Evaluation of the California Statewide 20/20 Demand Reduction Programs

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Executive Summary

ES.1 Overview

This report summarizes the results of an evaluation of the 2005 Statewide 20/20 Demand Reduction Programs implemented by San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE), and Pacific Gas & Electric Company (PG&E). The goal of this evaluation was to assess the design and impact of this program, and to provide recommendations regarding the future use of this type of program as a mechanism for achieving demand reduction goals.

The “Statewide 20/20 Programs” includes efforts conducted by SDG&E, PG&E, and SCE to develop and implement “price-responsive” programs that sought to reduce summer energy use among residential and smaller commercial/industrial (C&I) customers. The name “20/20” is derived from a common attribute: in each program, customers were urged to reduce energy by 20% and, in return, receive a 20% additional credit on their electric bill. Under this formula, energy use was compared against a similar time period, reflecting the baseline energy used to determine the percentage reduction in energy consumption achieved.

Although the 20/20 program is categorized as one of the “demand response” (DR) programs designed to reduce overall demand (kW), the incentives were based upon decreased energy (kWh) use. Given the lack of demand metering among this segment of the customer base, energy use was the only available proxy for demand. Consequently, the actual change in demand could not be directly measured, but was instead estimated on the basis of survey data and prototypical customer load shapes.

While eligibility requirements and calculation methods differ across the utilities, in general there were two program types, as described below.

1. The Statewide 20/20 Programs

These programs offered a 20% reduction on the summer bill to both residential and C&I customers who reduced summer use by 20% in comparison to the previous summer. Residential and small C&I customers were eligible for these programs and no enrollment was required.

2. San Diego Gas & Electric C&I 20/20 Program

The SDG&E C&I 20/20 program was a variant on the 20/20 program approach, targeted at larger C&I customers and designed to reduce load on specific days when the utility was nearing peak capacity. Eligibility requirements specified that a customer’s average peak demand must be

greater than 20kW and that customers enroll in the program in order to be eligible for the rebate. Trigger events were called on a day-ahead basis if the forecasted weather for the next day (Tues through Friday only) exceeded 84 degrees and the current day's peak exceeded 3,620 MW. Trigger events were called four times in 2005. Savings were calculated by comparing use on the event day between 11 am to 6 pm to the average use during the same time period for the three highest days out of last 10 non-event, business days. All participant businesses needed to have an interval meter installed.

The major challenge in the evaluation of the Statewide 20/20 programs was developing a method to identify program participants. Estimating program impacts required us to separate program activity from the natural variations in energy consumption. With no enrollment process, all customers had the opportunity to participate, but only those who knew about the 20/20 program and actively engaged in energy reduction activities could reasonably be considered to be participants. Consequently, the customer surveys conducted to assess the awareness and motivation of the utilities' customers formed the foundation of our evaluation.

This evaluation was designed to estimate program impacts for both program types. Surveys were conducted with residential and C&I customers, some of whom received the rebate and others who did not meet the 20% reduction threshold, to ascertain the influence of the 20/20 marketing efforts and overall program effectiveness. The data from these surveys were then combined with billing data to estimate the energy and demand reductions that can be attributed to the 20/20 Programs.

In addition, a process evaluation was conducted for the SDG&E C&I 20/20 Program, in part to gauge its applicability to other utilities. This component of the evaluation consisted of interviews with SDG&E employees and participating customers, and a survey of participant and non-participants.

This executive summary is divided into two main sections: 1) the Statewide 20/20 programs, and 2) the SDG&E C&I 20/20.

ES.2 Statewide 20/20 Programs

This section provides a summary of the evaluation results for the Statewide 20/20 programs, beginning with a broad overview of the total reduction in energy use for rebated customers. The next subsection covers appropriate adjustments to this reduction, followed by a discussion of the possible program impacts among non-rebated customers. The final two subsections present the estimated demand savings and an analysis of cost-effectiveness.

Most of the residential and C&I customers were eligible to receive a 20/20 rebate in 2005. Only large C&I customers (above 200kW in SCE and PG&E, and above 20kW in SDG&E territories), and those customers without continuous billing records from May 2004 through September of 2005, were ineligible.

The three utilities calculated 2004 and 2005 use for each customer and calculated a percentage saving as follows:

$$\%saved = \frac{(2004SummerUse - 2005SummerUse)*100}{2004SummerUse}$$

Table ES.1 shows the number of accounts who qualified for the 20% rebate.

Table ES.1: Summary of Customer Rebates in 2005

	PG&E		SCE		SDG&E	
Revenue Class	No. of Rebated Accounts	% of total accounts	No. of Rebated Accounts	% of total accounts	No. of Rebated Accounts	% of total accounts
Agricultural	24,373	31%	6,108	26%	14	24%
Small Commercial	52,932	14%	56,475	15%	12,564	13%
Med/Large Commercial	4,255	6%	8,102	8%	20	10%
Total C&I	81,560	15%	70,685	14%	12,578	13%
Residential	332,576	11%	300,023	10%	89,383	10%
Total Program	**414,136**	**12%**	**370,708**	**11%**	**101,961**	**10%**

Table ES.2 shows the kWh savings associated with the customers who reached the 20% threshold.

Table ES.2: Total Change in kWh Use by Rebated Customers as Measured by Utility Bills

(Summer 2004 kWh – Summer 2005 kWh)

	PG&E	SCE	SDG&E	Total
Total C&I	288,447	254,464	24,953	567,864
Residential	279,732	265,013	70,899	615,644
Total Program	568,179	519,477	95,852	1,183,508

The reductions shown in Table ES.2 are for all customers who received a rebate. However, this total reduction is not a true measure of the savings produced by the Statewide 20/20 Program. To estimate program savings, two types of adjustments must be made to the values in Table ES.2:

1. Decreasing savings to account for the fact that some of the total reduction in energy use was incidental to the program and cannot be reasonably attributed to the 20/20 program efforts.

2. Increasing savings to capture legitimate reduction in energy use resulting from participants who tried to reach the 20% reduction but were ultimately unsuccessful.

These adjustments are discussed in more detail in the following two sections.

ES.2.1 Adjustments to Program Savings for Rebated Customers

These adjustments were developed to account for activity that does not reflect actual 20/20 program impacts. Adjustments needed to be made at two levels in order to estimate net program savings, as described below.

1. Inactive Customers and Free Riders

   Reduction in energy use related to homes or businesses that were not active or were free riders should be removed in their entirety. Some rebated customers may have been unaware of the existence of the program or have achieved the 20% reduction without taking any energy saving actions (inactive customers), and others may have pursued energy conservation strategies even if the rebates had not been offered (free riders). The savings associated with these inactive customers and free riders cannot be reasonably attributed to the program.

2. Incidental Activity

   Specific activities or events that resulted in lower energy use may have been incidental to the program, even within active homes and businesses. For example, customers may have pursued specific conservation strategies, and yet lower occupancy or production levels may also have contributed to their ability to achieve the 20% threshold. These incidental, non-program energy reductions within the home or business also cannot be reasonably attributed to the program.

Adjustments at the household or business level were based on the results of the customer survey and the energy reductions associated with incidental activities were estimated through combining the survey data with billing records. It was not possible to develop a firm estimate of the impacts of incidental activities in the C&I sector.

ES.2.1.1 Adjustments at the Customer Level

We fielded a survey of 1,177 households and 810 businesses who received the rebate, the purpose of which was to assess customer awareness and actions. With this information, we were able to identify which customers were actively trying to reach the rebate savings levels and whether or not they were motivated by the offer of the rebate. The surveys asked questions about awareness, actions taken, customers' energy use, and housing characteristics.

From the survey, we categorized customers as active or inactive. To be *active*, a customer needed to meet the following conditions:

- have been aware of the program in time to take action,
- have taken deliberate action to try and receive the rebate, and
- been able to identify at least one energy saving action taken to reduce their 2005 summer energy use.

Active customers were considered to be program participants. Any reductions achieved by inactive customers were not included in the final 20/20 Program savings.

However, some active customers may well have taken the same actions to lower their energy use in the absence of the 20/20 program and thus were considered free riders. Net program savings should not include the decrease in energy use from these homes. Active customers whose survey responses indicated that the rebate did not play a significant role in their energy related decisions are identified as *active free riders* and the savings from these homes were not included in the net program impacts.

In the residential survey, approximately one in three of the rebated customers in the sample met the criteria for active participation, and about one-third of these respondents stated that the 20/20 program was *not* an important factor in encouraging them to reduce energy use. Among the surveyed C&I customers, 20% were active and all reported that the rebates were a very important factor in making the decision to take energy savings actions, indicating that no reductions are necessary to account for free riders in the C&I sector.

Figure ES.3: Impacts of Active and Inactive Rebated Customers

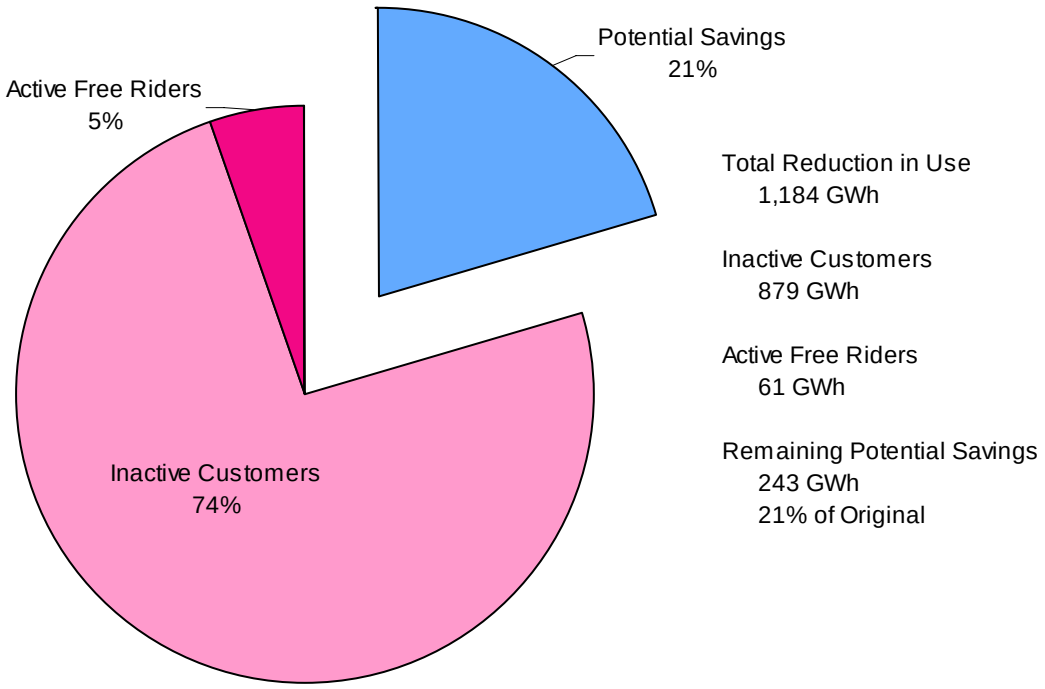


Figure ES.3 illustrates the adjustments made to the total reduction to account for inactive customers and active free riders. The net impact of these adjustments suggests that only 21%, or 243 GWh, of the total reduction associated with rebated customers could possibly be attributed to the program.

ES.2.1.2 Energy Savings vs. Incidental Activity

The blue shaded area in Figure ES.3, indicates that 21% of the total reduction in rebated homes could potentially be attributed to the program. However, it is entirely possible that a portion of this reduction was due to incidental activity or events and should therefore not be attributed to the program. For example, a family member moving out will lower occupancy and decrease energy use, but such a move is most likely precipitated by events that are wholly unrelated to energy conservation. This issue was investigated through the customer surveys and, in the residential sector, by conducting a billing analysis for surveyed homes.

The surveys of the residential and C&I customers asked each respondent to recall “what actions did you take that would have lowered your electricity use in the summer of 2005?” The results of those responses are shown in Table ES.4.

This table shows that the active households and businesses generally engaged in more energy saving activities than their inactive counterparts.

Table ES.4: Most Frequently Mentioned Energy Reducing Activities by Rebated Customers

	Residential		C&I	
	Active	**Inactive**	**Active**	**Inactive**
Purchased EE equipment or appliance	**53%**	**40%**	27%	18%
Turned off lights	**52%**	**35%**	48%	27%
Turned up Thermostat, turned off AC	**39%**	**29%**	44%	28%
Reduced no. of occupants	33%	28%		
Occupied house/operated business fewer hours	23%	29%	6%	1%
Turned off electronics or appliances	22%	16%	23%	6%
Reduced the use of energy consuming equipment			16%	14%
Used less hot water	**15%**	**6%**	10%	14%

By combining the residential survey results with billing records, we were then able to develop statistically valid models for the residential households that explain a portion of the variation in consumption. This approach was designed to estimate the savings associated with specific actions and explain the reductions among rebated homes in the 2005 program year. Separate models were constructed to estimate the changes in consumption related to base load activities and cooling-related actions, using a combination of disaggregation and regression techniques, as presented in Section 5. Unfortunately, we were not able to explain, with acceptable statistical confidence, the variation in the C&I use patterns.

