Center of Wisconsin is conducting a study of residential energy consumption on behalf of the Focus on Energy Program. The purpose of the study is to determine whether certain information materials and devices will help consumers to use energy more efficiently. To obtain the necessary energy consumption data for the study, we need all participants to complete the following release form.

-----CUSTOMER INFORMATION RELEASE FORM-----

The undersigned hereby gives permission to the company/companies below to provide customer energy usage and billing information to the Energy Center of Wisconsin, or its designated agents, for confidential use in connection with their study of residential energy usage on behalf of Focus on Energy and the State of Wisconsin. The release is effective through May 2009.

Utility (place a check mark next to your utility or utilities):

	Electricity	Natural Gas
Alliant Energy (a.k.a. Wisconsin Power & Light)		
Madison Gas & Electric		
Wisconsin Public Service Corporation		
We Energies (a.k.a. Wisconsin Electric Power)		
Xcel Energy (a.k.a. Northern States Power)		

Name: _____

Street Address: _____

City: _____

State: _____

Zip Code: _____

Utility account number(s) (it is extremely important that we have your account number from your utility bill so that the utility can provide the correct data):

Electric: _____

Natural Gas: _____

PLEASE NOTE: FORM CONTINUES ON BACK →

-----CUSTOMER INFORMATION RELEASE FORM (CONTINUED)-----



Telephone number:

Area Code: _____

Local number: _____

→ **Signature:** _____

Date: _____

Please return the completed form to the Energy Center of Wisconsin in the enclosed postage-paid envelope. If you have any questions, please contact Steven Kihm at the Energy Center at (608) 238-8276, ext. 131.

Thank you for participating in this important research study.

Energy Center of Wisconsin
Attn: Steve Kihm
455 Science Drive, Suite 200
Madison, WI 53711

TREATMENT GROUP:

**Energy Center of Wisconsin
Customer Information Release Form**

The Energy Center of Wisconsin is conducting a study of residential energy consumption on behalf of the Focus on Energy Program. The purpose of the study is to determine whether certain information materials and devices will help consumers to use energy more efficiently. To obtain the necessary energy consumption data for the study, we need all participants to complete the following release form.

-----CUSTOMER INFORMATION RELEASE FORM-----

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Utility (place a check mark next to your utility or utilities):

	Electricity	Natural Gas
Alliant Energy (a.k.a. Wisconsin Power & Light)		
Madison Gas & Electric		
Wisconsin Public Service Corporation		
We Energies (a.k.a. Wisconsin Electric Power)		
Xcel Energy (a.k.a. Northern States Power)		

Name: _____

Street Address: _____

City: _____

State: _____

Zip Code: _____

Utility account number(s) (it is extremely important that we have your account number from your utility bill so that the utility can provide the correct data):

Electric: _____

Natural Gas: _____

PLEASE NOTE: FORM CONTINUES ON BACK →

-----CUSTOMER INFORMATION RELEASE FORM (CONTINUED)-----



Telephone number:

Area Code: _____

Local number: _____

→ **Signature:** _____

Date: _____

SHIPPING ADDRESS

Where would you like us to send larger items, such as equipment?

___ Send it to my home address as shown on this letter.

___ Send it to the following address:

Name: _____

Street Address: _____

City: _____

State: _____

Zip Code: _____

Please return the completed form to the Energy Center of Wisconsin in the enclosed postage-paid envelope. If you have any questions, please contact Steven Kihm at the Energy Center at (608) 238-8276, ext. 131.

Thank you for participating in this important research study.

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