The California Bill Analysis Pilot: Using Web-Based Bill Analysis as a Tool to Reduce On-Peak Demand

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ABSTRACT

This paper presents the results of an innovative dynamic pricing educational pilot conducted during summer of 2005 with residential customers in California. The pilot was designed to determine the value of providing customized bill analysis to amplify the price response to critical peak rates. The pilot is part of the California Statewide Pricing Pilot that began in 2003 to broadly evaluate of the potential peak demand reduction benefits of time-based rates within the context of widespread advanced metering infrastructure (AMI) in California.

Over three hundred residential customers on a critical peak rate were selected from which participants were recruited by telephone and a comparable control sample was identified. An automated program website was developed that incorporated a detailed home energy survey available for all participants and processed monthly billing data for each customer. The specialized info provided in-depth, customized information about when energy is most expensive, how the customer uses energy during peak and critical peak periods, and how the customer can most effectively reduce peak energy use. This information is based on the customer's specific household characteristics, and is provided within a broader communication strategy that includes monthly e-mail and direct mail as well as e-mails sent the day prior to a critical peak event.

Telephone surveys and focus groups were used to evaluate the effectiveness and qualitative impacts of the program. A quantitative impact evaluation was also conducted using the difference of differences approach for both critical peak days and non-critical peak days.

Introduction

This paper presents the results of the California Bill Analysis Pilot program conducted during the summer of 2005 with customers in Southern California Edison (SCE), San Diego Gas and Electric (SDG&E), and Pacific Gas and Electric (PG&E) service territories. The pilot was designed to investigate the benefits of providing customers diagnostic information as a supplement to the standard bill for time-based critical peak rates, as part of an ongoing investigation of electric pricing options for residential customers.

The Bill Analysis Pilot is part of a broader, multi-year Statewide Pricing Pilot (SPP) that began in 2003 under the auspices of the California Public Utilities Commission (CPUC) to evaluate the potential peak demand reduction benefits of time-based rates. In 2003, a sample of customers was offered advanced meters that measured hourly electric use, and time-based electric rates of several designs. In 2004, an initial pilot examination was conducted of information treatments - including both Web tools, mail information, and Energy Orb displays - to see if there were potential benefits from assisting customers with their understanding of rates

and their response during high price critical peak periods. This earlier study showed that there was promise to the concept: both positive customer reports of interest and some quantitative results showing greater customer demand reduction in peak periods were noted (Nexus, ODC, & Primen 2005).

This study focuses on a more narrowly defined scope than do previous efforts: diagnostic information was offered only by Web and mail (without in-home display devices), and the target was limited to residential households who remained voluntarily on a critical peak rate (CPP-F). The objective of this study was to determine the extent to which customized bill analysis would be helpful to these customers in understanding and managing their energy use, as well as whether this information would amplify their price response to critical peak electricity rates. Note that the provision of providing bill analysis over the Web as a supplement to customer bills is relatively inexpensive – on the order of dollars per customer per year. The low cost of providing energy diagnostics to customers over the Web make this pilot approach important to evaluate as part of an ongoing consideration of rates and meter options in California.

Methodology

Within the context of this pilot, bill analysis is the provision of customized information to participants based on their specific monthly bill data and home energy survey data. The bill analysis was produced through an automated program website that was developed by Nexus Energy Software (Nexus) between April and June 2005 and then deployed and operated from 24 June 2005 through 31 October 2005.

The website was branded as the "Shift and Save" program for SCE and PG&E, and as the "Smart Shift and Save" program for SDG&E. Three separate instances of the pilot website were hosted with separate branding for each of the utilities (www.shiftandsave.com/sce, www.shiftandsave.com/pge, www.sdge.com/residential/criticalpeak). A screen shot from the primary page of bill analysis website for SCE participants is included as Figure 1.

The bill analysis emphasized three major messages: (1) Peak energy is expensive—by showing average prices and definitions of critical-peak, on-peak, and off-peak periods;[1] (2) Save money by using less peak energy, especially on critical peak days—by showing a bar chart and calculated benchmark statistics related to the customer's usage during critical peak and peak periods; (3) Take action, especially on critical peak days—by providing a customized list of measures to reduce peak energy use with estimated savings and a customized pie chart with a breakdown of end use during peak periods. The bill analysis also included a savings goal that was updated monthly during the program as well as extensive content and tools developed by Nexus (Home Energy Center, Thermo Calc, Load Shift Calculator) for participants interested in more information.