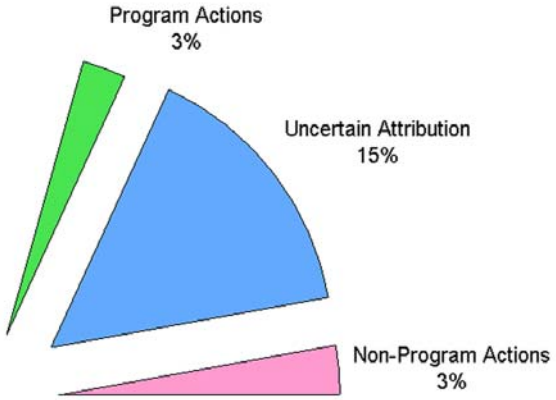
Of the 243 GWh of potential savings from Figure ES.3, only 30 GWh (3%) could be statistically attributed to energy savings associated with known cooling and baseload actions. About 32 GWh (3%) was associated with non-energy saving activities, particularly changes in occupancy levels and remodeling. The remaining 181 GWh represent the reductions in use that could not be definitively attributed to the program, i.e., it may represent program effects or just normal variations in summer use resulting from events incidental to the program. Figure ES.5 illustrates the impacts attributable to the program.

Figure ES.5: Attribution of Savings for Rebated Customers

Attributable to Program: 30 GWh

Uncertain Attribution: 181 GWh

Non-Program Activities: 32 GWh



ES.2.2 Savings from Active, Non-Rebated Customers

Some customers may have tried unsuccessfully to reach the 20% reduction threshold, and their energy saving actions should be counted as program savings. Our survey of non-rebated customers covered 1,121 households and 958 businesses, and included the same battery of questions that was asked of the rebated customers.

For the residential survey, our sample was limited to those customers who reduced their 2005 use between 10 and 20%; in other words, they just missed receiving the rebate. Our purpose was to establish whether this group was conserving energy to try to meet the 20/20 threshold. Given the budget and time constraints, we concentrated only on this “Just Missed” sample.

Our survey results indicate that this group did save energy by taking specific energy saving actions. However, since the survey was restricted to the Just Missed segment of the residential population, it does not provide direct evidence of the program impact on customers with reductions less than 10% or with increases in use. To estimate the potential impacts for this group, we extrapolated savings by establishing an active household trend line for the 20% to 10% households and projecting those figures to the remainder of the residential households.

The business sample represents a random sample, stratified by utility, of all non-rebated customers. Thus, the sample included some customers who just missed receiving the rebate and others whose use in the summer of 2005 actually increased. Accordingly, unlike the residential sample, no extrapolation was necessary. Only 11% of the C&I sample of non-rebated firms were active in the program.

Some differences between the rebated and Just Missed customers are summarized below.

- On average, the residential Just Missed sample was less active (27%) and consisted of more free riders (43%) than the rebated customers (at 31% and 32%, respectively).
- Active, rebated households were almost 350% more likely to have had a reduction in household size as the active, Just Missed group. The change in occupancy is a major determinant as to why households qualified for the rebate.
- The number of energy reduction activities was slightly lower among Just Missed respondents
- The active, Just Missed group was less likely to have purchased refrigerators and energy efficient lighting since the summer of 2004.

The same modeling approach for the Just Missed customers was also used for the analysis of rebated customers. The results indicated that the Just Missed residential group had 15.7 GWh of savings that were attributable to the program, and 23.7 GWh of savings that are of uncertain attribution. Based on these results, we estimate that the remainder of the residential, non-rebated households may have generated an additional 31.6 GWh of attributable savings and 23.7 of uncertain attributable savings. All 36.9 GWh of the C&I non-rebated reduction is of uncertain attribution. The results of the model building for the non-rebated groups is shown in Table ES.6

Table ES.6: Program Savings for Non-Rebated Customers

	Residential Just Missed Rebate	C&I Did Not Receive Rebate	Total
Potential Program Savings	53,040	36,901	89,941
Attributable to Program Just Missed	15,763		15,763
Uncertain Attribution	23,737	36,901	60,638
Attributable to Non-Program Activities	13,540		13,540
Extrapolation to All Residential Customer Who Did Not Receive Rebate	Residential Did Not Receive Rebate		
Attributable to Program	47,289		47,289
Uncertain Attribution	47,474	36,901	84,375

ES.2.3 Demand Saving from Statewide 20/20 Program

Demand savings at coincident peak were estimated using the energy savings and adjusting these results on the basis of hourly load profiles and the peak month and hour provided by the utilities. The projected program savings for the residential sector is 21,200 kW, net of free riders.

Sixty-two percent of the active households and 19% of active businesses, who reported that they turned off their AC units during the summer of 2005, also reported that on the hottest summer days they reversed that practice and ran the AC units more than two hours. It is therefore possible that applying the average load profiles to the coincident peak day may overestimate the kW savings.

ES.2.4 Net Program Savings and Cost-effectiveness

Table ES.7 combines all of the energy saving elements into an estimate of net program impacts. Savings are presented in two ways:

1. The first includes only those activities with statistically significant savings attributable to the program.
2. The second estimate includes all of the savings identified above, *plus* all reductions in use by active households with uncertain attribution.

This latter method produces the most generous estimate of savings. Actual program impacts are somewhere between these two extremes.

Table ES.7: Statewide 20/20 Program Savings in 2005

	Statewide Total (MWh)
Directly Attributable	
Rebated Customers	29,872
Active, Non-rebated Customers	47,289
Total Directly Attributable to Program (MWh)	77,161
Add back: Uncertain attribution	
Rebated Customers	181,500
Active, Non-rebated Customers	84,375
Total Directly Attributable to Program and Uncertain Attribution (MWh)	265,875
Total Change in kWh Use by Rebated Customers as Measured by Utility Bills (Table ES.2)	1,183,508

Table ES.8 provides the cost of efficiency and demand resources procured by this program. Even under the best of all possible indicators, the program performs poorly in achieving the intended results. The estimated cost per kWh ranges from approximately $0.29 cents to $1.00, depending upon what is included in the savings estimates. The estimated cost per kW is over $3,600.

Table ES.8: Statewide 20/20 Program Costs Relative to Savings Achieved

	Total
Program Costs	
Rebates	$67,450,469
Admin	$9,753,452
Total	$77,203,921
Energy Savings (MWh)	
Directly Attributable to the Program	77,161
Including Uncertain Attribution to the program	265,875
Cost per kWh Saved	
Directly Attributable to the Program	$1.00
Including Uncertain Attribution to the program	$0.29
Demand Savings (kW)	21,200
Cost per kW Saved	$3,642

ES.2.5 Statewide 20/20 Program Conclusions and Recommendations

The 20/20 concept represents a catchy message that the utilities can easily broadcast across the state. However, this evaluation demonstrates that the program distributes very large incentives, principally awarding customers who took no actions or took actions that they would have taken in the absence of the program. The evaluation results indicate that the program is not cost-effective and should not be continued, as is demonstrated by the following findings.

- Customer surveys indicate that 30% or fewer of rebated customers were even aware of the program and had undertaken any effort to achieve the rebate.
- A substantial portion of the observed reduction among customers who actively tried to achieve the rebate was likely to be due to free ridership and incidental actions not related to the program, as indicated by the customer survey and residential modeling.
- The cost paid for each kWh by this program was at least $0.29, and maybe as high as $1.00, both are costs that far exceed the costs experienced by even the least effective energy efficiency program.
- The program was even less effective in achieving its intended goal of reducing peak demand; the cost per kW saved is estimated to be over $3,600. This figure may itself be an overstatement, as many survey respondents relaxed their conservation practices on the summer's hottest days.

Beyond the catchy message and the generous incentives, the program did little to assist customers in overcoming the market barriers that impede the adoption of energy saving actions and investments. The 20/20 Program did not provide direct education to consumers, support markets for energy-efficiency goods and services, or encourage the development of new products. Much of the savings generated by the 20/20 Program represents short-term energy conservation rather than long-term structural change.

In a state without a developed energy efficiency industry, there might be a short-lived role for a 20/20 type of effort in the event of an emergency. In such a situation, the population would be faced with many opportunities for improving efficiency but the infrastructure to deliver efficiency quickly and effectively would be lacking, and the program's simple message might produce enough benefits to be justified, particularly in the face of major power supply shortages. However, in California with its energy efficiency history and existing infrastructure, the Statewide 20/20 Program represents a wasteful alternative to additional funding

ES.3 Results: San Diego Gas & Electric C&I 20/20

The San Diego Gas & Electric C&I 20/20 is a pilot program intended for C&I customers in the 20 kW to 200 kW demand range[1]. It was instituted for the first time in 2005. This program called for businesses to voluntarily lower their use during high peak demand situations and required that customers enroll in the program. Following enrollment, SDG&E installed an interval meter so that the utility would be able to record use for each 15-minute period.

SDG&E encouraged customers to lower use on event days between the hours of 11 a.m. and 6 P.M. Event days (or curtailment events) were called for the following day according to three criteria:

1. the forecasted temperature at the Miramar weather station for the following day was 84 degrees or above,
2. the system peak for the current day hit 3,620 MW, and
3. the following day was a Tuesday through Friday.

If more than one event occurred in a billing period, the usage during the peak hours on the event days was averaged. If this average usage was 20% lower than the average consumption during the same period on the three highest days out of last ten non-event, business days, the customer received a 20% credit on that month's bill.

[1] SDG&E's original proposal was limited to customers with demand between 20kW and 200kW because the Default CPP was proposed for customers with demands >200kW. When the Commission decided not to implement the CPP rate for 2005, SDG&E requested that the C&I 20/20 program be extended to include customers with demands greater than 200kW.

SDG&E received 1,496 applications and was able to enroll and install meters for 1,303 accounts. While the program was originally intended for customers between 20 and 200 kW in size, requests from larger customers, some of whom were already participating in other DR programs, led SDG&E to open the program up to larger customers. For those customers in other DR programs, the rules were set so that customers were not able to double-dip.[2] Four events were called during the summer of 2005, with two events called on consecutive days in July, and three events falling on Fridays.

The process evaluation included interviews with SDG&E staff. We also conducted interviews with twelve of the firms that had the largest reductions and a survey of a sample of the remaining participants. The final completed sample contains 56 records of successful firms and 31 records of unsuccessful firms. In addition, six unsuccessful firms were terminated because no one at the firm could remember participating in the SDG&E C&I 20/20 program.

The impact evaluation research included an examination of the metering records of the participating firms to estimate the level of savings that is attributable to the program. We then combined these savings with program costs to assess the cost-effectiveness. These results were integrated with the outcome of the process evaluation to develop policy recommendations for future programs of this kind. We also considered alternative methods for defining the baseline to assess whether another approach may provide a more accurate assessment of demand savings.

The remainder of this section is divided into seven sections, beginning with an overview of customer participation, followed by the survey findings, process evaluation results, estimated program savings, baseline assessment, cost-effectiveness, and recommendations and conclusions.

ES.3.1 Customer Participation

Table ES.9 metering data were processed for 1,265 participating customers. Of these, the percentage of accounts showing a 20% reduction in energy use as defined by the program baseline ranged from approximately 9% to 15%.

[2] As it turned out for 2005, there was no overlap in program events, so the rules were never enforced.

Table ES.9: SDG&E C/I 20/20 Program Participation

Status	Number of C/I Accounts	Percent of Total Accounts Enrolled
Total enrolled accounts with interval meters	1,265	100.0%
Enrolled but never reached 20% threshold	933	73.7%
Enrolled and reached 20% at least once	332	26.2%
Reached 20% on 7/21/05	130	10.3%
Reached 20% on 7/22/05	193	15.3%
Reached 20% on 8/26/05	117	9.2%
Reached 20% on 9/30/05	163	12.9%

These participation rates suggest that only a small number of the enrolled customers were able to participate in the program and receive a rebate. A significant portion of the utility investment in communication infrastructure and outreach was therefore not effective in achieving the desired load reductions. The recruitment process for the program was clearly successful, but a customer screening process may be necessary to redirect many of those firms to other alternatives that will, in the end, provide more benefits for the firm and be less costly for SDG&E.

An examination of survey results from customers who did not achieve the 20% reduction indicates that there are two major barriers that make it more difficult for smaller customers to participate in this type of program: communication and education.

Effective communication is critical for achieving the rapid response needed to reduce consumption on the following day. Fully 55% of those firms that were not successful in achieving the desired reductions missed notification of at least one of the four events. This result indicates that the communication with customers enrolled in the program needs to be more effective if the program is going to be successful in garnering increased participation during peak day events.

The second barrier is lack of knowledge of specific actions that would reduce demand. This barrier is further compounded by the fact that, for many smaller customers, the options were truly very limited (reductions in lighting and AC use). Moreover, many customers were unable to distinguish between demand response measures (shutting down particular energy using equipment) and general energy efficiency measures (e.g., investments in energy efficient lighting).

