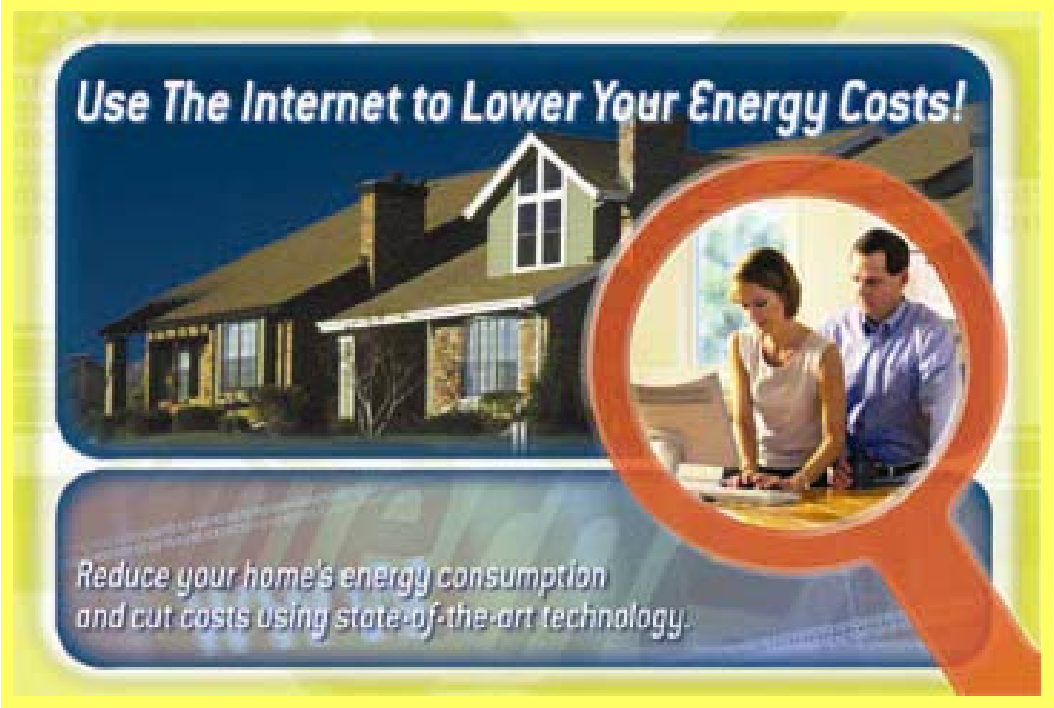
Residential Programmable Communicating Thermostat Customer Satisfaction Survey

Demand Response Emerging Markets and Technologies Program



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SOUTHERN CALIFORNIA EDISON
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EXECUTIVE SUMMARY

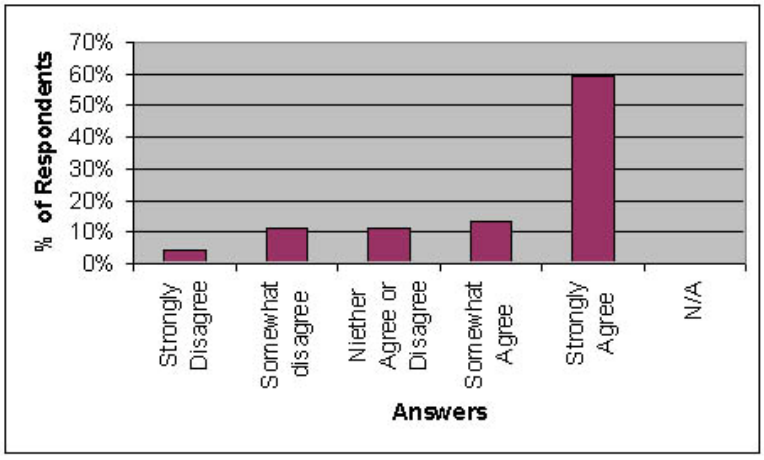
This report summarizes the responses of residential customers to a Programmable Communicating Thermostat (PCT) installed in their home to control their heating, ventilation, and air conditioning (HVAC) systems.

Programmable communicating thermostats let home owners adjust their thermostat to reduce cooling/heating loads and save money. The technology also gives Southern California Edison (SCE) the opportunity to better understand usage patterns and reduce demand during peak periods. But within this project, the objective was only to gauge customer acceptance of the PCT, not to test demand reduction.

The project represented the first test of a PCT that can only be programmed via the internet. It allowed temporary local adjustment, but programming setback temperatures are done through a web site using the home owner's computer.

Home owners in Valencia and Santa Clarita, California 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 survey describing how they interacted with the web-based thermostat controls and whether or not they felt comfortable with the technology.

Survey results demonstrated that, in general, the target customer demographic was favorable to the PCT. Customers stated that they liked the technology and used it without difficulty, with 58% responding they "strongly liked" and 27% replying they "somewhat liked" programming their thermostat using the Internet feature. Forty-three percent of customers said that before the PCT installation, they did not use their existing thermostat for night setback savings. Forty-three percent of survey participants said that they would be willing to pay from $25.00 to $100 more for a thermostat with this feature. Forty-eight percent were wiling to pay between $1.00 and $3.00 per month for web access to the thermostat. Seventy-three percent responded that they would recommend this thermostat to a friend or relative as shown in the figure below.



Responses to statement Q17: "I would recommend this thermostat to a friend or relative."

No actual electrical kWh usage was measured or calculated in this project, as the intention was solely to determine ease of use and acceptability of the PCT.

It is important to note that the communities selected were upper middle class, with higher than median home values for the region, and an 11% greater number of high school graduates and 3% greater undergraduate degree than reflected throughout the rest of the state. It is suggested that this PCT study be applied to a broader demographic to test its viability among various constituents in SCE service territory.

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.

Such remotely programmed communicating thermostats (PCTs) can be reached by wireless signals from different sources to adjust temperatures. In addition to the homeowner direct programming, the PCTs could be commanded to adjust their temperatures in real time to reduce peak demand on the electrical grid by reduced air conditioning use.

The ability to simultaneously raise the PCT temperature offers the electric utilities the ability 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, having the residential customers' thermostats communicating with a web site offers the capability 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 changes in rates.