To produce the bill analysis, the customer-specific data (gathered by the utilities through a home energy survey) and monthly bill data were entered into the database underlying the program website. Home energy survey data for each participant was entered manually through Microsoft Access database screens. Monthly bill data were transferred on a daily or regular basis through secure FTP from each utility to the program website. For SCE and PG&E, the FTP process was automated, while for SDGE the process was manual. The monthly bill data was

[1] Peak periods are weekdays between 2 and 7 pm. Critical peak periods are between 2 and 7 pm on days on which a critical peak event is called. In 2005, critical peak events were called on July 12, 13, 14 and 22; August 26; September 28 and 29; and October 6, 7, 13, 14.

loaded three days a week during program operation (typically Tuesday, Wednesday, Thursday). Updated bill data was received for most participants (and bill analysis prepared) four or five times during the period in which the program operated.

Figure 1. Screen Shot of Primary Bill Analysis Website Page for SCE Participants

Bill Analysis Pilot participants were recruited by telephone, and a comparable[2] control sample was identified from the entire population of over 300 customers on a residential critical peak rate (CPP-F). This resulted in 152 program participants and 118 who served as a control sample. The table below shows the breakdown of program participants by utility. Fifty-eight percent (58%) of customers provided e-mails and therefore participated by e-mail, while the remaining 42% of customers did not and thus participated through direct mail.

Table 1. Bill Analysis Pilot Participants

Utility	Total Participant Count	E-mail Participants	Direct Mail Participants
SCE	75	48	27
PGE	61	31	30
SDGE	16	9	7
Total	152	88	64
Percentage		58%	42%

For e-mail participants, a personalized html e-mail was sent each month when their updated bill analysis was available. The e-mails were branded separately for each utility and included custom content including a greeting with each customer's first name and benchmark data based on that participant's last month of bill data. The e-mails also contained a link leading the participant to the bill analysis at the program website. For SCE and PG&E, the link automatically brought the participant through to the primary bill analysis page without requiring a login. For SDG&E, the link brought the participant to a login page where they entered their account number in order to access the primary bill analysis page. These e-mails were processed

[2] The treatment and control samples were stratified based on climate zone, housing type, and usage level.

and typically sent three days each week during program operation (Tuesday, Wednesday, and Thursday).

For direct mail participants, a 2-page print version of the website was printed out and mailed to the participant each month with a cover letter. The direct mail bill analysis included the URL of the main program login page (www.shiftandsave.com/sce, www.shiftandsave.com/pge, www.sdge.com/residential/criticalpeak) to encourage participants to access the web treatment even if they had not provided an e-mail address. Direct mail bill analyses were typically sent once a week during program operation (Wednesday).

Note that two additional channels were available to participants to access their bill analysis. First, PG&E provided a link for pilot participants through their own Customer Service On-Line (CSOL) website. This link was provided only to pilot participants (detected through their login to CSOL) with direct login to the pilot program page. Second, any customer could go directly to the program login page and log in manually by account number.

The bill analyses were provided within a broader communication strategy that also included:

- A welcome communication (postcard for direct mail participants and e-mail for e-mail participants) to confirm participation in the program and verify contact information.
- A site launch e-mail to notify e-mail participants that the program web site was initially available.
- Pre-event e-mail messages (for e-mail participants) to remind customers a day in advance of a critical peak event and provide links to the program pages. Eleven critical peak events were called during the summer 2005 program period.
- Two reminder postcards (for all participants) to encourage continued participation during the summer and promote the website.

The pilot project was evaluated qualitatively after all critical peak days had occurred - through participant and control group surveys, as well as two focus group sessions - to determine the extent to which bill analysis had an effect on customer knowledge and behavior. For the participant survey, Opinion Dynamics Corporation (ODC) attempted to reach all participants to complete a quantitative telephone survey about the changes that they made in response to the critical peak events and/or bill analysis. Seventy-four respondents, or approximately half of all participants in the pilot, completed the survey. Respondents included 31 customers who received the bill analysis by mail, and 43 individuals who received a link to the bill analysis via e-mail.