The importance of education is also reflected in the observation that those firms with energy management plans in place to respond to the program were more likely to be successful in achieving the desired reduction. The implementation of

a plan requires knowledge of specific steps to reduce energy loads and, in particular, an understanding of the difference between energy efficiency (EE) investments and demand response (DR) measures. Our informal review of program marketing materials indicated that these marketing efforts to customers may not have sufficiently underscored the difference between EE and DR measures.

ES.3.2 Survey Findings for the SDG&E C&I 20/20 Program

The surveys were instrumental in identifying and comparing the characteristics of the successful (rebate) and unsuccessful businesses, and highlighting strategies that could be effective for small C&I establishments. The primary findings include the following observations:

- Customers that had a load reduction management plan in place appear more likely to succeed during the curtailment events (63 percent to 55 percent).
- In addition to a load reduction management plan, customers described steps taken to reduce loads during event days. The relative merits of the various strategies are discussed below.
    - Those customers that requested employees to reduce energy loads were more likely to succeed.
    - Success rates were also higher in facilities that focused on shutting down high-load equipment or altering their production/operation schedule.
    - Those customers that relied primarily on lighting reduction or installation of energy efficient lights or equipment were less likely to meet the specified threshold.
- Many participants did not know whether they had achieved the level of savings required to obtain the rebate. For example, only eight of the 56 firms that met the threshold at least once knew the exactly how many times they had successfully saved.
- The in-depth interviews of the 12 largest savers found that two respondents were able to reduce an unusually large portion of their load, simply because they were not open on Fridays. The survey also determined that summer loads on Fridays are typically lower than normal for 29% of the successful firms.
- The most common reason given for failing to participate in any of the four curtailment days was lack of awareness of the trigger events.
- Many customers who reduced use on the event days but were unable to achieve the full 20% reduction reported that they did not know “how to identify loads to shed.”
- The most often-cited reason for failing to lower their consumption at all on the event days was that the customer did not have the load available at the critical time.

- Customers were asked if they could suggest any improvements that should be made to the program. The most often suggested ideas include
  - providing additional technical information, such as how to reduce appliance load and other load reducing technologies (ten respondents), and
  - distributing information related to program performance and/or recognition (eight respondents).

An example of the latter is to prepare comparison charts of energy usage and publicize success stories from other similar-sized companies that were able to achieve the 20% load reduction.

ES.3.3 Process Evaluation Results for the SDG&E C&I 20/20 Program

Given that the approval for the 2005 summer program was not received until April of 2005, the project development team needed to plan and implement the program in approximately 90 days, including the enrollment of customers and installation of interval meters in most locations. Our assessment of the implementation is that the project team did a remarkable job in meeting these deadlines, developing a program, management team, and supporting software that worked effectively.

The process evaluation was effective in identifying the following critical issues arising with the 2005 program. These complex aspects of the program will need to be resolved before fielding future program efforts.

- Forecasting day-ahead events

  The day-ahead notification gives small firms time to adjust demand for the coming day; however, it forces the utility to commit to paying for demand reduction that may not be needed. Because the day-ahead approach relies on forecasted weather conditions, there will be days when the actual weather does not justify an event trigger, and other days when the actual weather should have triggered an event. The day-ahead requirement also precludes the calling of a Monday event, as businesses are generally closed on Sundays.

- Customer notification

  Customers were notified of the day-ahead event through a combination of communications consisting of e-mails, pages, and personal contact from account executives. While these approaches worked well from the perspective of utility staff, the participant survey revealed that many of these customers do not recall receiving four event notifications in 2005. It should probably be expected that many small business customers will overlook e-mail and paged notification. However, more complicated approaches such as personal contact are not warranted due to the low magnitude of expected savings from these small accounts.

- Installation and cost of meters
  A major cost for SDG&E was the need to install interval meters for each participant. SDG&E managed to get meters to most locations by the early summer, a feat that the other larger utilities would have found difficult to duplicate. To save money and time, SDG&E chose in most cases to not activate the two-way communication capability of the meters. This prevented customers from having real-time access to their billing data.

The impact of this decision has been the source of some debate among SDG&E staff. While some have maintained that the ability of customers to reduce their loads depends upon having access to real-time data, others are of the opinion that such information is of limited usefulness, and that resources are better spent informing customers of specific steps that they may take to reduce their loads.

ES.3.4 Savings Estimates for the SDG&E C&I 20/20 Program

There are a number of possible methods that may be used to estimate program savings. Ideally, program savings would reflect the change in use among those enrollees who intentionally took action to reduce savings on the trigger day, mirroring the “active” participant defined for the 20/20 Statewide programs. In addition, there are actions taken by active businesses that are incidental to the program and should not be incorporated into the program-related benefits. A good example of this effect is the savings realized by firms who have lower loads on Friday. However, given the short time frame for completing this study, we were not able to field the detailed surveys that are necessary to establish motivation and opportunity or to establish a comparison group to reflect the changes in peak period consumption of inactive businesses. The effects of the incidental reductions may be partially mitigated by normalizing use for differences in schedules.

Unlike the 20/20 Statewide programs, free ridership is not likely to be a significant factor for the SDG&E C&I 20/20 program. As discussed in the earlier section on the Statewide Program, free ridership reflects those participants who would have taken the action to reduce savings without the 20/20 program. Businesses that generally try to conserve energy will have a lower baseline, but there is no reason to assume that they would reduce usage suddenly on an event day in the absence of some type of stimulus. While the degree of motivation to reduce usage upon request and the ability to shed load with only one-days’ notice varies widely from one business to the next, neither of these factors are criteria for defining free ridership.

Given these limitations, we identified two strategies for estimating program savings: 1) adding the net change for all enrolled customers, regardless of whether their use went up or down (“All Enrollees”) and 3) estimating the gross

savings only for participants who met the threshold and received the rebate ("Rebated Savers"). In the next section, we describe the pros and cons of each of these methods, the results from the two analytical methods and the statistical approach used to estimate savings. Alternatives to the baseline are discussed in Section ES3.5 below.

Table ES.10 shows the savings calculated using the two summation methods and the statistical method described below. All of the methods include inactive businesses.

Table ES.10: SDG&E Reported Results v. Aggregate Modeled Results

	All Enrollees SDG&E Reported	Rebated Savers SDG&E Reported (>= 20%)	Evaluation Modeled Results
Definition of Method	Sums all enrollees	Sums only those enrolled who showed a 20% or greater reduction	Models aggregate savings using all enrollees
Issues with Method	Includes inactive customers who saved or increased load Includes incidental saving and losses	Excludes active customers who did not reach 20% threshold Includes inactive customers who saved 20% or more Includes incidental saving Corresponds to those customers who received incentives from SDG&E	Includes inactive customers who saved or increased load Partially adjusted for active incidental changes
Event			
7/21/05	-183 kW	7,338 kW	6,481 kW
7/22/05	2,544 kW	9,968 kW	11,975 kW
8/26/05	654 kW	7,450 kW	0 kW
9/30/05	7,634 kW	4,449 kW	8,084 kW
Total (All Four Events)	10,649 kW	29,205 kW	26,540 kW

Evaluation Model Details. The demand savings arising from the SDG&E C&I 20/20 Program were estimated using an aggregated econometric model, which combines the loads of the individual enrollees by hour and compares energy consumption during the peak hours to a three-day baseline estimation. Complete interval data were provided for 1,017 accounts of businesses that participated in all four events.

The econometric model used in this analysis controls for energy consumption during the morning hours of 9 to 11 am, weather, and day type. These accounts formed the basis of the estimated demand savings analysis.

The basic model structure is as follows:

$$ActualHrlyLoad = f(MorningLoad, Weather, DayTypes)$$

Where:

- $ActualHrlyLoad =$ the actual average hourly load during the peak period for all days (where the peak period includes hours ending 12 PM to 6 PM).
- $MorningLoad =$ The consumption during the morning pre-event hours (hours ending 9 AM to 11 AM). This captures daily operational differences that are otherwise not known.
- $Weather =$ A series of weather variables such as temperature, dew point, cloud cover, and lagged temperature effect.
- $DayTypes =$ A series of day type indicator variables to capture differences in load levels primarily due to day-to-day intra-site activity differences. These included Monday, midweek, Friday, weekend and holiday indicators.

This model attempted to account for the impact on energy use resulting from weather, the day of the week, and activity levels at the start of the day. The model estimated what the aggregate load for all participants would have been had no event been called. The model assumed that the enrollees' load behavior is relatively predictable and not subject to significant unknown influences, such as irregular operating schedules.

ES.3.5 Baseline Assessment

The results of the various models show that the three-day baseline used by the SDG&E C&I 20/20 program is not an efficient proxy for all enrollees. Customers with very irregular schedules make it difficult to model the enrollee population in aggregate and to estimate the program impacts without normalizing the load data. One means of getting around this issue is to model the larger enrollees with irregular schedules separately. By obtaining schedule information on these larger customers and including this information in the model, a better estimate of their load impacts was obtained. However, even after adding the schedule data, the models could not always identify load reduction activity that was known to have been taken.

The same variations and external influences evident in the models of the three largest customers are likely present in many of the smaller customer loads. Yet, while we have demonstrated that we can building more complex baselines for very large customers in many cases, or identify alternative baseline approaches that are more accurate representations of that specific building's load in absence of the program, all of these approaches require collection of firm specific data and time-intensive analysis. It would certainly be impractical to collect the data and build a separate baseline for each small customer enrolled in the program.

Table ES.11 shows our best estimate of the program savings given the data constraints discussed above. Table ES.11 uses the results of the three individual models built for the three largest enrollees and the basic model as shown above for all the remaining enrollees.

Table ES.11: Summary of Estimated SDG&E C&I 20/20 Program Impacts

	7/21/05	7/22/05	8/26/05	9/30/05
3 Largest Enrollees	3,029 kW	5,728 kW	0 kW	4,257 kW
All Smaller Enrollees	3,452 kW	6,247 kW	0 kW	3,827 kW
Total	6,481 kW	11,975 kW	0 kW	8,084 kW

The detailed results of the analysis are presented in detail in Section 10.4 of the report. There appears to be evidence that enrollees took action on the first, second and fourth events to produce peak period impacts. The August 26 event, however, does not show any significant impacts. This result may simply indicate that the model does not have the power to measure impacts much smaller than those observed on the other event days. While the model produced estimates greater than zero for the August 26 event, the associated tests for significance were very weak suggesting, that these estimates could not be differentiated from zero with any degree of certainty; thus we report them as zero. The resulting aggregate SDG&E C&I 20/20 Program impact estimates have wide confidence bands around them, indicating the high degree of uncertainty associated with these estimates.

This model does not differentiate between active and inactive businesses. There was no means to determine whether an enrollee intended to take some action on the event days. By chance, enrollees' loads could have been lower than normal even though they did not take any action to lower loads directly as a result of the program. However, it is also likely that some enrollees' loads were higher by chance on the event days.

ES.3.5 Cost Effectiveness and Reliability

An analysis of program costs and benefits indicates that the program provides limited capacity resource but only at significant cost. As shown in Table ES.12, peak demand reductions achieved under this program cost the utility approximately $30 to $80 per kW of demand reduced per event. Adjusting for inactive businesses would raise those values.

Table ES.12: Estimated Cost of Demand Reduction

	SDG&E C&I 20/20 Program	All Enrollees SDG&E	Rebated Savers SDG&E Reported (>= 20%)	Evaluation Modeled Results (net)
Costs				
Rebates	$503,254			
Admin	$374,000			
Total	$877,254			
Total Peak Demand Saved		10,649 kW	29,205 kW	26,540 kW
Cost per kW Saved per Event		$82.38	$30.04	$33.05

It was reported anecdotally during interviews with utility staff that this cost is significantly higher than the incentives paid under other DR programs where a customer might provide 100's to 1000's of kW reduction for as little as $1000 in bill credits. While a complete comparison of incentives was not within the scope of this effort, the inconsistency is potentially significant and a broader comparison of incentive levels across all DR programs may be warranted.

The reliability of savings is also an important issue that was highlighted by the evaluation results and is, ultimately, directly related to the cost effectiveness of such a program. As shown in Table ES.10, the capacity resource that was provided by the program on a given event day varied widely, ranging from 0 kW to almost 12 MW. As a demand resource, the program will ultimately only be able to justify paying for those savings that are reliable and therefore truly "dispatchable" as a resource. Absent this reliability, the value of the resource will be extremely limited.

ES.3.7 SDG&E C&I 20/20 Program Conclusions and Recommendations

The C&I program variant offered in 2005 by SDG&E is an attempt to bring demand response opportunities to smaller C&I customers. Despite that purpose, most of the load reduction was produced by the very largest enrollees. In addition, almost 74% of the enrollees were unable to reduce load enough to reach the 20% threshold even one time in 2005.

While the SDG&E C&I Program does a better job of encouraging and rewarding demand reductions that coincide with utility maximum demand conditions, it still suffers many of the same problems that confronted the Statewide 20/20 program. Principal among these is the high costs and low benefits associated with the program, especially when compared to some other DR programs. These high

costs are incurred in spite of the fact that other DR programs have identifiable loads that are reduced with short notification windows, while 20/20 is a day-ahead effort with customers being rewarded for unspecified actions. The continued existence of high 20/20 rebates is likely to exert pressure on the utilities to raise the incentives offered for other DR programs.