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 PCTs, this test was performed to gauge customer acceptance of the remotely programmable thermostat and the use of an Internet site to interact with the PCTs, not to test a curtailment.

Customers were asked to respond to a 20-question phone survey and then asked for general comments. A $100.00 American Express gift card was sent to the customers after the survey. They were given the option of having the PCTs removed or leaving them installed after the survey. Ninety percent said that they wanted to keep the PCTs.

In order for an electric utility to reduce peak demand, a large number of customers must participate in demand response programs. Higher income customers may not be attracted to current demand reduction technologies, such as air conditioning switch cycling, for example. Alternative technologies, such as PCTs, might attract a larger base of customers and lead to greater potential demand reduction.

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 PCTs and the subsequent customer satisfaction survey sought to see if customers perceived value in the PCTs.

BACKGROUND

This project was initiated and completed in the fourth quarter of 2005. Because of the short time frame for the test, the PCT was installed in only fifty-one households. Customers were solicited by a post card mailing (Appendix A) and direct telemarketing. They were offered a chance to try the new technology at no charge and offered a $100 gift card on completion of a phone survey. A local HVAC service company installed the PCTs in the customer's homes. Either one or two PCTs were installed, one per HVAC system, as some of the homes had two HVAC systems. Customers were contacted 40 to 45 days after the installation to respond to a survey on how they liked the PCTs and what comments they had. In addition, data was kept of the customer's activity programming the PCTs through the web site. Each customer's programming frequency and comments were correlated.

This test was directed at a single newer neighborhood (Valencia and 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 to participate in the project.

SCOPE OF WORK

This project needed to be completed in a short time frame, starting October 3rd, 2005 and concluding December 30th, 2005 to meet timeline constraints. This accelerated schedule influenced the scope of the project, and how the sample population was chosen. Convenience and speed was required, so a single area in greater Los Angeles was chosen for the installations.

TIMELINE

Below is the timeline for the PCT test project.

- Project initiation, goals and direction: October 3, 2005
- Project Team Members and participation defined: October 7, 2005
- Residential customer population chosen: October 17, 2005
- Post card production and mailing: October 26, 2005
- PCT shipments to installing contractor: October 28, 2005
- Telemarketing commences: November 2, 2005
- Installations commence: November 10, 2005
- Installations complete: November 18, 2005
- Telephone surveys start: December 20, 2005
- Telephone surveys complete: December 30, 2005

THERMOSTAT INSTALLATION

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

The thermostat 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 PCTs can also share addresses so they can be commanded as a group, which might be typically used for a curtailment command.

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.

CUSTOMER ACCESS

The customer accessed the PCT via a web site specifically set up for the project. The web site steps the customer through web screens to choose what temperature to select for different times of the day. The customer is initially shown a scheme that allows 4 temperature changes per day as recommended by the California Energy Commission. These are the typical settings: Wake, Work, Home, Sleep time settings 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.

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 PCTs were tested prior to installation to ensure that they would reliably receive paging signals. No subsequent testing of the PCTs was performed, and there were no customer complaints logged regarding PCT operation.

No special test equipment was employed. After installation, the technician called a technical support person and a test command was transmitted over the paging network to the PCT. The installing technician saw light emitting diodes (LEDs) 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 required that customers use their PCTs for a minimum of 30 days and then participate in a survey. The timing was such that the customers averaged over 40 days before the 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.

RESULTS

Data Analysis

Customers were called by a national telemarketing center and asked to respond to 20 questions. The questions were grouped to give an idea of:

- How much the customers typically used their Internet connection
- How the customer used their existing thermostat; did they use the setback function?
- How well the customer liked the new technology and whether it was easier to program the PCT compared to their old thermostat.
- What kind of a cost premium the customer might be willing to pay for the PCT and it's Internet connection.

The survey instrument, count of respondents, and percentage results are provided as Appendix C. Graphs of the results are also provided in Appendix C.

Customers were then asked if they had any positive or negative comments. The most frequently heard negative one was that the PCT had too short of a manual control. The manual control was limited to an hour and then had to be overridden again.

Many customers liked the Internet control of their PCT. Several felt that it is useful for remote control when not at home. Since the survey was given only 40 days after installation, the customers had no way to gauge whether the PCT had saved them money on their electric bill, and there were several comments requesting information on the website or on the PCT that would let them know what their energy savings were.

Twenty-nine percent of households had two air conditioners totaling an average of 8 tons, and the remainder, 71%, had a single air conditioner averaging 4 tons. Note that these figures are estimates from the installation contractor and not nameplate data.

Customers in these neighborhoods have Internet access from their homes, and use it for multiple reasons. Participants in the test liked using the Internet to control their thermostat.

Finally, customers overall positive or negative feelings about the PCT were correlated to the frequency of the customers' using the Internet to program their new thermostats. These feelings are illustrated by the responses graphed in Figures 2, 4, 5, and 6. As might be suspected, higher satisfaction strongly correlated to higher frequency of use. This might lead one to conclude that either customers who liked their PCT tended to use them more, or, customers who used the Internet to program their PCT tended to like it more.

As with any technology, some customers found that it meets their needs and others did not. The few drop-outs from the test were customers who had scored low on initial Internet frequency of use prior to the PCT installation.

There were quite a few customers, 16 out of 51, who apparently liked the default temperature settings well enough not to bother programming at all during the initial weeks. The default program left the customers with a cooling setting of 72 degrees and

a heating setting of 67 degrees. The settings adjusted to 55 for heating and 85 for cooling at 11:30 p.m. They reverted back to day settings at 6:00 a.m. It was late summer in Los Angeles, a time when there is little need for heating, and the cooling season was winding down. Perhaps a less comfortable default setting would encourage more programming by the customers.

PROCEDURE AND FINDINGS

Although Southern California Edison has installed PCTs for light commercial customers in the past, this project provided the first test of a similar thermostat for residential customers.

Programmable communicating thermostats let home owners adjust their thermostat to reduce cooling/heating loads and save money. This technology offers SCE the opportunity to better understand usage patterns and to reduce demand during peak periods. The project represented the first test of a PCT that can only be set up via the internet. It allowed temporary local adjustment, but programming setback temperatures were done through a web site using the homeowner's computer.