ODC conducted these participant surveys between 21 October 2005 and 6 November 2005. For the control group survey, ODC attempted to contact all customers who had been selected as the control group. In all, 32 customers from the control group, or approximately 27% of control customers, completed our survey. ODC conducted the control group surveys between 29 October 2005 and 9 November 2005. To complement the quantitative telephone survey data, ODC conducted two telephone focus groups. These tele-focus groups were held from 7:30 to 9 pm PST on November 15 and November 16. Each group included seven participants, for a total of 14. In all, the focus groups included four customers from SCE territory and 10 from PG&E territory. Due to the small number of customers on the CPP-F rate in SDG&E territory, we were unable to recruit any SDG&E customers for the tele-focus groups.

For the statistical analyses, a comparison approach sometimes referred to as the "difference of differences" method was used to investigate two questions: (1) What was the

magnitude and statistical significance of the average load impact attributable to the bill analysis? (2) Were bill analysis participants more likely to reduce energy use as a result of receiving the bill analysis?

For the first question, average load impacts were estimated for all hours of the day including the peak period (2 pm to 7 pm) on event days, weekdays, and weekend days using the difference of differences method. To estimate the average load impacts attributable to the bill analysis, the difference between the treatment group and the control group during the program period, beginning on 30 June 2005, was calculated. This unadjusted savings impact would be valid if the control group were identical to the treatment group. However, to adjust for any the differences between the two groups, the difference between the control group and the treatment group during a pre-treatment (summer 2004) period was calculated, and this difference was used to adjust the savings estimate, taking the "difference of the two differences." This can be thought of as a correction to the savings estimate based on the systematic differences between the treatment and control groups.

For the second question, individual energy savings were estimated for each customer, again with the difference of differences method. Then, a nonparametric analysis was used to determine if the percentage of individual customers who used less energy was statistically significantly different as a result of the bill analysis when compared to the random changes in energy use that would be observed if the bill analysis had no effect.

Results: Use of Bill Analysis

Participants engaged actively with the bill analysis. Most participants – 77% – visited the website at some point during the program. Further, participants began using the program website immediately (29% of participants visited the website within the fist 6 days of operation) and the website remained active throughout the summer, with 5 to 26 new unique users (3 to 17% of participants) every calendar month of program operation. This level of use is remarkable when compared to that seen for comparable utility sites offering bill information, where 1-3% of a target population typically visits a website on their own when informed of its benefits.

Table 2. Number of Website Users Over the Entire Program

	Total	**PG&E**	**SCE**	**SDG&E**
Total Number of Unique Users	117	49	54	14
Total Number of Participants	152	61	75	16
Total Number of E-mail Participants	87	31	47	9
% of All Participants	77%	80%	72%	88%
% of E-mail Participants	134%	158%	115%	156%

Table 3. Number of New Users by Month

	June 24-30	**July**	**August**	**September**	**October**
Total Number of Unique Users	44	38	38	43	28
Total New Users in Period	44	26	17	24	5

The open rate over the entire program period for bill analysis e-mails was 22%, and was 18% for all program e-mails. These rates are slightly lower than an applicable industry average of 28%. The click-through rate (the number of unique users that clicked on the program website link in the e-mail) for the bill analysis e-mails was 8%. The average click-through rate for all

program e-mails was somewhat lower at 3%. The actual number of unique clicks per month is only 25% of the total 167 unique users per month. Thus, other paths to the program website, such as logging in through a browser bookmark or entering through PG&E's CSOL pages were also significant channels for participants to access the website.

Results: Qualitative Impacts of Bill Analysis

According to participant survey and focus group results, participants found the bill analysis useful and reported that it caused them to take actions to reduce peak usage, resulting in lower electricity bills. Participants were asked to rate the usefulness of the bill analysis - specifically in helping them to reduce electricity consumption - on a scale of 1 to 10 where 1 is not at all useful and 10 is very useful. Nearly half (47%) of respondents found the bill analysis useful (rating it a 8, 9 or 10). An additional 37% gave a more neutral rating (5-7), while 10% felt that it was not useful.

Participant and control group respondents reported reducing the amount of electricity used in their homes during critical peak (sometimes also known as super peak) events and peak periods in similar proportions (see table below). Most respondents (whether a participant or not) stated that they took some action.

