

# Residential Programmable Communicating Thermostat Customer Satisfaction Survey

## (Phase II) - Draft

*Demand Response Emerging Markets and Technologies Program*

*Summary of First through Third Customer Phone Survey*



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## ABBREVIATIONS AND ACRONYMS

PCT	Programmable Communicating Thermostat.
CSG	Conservation Services Group, the vendor responsible for the Customer Satisfaction Survey phone calls and data compilation.
HVAC	Heating, Ventilation, and Air Conditioning system in a building for providing comfort conditions.
LED	Light Emitting Diode, a small solid state lamp, typically red, green or yellow in color, found on electronic equipment and devices to indicate a condition or state.
Q12, Q18	Question 12, Question 18, referring to the questions that the phone survey asked of the customers.
SCE	Southern California Edison

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## EXECUTIVE SUMMARY

This report summarizes the survey responses of residential customers who were selected to participate in a test of a Programmable Communicating Thermostat (PCT) installed in their home to control their heating, ventilation, and air conditioning (HVAC) systems.

Three Customer Satisfaction Surveys were performed over the course of a year to quantify how the customer liked and used the PCT's. The first survey was performed in December, 2005, about 40 days after the installation of the PCT's. Those customer responses were summarized in the report *Residential Programmable Communicating Thermostat Customer Satisfaction Survey* prepared by the Southern California Edison Design and Engineering Services Customer Service Business Unit, dated March 31, 2006, project number DR 05.09. The second survey was taken in August of 2006 and was used to quantify customer satisfaction with the PCT's after a 6 month period of time. The purpose of this report is to report on the customers' use of and satisfaction with the PCT's after a 12 month period (the third satisfaction survey). This report will then also compare the 40-day, 6-month, and 12-month findings.

The programmable communicating thermostats used in this test let homeowners accurately adjust their thermostat via an interactive internet site to reduce their cooling or raise their heating temperature settings and possibly save money. The technology tested also gives Southern California Edison (SCE) the opportunity to better understand usage patterns and the opportunity to remotely reduce demand during peak periods through the same type of addressable thermostat technology. Although the technology utilized (the PCT) within this project allows peak demand reduction, the objective of this test was only to gauge customer acceptance of the PCT, not to test potential demand reduction.

This project and the one mentioned previously, represented the first test of a residential PCT that can only be programmed via the internet. It allows temporary (one hour) local adjustment via an integral pushbutton, but programming the occupied and setback temperatures is done through a web site accessed by the home owner's computer and typical internet connection.

Home owners participating in the test reside in Santa Clarita, California, mainly in the Valencia area, and were solicited through a postcard mailing and direct telemarketing. Fifty-one households agreed to have the PCT installed. Customers were contacted 40 to 45 days after the installation to respond to a telephone survey (Survey # 1) describing how they interacted with the web-based thermostat controls and whether or not they felt comfortable with the technology, and how effective the technology was for their lifestyles

Customers were contacted for the second time in June, 2006 (Survey # 2); about six months after the installations to see if they had the same or different satisfaction with the PCT's. It should be noted that several of the questions in the second round of customer surveys had slightly different response choices. These changes were made at the request of the SCE Program Managers to offer the customers more differentiation in their responses. This should be construed as a fine tuning of the satisfaction survey, not as new questions. In general, the customer multiple choice answers were very comparable to the first round of

questions and answer choices and for this report, except where indicated, will be considered comparable.

The third satisfaction survey (Survey # 3) was performed in December, 2006, approximately 12 months after the PCT installations. The number of participants in the third survey is reduced by about 20% over this period due to participants having the PCT's removed, or the inability to contact the participants (though there were more customers contacted in the third survey than in the second survey).

As might be suspected, some participants liked the PCT's and some did not. The participants who liked it early in the test, continued to like it, and those that did not, continued to not like it. Those customers who dropped out of the program did so in the beginning. The lack of manual control (only a one hour override) was the most frequently cited complaint. This limited manual adjustment was done on purpose, as the test was to see how the customers liked and would use internet programming. It was felt that if local manual adjustment was too readily available, then customers would not use the internet.

Looking at overall satisfaction, after the third survey, 66% of the respondents fell into the (2) categories of "highly likely" or "likely" to recommend the PCT to a friend indicating satisfaction. After the first and second surveys, over 73% and 79% respectively of the respondents indicated satisfaction from the top two categories saying that they "would" or "definitely would" recommend this product to a friend.

Just under 30% of the participants are willing to pay extra for the remote access PCT with the most popular price point being \$25.00 over the cost of a traditional on-the-wall thermostat, though this is down from the second survey when 51% said they would be willing to pay a premium. When asked whether they would pay extra for the ability to control their thermostat over the internet, \$1.00 per month was the most frequent price point chosen. (This result is consistent with the second survey.) The majority of people that used the Internet for programming their thermostat did so about once a month.

No utility curtailment of air conditioning was imposed on these customers, though the PCT design allows for cycling the air conditioning or resetting the cooling temperature upwards as a means of reducing peak grid demand. To obtain a sense of how these respondents may view a curtailment as part of a utility program using the PCTs, several curtailment scenarios were added to Survey # 2 and # 3.

In the second survey, the proposed curtailment scenario that received the best acceptance was one that would change the cooling set-point by 4 degrees for two hours. The incentive presented was a \$120.00 credit on the utility bill. Changing the curtailment to 4 hours with the same incentive declined the acceptance rate by 32.5% and also had the lowest acceptance of the 5 scenarios presented. Additionally, (as you might expect) when blackout avoidance was used as an incentive, respondents were less receptive when the blackout avoidance would be in a neighborhood other than theirs.

In the third survey, blackout avoidance was the most popular incentive for having the cooling set point raised for 4 degrees for 2 hours. Whether the blackout avoidance was in

the customer's own neighborhood or another neighborhood, it had no impact on acceptance rates. The next most popular incentive was \$120.00 for a 4 degree up-shift of temperature for 2 hours. Finally the same \$120.00 incentive was offered to raise cooling by 4 degrees for 4 hours. Acceptance of this curtailment scenario was over 20% lower than that of the other two scenarios. If the incentive were doubled for the 4 hour, 4 degree curtailment, but the number of curtailments was unlimited (instead of 15 max), acceptance went up just over 7 percentage points.

In conclusion, the three surveys indicate that a majority of homeowners participating found the use of the internet enabled PCT 'likeable', would be willing to pay some small recurring fee to address the PCT over the internet, and gave some indication of what curtailment scenarios might be offered by the utility through a demand reduction program that customers would accept and possibly participate.



## INTRODUCTION

### OBJECTIVE

The purpose of this project was to ascertain if homeowners would welcome controlling their thermostats via the internet, if they thought on-line control was better than previous ways, and if they thought it would save them more energy dollars.

The so-called, remotely *Programmable Communicating Thermostats* (PCT's), can be reached by wireless signals such as paging, to adjust temperatures. In addition to the homeowner direct programming capability through the internet, the PCT's could be commanded by a utility to adjust their temperatures in real time to reduce peak demand on the electrical grid by reduced air conditioning use (though this remote adjustment of the customer's setting was never used for this test).

The ability to simultaneously raise the PCT temperature offers the electric utilities the capability to reduce peak demand in a user friendly way. Governing bodies such as the California Energy Commission and the California Public Utility Commission, as well as the electric utility companies, such as Southern California Edison (SCE), are interested in new and innovative ways to attract residential customers to reduce their peak demand for electricity without inconvenience.

In addition, when the residential customers' thermostats are communicating with a web site, it offers the ability for the customer to interact with different rates such as Time of Use (TOU) or Critical Peak Pricing (CPP) where automatic temperature settings might be sent to the PCT via a web site reflecting the changes in rates. The first step, in this scenario to use PCTs for possible demand reduction, is for the residential customer to be comfortable programming their thermostat remotely via the internet.

It should be noted that while the ability to curtail peak demand is the one reason why a utility or regulatory body would consider using such PCT's, this test was performed to gauge customer acceptance of the remotely programmable thermostat and the use of an internet site to interact with the PCT's, not to test a curtailment. Higher income customers, who made up the test sample, may not be attracted to current demand reduction technologies, such as air conditioning switch cycling, for example. Alternative technologies, such as PCT's, might attract a larger base of customers and lead to greater potential demand reduction possibilities.

In order for an electric utility to reduce peak demand, a large number of customers must participate in demand response programs. Should the overall base of potential demand reduction be increased with the addition of the PCT technology, then the need for increased generation may be delayed or reduced. Increasing the options for customer increases the potential pool of customers willing to participate in demand response programs.

The installation of the PCT's and the subsequent customer satisfaction surveys sought to ascertain whether or not customers perceived value in the PCT's. Customers were asked to respond to a 20-question phone survey, and then asked if they had any general comments. This contact was repeated three times; in December 2005, June 2006 and December 2006.

## **BACKGROUND**

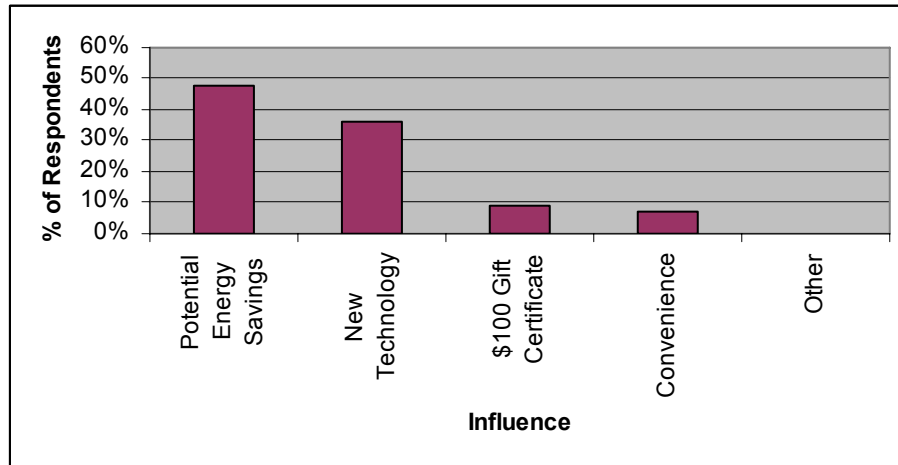
This program was initiated and installation completed in the fourth quarter of 2005. Because of the short time frame for the test, the PCT's were installed in only fifty-one households. Customers were solicited by a post card mailing and direct telemarketing. They were offered a chance to try the new technology at no charge and offered a free \$100 gift card on completion of the first phone survey. A local HVAC service company installed the PCT's in the customer's homes. Either one or two were installed, one per HVAC system, as some of the homes had two HVAC systems. As this was an upscale neighborhood, air conditioners were large. Homes with one air conditioner averaged 4.5 tons capacity, and homes with two air conditioners averaged 5.5 tons per house. Customers were contacted on three occasions (40 days, 6 months, and 12 months) after the installation to respond to a survey on how they liked the PCT's and what comments they had. In addition, data was kept of the customer's activity programming the PCT's through the web site. Each customer's programming frequency and comments were correlated.