In general, customers liked the technology, and used it without any instructions. The only calls for technical support were for lost or forgotten passwords.

Three of the 51 customers asked to have the thermostat removed after the survey. They all 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 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 Building Energy Efficiency Standards have required programmable setback thermostats for all homes for some 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. These results were shown in Figure 1.

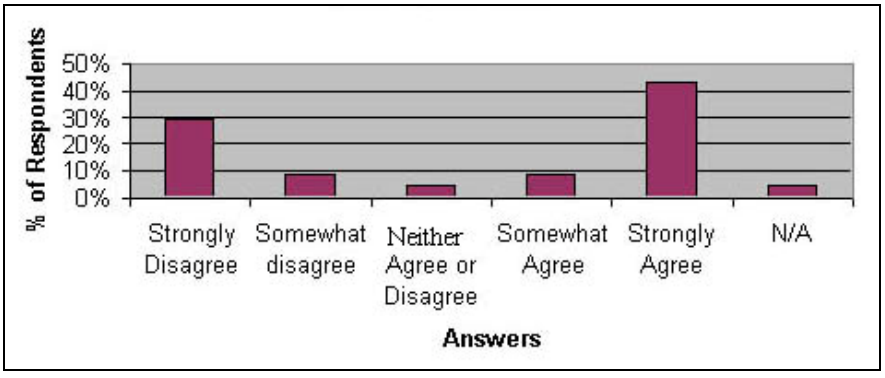


Figure 1. Responses to statement Q10: "I used my old thermostats' programmable features prior to this test."

It appears that a significant percentage (52%) of these households, as shown in Figure 2, like the ability to control their thermostats from their computer, and find that it is

easier to obtain (at least they thought they were obtaining) subsequent energy savings from PCTs.

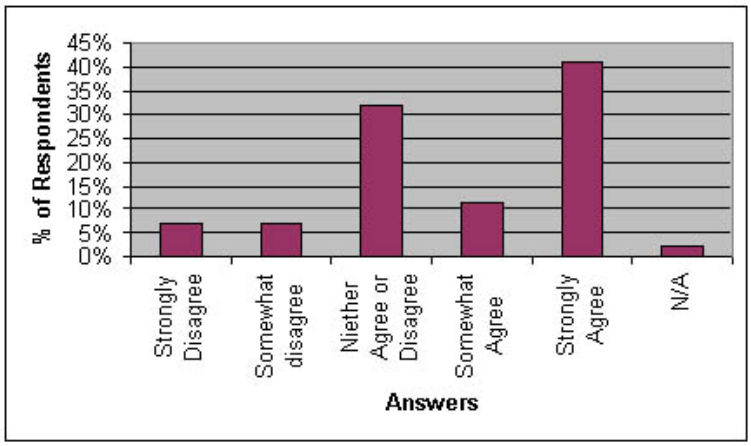


Figure 2. Responses to statement Q13: "It's easier to achieve energy savings by using an Internet programmable thermostat."

When given a choice of paying nothing extra for the Internet features, 43% said that they would be willing to pay from $25.00 to $100.00 more for a thermostat with this feature. These results are shown in Figure 3.

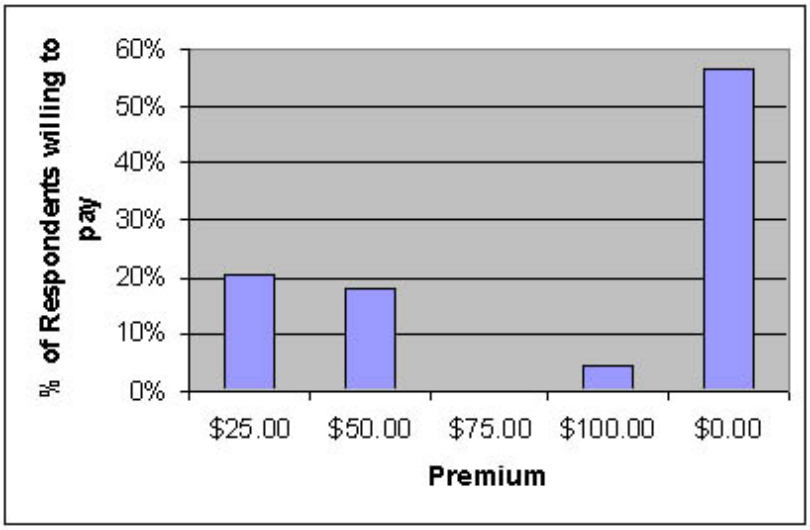


Figure 3. Responses to question Q18: "How much of a premium (over the cost of a traditional on-the-wall programmable thermostat) would you be willing to pay for web access to your thermostat?"

As shown in Figure 4, when given a choice of paying nothing extra for the wireless connectivity to their thermostats, 48% said that they would be willing to pay from $1.00 to $3.00 per month.

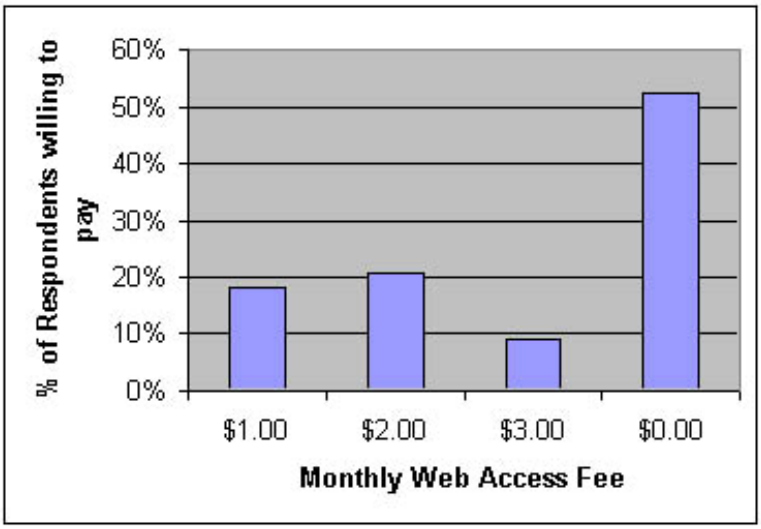


Figure 4. Responses to question Q19: "How much of a monthly web access fee would you be willing to pay to use the Internet to control your thermostat?"