Table 4. Reducing the Amount of Energy

Did you reduce the amount of energy you use during…	Participants (n=74)	Non-participant (n=32)
Critical or super peak events?	82%	88%
Peak periods?	78%	91%

When we asked participants specifically about whether the bill analysis led them to take additional actions, a large percentage responded affirmatively (see table below). Specifically, 46% of respondents stated that they took actions during the critical peak periods that they would not have taken if they hadn't received the bill analysis; and 49% of respondents stated that they took additional actions during daily peak periods because of the bill analysis. So while recipients of the bill analysis report taking some action in similar proportions to customers that did not receive the bill analysis, the number, types and times of the actions may be affected.

Table 5. Were Actions a Result of the Bill Analysis?

	Critical or Super Peak Events			Peak Period		
	Total (n=74)	Email (n=43)	Mail (n=31)	Total (n=74)	Email (n=43)	Mail (n=31)
Did not take action	18%	16%	19%	22%	23%	19%
Took actions as a result of bill analysis	46%	49%	42%	49%	56%	39%
Would have taken same action without bill analysis	32%	33%	32%	30%	21%	42%
Don't know	4%	2%	6%	-	-	-

Most participants (62%) noticed reductions in their bills since participating in the CPP-F rate, and approximately half of the participants (51%) noted reductions due to the bill analysis.

Table 6. Reductions in Bill Since Participating in Program and/or Receiving Bill Analysis

	Participants (n=74)	Non-participant (n=32)
Yes, due to CPP-F rate	62%	69%
Yes, due to bill analysis	51%	N/A

The most common methods for customers (whether a participant or not) to reduce their energy use during critical peak or peak periods is by not doing laundry during these times (i.e., shifting when they do their laundry), turning off lights, turning off the air conditioner, and/or shifting the times that they run their dishwasher. All of these changes were all recommended to program participants if applicable given the characteristics of that participant's household. Recommendations were sorted to present the largest potential savings first.

Table 7. Changes Made to Reduce Electric Use (multiple responses)

What changes did you make?	During Critical Peak Periods		During Peak Periods	
	Participants (n=61)	Control Group (n=28)	Participants (n=58)	Control Group (n=29)
Did not do laundry	66%	61%	64%	62%
Turned off lights	54%	46%	48%	38%
Turned off air conditioner	41%	43%	36%	41%
Did not run dishwasher	38%	39%	36%	31%
Turned off pool pump	10%	11%	9%	10%
Pulled window shades	7%	11%	2%	7%
Raised thermostat / raised AC temp	7%	7%	5%	21%
Turned down water heater pump	7%	4%	5%	10%
Turned off pool filter	3%	4%	5%	3%
Other/Don't know	3%	15%	9%	6%

While these are actions that customers could take just during critical peak events, comments from focus group participants indicated that they learned to behave differently based on the information provided to them. Moreover, since many of the actions that they were taking were not burdensome, customers may tend to make these changes habitual, rather than just in reaction to the critical peak event signal. This idea, that the changes made by customers during peak periods become habitual, is supported by findings from the impact analysis, which is discussed in the following section.

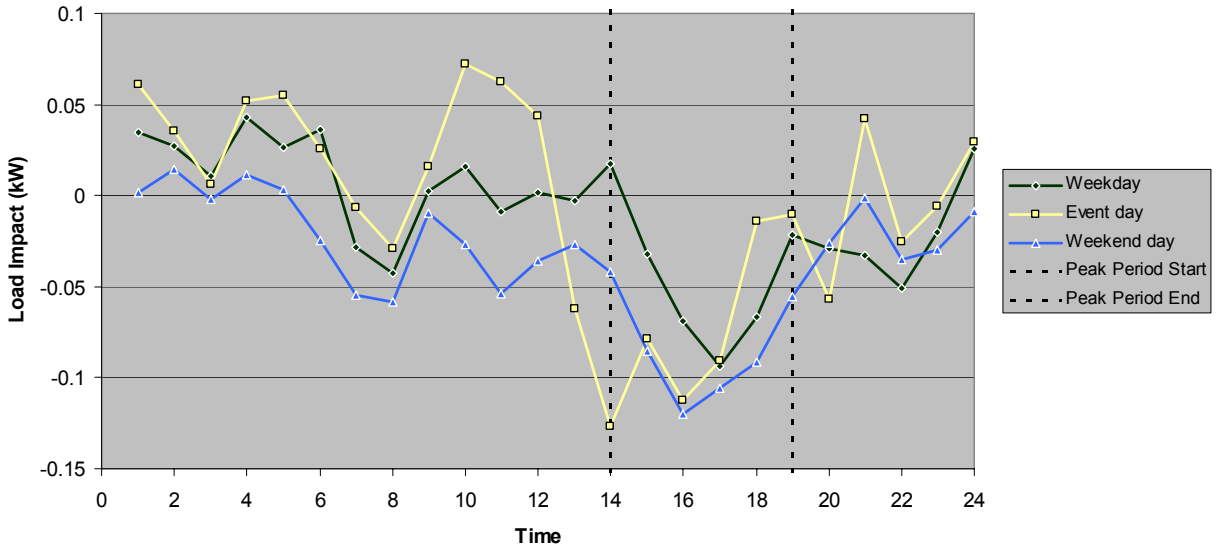
Results: Quantitative Impacts of Bill Analysis