This test was directed at only single family residences in a newer neighborhood (Santa Clarita, CA) of upper middle income households due to the short time frame allowed. Telemarketer screening questions included:

- Do you own your own home?
- Does your home have central air conditioning?
- Do you have an internet connection at home?

Respondents had to answer "yes" to all three questions to be eligible for the free PCT installation. The customers would receive:

- A free PCT (or two if the home had two air conditioning systems)
- Free installation of the PCT(s)
- Free web setup and activation, and a year's paging service access to the PCT
- Promise of a \$100.00 American Express gift certificate on completion of the first telephone satisfaction survey.



**FIGURE 1. CUSTOMER MOTIVATION Q 20: WHAT ITEM INFLUENCED YOU THE MOST TO SIGN UP FOR THE TEST?**

As we see in Figure 1 from the first survey, the majority of customers were interested both in the new technology of internet programming of their thermostat as well as possible future savings of energy using the technology.

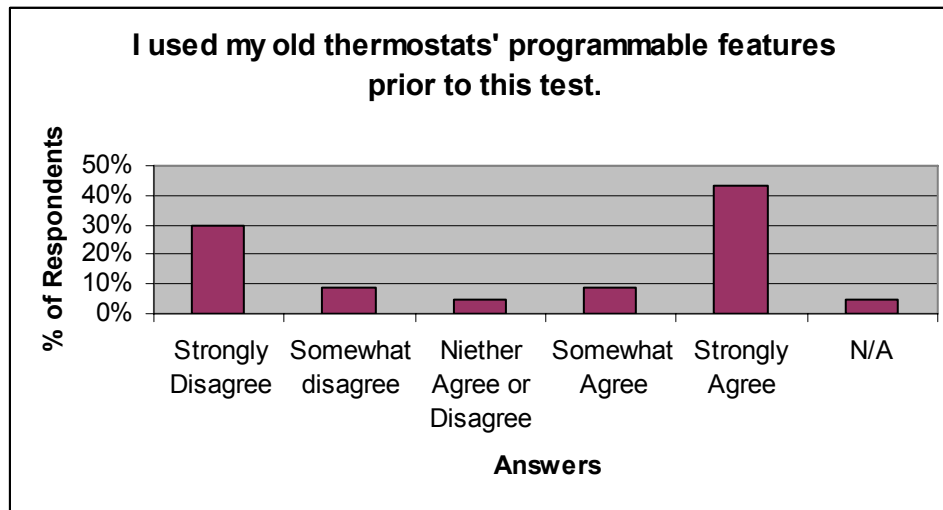
The first customer phone survey was performed 40-45 days after installation of the thermostats. Initial findings were reported in a SCE Design and Engineering release dated: March 31, 2006. A second customer satisfaction survey was completed in June, 2006. This report summarizes the most recent data which was collected in December of 06, and includes a comparison of the three sets of data to point out any changes over time.

### EXISTING TECHNOLOGY

The thermostats used in these homes prior to this study were non-communicating, programmable thermostats which complied with the existing CEC Title 24 Energy Code. These would typically be the thermostat that was installed when the house was constructed.

Programming for temperatures and night setback was done while standing at the unit. Customers often noted that they used their programmable thermostats as so called “set point” thermostats, meaning that they did not use the automatic setback functions of the programmable thermostats, rather just set a temperature manually, and generally just left it there 24/7.

From Q.12 on the first satisfaction survey, customers relayed some details about the use of their Title 24 thermostats.



**FIGURE 2 Q 20: HOW DID CUSTOMERS USE THEIR OLD THERMOSTAT'S PROGRAMMABLE FEATURES**

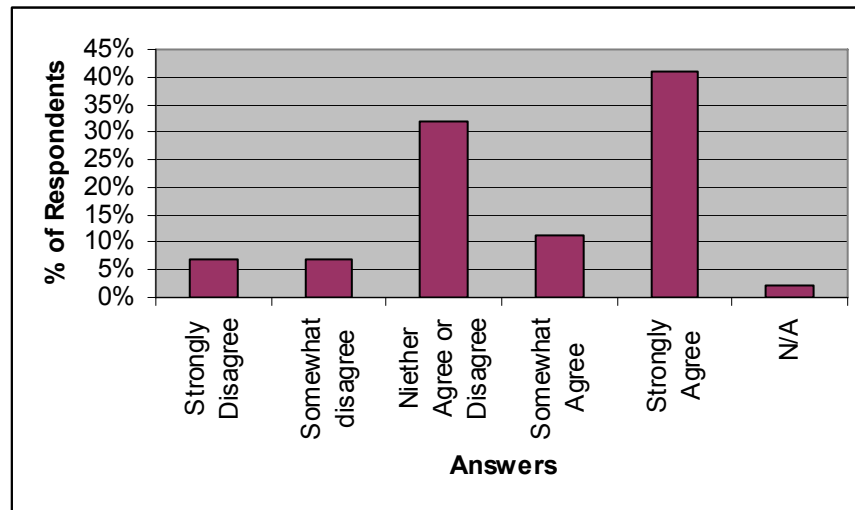
### PROPOSED MODIFICATION

This test consisted of replacing standard programmable thermostats with PCT's (programmable communicating thermostats) and giving the customer web enabled access to their PCT for purposes of setting occupied temperatures and night setback temperatures. They also had the option of setting temperatures such as "Wake, Work, Home, Sleep" as is typical of Title 24 conforming thermostats.

### BENEFITS

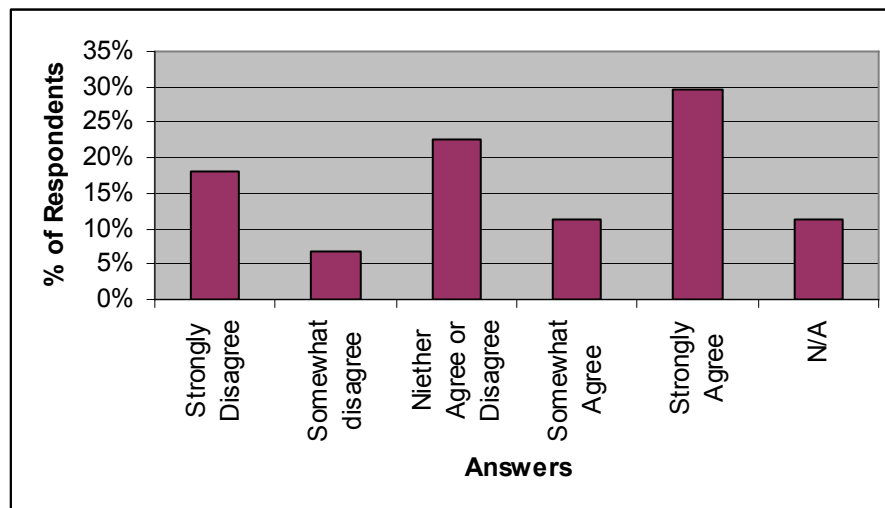
The PCT allows the end user to potentially conserve energy and related expenses while providing the utility with curtailment options in order to reduce peak demand. The PCT used in this study is a wire for wire replacement of the existing thermostat found in most new homes and can be installed by any qualified HVAC contractor or handy homeowner. We found through the installation process, that it could be accomplished in about an hour and there was no re-wiring required. It was felt that some web savvy customers would be more inclined to use the energy saving potential of setback thermostats if they were given an easy to use web interface. As we saw from the surveys, some did and some did not.

As we see in Figure 3, many customers are interested in ways to achieve energy savings by using an Internet programmable thermostat as evidenced by the responses to this question in the first satisfaction survey taken 45 days after the installation.



**FIGURE 3 Q 13 FROM THE ORIGINAL SURVEY: IT'S EASIER TO ACHIEVE ENERGY SAVINGS BY USING AN INTERNET PROGRAMMABLE THERMOSTAT.**

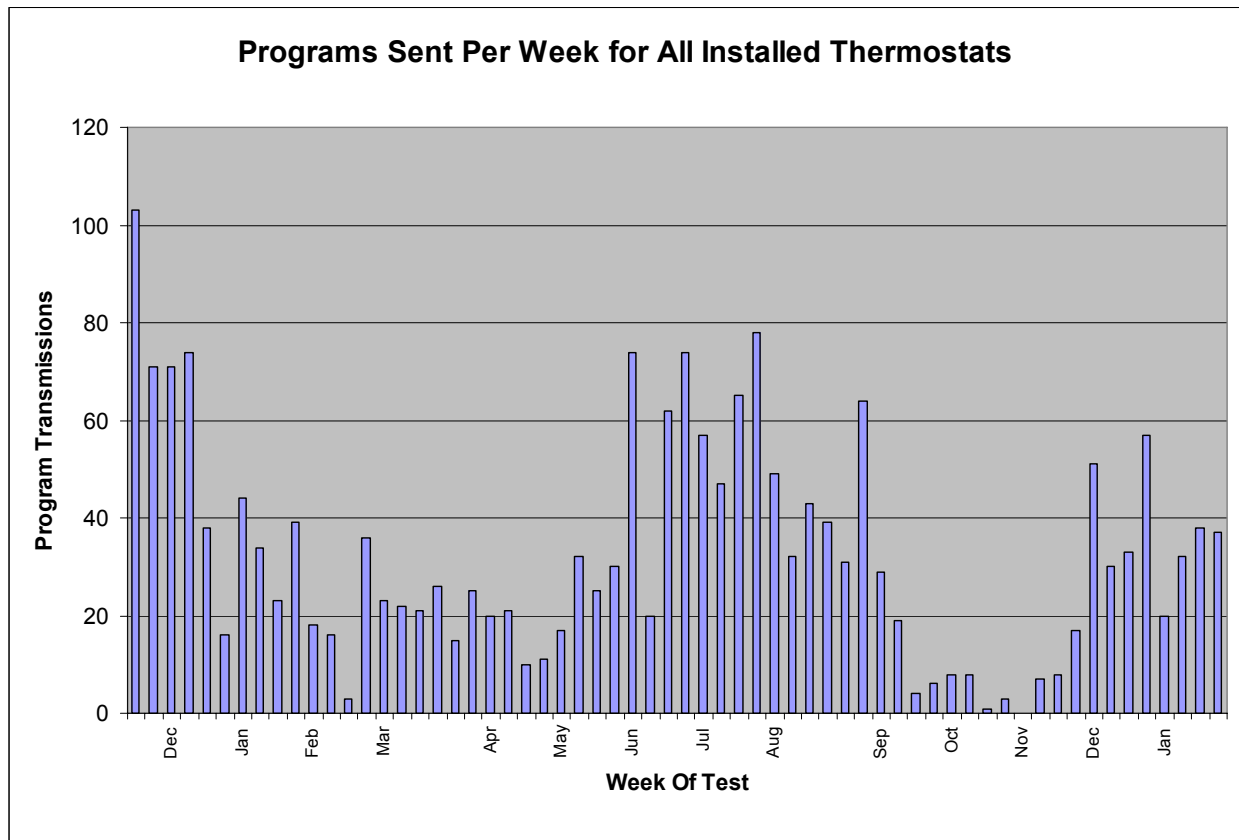
And many customers felt that it was easier to use the web based PCT versus their existing manual programmable thermostat based on the answers to this question posed in the first satisfaction survey:



**FIGURE 4 FROM THE ORIGINAL SURVEY: YOU ARE MORE LIKELY TO USE THE SCHEDULING AND SETBACK FUNCTIONS THROUGH THE WEB VS. MANUAL PROGRAMMING OF THE OLD THERMOSTAT.**

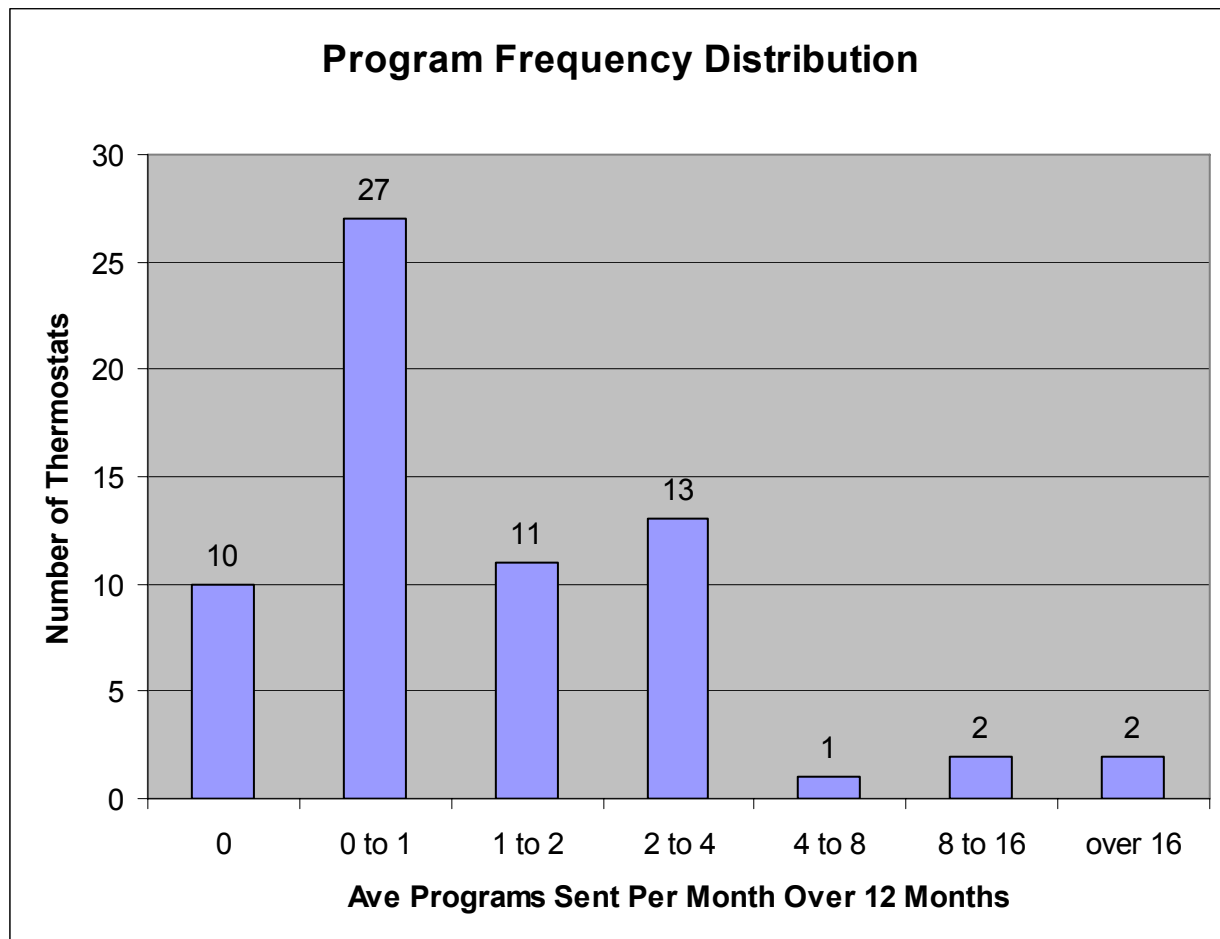
Ease of use in programming the PCT through the internet provides a significant benefit versus manual programming which as noted, many customers simply did not do.

To provide substantiation to the perceived customer benefit of internet programming of the PCTs, the thermostat manufacturer, who provided the paging services, keep track of the test customer's usage patterns as shown in Figure 5. It appears from the data that customers were actively using the convenience of setting temperatures and setbacks especially during the summer and winter months:



**FIGURE 5** THIS CHART SHOWS THE FREQUENCY OF THE PRGRAMS SENT TO THE PCT'S BY THE CUSTOMERS. THERE IS AN INITIAL PROGRAMING WHEN THE PCT'S ARE INSTALLED, AND MORE FREQUENT PROGRAMMING WHEN THE SUMMER WARMS UP. SOME CUSTOMERS WERE VERY ACTIVE IN PROGRAMMING AND OTHERS PRACTICALLY IGNORED IT. .

This is in contrast to the 50% plus customers that used little of the manually adjustable programming options with their existing thermostats.



**FIGURE 6: THIS CHART SHOWS THE AVERAGE FREQUENCY OF PROGRAMS SENT TO THE PCT'S PER MONTH. NOTE THAT A CUSTOMER MAY HAVE ONE OR TWO THERMOSTATS SO THE TOTAL NUMBER OF THERMOSTATS IS GREATER THAN THE NUMBER OF CUSTOMERS. PROGRAMMING WAS TRACKED ON BOTH A PER CUSTOMER AND PER THERMOSTAT BASIS.**

To better understand customer usage of their PCTs, an average frequency distribution graph was generated, Figure 6. This provided the following insights:

- The first bar shows that 10 customers/thermostats sent no programs at all, representing about 20% of the original customer base for the test.
- The second bar shows that 27 customers/thermostats sent none or one program per month.
- The third bar shows that 11 customers/thermostats sent from one to two programs per month.
- The last bar shows that two thermostats had programs sent on average every other day!

Interestingly, three customers accounted for half of the programming activity for the entire test.

Additionally, 25% of the customers took advantage of the “holiday” programming. This allows the customer to program a special temperature into a future date. For example, the customer could lower the heat or raise the cooling while they were away for a long weekend or a vacation. The thermostat will automatically revert back to the normal programmed temperatures when the holiday is past.

This takes a bit more understanding of the programming and to repeat, none of the customers needed any help with the web site for programming. The web site was intuitive enough for them to take advantage of this feature.



## TECHNICAL APPROACH

### TIMELINE

Phase I Project implementation & Completion	December 30, 2005
Phase II Second survey and report complete	August 21, 2006
Phase III Third survey to be completed	December 30, 2006
Phase III Report third survey results to be delivered	January 19, 2007

### THERMOSTAT INSTALLATION

The PCT's used in this test were manufactured by Lightstat Inc., (Barkhamsted, CT). The unit specifications are provided in the Appendix. It is a wire for wire replacement for the typical thermostat found in the customer's homes, and there were no problems encountered during the installations.

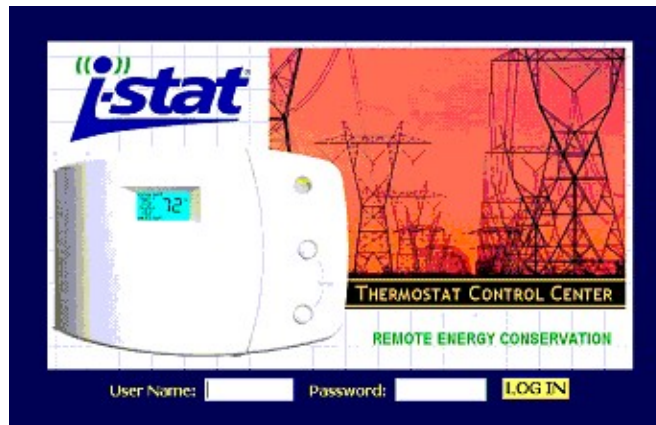
The PCT has an integral radio (one-way paging) receiver that receives programming command strings over the air from the commercial paging network. This is tuned to the local frequency (approximately 930 MHz), and each PCT has a unique address so the customer can program the thermostats independently. The PCT's can also share addresses so they can be commanded as a group, which might be typically used for a curtailment command from a utility or ISO to avoid a peak demand shortage.

It should be noted that not all homes where customers asked to have the PCT installed had adequate paging coverage to receive signals reliably. As part of the installation procedure, the installing contractor powers up the PCT with a portable transformer and calls the thermostat manufacturer's technical support for test pages. If these are not successful, then the customer is informed that the PCT cannot be installed due to poor reception. Mountainous terrain like in part of the Santa Clarita area caused signal shadows that prevented installations in several homes. Interestingly, some of the customers also commented that they had problems with cell phones, and in some cases, installing contractors had to use the customer's land line to call in for the test pages.

It is the manufacturer's experience that paging is a reliable communication method in urban and suburban areas, and less so in more rural areas. Relatively flat topography is a plus, and mountainous areas tend to weak signal pockets. The commercial paging carriers provide helpful maps on their web sites so that this can typically be determined before customers are signed up.

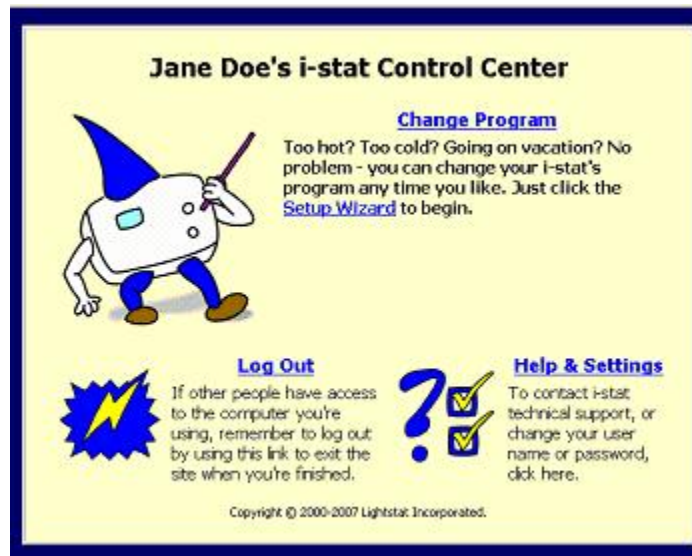
**CUSTOMER ACCESS**

The customer accessed the PCT via a web site specifically set up for the project. Every customer was given a User Name and Password.