When asked if they would recommend this PCT to their friends or relatives, 73% responded yes, as shown in Figure 5.

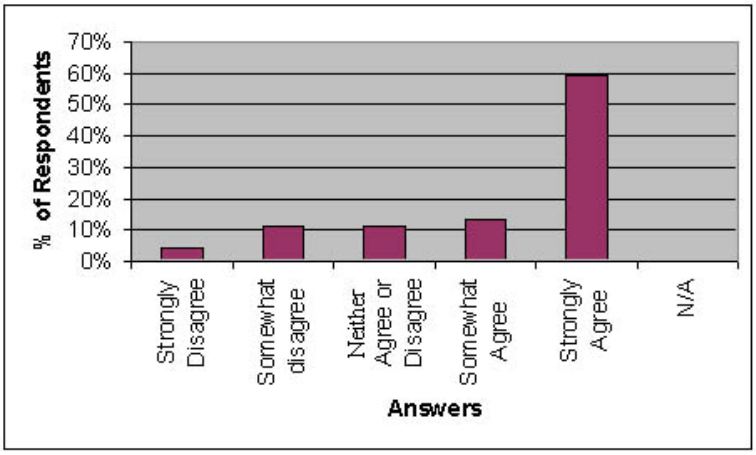


Figure 5. Responses to statement Q17: "I would recommend this thermostat to a friend or a relative."

There has often been debate about the merits of different residential demand reduction technologies such as air conditioning switches or thermostats that respond to wireless signals. Which technology offers benefits to which demographic segment? How does a utility get more customers to sign up, increasing total load controlled? Does one technology answer the needs of all customers?

The demographic surveyed:

- Had a median household income, as reported to the U.S. Census Bureau in 1999 of $66,717, in comparison with $47,493 in California.
- The average home price in 2006 is $500,000.
- Was Internet savvy (judged by the fact they have an Internet connection and that they did not need any assistance with the programming of their PCTs) and that they said that they used the Internet for multiple tasks. (see Figures 6 and 7)
- Had the PCTs installed, not for the money ($100 gift card) but for the energy savings, new technology, or convenience. Ninety percent cited energy savings, new technology or convenience (see Figure 8).

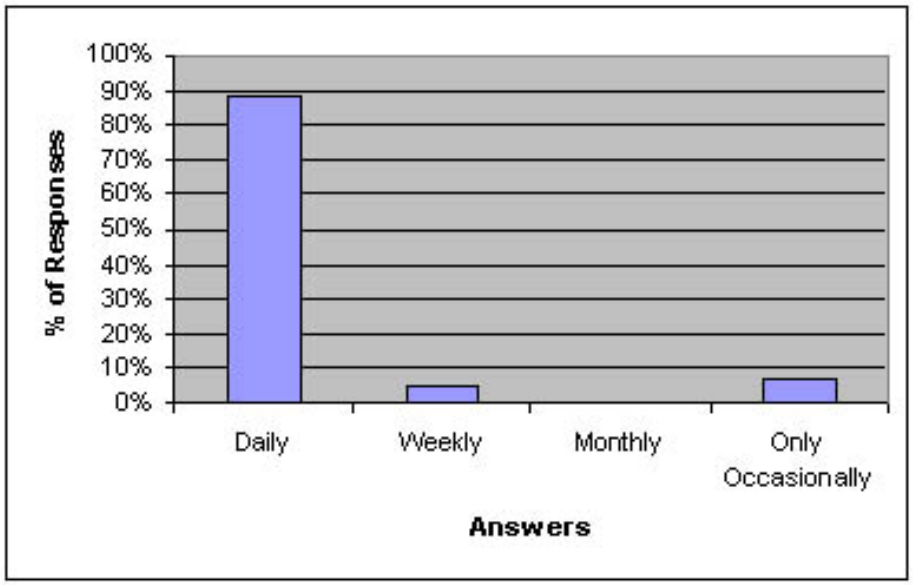


Figure 6. Responses to Q1: "Would you say that you use the Internet daily, weekly, monthly or only occasionally (provide one answer only)?"

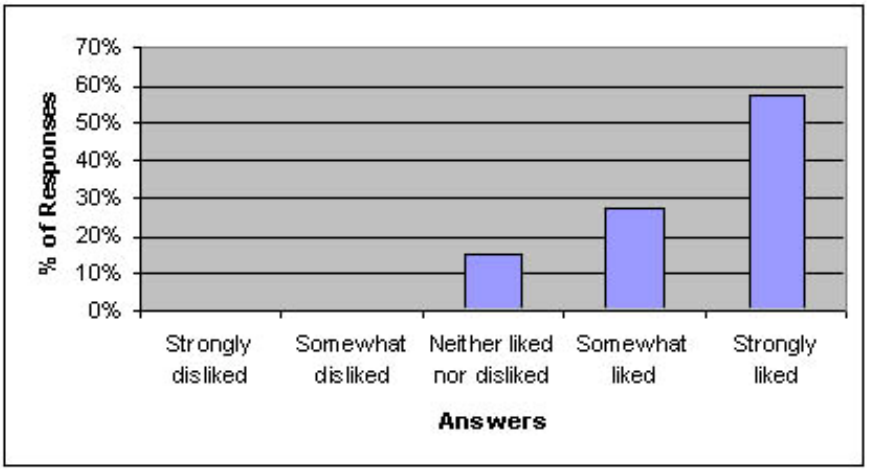


Figure 7. Responses to Q4: "How did you like programming your thermostat using the Internet feature?"