It appears that the bill analysis increases the average level of energy savings among residential customers, over and above the CPP-F rate. In the aggregate, our results show greater reductions among the treatment group than among the control group between 2 pm and 7 pm for all day types (critical peak event days, weekdays, and weekends) This suggests a general "conservation effect" attributable to the bill analysis, with customers making changes that become habitual, rather than just in reaction to a critical peak or peak pricing signal.

The figure below shows the load impact attributable to the bill analysis by hour calculated by the difference of differences method on the three different day types. A negative load impact indicates savings, with treatment customers using less energy than control

customers, adjusted for pretreatment differences. The following table shows the same data - hourly load impact estimates by day type – with an average load impact across the 5 peak hours. These data indicate incremental savings during peak times on event days, weekdays, and weekend days. The average savings was 0.06 kW per participant on event days and weekdays, and 0.09 kW per participant on weekend days.

Figure 2. Average Adjusted Load Impacts



An average adjusted load impact attributable to the bill analysis is discernable for all day types between 2 and 7 pm.

Table 8. Average Adjusted Load Impacts, All Day Types

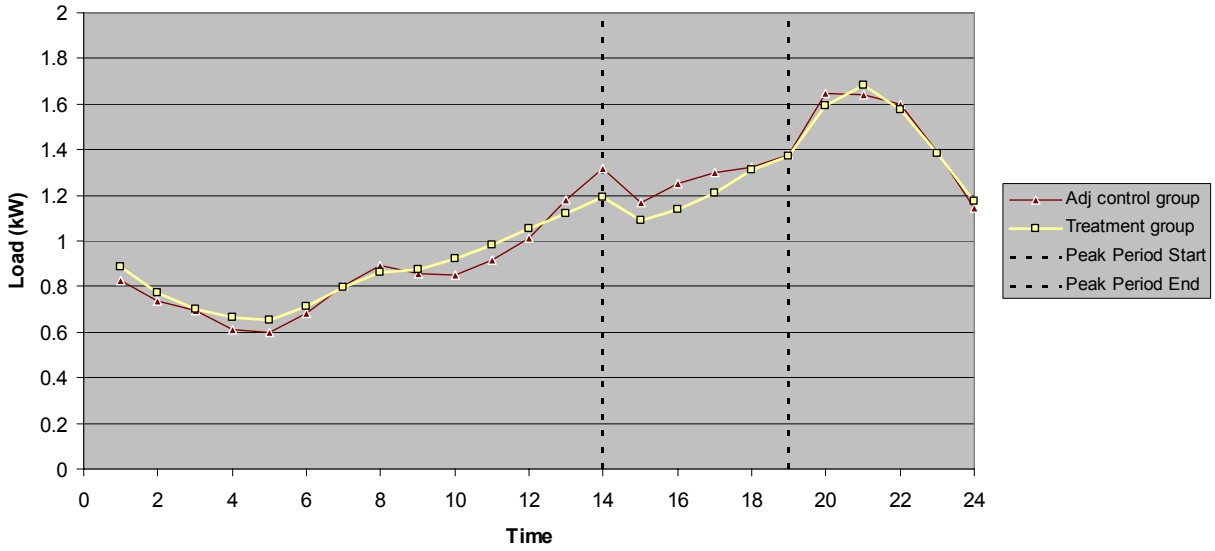
Hour ending	Event day	Weekday	Weekend day
3:00 pm	0.078	0.032	0.086
4:00 pm	0.113	0.069	0.120
5:00 pm	0.091	0.094	0.106
6:00 pm	0.014	0.067	0.091
7:00 pm	0.010	0.022	0.055
Average across peak hours	0.061	0.057	0.091