While the SDG&E Program may provide more robust demand impacts than the Statewide 20/20 Program, SDG&E's program also sometimes rewards customers who are not actively trying to save while providing no rebates to others who may just miss reaching the 20% threshold. Reaching the 20% threshold may be an insurmountable hurdle for many firms who are willing to help reduce peak demand during emergencies. For reliability purposes, it may also be preferable to identify actual equipment that businesses can curtail and contract for that reduction, rather than using the 20% threshold.

A relevant policy question is whether it is the design of the SDG&E Program or the focus of the program on small customers that makes it not cost-effective. It is certainly more difficult to recover the program costs associated with a business shedding 5 kW than it is for one shedding 50 or 500 kW. Among small C&I customers, there are many customers that can shed production or close off building sections. Collectively, this represents a valuable asset. Contracting for these loads to be curtailed can probably be made to be cost-effective.

Both 20/20 programs fail because they scatter high rewards to many customers whose reduction in use are of dubious value to the utility. A major problem with the SDG&E C&I 20/20 Program is that its marketing was effective in attracting many customers who could not deliver DR savings. Because there was no cost to the customer, many enrolled even though they did not have the necessary understanding of the program requirements and/or the capacity within their businesses to shed 20% of their load at peak times. As was the case with the Statewide Program, gaining customer attention through marketing is only likely to be effective if it is supported by effective education, technical support, and access to actionable solutions.

Finally, from a policy perspective, a key constraint limiting the usefulness of this program is the ability to forecast needs for demand reduction on a day-ahead basis. Forecasting abilities are limited at this point and, as a result, the actual need for peak reduction may never materialize. Moreover, there is as yet considerable uncertainty regarding the precise value of the peak demand. Continuation of these programs may be justified only if there is a clear value to the savings.

Future use of this type of program may be warranted for the purposes of developing a more sophisticated relationship with this class of customers. Such efforts should probably be designated as pilots, however, rather than being implemented under the guise of true demand response programs.

Section 1: Introduction

This report summarizes the results of an evaluation of the 2005 Statewide 20/20 Demand Reduction Programs, implemented by San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE), and Pacific Gas & Electric Company (PG&E). The goal of this evaluation is to assess the design and impact of this program, and to provide recommendations regarding the future use of this or similar programs as mechanisms for achieving demand reduction goals.

In this introductory section, we provide information on the following:

- Program Background;
- Evaluation Objectives;
- Evaluation Research Tasks;
- Key Study Challenges; and
- Report Organization

1.1 Program Background

On January 27, 2005, the California Public Utilities Commission issued decision 05-01-056 approving several Demand Response goals, programs, and budgets in accordance to Rulemaking 02-06-001. Collectively referred to as the "Statewide 20/20 Programs," these include efforts conducted by SDG&E, PG&E, and SCE to develop and implement "price-responsive" programs that seek to reduce summer energy use among residential and smaller commercial / industrial (C&I) customers.

The name "20/20" is derived from a common program attribute: in each program, customers were given urged to reduce energy by 20% and, in return, received a 20% credit on their electric bill. Under this formula, energy use was measured against a similar time period – a "baseline energy use" – in order to determine the percentage reduction in energy use achieved. Although the overall objective of the program was to reduce overall demand (kW), the incentives were based upon reductions in energy (kWh) use. Since most residential and small commercial customers are not demand metered, energy use serves as a proxy for demand. This distinction is important within the context of the 20/20 evaluation because the ability to measure actual demand reductions is limited. Reductions in demand must therefore be estimated based upon survey data and prototypical customer load shapes.

While eligibility and program measure requirements differ across the utilities, in general there are two program types:

- The Statewide 20/20 Programs
- San Diego Gas & Electric C&I 20/20 Program

1.1.1 Statewide 20/20 Programs

These programs offered an additional 20% credit on the bill to both residential and C&I customers for reducing summer use by 20%. Residential customers at each of the three utilities were eligible for these programs. C&I customers were also eligible, with the exception of larger C&I customers in the SDG&E service area who were offered a different variation of this program (see below).

For the purposes of determining customer eligibility for the rebate, energy use was summed across the entire four-month summer period in 2005 and compared with the baseline use for the same months in 2004. To meet the 20/20 threshold, time-of-use customers had to reduce on peak use by 20%. The use of a single calculation for the entire summer period represented a change from previous versions of this program. In the past, the calculation and award were made based upon a month-by-month comparison of energy consumption between the baseline and program years.

A common characteristic of these programs was the lack of an enrollment requirement. As discussed later in this report, this approach to program implementation affects the methods to be used for assessing program impacts. Given that a reduction in energy use is not necessarily associated with conservation efforts, program participation must be carefully defined. Consequently, substantial efforts have been undertaken in this study to differentiate between various types of “participants” in order to estimate the impacts that are truly attributable to the Statewide 20/20 Programs.
The rate schedules for these programs are attached as Appendix E.

1.1.2 San Diego Gas & Electric C&I 20/20 Program

The SDG&E C&I 20/20 program was a variant on the 20/20 program approach. In order for C&I customers to participate in this program, a customer’s average peak demand must exceed 20kW.

Unlike the Statewide 20/20 Programs described above, this program required that customers enroll in the program in order to be eligible for the rebate. While it is still important to note that it was possible for a customer to receive the rebate as a result of reduced energy use in the 2005 period as compared with the 2004 baseline period without actually undertaking any steps to reduce their energy use, the definition of participants is straightforward..

No contract or commitment was required, and therefore no penalties for failure to reduce load were applied. The program was open to both bundled and Direct Access customers. The day-ahead notification was given based on three triggers: temperature, system peak, and special CAISO alerts. Four triggers events were called in the summer of 2005. Customers received a 20% credit applied to a particular billing month if energy usage was reduced by at least an average of 20% over peak hours for all events called during that billing month.

The baseline was calculated using the average consumption for the 10 non-weekend, non-event days prior to the event. Peak hours were defined as 11am until 6 pm. The rate schedule is attached as Appendix F.

1.2 Evaluation Objectives

This evaluation study addresses both process- and impact-related objectives. Together, the results from these areas of assessment serve to inform longer-term decision-making for these programs.

1.2.1 Process Evaluation Objectives

Process evaluation research typically examines the overall approach taken by a program, as well as the effectiveness of the various program elements in addressing the strategic objectives of the program. In this work, the process evaluation objectives include the following:

- Document each program design
- Assess marketing efforts undertaken for each program
    - Appropriateness of the target market
    - Execution, including timing and messaging
    - Effectiveness of marketing materials
- Assess customer awareness of the programs
    - Understanding of the program
    - Accuracy, clarity, and accessibility of available information
- Create a feedback loop with program managers, providing recommendations for marketing and recruitment
- Identify actions taken by customers to participate in the program
- Recommend ways in which the program design may be improved to enhance program participation and overall effectiveness

1.2.2 Impact Evaluation Objectives

Impact evaluation research seeks to quantify the estimated impacts that are attributable to the program activities. In the case of this evaluation, the attribution of observed impacts to the program is a particularly challenging but important issue. Specific objectives of the impact evaluation are listed below.

- Assess whether the baselines are appropriate
    - Consider alternatives such as weather and ratio adjustments
- Quantify the load reduction
    - Compare to goals
    - Break out by month and by conservation activity
    - Assess weather impacts
- Assess the effectiveness of SDG&E's triggers

- Identify factors contributing to the success or failure of load reduction strategies in these markets
    - Identify methods used to reduce loads
    - Assess applicability of these methods to the larger market
    - Combine with process evaluation to evaluate the success of marketing strategies

1.3 Evaluation Research Tasks

This evaluation included a number of distinct tasks that in combination address the process and impact evaluation objectives. These tasks are described in the following list:

- Three telephone surveys
    - A residential survey of 1177 rebated households, and 1121 non-rebated households who "Just Missed" receiving the rebate (reductions were between 10% and 19.99%),
    - A commercial and industrial survey of 810 rebated firms and 958 non-rebated firms
    - A commercial and industrial survey of participants in the SDG&E C&I 20/20 program, including 56 cases of firms that were successful in reducing load during at least one trigger event, and 31 firms that did not meet the 20% reduction threshold during any of the four trigger events

- An analysis of program impacts for the residential portion of the Statewide 20/20 program

- An analysis of program impacts for the C&I portion of the Statewide 20/20 program

- An analysis of program impacts for the SDG&E C&I 20/20 program

- A process evaluation concentrating on the SDG&E C&I 20/20 Program

The survey research provided data that was used in the process evaluation and combined with customer billing records to conduct the impact evaluations.

1.4 Report Organization

This report represents evaluations of two very different programs, the Statewide 20/20 Program and the SDG&E C&I 20/20 Program. In order to make it easier for the reader to follow the evaluation of one of the programs, we have organized the report so that the early sections cover the Statewide 20/20 Program, followed by the evaluation of the SDG&E C&I 20/20 Program. The remainder of this report is divided into the following eleven sections:

Statewide 20/20 Program

- Section 2: Statewide 20/20 Overview and Process Issues
- Section 3: Statewide 20/20 Residential Survey
- Section 4: Statewide 20/20 Commercial and Industrial Survey
- Section 5: Statewide 20/20 Residential Impact Results
- Section 6: Statewide 20/20 Commercial and Industrial Impact Results
- Section 7: Statewide 20/20 Program Summary and Conclusions

SDG&E C&I 20/20 Program

- Section 8: SDG&E Process Evaluation
- Section 9: SDG&E C&I 20/20 Survey
- Section 10: SDG&E C&I 20/20 Impact Results
- Section 11: SDG&E C&I 20/20 Conclusions and Policy Recommendations

Appendices provide extensive supporting documentation of the work undertaken for this evaluation.

Section 2: The Statewide 20/20 Process Issues and Study Challenges

2.1 Process Evaluation Approach

This section summarizes the findings resulting from process evaluation. During the initiation meeting for this project, the utilities and regulators determined that it would not be wise to expend considerable resources evaluating the Statewide 20/20 program processes since the program would not be offered to customers in its current form in 2006. Instead, the evaluation team was directed to conduct an abbreviated process evaluation of the Statewide 20/20 program.

The process evaluation component of the study consisted of interviews with utility representatives of the Statewide 20/20 program and review of program materials.

2.2 Process Issues with the Statewide 20/20 Program

As noted above, relatively less emphasis was placed upon our process evaluation of the Statewide 20/20 Program. The Statewide program has few process components. Once the program is announced, the utilities' only responsibility is to make customers aware that the program exists. After the end of the 20/20 summer period, the billing records can be used to identify the customers who reached the 20/20 threshold by reducing 2005 summer use 20% as compared to 2004 summer use. This comparison is made without weather normalization.

Originally, the utilities did not propose a 20/20 program for 2005. The 2005 forecast prepared by the CEC predicted that capacity would be tight for the summer of 2005. In light of this forecast, the CPUC then required the utilities to submit plans for a 20/20 program even though the utilities themselves did not view the program as being necessary or effective in providing reliable peak-load reductions. SDG&E originally proposed a different program that included an opt-in provision to limit the payment of program rebates to customers who were truly trying to save energy. The CPUC reportedly asked SDG&E to revise their proposal in order to conform to the proposals submitted by the other utilities.

The simplicity of marketing the Statewide 20/20 Program is viewed as one of its key attributes. Dating back to the West Coast Energy Crisis and the Flex Your Power marketing campaign, the idea of reducing energy use by 20% in order to save an additional 20% on one's household energy bill has a high level of intuitive appeal. Similarly, the marketing message "20/20 will save you plenty" was viewed as being highly successful.

From SDG&E's perspective, program implementation went smoothly. In contrast, SCE staff noted that their Statewide20/20 Program was not an easy program to run. In total, it cost $4 million in marketing administration and approximately

$28M rebates. SCE launched an aggressive outreach program targeting the utility's 88,000 highest users. The utility mailed 1.8 million mailers, and reached 2.6 million households via cable TV. Cable TV was utilized instead of broadcast TV in order to target specific customer segments. SCE also promoted the program heavily with its staff. PG&E and SDG&E spent $4.8 million and $750,000 on marketing and administration, respectively.

It was noted by implementation staff at SDG&E that, in contrast with statewide energy efficiency programs, there was relatively little coordination among the various utilities for this initiative.

2.3 Statewide 20/20 Study Challenges

The evaluation of the Statewide 20/20 Program posed several unique challenges. The first challenge was the short time frame available for completion of this work. The work began in late November of 2005, with a firm completion date of March 1, 2006. This time constraint limited the depth and breadth of our data collection and analysis.

From a technical perspective, additional challenges were posed by the design of the program and resulting limitations on available data. Demand response efforts are often targeted at the large commercial and industrial markets and involve either the installation of specific devices designed to control customer loads and/or the recruitment of customers to enroll in special rates that provide an incentive for curtailing loads. The Statewide 20/20 Programs are different in that they do not require a formal enrollment process of any kind.