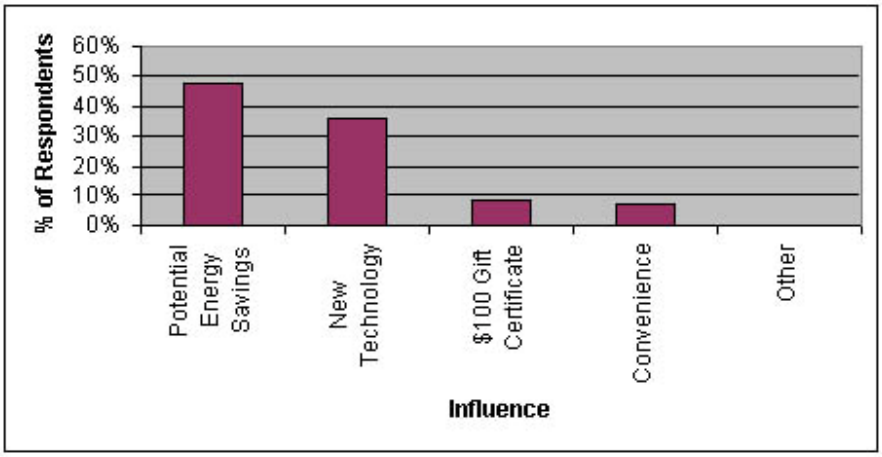


Figure 8. Responses to Q20: "What item influenced you most to sign up for the test?"

The drop-out rate of 4 households out of the total 51 was about the same percentage (9%) who said that they did it for the money. There have been no further drop-outs from the test in the subsequent month.

CONCLUSIONS

The demographic group represented by this survey, is above average income, heavy Internet users, and interested in new technology. This group finds it easier to program their thermostats via the Internet than conventionally. They are more inclined to utilize the energy savings potential from better control of their air conditioners via the Internet than conventional programmable thermostats. Also, they are willing to pay more for the new technology afforded by PCTs, both for initial cost and for monthly access.

Although this survey did not gauge customer acceptance of demand response, the PCT provides a gateway by providing access to customer air conditioners. It also provides a potential educational tool for the sponsoring utility to promote variable pricing Demand Response and Energy Efficiency programs and other strategies to help customers save energy and money.

These customers represent above average air conditioning load per household, with an average of 4 tons per air conditioning system. This is a desirable demographic to reach for demand response. It is also representative of the fastest growing housing market in Southern California, that being the desert climate zones. It is a future demographic that will be important to reach for demand response.

While the cost today for PCTs might still be considered high ($300.00), this cost is bound to be reduced in the future. If this is reduced to say $150.00, it might represent a $75.00 premium over typical high quality programmable thermostats. This cost premium might easily be saved in less than a year if the customer is induced to use the energy conserving night or day setback features. Customers appear willing to pay in the $1.00 a month for the ability to reach their PCT via the Internet, and this might cover most of the costs in large scale. It does appear that the costs might be in line with other competitive demand response technologies. The PCT might be offered as a “step-up” product to customers for demand response who might not be tempted by the base offering of say, an air conditioning cycler switch.

It is recommended that a follow-up survey be given in the 3 to 6 month time frame, and that this test be expanded to include customer reaction to demand response actions such as air conditioning cycling and temperature offset. It is also recommended that the customers be offered variable pricing electrical rates that interact with their thermostats. The total number of households should be increased, and the geographic area encompassed should be increased, as well.

In summary, the survey points out that there is potential to reach customers with a technology suitable for peak demand reduction that is not currently being deployed. Most importantly, the customer sees enough value in the product to be willing to pay a premium for it on initial cost and is also willing to pay a monthly fee for it as well.

It is recommended that this concept be studied further as a potential residential demand response strategy for these reasons:

- The demographic was predominantly white (79.5% versus 59.5% statewide), upper middle class with high-level computer skills and high-speed internet access
- The study should be applied to a greater populus to determine if the results would be consistent across city and county lines and among younger, older and less internet savvy communities
- This demographic may have a greater interest in and concern with energy efficiency than the general population, but that is unknown at this time.

Appendix A

Residential Programmable Communicating Thermostat
Direct Mail Promotion

Use The Internet to Lower Your Energy Costs!

Architectural Energy Corporation is implementing a small scale test for Southern California Edison Company (SCE) of a cutting-edge energy savings technology. This opportunity is for a select few SCE customers in the City of Santa Clarita using your home or office computer's Internet connection. This offering will allow you to learn how to change your home thermostat settings using the internet to keep your living space comfortable while conserving energy and saving money.

ARCHITECTURAL ENERGY CORPORATION
Integrated Engineered Solutions

Postage

Participants will receive:

- A wireless, Internet-enabled thermostat,* installed **FREE** of charge (a $300 value)
- 12 months of wireless paging service ($36 value)
- A $100 gift certificate to a local major retailer – our gift for your participation in a brief survey after 30 days of program participation

Interested customers should call **1-866-673-4340** to see if they qualify. But hurry – we can only accept the first fifty (50) respondents. Don't miss out on this exciting opportunity to reduce your home's energy consumption and cut costs using state-of-the-art technology. **Call today!**

*For more information about the thermostat product, please visit: http://www.lightstat.com/aec
This test is administered by Southern California Edison under the auspices of the California Public Utilities Commission.

Appendix B

Lightstat
Internet Programmable Thermostat Specification Sheet

Lightstat reduces your energy costs… automatically!

Cut your energy costs with a setback thermostat that offers the benefits of complex energy management systems without the high costs or maintenance.

Automatic setback of heating and air-conditioning.	Patented *Intelligent* Light Sensing ignores daylight; looks for artificial light. You save more energy.
Pre-set limits prevent temperature abuse.	*You* control the environment, not your employees. Allows adjustment of the thermostat, but cannot over-cool or over-heat.
Quick and simple diagnosis of your HVAC system.	Read the status of equipment — *and for the first time in a stand-alone thermostat* — read the Supply Air Temperature, and the Return Air Temperature. You know at a glance how your HVAC system is working.
Protect your valuable HVAC equipment.	Compressor protection time delays built-in. Random re-start after power failures prevents electrical surges.
Zero maintenance	No clocks...No programming… No batteries

LIGHTSTAT®

Managing Energy Sense-ably

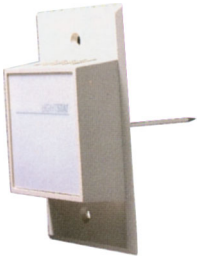
LIGHTSTAT | Model TME Setback Thermostat

REMOTE TEMPERATURE SENSOR

Locate remote sensor in high traffic areas to keep thermostat away from people

Sensors use ordinary 2-wire, low-voltage cable

Sensor can be added or deleted in the field as needed



REMOTE SUPPLY AIR SENSOR

Mounts to supply air duct.