Changes made by participants, whether physical or behavioral, appear to affect all days equally, since all three day types see about the same load impact. While the savings on weekend days was not shown to be statistically different than savings on other days, the weekend savings indicates an affect in the absence of a higher price signal. This is most likely because changes made by bill analysis customers are either permanent measures, or behaviors that become habitual once they are made aware that these behavior changes could save money. Further, it is possible that the weekend effect is sustained simply because a greater percentage of participants are home and thus able to modify their energy usage.

Figure 3 below shows the average load across all event days during the treatment period (2005) for the treatment group, and compares it with the adjusted average load for the control group during the treatment period. The control group load is adjusted by the difference between the treatment and control group loads during event days during the pre-treatment period (2004). Note that the Y-Axis in this graph is load, rather than a load impact or difference in load. The

difference between the two lines in the figures below is approximately the same as the load impacts for event days shown Figure 1.

Figure 3. Comparison of Loads, Event Days



The average load across all event days is lower than the adjusted control group loads between 2 and 7 pm.

We also calculated 90% confidence intervals for the hourly load impact estimates. Given the magnitude of the savings, the sample size, and an assumed normal distribution of variance, these impacts were not found to be statistically significant based on this difference of differences, normal distribution analysis, since all 90% confidence intervals included zero. The standard errors of the load impact estimates were over 9 times the magnitude of the point estimates (for instance, the average load impact across the peak period on event days was -0.061, and the standard error was 0.59, making the 90% confidence interval nearly 1 kW). However, over certain time periods (peak periods, weekdays generally, and weekends generally), a non-parametric analysis showed that a statistically significant proportion of bill analysis participants was found to be more likely to have reduced energy use.

For each individual treatment customer, we used the corresponding control group cell as the comparison group, and calculated the savings using a difference of differences approach as described previously where the savings estimated between the control and treatment groups during the treatment period was adjusted by the difference in loads between the control and treatment group during a pre-treatment (summer 2004) period. If the treatment had no effect, we would expect that about half of the bill analysis treatment customers would save energy during the peak period, and half would use more, simply because of random variation. Using a nonparametric approach based on a binomial probability distribution, we can calculate the probability of the results we saw under this assumption of equal probability of increasing and decreasing consumption. If the outcome is very unlikely to occur under the assumption of equal probability, then we have evidence that participants are more likely to reduce energy consumption, and this result is attributable to the bill analysis.

Of the 139 treatment customers, the number that used less energy and the number that used more energy are listed in the table below. On weekdays, there is a statistically significant

effect (assuming a cutoff probability of 0.10), both during the on-peak period of 2 pm to 7 pm and throughout the day. This means that customers who received the bill analysis information were more likely to use less energy than customers without the information. Both results for weekdays were clearly significant, with a very small probability.

Table 9. Individuals Using Less Energy Attributable to Bill Analysis by Day Type

Day type	Time period	Number using less energy	Number using more energy	Probability	Significantly Significant Effect (Probability ≤ 0.10)
Weekday	On-peak energy	82	57	0.0207	Yes
Weekend day	On-peak energy	77	62	0.1175	No
Event day	On-peak energy	71	68	0.4327	No
Weekday	Daily energy	84	55	0.0086	Yes
Weekend day	Daily energy	78	61	0.0873	Yes
Event day	Daily energy	75	64	0.1982	No

On weekend days, the test on reduction in daily energy was significant, but the test for on-peak period reduction was not significant. However, the results were close to each other, with one falling just below the cut-off probability of 0.10. So we can conclude that the treatment resulted in a higher likelihood of a reduction in daily energy use on weekends, and there is some evidence of a higher likelihood of on-peak energy savings on weekend days. Of course, there is no separate peak pricing period on weekends, but as with the load impact analysis shown above, the changes are similar on weekdays and weekend days.

There is no statistically significant effect for event days. Based on this non-parametric analysis, there is no evidence that customers receiving the treatment are more likely to reduce their energy use during the critical peak period or across all hours on event days.