The use of billing analysis tools is therefore limited by the absence of data regarding the conservation actions pursued and the customers' motivations. Additionally, the reduction in energy use may not directly correlate to capacity savings at the coincident peak. Each of these issues is discussed in more detail below.

2.3.1 Definition of a Statewide 20/20 Participant.

Unlike, other programs, the dataset of rebated customers does not constitute the full set of program participants. Some customers received the 20/20 financial rebate without taking any deliberate actions or even being aware of the program.[3] Furthermore, there are customers who took actions as a result of the program but did not reach the 20% threshold to earn a rebate.

For this reason, it is important to establish a clear distinction between receiving the rebate and being an active participant. Throughout this report we will refer to the customers using the following labels:

[3] The SDG&E C&I 20/20 Program did require customers to enroll and the discussion that follows does not apply to that program.

- Eligible customers are the broad set of customers for whom the utility had continuous billing records from the beginning of the summer of 2004 through the end of the summer of 2005.
- Received Rebate customers are those eligible customers who received a 20% rebate on their 2005 summer bill because they lowered their 2005 summer use by 20% when compared to their 2004 summer use.
- Active participants are those customers who were aware of the program in time to take action, said that they deliberately took action to try to receive the rebate, and could identify at least one energy saving action taken to reduce their 2005 summer energy use. Customers who did not receive a rebate can be active participants, and not all customers who received rebates are considered active.

None of the reduction achieved by inactive customers is attributable to the program. Some of the savings from active participants is also not classified as program-related. These non-attributable savings include the reduction associated with free riders (i.e., customers who would have taken conservation actions in the absence of the program), and savings that occurred in active households from incidental conditions independent of the programs. These incidental conditions include changes in home occupancy, remodeling, and extreme unexplained changes in use.

2.3.2 Limitations to the Use of Billing Analysis

Most traditional programs have a tracking system that identifies both the participants and the measures installed by each participant. In the case of the Statewide 20/20 program, there is no such system and no simple method of identifying either the participants or the conservation actions. Given this lack of basic information, the evaluator is left in the position of relying on self-reports. Only the customer knows which conservation actions were pursued (if any) and the motivation behind them.

Thus, active participants can only be identified through a post-program survey, thereby limiting the analysis to a sample of all eligible accounts. The absence of easily identifiable participants also affects the usefulness of some common impact evaluation methods, particularly billing analysis of all participating customers such as those often used to determine savings for efficiency programs. For the Statewide 20/20 programs, the lack of available information about participants limits the value of conducting a detailed billing analysis on the full set of successful customers. Even if a billing analysis shows changes have occurred between 2005 and 2004 summer periods, there is no information to explain why the savings occurred. There is also the possibility of double-counting savings for 20/20 participants who decided to take advantage of other efficiency programs offered by the utilities.

2.3.3 Net to Gross Program Savings.

Estimating free ridership is another critical component of an impact evaluation. Free riders in the 20/20 program can be defined as those customers who are pre-disposed to energy conservation and would have reduced their energy consumption to the same degree with or without the offer of an incentive.

Two methods are commonly used for the estimation of net program savings: (1) calculating savings net of the change in use of a comparison group or (2) basing net effects on self-reports. For the 20/20 program, defining a comparison group is problematic at best.

One option is to characterize the entire population of eligible customers as the comparison group. Under this scenario, 20/20 impacts would be estimated based on the distribution of the change in use across all eligible customers. This approach has a serious drawback, in that 20/20 participants are part of the eligible population and it is not possible to determine what the distribution would have looked like in the absence of the 20/20 program. Analyzing billing data from a previous year would not be an improvement since other external factors (such as weather or economic climate) are likely to affect energy use and cannot be controlled in such a comparison. Also, the utilities were offering versions of the 20/20 program in previous years, which would introduce another confounding factor.

Another possibility is to identify the inactive survey respondents as the comparison group. While this approach may seem like an attractive solution, is also has a fundamental drawback in that it results in stratification based on outcome. Survey respondents are a select group, that is, those who successfully managed to reduce their use by 10% or more. This group cannot be considered representative of the entire population of energy conservers, as one would expect that their average savings levels would be substantially higher than in the general population of customers who are pre-disposed to reduce energy use.

Self-reports are an alternative method for estimating net program impacts. The surveys included questions intended to determine whether the incentive was an important motivation for reducing use. A drawback of this method is that the results may be biased due to socially-desirable responses, i.e., survey participants may be more likely to give what they perceive as being the desired response.

Estimating net impacts is a complex process and in this case, required selecting among these imperfect choices. Given the degree of the issues associated with defining a comparison group, self-reported customer information was chosen as the best option and the net impacts shown in this report are estimated on that basis.

2.3.4 Challenges in Determining Peak Demand Impacts

The Statewide 20/20 programs are intended to be demand response programs and the ultimate success of these programs is determined by the quantity of peak demand that is reduced. The SDG&E C&I 20/20 program required that interval metering be installed so that peak demand effects could be determined. However, for the residential customers and most commercial customers in the Statewide 20/20 Program, the existing metering provides only a single monthly measure of total consumption. This limitation in the available metering data makes it difficult to isolate the demand impacts of the program. As a result, survey data are needed to identify the types of activities that customers took to reduce loads. Demand reductions must then be estimated from our knowledge of the typical load shapes associated with the measures affected by customer activities.

3: Statewide 20/20 Residential Survey

This section reports on the results of the residential customer survey. This survey was designed to serve two purposes: (1) to provide process and marketing information regarding program participation, and (2) to develop data for use in the impact evaluation analysis.

For the purposes of this survey, samples were drawn for two distinct groups of customers: (1) rebated residential customers with billing data indicating a 20% reduction in summer use, and (2) residential customers with billing data indicating a reduction in use between 10% and 20%, just missing the threshold for the rebate. The “Just Missed” group was selected in order to establish whether customers other than those who received the rebate were active program participants. Given the time and budgetary constraints, concentrating on the Just Missed group, who are known to have reduced use during the 20/20 period, improved the likelihood of isolating these effects.

However, a downside of this methodology is that we do not have direct evidence regarding the behavioral patterns of the residential customers with reductions of less than 10%. Savings for this group can be extrapolated by establishing an active household trend line for the just missed households and projecting those figures through the rest of the residential households.

The details of the approach are highlighted below, followed by the results.

3.1 Survey Approach

3.1.1 Survey Purpose and Content

Given the lack of enrollment and absence of basic information about program participants, the major focus of this survey was to identify households who were active participants and to determine the level of energy savings from these households that may be attributable to the program. A second major objective was to determine the number of free riders who received the rebate. The third component was to document the specific energy-related actions undertaken by the survey respondents, and to determine whether the savings associated with these activities should be attributed to the program.

To save time in survey implementation, the survey of customers who received the rebate was conducted first, followed by those that just missed the rebate. The two separate survey instruments differed only in the screening questions used. For that reason, we have attached only the one instrument, the Residential Received Rebate Instrument, as Appendix A. The screening questions for the Just Missed survey are inserted where they differed from the Received Rebate survey. The surveys contained questions with the following content:

- Screeners on recall of receiving rebate (Received Rebate Group only),

- Awareness of 20/20 before or during summer; and source of awareness,
- Whether customer actively tried to achieve 20% reduction,
- Actions taken to lower use,
- Importance of rebate in motivating action,
- Changes in household occupation between summer 2004 and summer 2005,
- Air conditioning use on hottest days,
- Participation in earlier 20/20 programs,
- Household demographics, such as the number of occupants, type of home, number of bedrooms, type of AC, space and water heating fuels, and household income, and
- Participation in other energy efficiency programs.

3.1.2 Sample Design

We began this study without any prior knowledge of how many households were aware of the program or how many were active participants. Initially, the distinction between those aware and unaware households was considered to be a critical characteristic. As explained in Chapter 1, we later developed the more stringent metric, “active participation.” However, the sample quotas were set on awareness rather than active participation.

For the Received Rebate group, the sample selection was performed by utility and by usage (for SCE and PG&E). The first step in implementing the sampling approach was to identify the PG&E and SCE customers who received the rebate. This group is called the “Received Rebate” sample. Next, we identified two strata for each utility: those using less than the median amount of kilowatt-hours per day, and those using more than the median. Table 3.1 shows the stratification used for the PG&E and SCE Received Rebate sample. The median values shown in column two subdivide the samples so that approximately half of the accounts fall into the low-use strata and half into the high-use strata. Note that we did not undertake this stratification for the SDG&E sample because the necessary energy use data were not provided. The sample frame used for the survey was randomly selected within each of the strata.

Table 3.1: PG&E and SCE Rebated Residential Stratification

	Median Cutoff	Total Rebated Residential Accounts	Number of Accounts in Low Use Strata	Number of Accounts in High Use Strata
PG&E	1854 kWh/summer 2004	329,861	167,725	162,136

SCE	12.04 kWh/day summer 2004	278,507	139,320	139,187
SDG&E		89,383		

For rebated customers, the sample strategy was designed to gather information from both aware and unaware customers for the purpose of comparing behavioral patterns. Based on the expectation that the majority of households who received the rebate would not be aware of the program and our understanding that most of the interest in this program related to aware households, we established a quota of 500 for completed surveys of unaware customers. When the quota was reached, we terminated the survey with unaware households and recorded the number that were terminated to be able to calculate the correct proportion of unaware households in the population. The survey continued until at least 500 surveys of aware households were completed.

We also selected from each utility a sample of households that had a reduction in their 2005 summer use of 10% to 20% in comparison to 2004. To keep this portion of the analysis manageable, the sample frame was not stratified by usage level. Since the objective of surveying the Just Missed group was to ascertain whether some customers who did not meet the 20/20 threshold were actively engaged in energy conservation as a result of the 20/20 program, this survey was restricted to customers who were aware of the program. The survey process resulted in a completed sample of over 500 Just Missed, aware households.

To ensure sure that each utility had an adequate representation and a sufficient sample size, we set quotas of 200, 200 and 100 surveys for PG&E, SCE and SDG&E customers in both the Received and Just Missed samples.

A data coding error resulted in 60 surveys of SCE households whose reductions were less than 10%, or below the threshold for our Just Missed category. These surveys are not included in the analysis.

3.1.3 Sample Weights

The ultimate determinant of participation became whether customers were active or inactive in the program, as is explained in detail in the Section 3.1.4. A post-analysis weighting of each response was necessary to ensure that the results represented the population distribution of active and inactive households and not the distribution of the completed surveys. This step was particularly important due to the fact that many surveys were terminated when it was determined that the household was not aware of the program. Weighting allows us to include those terminated customers as though they had completed the surveys, giving the actual determinant of the percentage of customers who were active and inactive.

Table 3.2 shows the weighting factors used to adjust the sample responses to include all surveys that were terminated. To calculate a weight, we first establish the percentage of the completed surveys in that category and the percentage of all calls (including terminations) in the category. The weighting factor is then calculated as the Percentage of Actual Total Responses divided by the Percentage of Completes. For example, using households that received the rebate, we completed surveys with 692 inactive households, however when we add in the terminated calls, we have 811 households who were not active. In this case, each completed survey represents 1.053474347 (.6890/.6541) actual households.

Table 3.2: Weighting Factors to Include Terminated Calls

	Number of Respondents	Percentage of Completes	Percentage of Actual Total Responses
Active/Inactive Weighting for Rebated Sample			
Completed Active	366	34.59%	
Completed Inactive	692	65.41%	
Total Rebated Completes	*1058*		
Terminated Inactive	119		
Actual Active	366		31.10%
Actual Inactive	811		68.90%
Actual Total Respondents	*1177*		
Weight for Active	0.898895497		
Weight for Inactive	1.053474347		
Active/Inactive Weighting for Just Missed Sample			
Completed Active	299	64.44%	
Completed Inactive	165	35.78%	
Total Just Missed Completes	*464*		
Terminated Inactive	597		
Actual Just Missed Active	299		28.18%
Actual Inactive	762		71.82%
Actual Total Respondents	*1061*		
Weight for Active	0.437323280		
Weight for Inactive	2.007266629		

Table 3.3 shows the derivation of the sample weights applied to adjust the completed surveys to reflect the actual percentages of each utility.

Table 3.3: Weights Developed to Adjust for Utility and Use Size

Sample	Rebated Low-use*	Rebated High-use*	Not Rebated Just Missed	Total
Percentage of Completed Responses				
PG&E	3.22%	21.48%	12.68%	37.39%
SCE	3.68%	23.26%	9.20%	36.14%
SDG&E	0.00%	17.87%	8.61%	26.48%
Total				100.00%
Population				
PG&E	167,725	162,136	369,937	699,798
SCE	139,320	139,187	352,985	631,492
SDG&E		89,383	104,171	193,554
Total				1,524,844
Population Percentages				
PG&E	11.00%	10.63%	24.26%	45.89%
SCE	9.14%	9.13%	23.15%	41.41%
SDG&E	0.00%	5.86%	6.83%	12.69%
Total				100.00%
Relative Weights				
PG&E	3.416574992	0.494903972	1.913197032	
SCE	2.483217019	0.392450286	2.51661889	
SDG&E		0.32800107	0.793715342	

* See Table 3.1 for dividing point. No low use/high use strata were developed for SDG&E

The weighting factors for each respondent are the multiplicative combination of the weights in Table 3.2 and Table 3.3. The total actual respondents for this survey are 1177 from the Rebated sample and 1061 from the Just Missed sample. **All tables in Chapter 3 are weighted using the relative weights developed in Table 3.3. Because weights are used, table n's may differ because of rounding.**

3.2 Results of the Residential Survey

3.2.1 Active Program Participation

The designation of respondents as being active or inactive is the key objective of the survey. Active customers are those who were motivated by the program to take at least one energy-saving action. Any reductions in energy use realized by inactive customers are not considered to be attributable to the program. We define a customer as active if they have the following three characteristics:

- They became aware of the existence of the Statewide 20/20 program before or during the summer of 2005,
- They reported that they purposely tried to earn the 20% discount by taking steps to reduce energy in the summer of 2005, and
- They identified at least one energy saving action that they implemented.