Let's you know how warm or cool that air is coming into the room.

Tells you how well your HVAC equipment is working.

Replaces Typical Thermostats

- Simple installation by local tradesmen using existing wires.
- One model fits gas or electric heat, heat pumps too. Single or dual stage.
- Pre-heat or cool the building prior to occupancy.
- Automatically adjusts for holidays or schedule changes.

DISPLAY INDICATES OUTPUTS
Shows which stages of heating or cooling are operating

BACK-LIT DISPLAY
Shows setpoint and current temperature at a glance.

GREEN SETBACK LIGHT
Tells you when the thermostat is in the energy-saving night mode

PUSH BUTTONS
Allow employees to adjust temperature for comfort, but they cannot override the built-in limits.

LIGHT SENSITIVITY ADJUSTMENT
Allows placement of the Lightstat in high or low light areas. Choose normal light sensitivity or Intelligent light sensing which ignores sunlight.

Specifications:

Electrical:	24 VAC, with 2-Amp relay output switching Both Hot and Common wires are required
Operation:	Dual stage Heating / Cooling with Automatic Changeover Dry contacts for night shutdown of outside air dampers
Sensors:	Supports both Remote-Room Sensor and Supply-Air Sensor. Sensors can be added or removed in the field, shielded cable is not required
Size:	Approx. 4.25" high x 6.25" wide x 1.5" deep
Warranty:	Two-year warranty with overnight replacement. 800 number Technical Support across U.S. and Canada.

MANUFACTURED BY

*LIGHT**STAT*** Inc.
22 W. West Hill Road
Barkhamsted, CT 06063 USA

LIGHTSTAT®
Managing Energy Sense-ably

www.lightstat.com
1-800-292-2444

Appendix C

Residential Programmable Communicating Thermostat Satisfaction Survey

Appendix C.

Survey Questionnaire

Residential Programmable Communicating Thermostat Satisfaction Survey

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%

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%

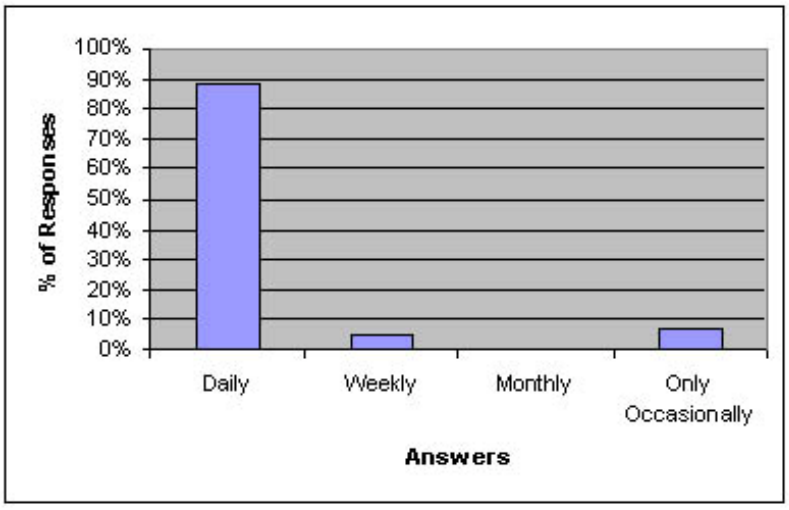
Q19. How much of a monthly web access fee would you be willing to pay to use the Internet to control your thermostat?

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%

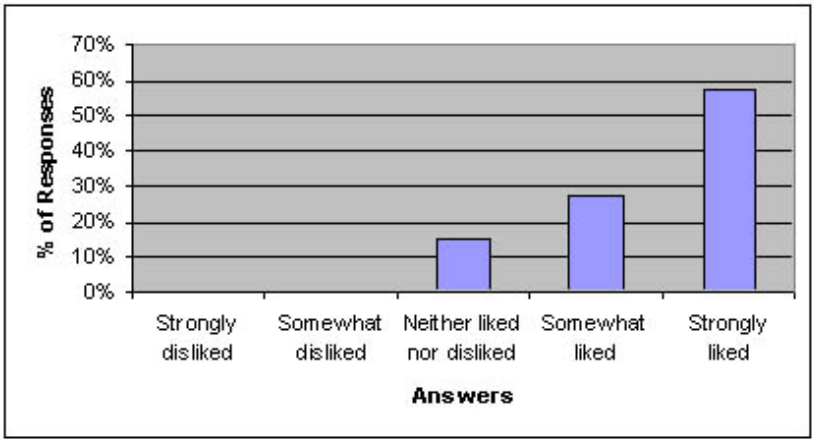
Q20. What item influenced you the most to sign up for the test?

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%

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



Q2: How did you like programming your thermostat using the Internet feature?



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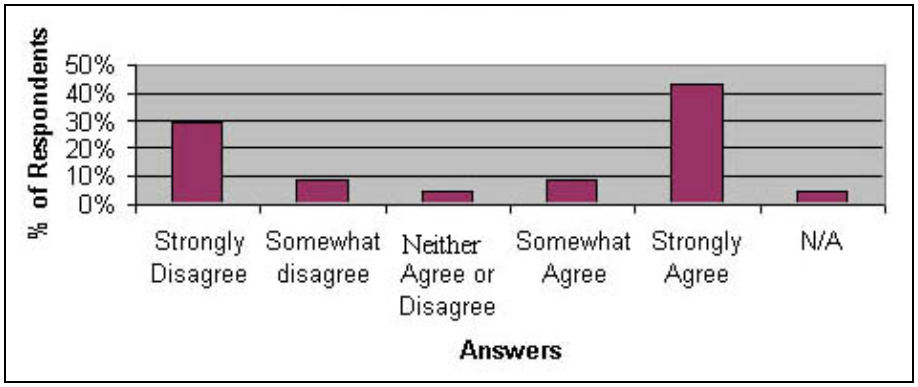