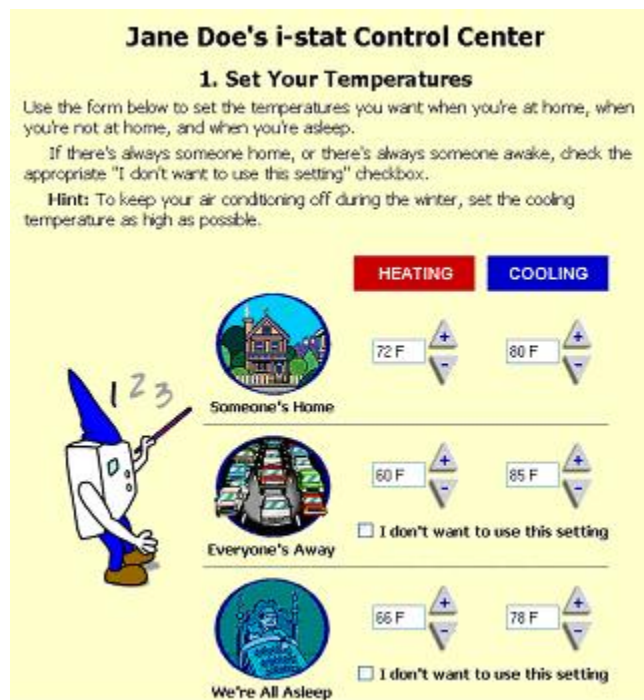
**FIGURE 7. WEB SITE SIGN ON SCREEN**

Upon entering the user name and password, the customer is presented a simple menu as shown in Figure 8. The objective was to keep the screens simple and intuitive. The surveys substantiated that most customers had little trouble using or navigating the site.



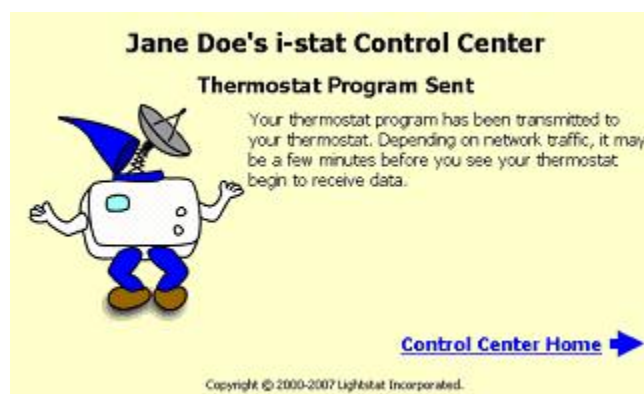
**FIGURE 8. WEB SITE MENU OPTIONS**

The web site then steps the customer through web screens to choose what temperature to select for different times of the day – Figure 9. The customer is initially shown a scheme that allows 4 temperature changes per day as recommended by the California Energy Commission.



**FIGURE 9. CONTROL CENTER TO SET THERMOSTAT TEMPERATURES**

When the customer was finished updating their settings, the web site would confirm that a signal was sent and the settings were successful, Figure 10.



**FIGURE 10. SIGNAL SENT CONFIRMATION SCREEN**

These are the typical settings: Wake, Work (Everyone's Away), Home (Someone's Home), Sleep (We're All Asleep) time settings also found on manually programmable thermostats. The customer can choose a 7-day programming or 5+2 day programming scheme. For the 7-day scheme, each day of the week can be programmed independently, whereas for the 5+2-day scheme, the 5 weekdays and 2 weekend days are the same.

Customers were given the web site address and their login password during the installation, and out of the 51 customers, only one had difficulty with the programming. Calls to technical support personnel were typically for lost passwords. Customers could also program "away" holidays in advance, though given the short time period between the installation and the survey, few used this feature by the time of the first survey, and few used it over the course of the year.

Shown in Figure 11 is the help screen provided customers during the test. The screen included telephone numbers for technical assistance.

**Jane Doe's i-stat Control Center**

**Get Help With Your i-stat**

For assistance with your thermostat or this web site, click [here](#) to contact i-stat technical support. You may also obtain support by phone at 1-800-292-2444 from 8:00 AM to 6:00 PM M-F Eastern Standard Time.

**Set Thermostat Time**

Normally your thermostat's clock is updated automatically once every 24 hours, so it should not need to be set. However, if your thermostat has just been replaced, or if it has been without power for more than 72 hours, you may need to set the time manually. [Click here to send the current time to your thermostat.](#)

**Change Your User Name / Password**

To change your user name and/or password, use the form below. Passwords must be at least 6 characters long. User names and passwords can contain only letters, numbers, the period (.), the hyphen (-), and the underscore (\_). Both are case-sensitive.

User Name:

Password:

Retype Password:

[← Control Center Home](#)

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FIGURE 11. HELP AND SETTINGS SCREEN

It should be noted, that the thermostat used for this test had limited local override capability. Customers could use an Up and Down button for local adjustment of the temperature from the programmed settings, but the change only lasted one hour. Then the PCT reverted back to the program settings. Several customers found this annoying and said that they would prefer a Manual mode where the change lasted until they decided to change it or manually revert to the Program mode.

## TEST PROCEDURES

The PCT's were tested prior to installation to ensure that they would reliably receive paging signals. No subsequent testing of the PCT's was performed.

No special test equipment was employed. After installation, the technician called a technical support person at the manufacturer and a test command was transmitted over the paging network to the PCT. The installing technician saw light emitting diodes (LED's) flash on the PCT and the display changed temperature. Any error was noted and the PCT kept track of the most recent successful data string transmissions.

Using this procedure, the technical support person sent over commands to raise the heating setpoint and then to lower the cooling setpoint to make sure that the customers' HVAC system was operating correctly. This procedure better tested the PCT communications capabilities and at the same time made certain that the customers' HVAC system was operating correctly prior to the installing technician leaving the customer's premises.

## DATA COLLECTION/MONITORING

Project goals for the second Customer Satisfaction Survey required that customers use their PCT's for a minimum of six months and then participate in a survey. The timing was such that the customers averaged between 6 and 7 months before the second survey. The phone survey was performed typically in the early evening. Customers were asked 20 questions. Four questions required a "Yes or No" answer, and the balance of 16 were multiple choice. The telemarketing staff took down the customers individual responses and also presented them in group form as percentages of the total. In addition, the web site database logged the frequency of customers using the web site to program their thermostats.

The third round of phone surveys used the same set of questions as the second round.

It should be noted that there have been seven (7) customers who have requested that their PCT's be removed in the twelve months between the first customer satisfaction survey and the second customer satisfaction survey. The main reason for the removal has been the inconvenience with logging onto the web site for changes to the thermostat comfort settings. It should be noted that one customer had never logged onto their site, so customer education with internet based products is important so that they know what to expect.

It should also be noted that three of the customers admitted that they agreed to have the PCT installed simply to obtain the \$100.00 gift certificate.

This left a total of 42 customers who responded compared to the original 44 in the first survey and 40 in the second survey. The relative success in contacting customers accounted for the difference in the number of replies from the second to the third surveys.

## PROCEDURE AND FINDINGS

Although Southern California Edison has installed programmable communicating thermostats (PCT's) for light commercial customers in the past, this project provided the first test of a similar thermostat for residential customers.

These programmable communicating thermostats let home owners adjust their thermostats via the web to reduce heating loads and save money. This test presented Southern California Edison the opportunity to monitor usage patterns and contemplate potential demand reductions during peak periods using the PCTs.

The project represented the first test of a PCT that can only be programmed via the internet. The PCT allowed only (one hour) temporary local adjustment, requiring programming setback temperatures to be done via the customer's computer to a web site.

In general, customers liked the technology, and most used it without any instructions. The web site was only in English though there were no complaints in that regard.

Three of the 51 customers asked to have the thermostat removed after the first survey. They received \$100 gift cards. One asked to have it removed prior to the survey when they found out that they had to use the Internet to program it; although this fact was clearly presented in the telemarketing scripts and postcard. In the first follow-up survey, four customers said that their reason for joining the test was for the \$100 gift card. That might account for some of the drop-outs.

Even though the California Energy Commission (CEC) has required programmable setback thermostats for all homes for nearly two decades, and these customers were in a 3-year old housing development, forty-three percent of the customers said that before the PCT installation, they did not use their existing thermostat for night setback savings (based on responses in survey # 1).

During survey # 1, 52% of the households liked the ability to control their thermostats from their computer, and found that it is easier to obtain (at least they thought they were obtaining) subsequent energy savings from computer use.

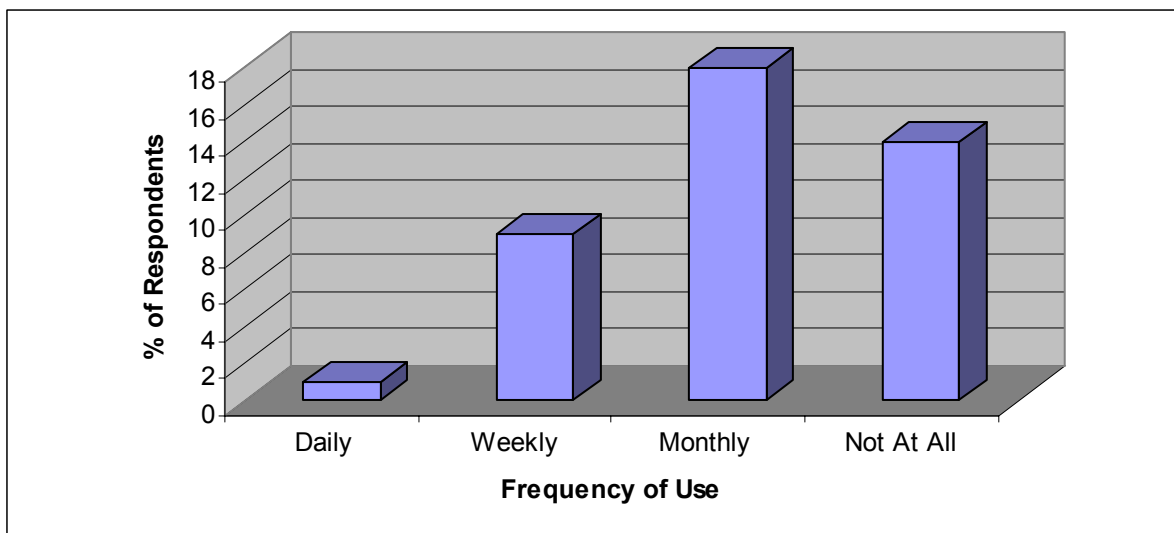
## RESULTS

The following charts are based on the Question summary report issued by CSG to Southern California Edison found in the appendix which tally's the exact percentages of responses to the 20 questions in the survey in each of the three surveys one during the course of this test.

Of the 51 homes -- 36 had one PCT, 15 had two PCT's installed.

Percentages are based on the following respondent rates.