Table 3.4 shows that only 28% of the total number of respondents were active in the program and 71% of the households who received rebates were not active participants.

Table 3.4: Household Designation as Active and Inactive

	Active Status		Total
Rebate Status	**Active**	**Inactive**	
Rebated	202 (29%)	497 (71%)	699
Not Rebated	231(27%)	614 (73%)	845
Total Residential	433 (28%)	1,111 (72%)	1,544

As a final qualification of intent, we asked a traditional free-rider question of those respondents who were classified as active: “For the energy saving measures that you just mentioned, how important was the prospect of receiving the 20% rebate in taking those actions?” The results are shown in Table 3.5. It indicates that 137 (68%) active rebated households thought that the rebate was important in prompting their actions. Another 131 Just Missed households (57%) also thought the rebate was an important factor. The percentage of households who are active and free-riders is 32% and 43% for the Rebated and Just Missed groups, respectively.

Table 3.5: The Importance of the Rebate in Prompting Actions

	Active Rebated Customers		Active Just Missed Customers	
How Important Was Rebate	**Number**	**Percent**	**Number**	**Percent**
Was the most important	53	26%	41	18%
Was important	84	42%	90	39%
Was not important	64	32%	99	43%
Total	201	100%	230	100%

Please note the application of relative weights means that totals in each table will not always sum to the exact sample numbers due to rounding.

When we combine Table 3.4 and Table 3.5, we develop a measure of the number of households that are active, non-free-rider participants. Table 3.6 indicates that less than one in five of households that received a rebate took actions that are attributable to the program.

Table 3.6: Percent of Households that Are Active and Are Not Free-Riders

Rebate Status	Active Household	Rebate Was Important or Very Important	Active and Not Free-Riders
Rebated	29%	68%	20%
Just Missed	27%	57%	15%

3.2.2 Savings Estimates and Actions Taken

We asked each respondent to list any actions or behaviors that might explain why their 2005 summer use was lower than the 2004 summer use. The results indicate that active households were more likely to have invested in energy saving equipment and to take behavioral actions to reduce energy use. The average reduction for the different groups is calculated from the billing data for all accounts in the residential sample and presented in Table 3.7. A detailed estimate of the savings from the programs is presented in Chapter 5.

Table 3.7 indicates that active households reduced use more than the inactive households. However, the percentage reduction is similar between the active and inactive households.

Table 3.7: Average 2005 Summer Savings by Group

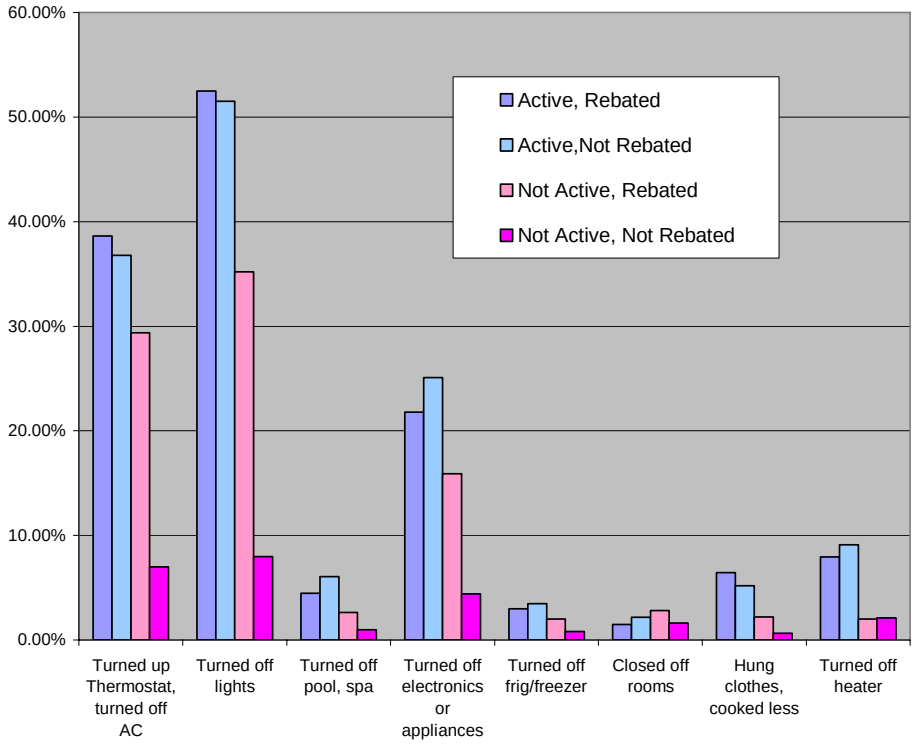
Rebate Status	Active Status	2004 Summer Use (kWh)	2005 Summer Reduction (kWh)	% Reduced [(2005-2004) /2004]
Rebated	Active	2,772	875	32.0%
>=20% reduction	Inactive	2,339	707	31.3%
	Sample Total	2,464	755	31.8%
Just Missed	Active	2,930	403	14.7%
10% to 19.9% reduction	Inactive	3,050	390	14.1%
	Total	2,983	398	14.4%

A series of questions was designed to determine the actions taken. The penetration of these actions by group is shown in Figure 3.8 and Figure 3.9. We note that some responses given, such as turned off heater or used off-peak, are unlikely to have caused any summer use reductions. The mention of the used off-peak may reflect respondents' confusion between the 20/20 Program and Flex Your Power advertising.

The results show that the active groups undertook the following more often than the inactive groups did:[4]

- turn off ac (significant for rebated and just missed at 0.01),
- turn off lights (significant for rebated and just missed at 0.01),
- turn off refrigerators (significant for just missed at 0.01),
- turn off appliances (significant for rebated and just missed at 0.01);
- Wash clothes/used less hot water (significant for rebated and just missed at 0.01),
- hung clothes and cooked less (significant for rebated and just missed at 0.01), and
- purchased more energy efficient appliances and equipment (significant for rebated and just missed at 0.01).

Figure 3.8: Level of Activity by Group—Behavioral Actions



[4] Significance is based on Chi Square test done separately for received and just missed groups

Figure 3.9: Level of Activity by Group—Purchases and Other Actions

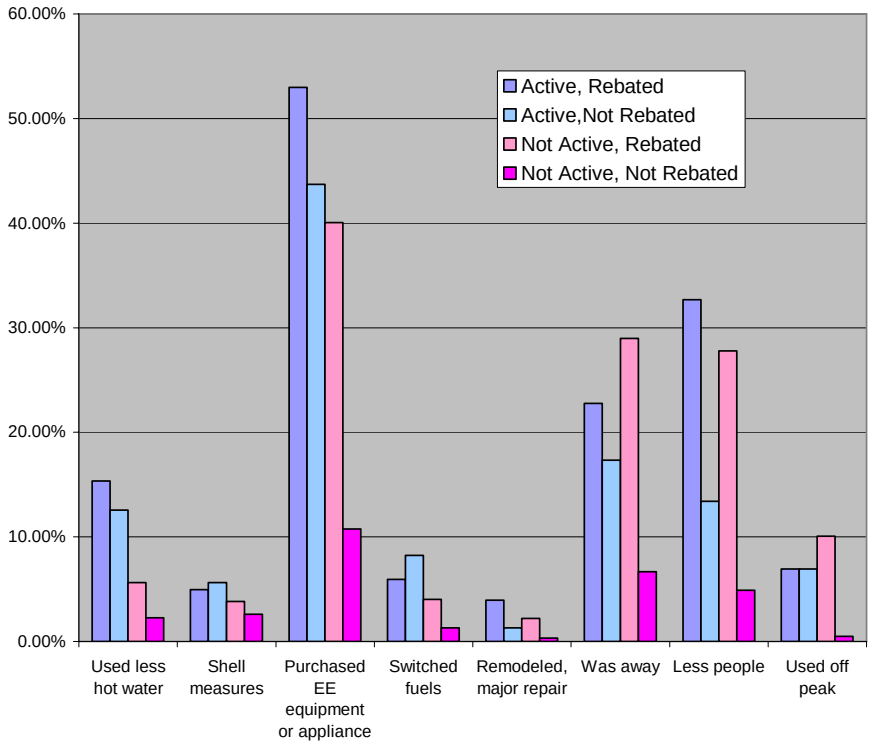
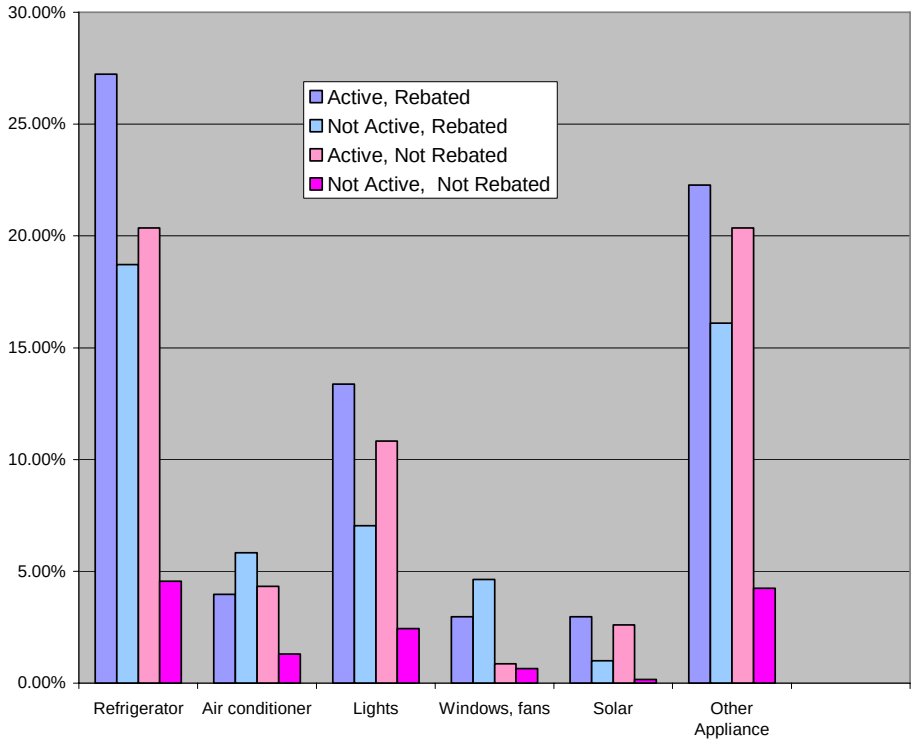


Figure 3.9 shows the distribution of a number of other actions or events that are likely to result in a decrease in energy use. Purchases of specific energy efficient equipment by group are illustrated in Figure 3.10. Active groups purchased lights and refrigerators significantly more often than the other groups did.

Figure 3.10: Purchases of Energy Efficient Equipment by Group



3.2.3 Air Conditioning Behavior at Peak

One of the concerns about the 20/20 Program is that the program encourages energy savings that may not necessarily result in peak savings for the utilities. Some of the survey questions asked respondents who reported lower air conditioning use to specify whether they also decreased A/C use on the peak day.

Table 3.11 presents the results of the question targeted to households who had previously claimed that they lowered their use of air conditioning. This question asked the respondent to state whether they controlled their air conditioner on the peak day. The results suggest that only a few of these customers reversed that behavior on the peak days. Five of the 35 active, rebated households and two of the 41 active, just missed households say they turned up the cooling on the peak day.

Table 3.11: Use of AC on Peak Day by Those Who Lowered AC Use

Rebate Status		Made it colder	Kept it the same	Made it warmer	AC was off all day	Don't Know
Active	Rebated	5	11	8	7	3
	Just Missed	1	20	4	5	4
	Total	6	21	12	12	7
Inactive	Rebated	12	17	6	7	4
	Just Missed	2	8	0	2	0
	Total	14	25	6	9	4

A similar question was fielded to households that claimed they turned off their AC units during the summer of 2005. Table 3.12 shows that some of these households used AC during the peak day. In fact, 62% of the active households ran those units for more than a couple of hours on the hottest days. This result implies that the kWh savings from air conditioning reductions may achieve lower peak savings than would be expected.