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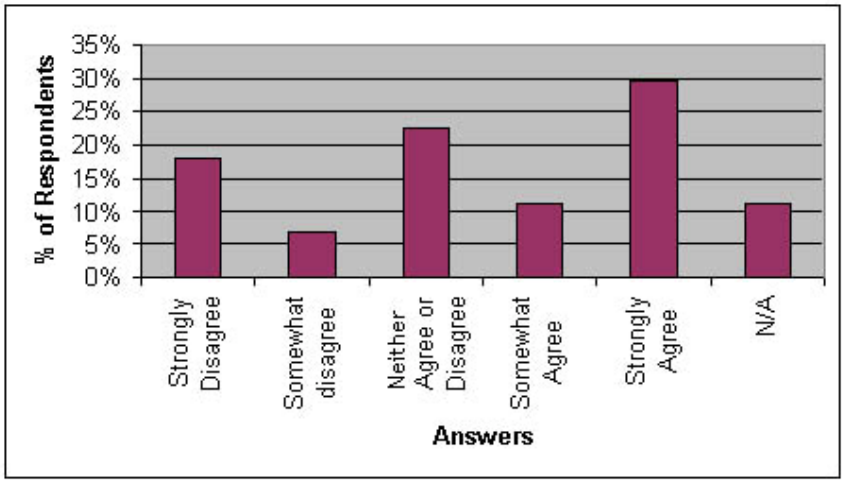
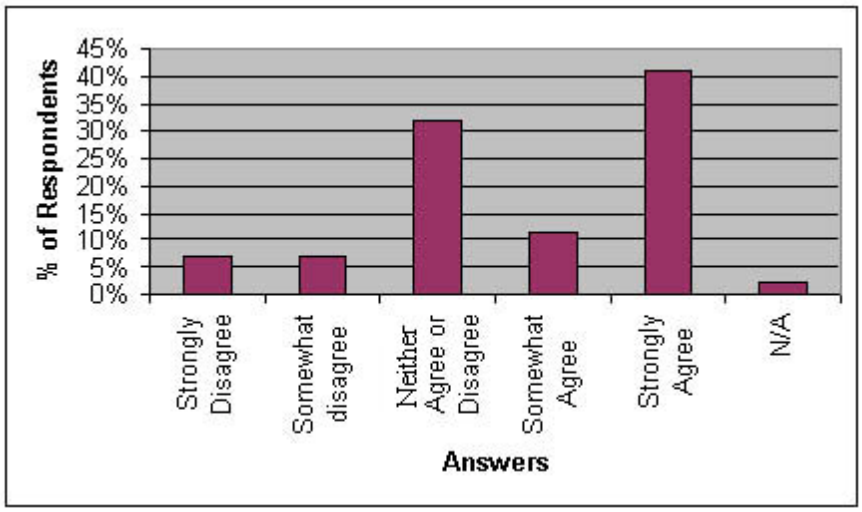
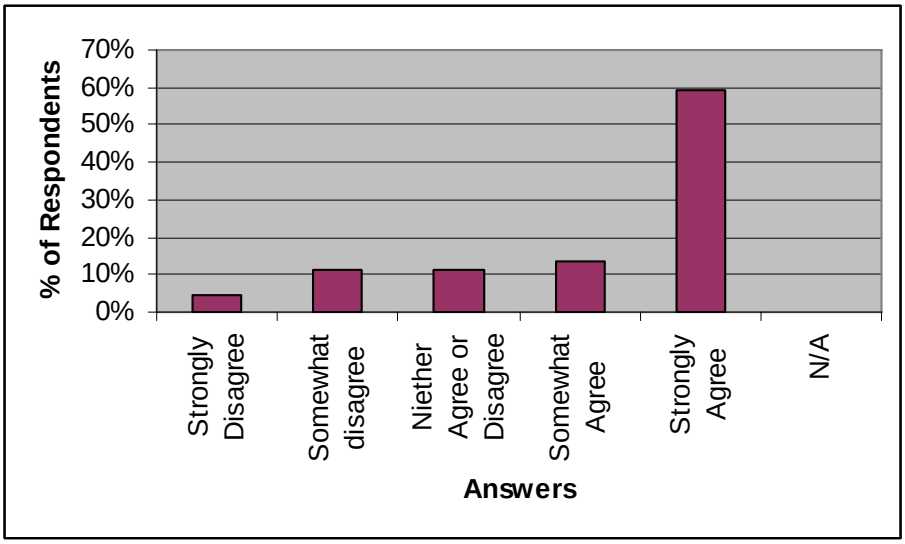


Q13: It's easier to achieve energy savings by using an Internet programmable thermostat.



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



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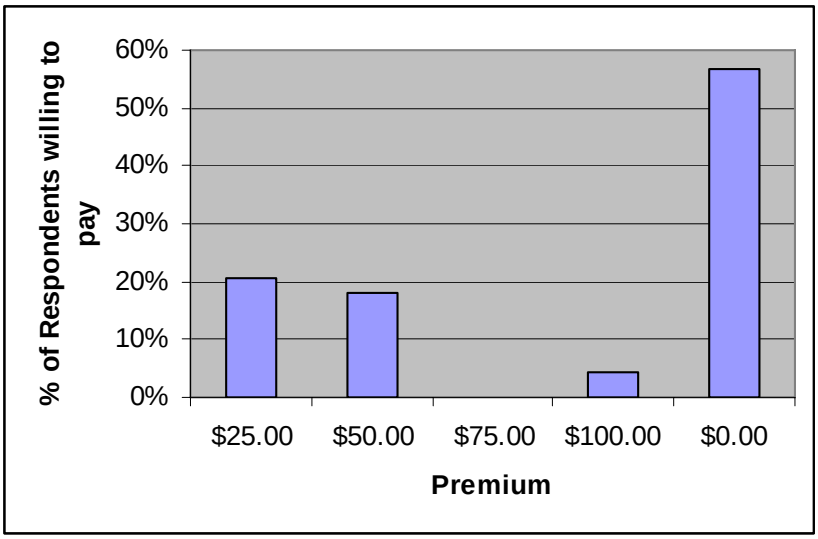