Survey # 1    44 respondents  
Survey # 2    40 respondents  
Survey # 3    42 respondents



**FIGURE 12. HOW OFTEN HAVE YOU USED THE INTERNET TO PROGRAM YOUR THERMOSTAT SINCE IT WAS INSTALLED?**

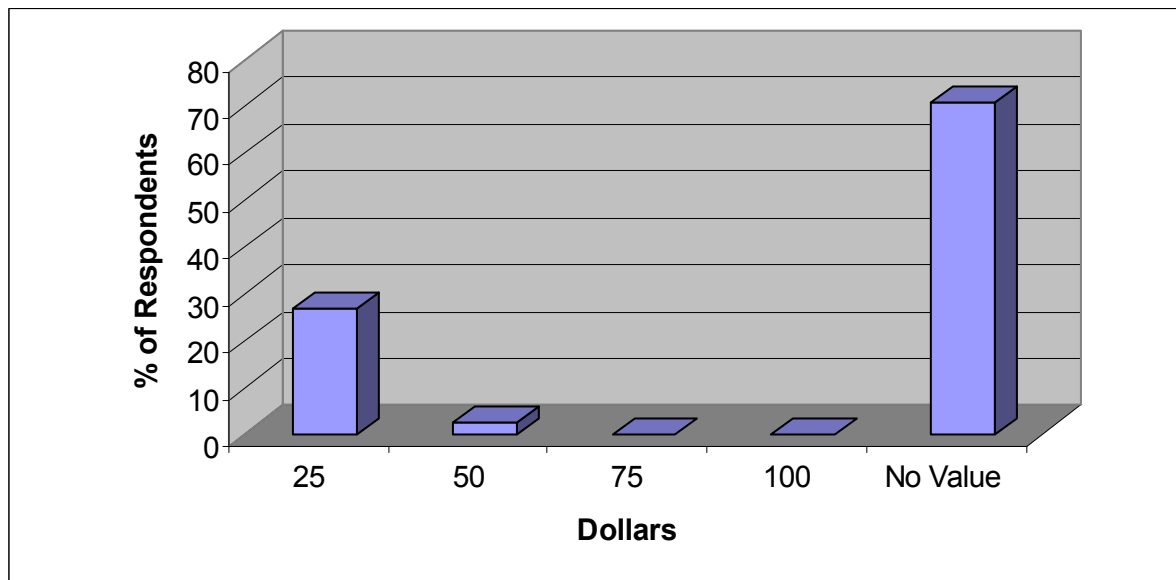
Just over 66% of the respondents have used the Internet for programming their thermostat at the time of the third and final survey. As you can see in Figure 12, the majority of respondents programmed on a monthly basis.

Shown below in Figure 13 are comparisons from the three surveys regarding the customer's usage of the internet to program their PCT.

Survey	% Used Internet for Programming	% Change from Last Survey	Frequency of Programming
# 1 @ 45 days	75%		At least Monthly
# 2 at 6 months	80%	5% more	At least Monthly
# 3 at 12 months	66%	14% less	At least Monthly

**FIGURE 13. SURVEY COMPARISON**





**FIGURE 14. HOW MUCH OF A PREMIUM (OVER THE COST OF A TRADITIONAL ON-THE-WALL PROGRAMMABLE THERMOSTAT) WOULD YOU BE WILLING TO PAY FOR WEB ACCESS TO YOUR THERMOSTAT?**

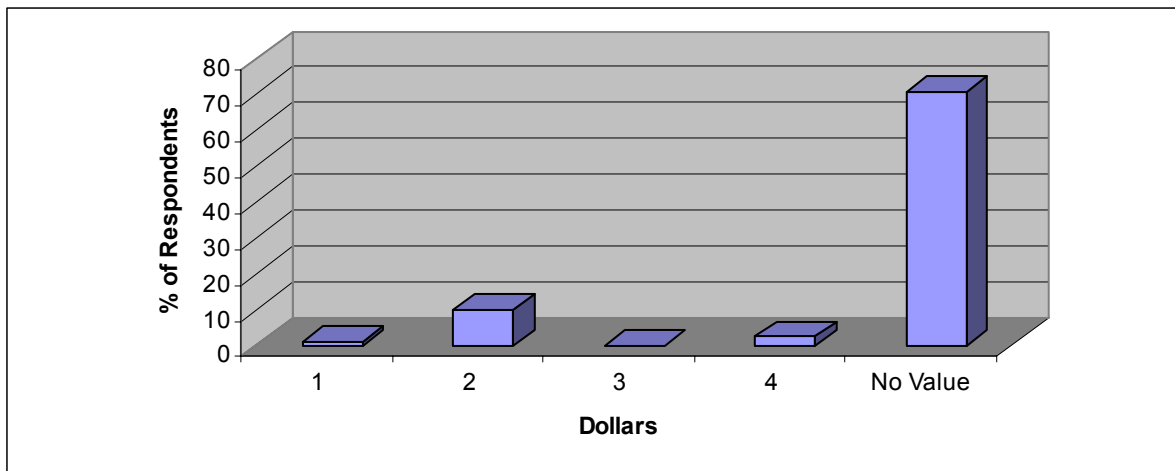
Another question surveyed to the test customers arose regarding whether the customers would be willing to pay additional cost to have a internet enabled PCT in their homes.

At the third and final survey, 29% are willing to pay a premium over a traditional on-the wall thermostat. The majority of those willing chose \$25.00 as the premium they would be willing to pay.

Survey	% Willing to pay a premium	% Change from Last Survey	Majority Choice of Premium
# 1 @ 45 days	43%		\$25.00
# 2 at 6 months	51%	8% more	\$25.00
# 3 at 12 months	29%	22% less	\$25.00

**FIGURE 15. A SURVEY COMPARISON**

Interestingly, the number willing to pay a premium went up during Survey 2 while dropping back at Survey 3.



**FIGURE 16. HOW MUCH OF A MONTHLY WEB ACCESS FEE WOULD YOU BE WILLING TO PAY TO USE THE INTERNET TO CONTROL YOUR THERMOSTAT?**

While it's quite likely that, any utility tariff that might originate for residential customers using a PCT will have the cost of contacting the PCT embedded in the rate structure as well as the cost of the PCT itself, it was nevertheless interesting to see what type of cost hurdles would present themselves if customers had to pay for the paging service to address their PCT through the internet.

The third survey found that 29% of respondents are willing to pay to use the Internet to control their thermostat. The majority of those willing chose a \$1.00 price point at the third survey. In the second survey \$1.00 and \$2.00 were the most popular choices with the one dollar only beating by (2) responses.

Test respondents were given the following curtailment scenarios in the second and third surveys to determine their motivation to use a PCT should it be used to offset the effects of a blackout (rotating outage) both inside their neighborhood and out. In the first survey these questions were not asked. Respondents were asked if they would endure the curtailment scenarios shown below in Figure 17 for the corresponding “benefit” presented, including some cases where the “benefit” would not directly apply to them.

- A. Cooling Set-Point Raised 4 degrees for 2 hours to avoid a blackout.
- B. Cooling Set-Point Raised 4 degrees for 2 hours to avoid a blackout in some other neighborhood.
- C. Cooling Set-point raised 4 degrees for 2 hours for an electric bill credit of \$120.00 for the summer season.
- D. Cooling Set-Point raised 4 degrees for 4 hours for an electric bill credit of \$120.00 for the summer season.
- E. Cooling set-point raised 4 degrees for 4 hours for an electric bill credit of \$240.00 for the summer season.

Note: A, B, C and D are limited to 15 events per summer season, while scenario E is for an unlimited number of events.

<b>Scenario</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
	4 Deg / 2 hrs Avoid Blackout in Your own neighborhood	4 Deg / 2 hrs Avoid Blackout in another neighborhood	4 Deg / 2 hrs \$120.00	4 Deg / 4 hrs \$120.00	4 Deg / 4 hrs \$240.00
<b>Survey # 1</b>	N/A	N/A	N/A	N/A	N/A
<b>% Willing (Survey # 2)</b>	78	65	81	49	68
<b>% Willing (Survey # 3)</b>	76	76	71	49	56

**FIGURE 17. CURTAILMENT SCENARIOS**

Interestingly, financial compensation was more a motivator than avoiding a blackout, and in some other cases, the reverse was true. This may have something to do with the timing of the questioning but was not planned as such.

In an another attempt to gauge customer satisfaction with the PCTs, questions were posed to assess whether the customer would recommend the PCT to a friend. Figure 18 and Figure 19 graphically display their responses for Survey # 3 and Survey # 2 respectively.