Table 3.12: Use of AC on Peak Day by Those Who Turned Off AC

Rebate Status		Kept it off complete-ly	Turned it on for <15 minutes	Turned it on for <1 hour	Turned it on for a couple of hours	Turned it on all day	Turned it on all night	Don't Know
Active	Rebated	13	0	5	23	3	1	1
	Just Missed	10	3	10	27	2	3	4
	Total	23 (22%)	3 (3%)	15 (14%)	50 (48%)	5 (5%)	4 (4%)	5 (5%)
Inactive	Rebated	20	4	17	35	13	1	11
	Just Missed	2	3	4	9	6	0	7
	Total	22 (17%)	7 (5%)	21 (16%)	44 (33%)	19 (14%)	1 (1%)	18 (14%)

3.2.4 Activity in Other Energy Efficiency Programs and Previous Years of the 20/20 Program

Survey questions were also designed to determine whether respondents had participated in other efficiency programs or in the 20/20 Program offered in previous years. Program records for previous versions of the 20/20 program suggest that award rates were generally high in earlier years (over 30% for some months), most likely due to the method in place at that time in which the rebate was offered on a monthly basis. The monthly calculation made it possible for households to qualify in consecutive years, something that would be very difficult using the cumulative, four-month method. Table 3.13 shows that few of the

households (13% of the active households and just 5% of the inactive households) remember receiving rebates from these earlier versions of the 20/20 Program. SCE estimates that approximately one third of all eligible customers qualified in each month in 2004, so the low numbers in Table 3.13 probably reflect poor awareness and memory rather than a low penetration rate of rebates in the past.

Table 3.13: Received 20/20 Rebate in Previous Years

Rebate Status	Utility	Received Rebate in Previous Year	Did Not Receive Rebate in Previous Year	% Received
Active	Rebated (n=202)	26	180	14%
	Just Missed (n=231)	23	208	11%
	Total (n=433)	49	388	13%
Inactive	Rebated (n=497)	23	474	5%
	Just Missed (n-614)	11	168	7%
	Total (n=1111)	34	642	5%

Table 3.14 shows the year that customers remember receiving a rebate.

Table 3.14: When They Remembered Receiving 20/20 Rebate in Past

Year	Number claiming they received rebate
2004	34
2003	21
2002	7
<2002	10

Table 3.15 shows the reported participation in other energy efficiency programs. The results show around 5% of the active survey respondents also participated in the Low-Income Energy Efficiency (LIEE) Program and 2% in the Appliance Rebate Programs.

Table 3.15: Participation in Other Energy Efficiency Program

		Low Income Energy Efficiency	Appliance Rebate	CARE, Senior, Medical	Other
Active	Rebated (n=202)	11	6	2	4
	Just Missed (n=231)	12	3	3	1
	Total (n=433)	23	9	5	5
Inactive	Rebated (n=497)	24	7	3	3
	Just Missed (n=614)	5	5	3	2
	Total (n=1111)	29	12	6	5

No adjustment was made to the active participation numbers to remove customers who have participated in other programs. The percentages are so small that doing so would have little effect on the final participation numbers. In addition, we are unable to conclude definitively that the actions taken by households were totally motivated by the other programs. While the LIEE program provides whole-house treatment, the other programs do not. It is unlikely that participation in an appliance rebate program, for example, would explain the entire reduction. Even in the case of LIEE, some behavioral actions may have been related to the Statewide 20/20 program.

3.2.5 Variations in Occupancy

We asked households for the number of occupants in the home in the summer of 2004 and 2005. Table 3.16 shows that the occupancy rates dropped significantly for those groups that received the rebate. The reduction in household size is a major determinant as to whether households receive a rebate or not.

Table 3.16 Occupancy Levels in Summers of 2004 and 2005

	2004 Occupancy	2005 Occupancy	Change 2004 to 2005	Percent Change
Rebated	3.01	2.72	0.29	9.6%
Just Missed	3.07	3.01	0.06	-2.0%

2005 means are significantly different at 0.013

Table 3.17 shows the results of a question asking whether households were away more or less in the summer of 2005 as compared to the summer of 2004. Most households had the same stay at home patterns for both years, but a larger percentage of rebated households were gone more in 2005 than were gone in 2004. Another question asked the length of time they were away, but no distinct patterns emerged.

Table 3.17: Comparison of Time Stayed at Home in 2004 and 2005

		Stayed the Same in Both Years	Stayed Home More in 2005	Stayed Home More in 2004	Total
Active	Rebated	132 (65%)	24 (12%)	46 (23%)	202
	Just Missed	153 (69%)	30 (13%)	40 (18%)	223
	Total	285 (67%)	54 (13%)	86 (20%)	425
Inactive	Rebated	355 (71%)	50 (10%)	93 (19%)	498
	Just Missed	129 (75%)	16 (9%)	28 (16%)	173
	Total	484 (72%)	66 (10%)	121 (18%)	671

The question arises as to how much influence the change in occupancy has on the achievement of the 20% reduction by households. In Table 3.18, we show increases and decreases in occupancy in 2005. The results show that the Active Received group is more likely to have had a drop in household occupancy than any other group. In addition, the rebated homes are far more likely to have had an occupancy decrease than an occupancy increase. Even the just missed households are more likely to have experienced an occupancy decrease in 2005.

Table 3.18: Change in Occupancy in 2005

		Increased in 2005	No Change	Decreased in 2005	Total
Active	Rebated	26(13%)	105 (52%)	71 (35%)	202
	Just Missed	37 (16%)	139 (60%)	55 (24%)	231
	Total	63 (15%)	244 (56%)	126 (29%)	433
Inactive	Rebated	49 (10%)	316 (64%)	132 (27%)	497
	Just Missed	28 (15%)	113 (62%)	42 (23%)	183
	Total	87 (13%)	429 (63%)	174 (26%)	680

3.2.6 Demographic Information

We asked households information on the type of space and water heating fuel they use. The results indicate that the samples are very similar to each other and are also similar to the overall patterns for the eligible population.

Table 3.19 shows the types of air conditioning in the homes. Over 40% of the homes have no air conditioning system. That number is significantly higher for those households that received rebates.

Table 3.19: Type of Air Conditioning System in Home

		Central air	Room AC	Evaporative	No AC	Other, Don't Know, Refused	Total
Active	Rebated	83 (41%)	16 (8%)	13 (6%)	85 (42%)	6 (3%)	203
	Just Missed	113 (49%)	21 (9%)	17 (7%)	77 (34%)	1 (0%)	229
	Total	196 (45%)	37 (9%)	30 (7%)	162 (38%)	7 (2%)	432
Inactive	Rebated	199 (40%)	52 (10%)	21 (4%)	211 (42%)	14 (3%)	497
	Just Missed	88 (49%)	13 (7%)	4 (2%)	71 (39%)	4 (2%)	180
	Total	287 (42%)	65 (10%)	25 (4%)	282 (42%)	18 (3%)	677

Table 3.20 shows the number of rooms not cooled in those homes with an air conditioning system. We calculate the number of rooms not cooled by subtracting the number of rooms cooled from the total number of rooms. It is clear that many of the homes with central air do not use the system in every room in the home.

Table 3.20: Number of Rooms Not Cooled in Homes with AC

		One Room	Two Rooms	Three to Four Rooms	More Than Four Rooms
Active	Rebated	6	12	25	18
	Just Missed	14	18	17	11
	Total	20	30	42	29
Inactive	Rebated	19	13	51	32
	Just Missed	12	4	14	6
	Total	21	17	65	38

Customers with air conditioning were asked if they use the AC more in 2004 or 2005. Table 3.21 shows the results, indicating that a greater number of customers say they used more in 2004 than in 2005.

Table 3.21: Use of Air Condition in 2004 and 2005

		Used Same in Both Years	Used More in 2004	Used More in 2005
Active	Rebated	28	60	11
	Just Missed	53	48	24
	Total	81	108	35
Inactive	Rebated	78	119	22
	Just Missed	29	39	6
	Total	107	158	28

Table 3.22 shows the housing type.

Table 3.22: Housing Type

		Mobile	Apartment	Row/ Townhouse	Single Family	Other/ Don't Know
Active	Rebated	4	21	7	169	1
	Just Missed	7	28	12	181	2
	Total	11	49	19	350	3
Inactive	Rebated	13	115	17	345	7
	Just Missed	4	27	5	142	2
	Total	17	142	22	487	9

We asked households to tell us the total number rooms in the home. Table 3.23 shows that the rebated, active households are slightly larger than other homes.

Table 3.23: Number of Rooms

		Number of Rooms
Active	Rebated	6.05
	Just Missed	5.72
	Total	5.87
Inactive	Rebated	5.59
	Just Missed	5.93
	Total	5.68

Table 3.24 shows the income categories of the respondents.

Table 3.24: Income Categories of Respondents

		Less than $25,000 per year	$25,000 to $50,000 per year	$50,000 to $100,000 per year	$100,000 to $150,000 per year	More than $150,000 per year	Re-fused, Don't Know	Total
Active	Rebated	44 (22%)	43 (21%)	57 (28%)	8 (4%)	7 (3%)	44 (22%)	203
	Just Missed	72 (31%)	49 (21%)	45 (19%)	19 (8%)	6 (3%)	40 (17%)	234
	Total	116 (27%)	92 (21%)	102 (23%)	27 (6%)	13 (3%)	84 (19%)	437
Inactive	Rebated	149 (30%)	88 (18%)	78 (16%)	47 (10%)	23 (5%)	108 (22%)	493
	Just Missed	37 (19%)	33 (17%)	34 (18%)	26 (14%)	13 (7%)	47 (25%)	190
	Total	116 (17%)	121 (18%)	112 (16%)	73 (11%)	36 (5%)	155 (23%)	683

Table 3.25 shows the distribution of owners and renters

Table 3.25: Home Ownership

		Rent	Own	Total
Active	Rebated	35 (17%)	166 (83%)	201
	Just Missed	46 (20%)	183 (80%)	229
	Total	81 (19%)	349 (81%)	430
Inactive	Rebated	121 (25%)	368 (75%)	489
	Just Missed	33(19%)	145 (81%)	178
	Total	154 (23%)	513 (77%)	667

3.2.7 Awareness of 20/20 Program

The 20/20 Program included a large promotional campaign to expose customers to the program. We asked all rebated households the following question: “Do you recall receiving a 20% credit on your [utility] bill for the summer of 2005 for [service address]?” Table 3.26 provides the customer breakdown as to Active and Inactive. Approximately 44% of the households remember getting the rebate. Not surprisingly, the households determined to be active are twice as likely to remember receiving the rebate. Those respondents who did not remember receiving the rebate were then reminded that the utility records showed that they did receive a rebate. If the customer insisted that this was not the case, the survey was terminated, otherwise we continued with the interview.

Table 3.26: Number of Households Respondents Who Remember Receiving the Rebate

Did Customer Recall Receiving Rebate?	Active	Inactive	Total
Yes	131 (65%)	176 (35%)	307 (44%)
No	71 (35%)	321 (65%)	392 (56%)
Total Number	202	497	699

Another question was addressed only to rebated customers, asking if they knew the reason for the rebate. Table 3.27 shows the responses for all the Rebated group and Table 3.28 shows the responses for just those who recalled receiving the rebate. Only 211, (29%) of all rebated households responded that the rebate was associated with their reduction in energy use. Only 75 (11%) customers knew that they had reduced their use by 20%. Even among the households that remembered receiving the rebate, almost half did not know the reason why they received the rebate. Interestingly, 29 respondents thought that the rebate was connected to an overcharge settlement, and 23 thought it was a low-income, disability, or senior citizen discount.

Table 3.27: Know the Reason for the Rebate (For all Rebated Group)

Utility	Knew 20% Energy Savings	Knew Energy Saving	Did not Know	Total
PGE	43 (13%)	83 (25%)	203 (62%)	329
SCE	23 (8%)	34 (12%)	224 (79%)	281
SDGE	8 (9%)	12 (14%)	68 (77%)	88
Total	75 (11%)	129 (18%)	495 (71%)	698

Table 3.28: Know the Reason for the Rebate (For those that remembered receiving rebate)

Utility	Knew 20% Energy Savings	Knew Energy Saving	Did not Know	Totals
PGE	39 (26%)	57 (38%)	56 (37%)	152
SCE	21 (18%)	28 (24%)	68 (58%)	117
SDGE	7 (18%)	7 (18%)	24 (63%)	38
Total	67 (22%)	92 (30%)	148 (48%)	307

The next step in the process was designating which customers were aware of the program at the time it was running. We asked everyone directly if they “knew about the 20/20 conservation program where customers who reduce energy use by 20% in the summer get a 20% rebate.” Those that answered positively were then asked when they first learned about the program. The results are shown in Table 3.29. Anyone who said they learned about the program after the summer of 2005 was considered to be unaware when the program was operating. Active

households were more likely to have learned of the program during the summer of 2005, and this belated awareness may explain why some of the active, Just Missed customers failed to make the 20% threshold.