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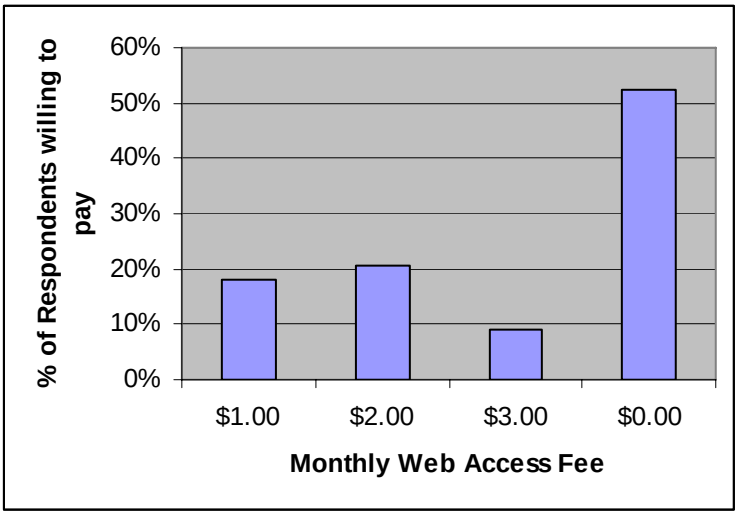

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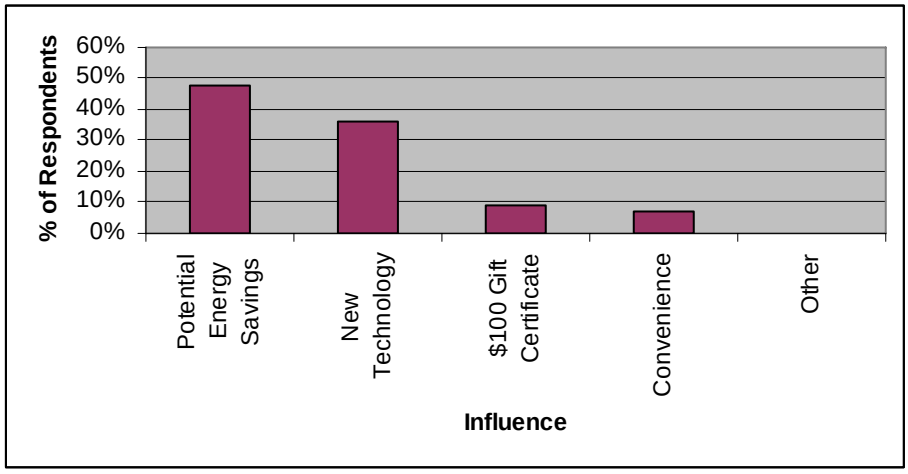
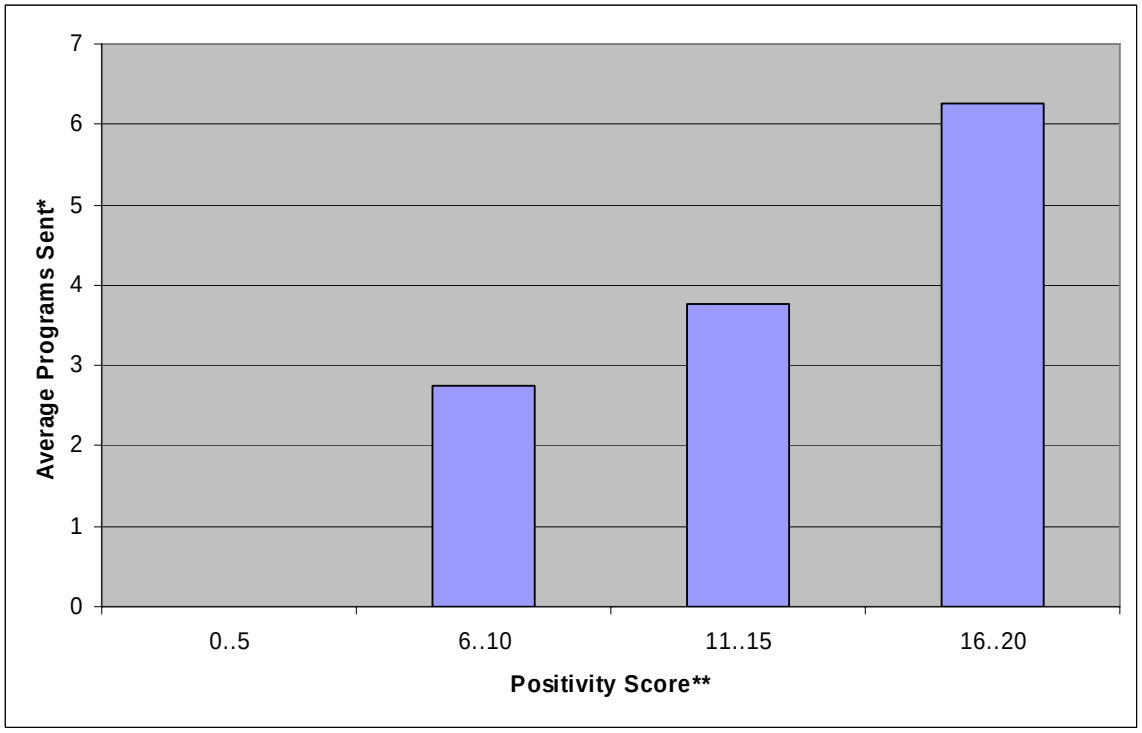


Programming Activity versus Customer Opinion



*Average Programs Sent is the average number of program transmissions per thermostat, including scheduled holiday transmissions, sent by all customers with Positivity Scores in the indicated range. Customers who sent 0 programs are included in the averages.

**Positivity Score is the sum of the customer responses to survey questions Q11, Q12, Q13, and Q17, which pertain to the customer's opinion of the thermostat and underlying technology. Higher values indicate a more favorable overall opinion.

In three cases, the person responding to the survey indicated that they were not the one in the household who programmed the thermostat. Because the programming activity

In three cases, the person responding to the survey indicated that they were not the one in the household who programmed the thermostat. Because the programming activity and the opinion would be from two different individuals, these three customers were excluded from these results.