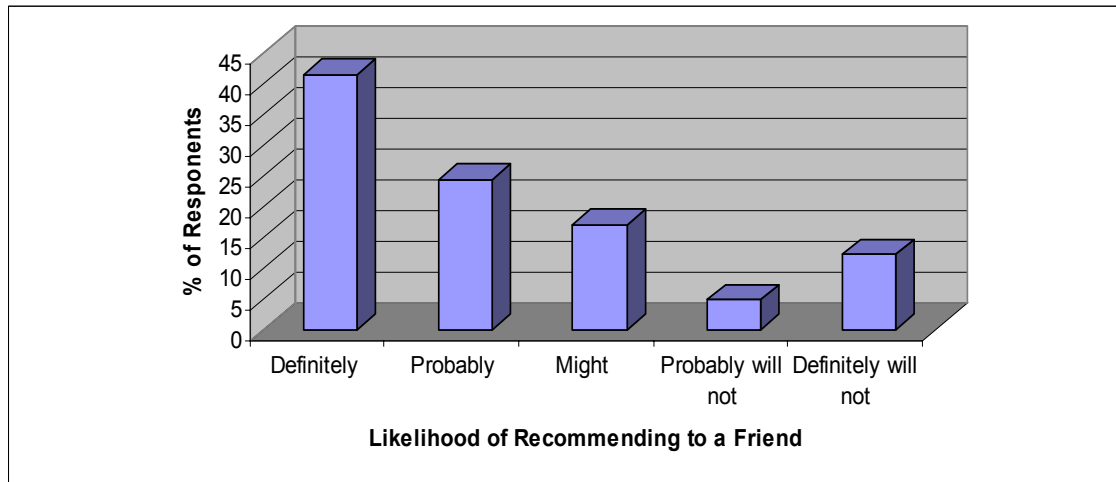


FIGURE 18. SURVEY 3

After the third survey, 66% said that they would recommend the PCT

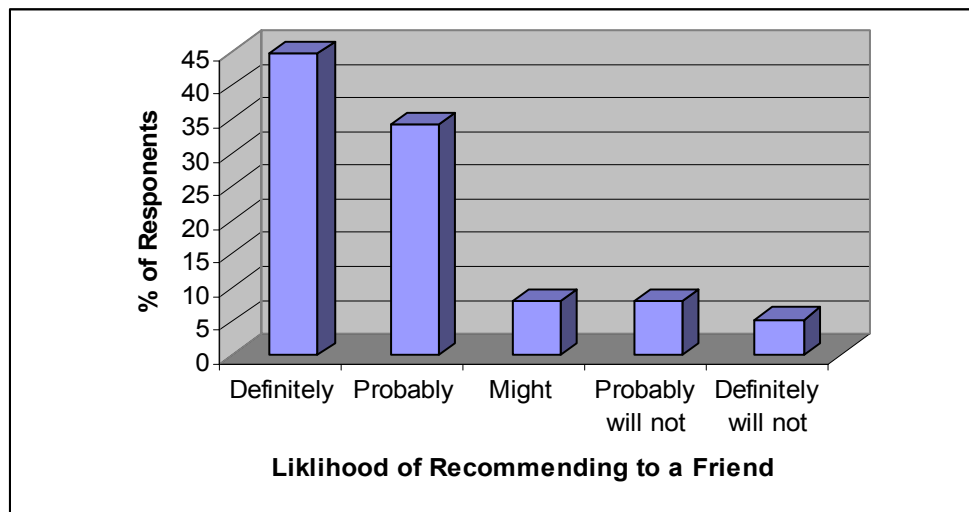
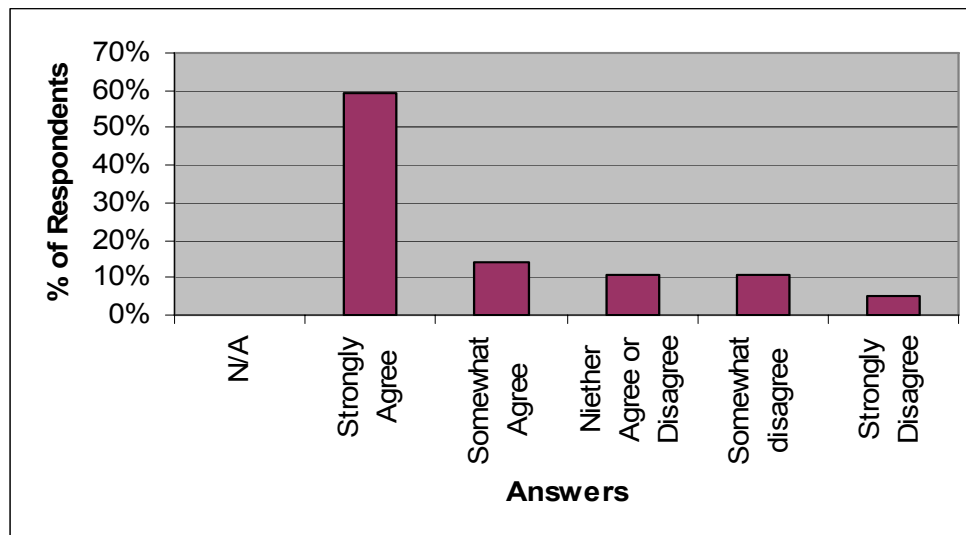


FIGURE 19. SURVEY #2

After the second survey, 79% said that they would recommend the PCT



**FIGURE 20. RESULTS FROM SURVEY #1**

After the first survey, 73% said that they would recommend the PCT.

3RD SURVEY		2ND SURVEY		1ST SURVEY	
Definitely	42%	Definitely	45%	Strongly Agree	59%
Probably	24%	Probably	34%	Somewhat Agree	14%
Might	17%	Might	8%	Niether Agree or Disagree	11%
Probably will not	5%	Probably will not	8%	Somewhat disagree	11%
Definitely will not	12%	Definitely will not	5%	Strongly Disagree	5%

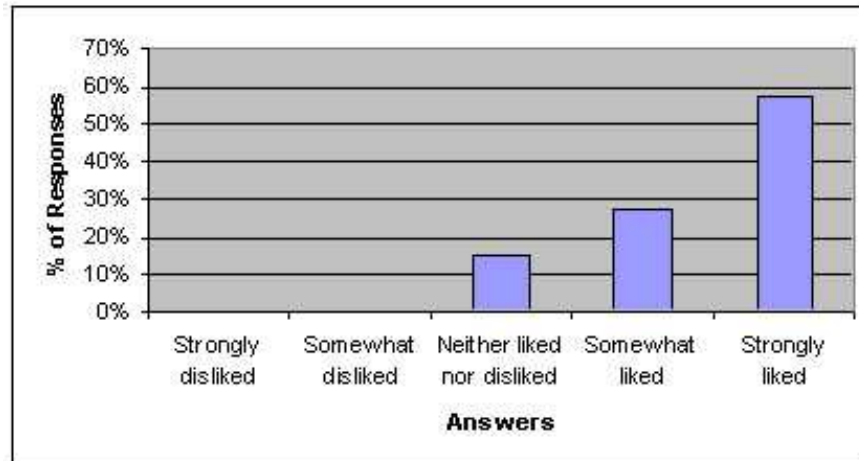
**FIGURE 21. COMPARISON OF RESULTS FROM ALL SURVEYS.**

On average over the three surveys, 73% of the respondents fell into the first (2) categories for recommendation to a friend.

While it's interesting to see the variances between the surveys, it's clear that most test customers liked the PCT enough to recommend it to people that know indicating the technology has potential for future demand side consideration as a mechanism for curtailing HVAC load.

### OTHER ITEMS FOR CONSIDERATION...

From the first survey, the following chart shows responses to the question “How did you like programming your thermostat using the Internet feature?” This question was not asked in subsequent surveys, but it is worth noting that most respondents “strongly liked” programming using the internet feature during the first survey.



**FIGURE 22. SURVEY 1 - “HOW DID YOU LIKE PROGRAMMING YOUR THERMOSTAT USING THE INTERNET FEATURE?”**

This question was not asked in the second or third survey. It was assumed that if the customers could program their PCT's by the first survey, then they certainly could by the second and third surveys.

Likewise, if the customers felt comfortable programming their surveys using the internet, their requirements for technical support were speculated to be low. The following points are directed to understanding the customer's usage and expectations of the technical support offered by the PCT manufacturer.

#### **THE FOLLOWING POINT WAS SUMMARIZED FROM THE COMMENTS GIVEN BY THE RESPONDENTS:**

In survey # 3, 38 people (91% of the respondents) answered that they do not want or need a technical representative to contact them, and 10% of the people indicated that there are thermostat features they would like to better understand. This is a drop from survey # 2 where 36% of respondents said there were features they would like to better understand. We concluded that they learned or got used to the features over time.

**THE FOLLOWING POINTS WERE FROM “YES” OR “NO” ANSWERS TO Q. 5 AND Q. 6**

76% of the respondents know how to access technical support while only 40% actually have used it.

Note: Since there was only (1) respondent per household interviewed, it is important to note that there are 10 other users (due to multiple users in one household) that were not interviewed.

At the end of the test, Lightstat Inc. sent out a letter to remind participants that they could have the thermostat removed, or continue service for a fee. In response to the letter:

- 14 have requested removal
- 8 paid renewal fee
- 1 likes the product but does not want to pay the renewal fee.
- The balance of the test customers have yet to respond as the time of this report writing

Finally, the test customers were given an opportunity to share their thoughts regarding the PCT.

**CUSTOMERS WERE ASKED TO SHARE THEIR RECOMMENDATIONS WITH EDISON ABOUT THE THERMOSTAT PRODUCT OR SERVICE.**

10 people did not have a comment. Following is a list from those that did have a comment during survey # 3.

- I'd like to understand why the temp reads on degree but the rooms are all different temperatures? Is there a way to regulate it better?
- It's convenient, should make it available to more people.
- Not useful.
- Great for when on vacation and you forget to turn off the temperature.
- Hard to change on equipment, easy online.
- It's easier to just go to the thermostat instead of using the Internet.
- Make it easier to control through the Internet.
- They could have done better with the design.
- Not Really
- More options of control
- I think what I didn't like was setting the temp when I'm home. More flexibility setting temps.
- Make it more user Friendly.
- If the product was free, but if there's a charge, I don't want it.

- Update the internet. Insufficient, not enough options.
- You should get it out to more people.
- We've been doing it manually.
- No, it's a pretty good think.
- Really inconvenient.
- When they came to install it, there were no written instructions, just the web site info.
- Think it's great, especially if you're out of town and forget to turn it on or off.
- Totally useless for me. I'm home a lot so it's not for me. Don't want to go online to adjust temperature. If I lived elsewhere it may be helpful.
- Not really.
- I think people who are not home a lot should use it.
- Yes, I suggest partnering with someone who can give support for the product.
- The online component needs to have more features.
- To make it better, it would be nice to lock the t-stat so you can not manually change it. Is it possible to change over the phone or turn it on/off over the phone?
- If it was free, I'd want to keep it. I don't think it's worth paying for.
- 100% would have kept the thermostat if the thermostat could have been manually programmed or controlled. Had thermostat removed.
- No, it's a really good thing.
- Maybe market it for someone who isn't home a lot, not for someone who is. Thermostat removed.
- The thermostat program doesn't always go through. Would like it to be more reliable.
- One this is to do a comparison of your energy costs from last year to now. Does it save energy?

The responses above are specific comments that tend to mirror the questions regarding usages of the PCT. For example, many people like the convenience of the internet adjustments but would have preferred a longer override time at the thermostat. In any event, the test customers were given this brief opportunity to make a statement regarding the thermostat and for the most part, the comments again, mirrored the survey questions.



## CONCLUSIONS

The primary objective of the PCT test described in this report as mentioned previously was designed to assess how residential customers would perceive and use a programmable thermostat controlled through the internet. The customer responses were summarized through three Customer Satisfaction Surveys.

As a secondary objective, the utility was interested in drawing conclusions as to how the new PCT technology could be used for HVAC demand curtailment in residential homes.

The results obtained tend to favor the technology for several reasons:

- The PCT can be used in future utility demand reduction programs since the PCT technology provides a wireless control strategy that permits adjusting and overriding thermostat settings
- Customers can benefit since the PCT provides a very friendly internet user interface to easily program their thermostats where many simply didn't use such functionality and thus derived none of the benefits of a manually programmable thermostat

The substantiation for the conclusions include observations of customer behavior found during the surveys including:

- Customer use the internet frequently and are comfortable with it
- Internet technical support can be provided in the same easy to understand format that was used to adjust the PCT temperature settings

As for what the utility can conclude from the test and the customer surveys:

- Wireless technology can be used to implement demand reduction strategies like temperature set backs in residential construction
- Customers appear willing to accept incentives for temperature set backs and can perceive the value to them beyond the incentives including their help in preventing rotating outages

Understandably, as the customers surveys revealed, introducing new technology such as the PCT does present utility customers new challenges to both become familiar with the technology as well as using it on a regular basis. Likewise, after customers have become comfortable with the technology, they begin to realize its benefits.

For utilities interested in PCT technology, it provides a wireless and for the most part seamless strategy to reduce residential HVAC load on command.

The combination of increased perceived value of the PCT to customers while at the same time increasing a utility's option to control load, make the PCT studied in this test a valuable option for consideration in future demand reduction programs.

## APPENDIX

- APPENDIX A – SOUTHERN CALIFORNIA EDISON INTERNET PROGRAMMABLE THERMOSTAT INSTALLATION STUDY (SATISFACTION SURVEY # 1)
- APPENDIX B – SOUTHERN CALIFORNIA EDISON INTERNET PROGRAMMABLE THERMOSTAT INSTALLATION STUDY (SATISFACTION SURVEY # 2)
- APPENDIX C – SOUTHERN CALIFORNIA EDISON INTERNET PROGRAMMABLE THERMOSTAT INSTALLATION STUDY (SATISFACTION SURVEY # 3)
- APPENDIX D – LIGHSTAT PRODUCT BROCHURE

## APPENDIX A – SOUTHERN CALIFORNIA EDISON INTERNET PROGRAMMABLE THERMOSTAT INSTALLATION STUDY (SATISFACTION SURVEY # 1)

### Questions

Q1. Would you say that you use the Internet: (one answer only)

Mean:		1.3
Standard Deviation:		0.8
Responses	Count	Percent
Daily	39	88.6%
Weekly	2	4.5%
Monthly	0	0.0%
Only Occasionally	3	6.8%

Q2. What do you normally use the Internet for? (allow more than 1 answer)

Responses	Count	Percent
Work related	33	75.0%
Information searches	34	77.3%
Shopping	33	75.0%
Homework	26	59.1%
E-Mail	32	72.7%
Other	29	65.9%

Q3. Did you program your thermostat using the Internet feature?