These results appear somewhat contradictory, since event days all fell on weekdays, and yet the hypothesis tests yield different results. One possibility is that customers change their regular habits, and over the course of many days (all weekdays), there is a small effect. But when you look at only a few days, specifically the eleven event days that fall on the hottest days, there may not be as much of an effect. The results of this analysis again reinforce the idea that the changes that participants make as a result of the bill analysis information are not specific to particular days or even day types, but are made on all days.

According to qualitative survey results, these impacts appear to be persistent. The majority of participants reported they would continue to take all of the actions they took as a result of the bill analysis if the monthly bill analysis were stopped.

Table 10. What Would Happen If Bill Analysis Was Stopped

If you stopped receiving the monthly bill analysis would you…	Total (n=58)	Email (n=36)	Mail (n=22)
Stop taking the actions	8%	5%	14%
Continue to take some of the actions	25%	27%	23%
Continue to take all of the action	61%	65%	55%
Don't know	5%	3%	9%

Perceptions of Bill Analysis

As part of the pilot, considerable information was collected through the participant surveys and focus groups to gauge perceptions of the program and to gather feedback for future efforts. Generally, participants are interested in continuing a bill analysis program and did provide considerable feedback applicable to a larger-scale rollout of a similar bill analysis program. Most participants want to continue receiving the bill analysis. Only 12% of them said they would not want to receive it in the future. Also, recipients of the bill analysis generally felt that each section of the bill analysis was clear and well presented.

While customers wanted the bill analysis to continue, the majority is not willing to pay for the bill analysis. However, approximately one-third (29%) of participants and 17% of non-participants stated that they **are** willing to pay at least $12 per year (or $1 per month) for this type of information.

Conclusions

The primary conclusions of the evaluation are summarized below, organized into three high-level observations with references to the section of the report in which specific results are discussed.

First, participants engaged actively with the bill analysis. They found it useful and reported that it caused them to take actions to reduce peak usage, resulting in lower electricity bills.

- More than three-quarters of the participants contacted recalled receiving the bill analysis (or a link to the bill analysis) at least once.
- Based on site traffic data collected at the bill analysis website, 77% of all program participants visited the website at some point during the program and the website remained active throughout the program.
- Survey results indicate that many participants found the bill analysis useful in helping them reduce their usage. Nearly half (47%) of participants found the bill analysis useful.
- A significant portion of respondents (46%) stated that they took actions during the critical peak periods that they would not have taken if they hadn't received the bill analysis; and 49% of participants stated that they took additional actions during regular peak periods because of the bill analysis.
- Most participants (62%) noticed reductions in their bills since participating in the CPP-F rate, and approximately half of the participants (51%) noted reductions due to the bill analysis.

Second, the quantitative impact analysis showed savings, with statistical significance for some, but not all, results.

- The bill analysis appeared to have an impact between 2 pm and 7 pm on all days (critical peak event days, weekdays, and weekends). This suggests a general "conservation effect" attributable to the bill analysis, with customers making changes that become habitual, rather than just in reaction to a critical peak or peak pricing signal.
- The load savings during critical peak periods ranged from a low of 0.010 kW to a high of 0.113 kW, for an average critical peak period savings of 0.061 kW. Given the magnitude

of these savings, the sample size, and an assumed normal distribution of variance, these impacts were not found to be statistically significant.

- Over certain time periods (peak periods, weekdays generally, and weekends generally), a statistically significant portion of bill analysis participants were found to be more likely to reduce energy use as a result of receiving the bill analysis. This effect was not observed during other time periods including critical peak periods. This again suggests a general "conservation effect" attributable to the bill analysis that may not hold during critical peak periods.

Finally, participants are interested in continuing a bill analysis program and provided considerable feedback applicable to a larger-scale rollout of a similar bill analysis program.

- Most participants want to continue receiving the bill analysis. Only 12% of them said they would not want to receive it in the future.
- While recipients of the bill analysis generally felt that each section of the bill analysis was clear and well presented, they provided several detailed suggestions to improve the bill analysis presentation.
- While customers wanted the bill analysis to continue, the majority is not willing to pay for the bill analysis. However, approximately one-third (29%) of participants and 17% of non-participants stated that they are willing to pay at least $12 per year (or $1 per month) for this type of information.

References

Nexus Energy Software, Opinion Dynamics Corporation, and Primen. 2005. "Final Report – Information Display Pilot."