Mean:		1.3
Standard Deviation:		0.4
Responses	Count	Percent
Yes	33	75.0%
No	11	25.0%

Q4. How did you like programming your thermostat using the Internet feature?

Mean:		4.4
Standard Deviation:		0.8
Responses	Count	Percent
Strongly disliked	0	0.0%
Somewhat disliked	0	0.0%
Neither liked or disliked	5	15.2%
Somewhat liked	9	27.3%
Strongly liked	19	57.6%

Q5. Did you use any of the "holiday" calendar scheduling options?

Mean:		1.9
Standard Deviation:		0.3
Responses	Count	Percent
Yes	4	9.1%
No	40	90.9%

Q6. Are you the only person in your household who uses the Internet to program the thermostat?

Mean:		1.4
Standard Deviation:		0.5
Responses	Count	Percent
Yes	25	56.8%
No	19	43.2%

Q8. Did you need to contact technical support after installation?

Mean:		1.7
Standard Deviation:		0.5
Responses	Count	Percent
Yes	12	27.3%
No	32	72.7%

Q9. Did you received adequate information from technical support in a timely manner?

Mean:		4.2
Standard Deviation:		1.3
Responses	Count	Percent
Disagree Strongly	1	8.3%
Disagree	1	8.3%
Neither Agree nor Disagree	0	0.0%
Agree	3	25.0%
Agree Strongly	7	58.3%

Q10. I used my old thermostats' programmable features prior to this test.

Mean:		3.4
Standard Deviation:		1.8
Responses	Count	Percent
Strongly disagree	13	29.5%
Somewhat disagree	4	9.1%
Neither agree or disagree	2	4.5%
Somewhat agree	4	9.1%
Strongly agree	19	43.2%
N/A	2	4.5%

Q11. The Internet programmable thermostat was easier to program than the traditional on-the-wall programmable thermostat.

Mean:		4.0
Standard Deviation:		1.3
Responses	Count	Percent
Strongly disagree	2	4.5%
Somewhat disagree	4	9.1%
Neither agree or disagree	11	25.0%
Somewhat agree	8	18.2%
Strongly agree	15	34.1%
N/A	4	9.1%

Q12. You are more likely to use the scheduling and setback functions through the web vs. manual programming of the old thermostat.

Mean:		3.6
Standard Deviation:		1.7
Responses	Count	Percent
Strongly disagree	8	18.2%
Somewhat disagree	3	6.8%
Neither agree or disagree	10	22.7%
Somewhat agree	5	11.4%
Strongly agree	13	29.5%
N/A	5	11.4%

Q13. It's easier to achieve energy savings by using an Internet programmable thermostat.

Mean:		3.8
Standard Deviation:		1.3
Responses	Count	Percent
Strongly disagree	3	6.8%

Somewhat disagree	3	6.8%
Neither agree or disagree	14	31.8%
Somewhat agree	5	11.4%
Strongly agree	18	40.9%
N/A	1	2.3%

Q14. The phone representative who called me to describe the program and schedule the information had adequate knowledge to answer your questions about the text.

Mean:		4.8
Standard Deviation:		0.4
Responses	Count	Percent
Strongly disagree	0	0.0%
Somewhat disagree	0	0.0%
Neither agree or disagree	0	0.0%
Somewhat agree	10	22.7%
Strongly agree	34	77.3%
N/A	0	0.0%

Q15. The scheduling and installation of the new thermostat was convenient.

Mean:		4.9
Standard Deviation:		0.4
Responses	Count	Percent
Strongly disagree	0	0.0%
Somewhat disagree	0	0.0%
Neither agree or disagree	1	2.3%
Somewhat agree	3	6.8%
Strongly agree	40	90.9%
N/A	0	0.0%

Q16. You were given enough training by the technician to use the web site and the thermostat.

Mean:		4.1
Standard Deviation:		1.0
Responses	Count	Percent
Strongly disagree	0	0.0%
Somewhat disagree	3	6.8%
Neither agree or disagree	11	25.0%
Somewhat agree	8	18.2%
Strongly agree	22	50.0%
N/A	0	0.0%

Q17. I would recommend this thermostat to a friend or relative.

Mean:		4.1
Standard Deviation:		1.3
Responses	Count	Percent
Strongly disagree	2	4.5%
Somewhat disagree	5	11.4%
Neither agree or disagree	5	11.4%
Somewhat agree	6	13.6%
Strongly agree	26	59.1%
N/A	0	0.0%

Q18. How much of a premium (over the cost of a traditional on-the-wall programmable thermostat) would you be willing to pay for web access to your thermostat?

Mean:		3.6
Standard Deviation:		1.7
Responses	Count	Percent
\$25	9	20.5%

\$50	8	18.2%
\$75	0	0.0%
\$100	2	4.5%
\$0	25	56.8%

Q19. How much of a monthly web access fee would you be willing to pay to use the Internet to control your thermostat?

Mean:		3.0
Standard Deviation:		1.2
Responses	Count	Percent
\$1	8	18.2%
\$2	9	20.5%
\$3	4	9.1%
\$0	23	52.3%

Q20. What item influenced you the most to sign up for the test?

Mean:		1.8
Standard Deviation:		0.9
Responses	Count	Percent
Potential energy savings	21	47.7%
New technology	16	36.4%
\$100 gift certificate	4	9.1%
Convenience	3	6.8%
Other	0	0.0%

Q7. How many other people in your household program the thermostat using the Internet?

1

1

Didn't program

1

1

1

1

1

1

1

2

1

2

1

1

2

1

1

2

Q21. Do you have any thoughts or comments or suggestions to make to the folks at Edison who are testing this technology?

Market to customers who are away from their homes alot (businessmen)

Market to customers who are away from their homes alot (businessmen)

Everything is great.

in general technology is great. more useful for homeowners who travel but stay home mom not really seeing the savings

too much time to deal with the different option. Customer very limited in time.

didn't feel like it was saving any money

no comment

more features when adjusting manually vs. having to go on line.

way to show savings on internet programming

customer would like to see some sort of indiglow screen to see temp in the dark

sometimes the thermostat doesn't work accurately

wants to see more controlling selection on the setting of the thermostat customer has 2 stats installed -cause heat rises stat doesn't turn on to temp set to. Tstat very sensitive.

working very well

It would be easier if the technically challenged could work it

no comment

no comment

happy with it

no comment

they didn't give the technician enough time to answer our questions. I felt rushed.

customer was very unhappy and wants stat removed...no reason provided

really nice

old t-stat had more programming options. wants to see more options making it so you can manually program it

can't override tstat manually. major setback because can only do it for 1 hour. Override function where you can have the option to have the internet or manually. Customer is going to remove tstat

way to save the setting or recommend settings

it was a little difficult getting use to the different setting but now I'm happy with it

everything is good

really easy

great product and easier to work with

nice unit very convenient to work

always battling with tstat because always adjusting. Easier to keep on temp that it's set at

launch it out to more people

no comment

no comment

on line ability to turn system on and off and manually adjust temp

easy to use and great

tstat isn't convenient. should be more exccessible

be able to show customer the difference on their bill of before and after

to be able to manually program override tstat more than 1 hour

more companies to choose from

no comment

neat. I don't think it's practical

Touch back with customer after the year is over to see if there was bill savings

trying to set settings manually was difficult. wants to remove thermostat

no comment

Q22. We will sending you the \$100 American Express Gift Check today to your address (verify)

Q23. Could you please share your thoughts on why you are asking for the thermostat to be removed? This information will help Edison in the evaluation of this test.

No reason given

can't override tstat manually. major setback because can only do it for 1 hour. Override function where you can have the option to have the internet or manually. Customer is going to remove tstat



hard to set settings

Q24. Should you have any questions about the thermostat and the program, please call the phone number on your thermostat 800.292.2444.

## APPENDIX B – SOUTHERN CALIFORNIA EDISON INTERNET PROGRAMMABLE THERMOSTAT INSTALLATION STUDY (SATISFACTION SURVEY # 2)

### Questions

Q1. How often have you used the Internet to program your thermostat since it was installed?

Mean:		2.8
Standard Deviation:		0.9
Responses	Count	Percent
daily	5	12.5%
weekly	7	17.5%
monthly	20	50.0%
not at all	8	20.0%

Q2. Did you use any of the "holiday" calendar scheduling options?

Mean:		1.9
Standard Deviation:		0.3
Responses	Count	Percent
Yes	3	7.5%
No	37	92.5%

Q3. Are you the only person in your household who uses the Internet to program the thermostat?

Mean:		1.3
Standard Deviation:		0.5
Responses	Count	Percent
Yes	28	70.0%
No	12	30.0%

Q5. Have you needed to use the technical support that is available?

Mean:		1.9
Standard Deviation:		0.4
Responses	Count	Percent
Yes	6	15.0%
No	34	85.0%

Q6. Do you know how to access the technical support?

Mean:		1.1
Standard Deviation:		0.3
Responses	Count	Percent
Yes	37	92.5%
No	3	7.5%

Q8. Would you like a technical representative to be in touch with you to discuss these features?

Mean:		1.8
Standard Deviation:		0.4
Responses	Count	Percent
Yes	8	20.0%
No	32	80.0%

Q9. If yes, what would be the best way to reach you? Take this information from the customer. This needs to be relayed to Lightstat.

Responses	Count	Percent
By phone	5	12.5%
By email	3	7.5%

Q11. On a scale of 1 to 5, how likely are you to recommend this thermostat to a friend or relative

Mean:		1.9
Standard Deviation:		1.2
Responses	Count	Percent
Definitely recommend	17	44.7%
Probably would recommend	13	34.2%
Might recommend	3	7.9%
Probably will not recommend	3	7.9%
Definitely will not recommend	2	5.3%

Q12. How much of a premium (over the cost of a traditional on-the-wall programmable thermostat) would you be willing to pay for web access to your thermostat?

Mean:		3.1
Standard Deviation:		2.0
Responses	Count	Percent
\$25	17	43.6%
\$50	1	2.6%
\$75	1	2.6%
\$100	1	2.6%
Web access is of no value to me	19	48.7%

Q13. How much of a monthly web access fee would you be willing to pay to use the Internet to control your thermostat?

Mean:		3.4
Standard Deviation:		1.7
Responses	Count	Percent
\$1	9	23.1%
\$2	7	17.9%
\$3	2	5.1%
\$4	2	5.1%
Web access is of no value to me	19	48.7%

Q14. Would you be willing to have your cooling set-point raised 4 degrees for 2 hours (not to exceed 15 times per summer season) in order to avoid a blackout?

Mean:		1.2
Standard Deviation:		0.4
Responses	Count	Percent
Yes	29	78.4%
No	8	21.6%

Q15. Would you be willing to have your cooling set-point raised 4 degrees for 2 hours (not to exceed 15 times per summer season) in order to avoid a blackout in some other neighborhood?

Mean:		1.4
Standard Deviation:		0.5
Responses	Count	Percent
Yes	24	64.9%
No	13	35.1%

Q16. Would you be willing to have your cooling set-point raised 4 degrees for 2 hours (not to exceed 15 times per summer season) if you received a \$120.00 electric bill credit for the summer season?

Mean:		1.2
Standard Deviation:		0.4
Responses	Count	Percent
Yes	30	81.1%
No	7	18.9%

Q17. Would you be willing to have your cooling set-point raised 4 degrees for 4 hours (not to exceed 15 times per summer season) if you received a \$120.00 electric bill credit for the summer season?

Mean:		1.5
Standard Deviation:		0.5
Responses	Count	Percent
Yes	18	48.6%
No	19	51.4%

Q18. Would you be willing to have your cooling set-point raised 4 degrees for 4 hours (for an unlimited number of events during the summer season) if you received a \$240.00 electric bill credit for the summer season?

Mean:		1.3
Standard Deviation:		0.5
Responses	Count	Percent
Yes	25	67.6%
No	12	32.4%

Q4. If no, how many other people in your household program the thermostat using the Internet?

1

2

2

2

2

1 other person

1, my husband

1, husband uses as well

1 other (husband and wife use)

1 other (Jose and son use)

1 other person

1 other, my wife

Q7. Are there features of your thermostat that you would like to understand better? If so, what?

Yes, there have been some confusion as to whether or not this thermostat will work without Internet access? I realize I can set the thermostat manually but it always reverts back to programmable set degree in 2 hours or less. I would like to know if I am doing something wrong.

The use of the holiday calendar and the calendar itself. It's difficult to understand all features

no; self explanatory

the features of the manual override

Just the programming, but I will devote more time to it.

no, very simple

none

no

no, everything ws explained well

no well described

possibly (customer would not elaborate further)

no

no

no

How to program the thermostats manually. Have not used and need to be refreshed

no, self explanatory

no

Understanding of thermostat is clear. Very user friendly

no, self explanatory

no

time setting for am when I wake up

no, self explanatory

no, self explanatory

no

manual controls

none

Yes, difficult to change it at night. Manual was not explained efficiently

In principle it sounded good but we are not Internet literate

Yes, it really was not as easy or explained very efficiently

Need to know how to program through the net

no

no

It was uneasy setting the temperature.

Yes, there are options like home, away and bedtime. I have questions on how to access these features. I think more training could have been provided.

not really

not really, pretty easy to understand

no

I'd like to understand how to manually override the temp for the heat to rise. Also this shouldn't do that, we need to figure out how to work that better.

Overriding the thermostat. It takes too long to register the changes.

no they are fine

Q10. Do you have any recommendations to share with Edison about the thermostat product or service?

Yes. Don't think it works very well. It does not automatically kick on. It sometimes forgets to kick on my home will be warmer than the set degree on the thermostat and I will have to turn it on manually.

Is a very nice program, works well for me.

none

It would be better if the manual override worked longer

Want the thermostat to work on its own based on the weather without having to manually change it.

none

Just that it works well

software once I understood it was simple Cannot manually set the temperature on the thermostat.

\*Customer uninstalled thermostat about 1 month ago

no, works well

no

Thermostat is fine, the problem is there's no features. You can't just change the temperature. You need to reprogram all the settings. For regular use, it just doesn't do enough.

way to save presets (i.e. winter and summer setting)

none

no

no

I think it's convenient

website locked us out, problems accessing website. This should be cleared up. Very frustrating.

Product works well but can't set it manually. Can only set it for 2 hours. Very inconvenient that you always have to go on the internet. You should be able to set it up over the phone as well.

more value for customers who travel

no

not really

not really

no

no

Web interface is really not user friendly. You have to always program. You can't just ask the web to turn air on for 3 hours or so.

none

Improve the ease of manual programming

It was just not practical for me. It was more work than I wanted to do.

Pocket manual or a simple 123 way to access the programming would be helpful

I thought it would be easier to program

pretty good

no, it's really a good product

It is good but not very useful. We really don't use it very often because we don't go away a lot.

I can see it being useful for someone who travels but for someone who is home all the time it can be a pain.

Remote turn off feature would be great, without having to adjust time and temperature. Also cell phone access for remote programming would be nice.

I don't think it's worth the money to keep the web access.

no

no

no

no

Q19. Customer Name & Address



## APPENDIX C – SOUTHERN CALIFORNIA EDISON INTERNET PROGRAMMABLE THERMOSTAT INSTALLATION STUDY (SATISFACTION SURVEY #3)

### Questions

Q1. How often have you used the Internet to program your thermostat since it was installed?

Mean:		3.1
Standard Deviation:		0.8
Responses	Count	Percent
daily	1	2.4%
weekly	9	21.4%
monthly	18	42.9%
not at all	14	33.3%

Q2. Did you use any of the "holiday" calendar scheduling options?

Mean:		1.9
Standard Deviation:		0.4
Responses	Count	Percent
Yes	6	14.3%
No	36	85.7%

Q3. Are you the only person in your household who uses the Internet to program the thermostat?

Mean:		1.2
Standard Deviation:		0.4
Responses	Count	Percent
Yes	32	76.2%
No	10	23.8%

Q5. Have you needed to use the technical support that is available?

Mean:		1.6
Standard Deviation:		0.5
Responses	Count	Percent
Yes	17	40.5%
No	25	59.5%

Q6. Do you know how to access the technical support?

Mean:		1.2
Standard Deviation:		0.4
Responses	Count	Percent
Yes	32	76.2%
No	10	23.8%

Q8. Would you like a technical representative to be in touch with you to discuss these features?

Mean:		1.9
Standard Deviation:		0.3
Responses	Count	Percent
Yes	4	9.5%
No	38	90.5%

Q9. If yes, what would be the best way to reach you?

Responses	Count	Percent
by phone	4	9.5%
by email	0	0.0%

Q11. On a scale of 1 to 5, how likely are you to recommend this thermostat to a friend or relative?

Mean:		2.2
Standard Deviation:		1.4
Responses	Count	Percent
definitely recommend	17	41.5%
probably would recommend	10	24.4%
might recommend	7	17.1%
probably will not recommend	2	4.9%
definitely will not recommend	5	12.2%

Q12. How much of a premium) over the cost of a traditional on-the-wall programmable thermostat) would you be willing to pay for web access to your thermostat?

Mean:		3.9
Standard Deviation:		1.8
Responses	Count	Percent
\$25	11	26.8%
\$50	1	2.4%
\$75	0	0.0%
\$100	0	0.0%
web access is of no value to me	29	70.7%

Q13. How much of a monthly web access fee would you be willing to pay to use the Internet to control your thermostat?

Mean:		4.0
Standard Deviation:		1.6
Responses	Count	Percent
\$1	7	17.1%
\$2	4	9.8%
\$3	0	0.0%
\$4	1	2.4%
web access is of no value to me	29	70.7%

Q14. Would you be willing to have your cooling set-point raised 4 degrees for 2 hours (not to exceed 15 times per summer season) in order to avoid a blackout?

Mean:		1.2
Standard Deviation:		0.4
Responses	Count	Percent
Yes	31	75.6%
No	10	24.4%

Q15. Would you be willing to have your cooling set-point raised 4 degrees for 2 hours (not to exceed 15 times per summer season) in order to avoid a blackout in some other neighborhood?

Mean:		1.2
Standard Deviation:		0.4
Responses	Count	Percent
Yes	31	75.6%
No	10	24.4%

Q16. Would you be willing to have your cooling set-point raised 4 degrees for 2 hours (not to exceed 15 times per summer season) if you received a \$120.00 electric bill credit for the summer season?

Mean:		1.3
Standard Deviation:		0.5
Responses	Count	Percent
Yes	29	70.7%
No	12	29.3%

Q17. Would you be willing to have your cooling set-point raised 4 degrees for 4 hours (not to exceed 15 times per summer season) if you received a \$120.00 electric bill credit for the summer season?

Mean:		1.5
Standard Deviation:		0.5
Responses	Count	Percent
Yes	20	48.8%
No	21	51.2%

Q18. Would you be willing to have your cooling set-point raised 4 degrees for 4 hours (for an unlimited number of events during the summer season) if you received a \$240.00 electric bill credit for the summer season?

Mean:		1.4
Standard Deviation:		0.5
Responses	Count	Percent
Yes	23	56.1%
No	18	43.9%

Q4. If no, how many other people in your household program the thermostat using the Internet?

3

1

1 other person

1

1

2

1

3

1

1

Q7. Are there features of your thermostat you would like to understand better? If so, what?

no

No, it's fairly easy

no, it's very easy

no

no

no

no

no

I'd like to review the calendar options a little more.

no

no

no

no

no

The resetting or programming from the internet, you should be able to do this manually.

no

no

no

no

not really

It didn't suit by fancy. Thermostat Removed

no

no

no

no

no

no

no

no, thermostat was removed

I would have kept it but we don't have severe weather so I got rid of it. It's better on the East Coast.

It seemed to not work as well as we thought it would.

No

The internet program itself is to complicated. It doesn't have enough features.

no

no

Manually set tstat instead of over the internet all the time.

Yes, the daily calendar

No

thermostat removed - hard to program

no

no

No

Q10. Do you have any recommendations to share with Edison about the thermostat product or service?

no

I'd like to understand why the temp reads one degree but the rooms are all different temperatures? Is there a way to regulate it better?

It's convenient, should make it available to more people.

not useful

Great for when on vacation and you forget to turn off the temperature.

Hard to change on equipment, easy online.

It's easier to just go to the thermostat instead of using the Internet.

Make it easier to control through the Internet

They could have done better with the design.

no

not really

no

more options of control

I think what I didn't like was setting the temp when I'm home. More flexibility setting temps.

make it more user friendly

If the product was free but if there's a charge I don't want it.

Update the internet. Insufficient, not enough options.

You should get it out to more people.

no

We've been doing it manually

no

no, it's a pretty good thing.

really inconvenient

When they came to install it, there were no written instructions, just the web site info.

Think it's great, especially if you're out of town and forget to turn it on or off.

no

no

Totally useless for me. I'm home a lot so it's not for me. Don't want to go online to adjust temperature. If I lived elsewhere it may be helpful.

not really

I think people who are not home a lot should use it.

Yes, I suggest partnering with someone who can give support for the product.

No

The online component needs to have more features.

To make it better it would be nice to lock the t-stat so you can not manually change it. Is it possible to change over the phone or turn it on/off over the phone?

If it was free, I'd want to keep it. I don't think it's worth paying for.

100% would have kept thermostat if the tstat could have been manually programmed or controlled. Had Thermostat removed.

No, it's a really good thing.

Maybe market it for someone who isn't home a lot, not for someone who is. Thermostat Removed.

no

the tstat program doesn't always go through. Would like it to be more reliable.

none

One thing is to do a comparison of your energy costs from last year to now. Does it save any energy?

#### Q19. Customer Information

## **APPENDIX D – LIGHTING PRODUCT BROCHURE**