Table 3.29: When Households Became Aware of Program

Status	Rebate Status	When Became Aware of Program			
		Before	During	Unaware*	Total
Active	Rebated	163 (81%)	39 (19%)	0 (0%)	202
	Just Missed	156 (68%)	75 (32%)	0 (0%)	231
	Total	319 (74%)	114(26%)	0 (0%)	433
Inactive	Rebated	96 (19%)	29 (6%)	372 (75%)	497
	Just Missed	133 (22%)	49 (8%)	432 (70%)	614
	Total	229 (21%)	78 (7%)	805 (72%)	1111
Total Sample		548 (35%)	192 (12%)	805 (52%)	1544

*includes those who became aware after program was completed.

We asked customers who were aware of the program how they first heard of the 20/20 program. Table 3.30 shows the results. It is clear that a bill insert was the most important initial source of information.

Table 3.30: First Source of Information on 20/20

Source	Active	Aware But Inactive	Total
Newspaper	24 (5%)	10 (2%)	34 (4%)
Radio, TV	69 (16%)	43 (11%)	112 (13%)
Internet	1 (0%)	1 (0%)	2 (0%)
Utility Bill	34 (8%)	25 (6%)	59 (7%)
Utility Insert	199 (46%)	175 (44%)	374 (45%)
Utility Letter	28 (6%)	29 (7%)	57 (7%)
Friend	30 (7%)	27 (7%)	57 (7%)
Govt Announcement	0 (0%)	0 (0%)	0 (0%)
Did not know	35 (8%)	86 (22%)	121 (15%)
Other	12 (3%)	4 (1%)	16 (2%)
Total	432	400	832

3.3 Calculating Savings from Households Saving Less than 10%

For the residential survey, our sample was limited to those customers who reduced their 2005 use between 10 and 20%, in other words they just missed receiving the rebate. We wanted to establish whether this group took actions to

save energy. Given the limited budget and timeframe, we concentrated on this "Just Missed" sample. The survey results and billing records show that this group saved energy by taking specific conservation actions. However, the downside of concentrating our efforts on the Just Missed segment of the residential population is that we do not have direct evidence of the behavioral patterns of the residential customers with small decreases or an increase in use.

However, it is possible to extrapolate savings for this group by establishing an active household trend line for the 20% to 10% households and projecting those figures through the rest of the residential households. On average, the Just Missed group of households had 27% of the households that were active, and 15% of the households that were both active and not free riders. Table 3.31 shows that there is statistically significant drop-off in both these values as the percent reduction drops. If we extrapolate downward, it is likely that the rest of residential population contains about 450,000 active households. Using the same free-rider value for the just missed group of 43%, we estimate there are an additional 260,000 active non-free-riders with energy savings among the population of households who reduced their use by less than 10% in the summer of 2005.

Table 3.31: Linear Trend in Percent Active among Just Missed Households

Reduction Range	Percent Active	Population	Extrapolated Number of Active
19 to 20	34.1%		
18 to 19	33.9%		
17 to 18	27.2%		
16 to 17	32.4%		
15 to 16	8.7%		
14 to 15	22.7%		
13 to 14	24.0%		
12 to 13	31.3%		
11 to 12	22.2%		
10 to 11	25.9%		
Linear Trend	-0.89%		
Average Value for Just Missed Sample	27%	925,696	249,938
Projected Average Values for Decrease of 0%-10% range	18.1%	1,682,293	304,495
Projected Average Values for Increase of 0%-10% range	9.2%	1,570,044	144,444
Projected Average Value for Increase of 10% to 20% range	0.3%	1,034,216	3,103

3.4 Residential Survey Summary and Conclusion

The residential survey finds that the vast majority of rebated households from the 2005 Statewide 20/20 Program should be considered to be free-riders.

- Only 29% of the rebated households were active participants who were aware of the program in time to take action, said that they took action in direct response to the program, and could identify at least one action that they did take.

- Almost one-third of the active rebated participants are considered free-riders in that they would have done the actions had the rebates not been available. Combining the active percentage and the free rider estimates means that about 20% of the households were active and not free riders.

- Active households were more likely than inactive households to make investments in energy efficient equipment, cook less, use less hot water, and to turn off air conditioners, lights, and appliances.

- A major reason that many households reached the 20% reduction household is that they experienced a decrease in occupancy in 2005 as compared to the occupancy level in 2004. Fully 35% of the active rebated households experienced an occupancy decrease, while only 13% experienced an increase. Even households with savings between 10 and 20% were more likely to have a household occupancy decrease than to have an occupancy increase. The savings that results from this incidental change in occupancy is not an impact attributable to the program.

- The peak savings from this program may be less than expected because of households' action when the weather is hottest. For summer of 2005, 62% of the active households who say they turned off their AC units had those units running for more than a couple of hours on the hottest days.

- Despite the large promotional campaigns of the utilities, only 48% of the households contacted had an awareness of the program before or during its implementation. Furthermore, only 44% of the rebated households recalled receiving the rebate. Only 29% of the households that received the rebate knew that the rebate was awarded for saving energy.

4. Commercial and Industrial Survey

This section presents the results of the commercial and industrial surveys. Samples were drawn for customers who received a rebate for achieving a 20% reduction in their summer use, and all other, non-rebated C&I accounts. The details of the approach are highlighted below, followed by the results.

4.1 Survey Approach

4.1.1 Survey Purpose and Content

The major focus of this component of the study is to identify active participants and to assess the level of energy savings from these businesses that can be reasonably attributed to the program. Estimating free ridership is another key objective. The surveys were also designed to document the activities taken by active participants.

To save time, the survey of rebated businesses was conducted first, followed by the survey of firms that did not receive the rebate. Unlike the residential survey, the C&I survey was not restricted to just firms that “just missed” getting the rebate. All non-rebated C&I firms were eligible for selection into the C&I “did not receive” sample. The two separate survey instruments differed only in the screening questions used. The Commercial and Industrial Received Rebate Instrument is attached as Appendix B. The screening questions for the Did Not Receive the Rebate survey were inserted where they differed from the Received survey.

The survey contained questions including the following content:

- Screeners on recall of receiving rebate (Rebated Group only),
- Awareness of the 20/20 program before or during the summer of 2005 and the source of program information,
- Whether the customer actively tried to achieve 20% reduction,
- Actions taken to lower use,
- Importance of rebate in motivating action,
- Changes in business occupation and operations between summer 2004 and summer 2005,
- Air conditioning use on hottest days,
- Participation in earlier 20/20 programs,
- Business demographics, such as number of employees, type of business, type of AC, and space and water heating fuels, and
- Participation in other energy efficiency programs.

4.1.2 Sample Design

The survey is divided into those businesses that received the 20% rebate and those that did not. Unlike the residential survey, the sample was not stratified on business size or percent reduction.

One of the challenges of this study is that there was no requirement to sign up for the program and technically all customers with a previous summer's billing history are eligible. As in the residential study, customers were differentiated according to their active status, i.e., customers who knew about the program prior to or during the 2005 summer season, reduced their energy use for the purpose of receiving the rebate, and could identify as least one energy conservation action taken were designated as active participants. This distinction applies whether or not customers achieved the 20% reduction.

When the survey was initially put into the field, the penetration of aware and active businesses was an unknown quantity, and the only means of determining these classifications was through survey responses. Therefore, it was necessary to use the screening questions to establish categories and quotas were set for each type of participant. Once the quota for inactive customers had been filled, we terminated surveys with inactive respondents and continued the surveys until the quotas for aware participants were met.

4.1.3 Sample Weights

The existence of sample strata, and quotas for each utility and for classifications of active, aware, and unaware customers necessitates the use of sample weights to bring the survey results to be representative of the statewide situation. Since some surveys were terminated when the business was screened for active participation, it was necessary to recalculate weights to include those terminated customers as though they had completed the surveys. This adjustment gives the real determinant of the percentage of customers in each classification. Table 4.1 shows the weighting factors used to adjust the sample responses to incorporate all surveys, including those that were terminated when a quota was already filled.

Table 4.1 shows the weighting factors used to adjust the sample responses to include all surveys, terminated and completed. To calculate a weight, the first step is to establish the percentage of the completed surveys in that category and the percentage of the total calls (including terminations) in the same category. The weighting factor is then calculated as the Percentage of Actual Total Response divided by the Percentage of Completes. For example, using firms that received the rebate, surveys were completed with 253 inactive firms, however when we add in the terminated calls, the total number of inactive firms is 649. In this case, each completed survey represents 1.31111 (.8012/.6111) actual firms.

Table 4.1: Weighting Factors to Include Terminated Over Quota Calls

	Number of Respondents	Percentage of Completes	Percentage of Actual Total Responses
Active/Inactive Weighting for Rebated Sample			
Completed Active	161	38.89%	
Completed Inactive	253	61.11%	
Total Rebated Completes	*414*		
Terminated Inactive	396		
Actual Active	161		19.88%
Actual Inactive	649		80.12%
Actual Total Respondents	*810*		
Weight for Active	0.511111111		
Weight for Inactive	1.311111111		
Active/Inactive Weighting for Not Rebated Sample			
Completed Active	103	46.61%	
Completed Inactive	118	53.39%	
Total Not Rebated Completes	*221*		
Terminated Inactive	737		
Actual Not Rebated Active	103		10.75%
Actual Inactive	855		89.25%
Actual Total Respondents	*958*		
Weight for Active	0.23068894		
Weight for Inactive	3.815733219		

Table 4.2 shows the derivation of the sample weights applied to adjust the completed surveys to reflect the actual percentages for each utility.

Table 4.2: Weights Developed to Adjust for Utility

Sample	Rebated	Not Rebated	Total
Percentage of Completed Responses			
PG&E	24.41%	12.91%	37.32%
SCE	24.41%	12.91%	37.32%
SDG&E	16.38%	8.98%	25.35%
Total			100.00%
Population			
PG&E	72,490	342,635	415,125
SCE	63,912	424,442	488,354
SDG&E	12,270	82,842	95,112
Total			998,591
Population Percentages			
PG&E	7.26%	34.31%	41.57%
SCE	6.40%	42.50%	48.90%
SDG&E	1.23%	8.30%	9.52%
Total			100.00%
Relative Weights			
PG&E	0.29739419	2.657075832	
SCE	0.262202476	3.291475127	
SDG&E	0.075023497	0.924191133	

The weighting factors for each respondent are the multiplicative combination of the weights in Table 4.1 and Table 4.2. The total actual respondents for this survey are 810 from the Received sample and 958 from Not Received sample. **All tables in Chapter 4 are weighted using the weights developed in Table 4.2. Because weights are used, table n's may differ because of rounding.**

4.2 Results of the C&I Survey

4.2.1 Active Program Participation

The designation of respondents as being active or inactive is the underlying purpose of the survey. Active customers are those who were motivated by the program to take at least one energy saving action. Any reductions in energy use realized by customers who are determined to be inactive should not be attributed to the program. Active participants are defined by the following three characteristics:

- They became aware of the existence of the Statewide 20/20 program before or during the summer of 2005,

- The reported that they purposely tried to earn the 20% discount by taking steps to reduce energy in the summer of 2005, and
- They identified at least one energy saving action that they implemented.

Table 4.3 shows that only 14% of the respondents were active in the program. Among those businesses that received a rebated, 30% were active participants.

Table 4.3: Business Designation as to Active and Inactive

	Active Status		Total
Rebate Status	**Active**	**Inactive**	
Rebated	33 (30%)	77 (70%)	110
Not Rebated	60 (11%)	475 (89%)	535
Total C&I	93 (14%)	552 (86%)	645

As a final qualification of intent, the survey included a traditional free-rider question for active respondents: “For the energy saving measures that you just mentioned, how important was the prospect of receiving the 20% rebate in taking those actions?” The results are shown in Table 4.4. It indicates that 100% of the active businesses thought that the rebate was the most important factor in prompting their actions.

Table 4.4: The Importance of the Rebate in Prompting Actions

	For Active Rebated Customers Only		For Active Non-Rebated Customers Only	
How Important Was Rebate	**Number**	**Percent**	**Number**	**Percent**
Was the most important	33	100%	60	100%
Was important	0	0%	0	0%
Was not important	0	0%	0	0%
Total	0	100%	60	100%

By combining Tables 4.3 and 4.4, it is possible to develop a measure of the number of businesses that are active, non-free-rider participants. Table 4.5 indicates that 30% of the businesses that received the rebate were active, non-free-rider participants, and 11% of the other C&I customers who did not qualify for the rebate are active, non-free rider participants.

Table 4.5: Percent of Businesses that Are Active and Are Not Free-Riders

Rebate Status	Active Businesses	Rebate Was Important or Very Important	Active and Not Free-Riders
Rebated	30%	100%	30%
Not Rebated	11%	100%	11%

4.2.2 Savings Estimates and Actions Taken

A detailed estimate of the savings from the programs is presented in Chapter 7. The average reduction in use for the different groups in the C&I survey was calculated and is presented in Table 4.6. This table indicates that the active businesses reduced their use by more than the aware and unaware businesses. However, the percentage saved is similar between the active and inactive businesses. This table does not identify the actions that contributed to the savings.

Table 4.6: Average Reduction by Group over 2005 Summer

Rebate Status	Utility	2004 Summer Use (kWh)	2005 Summer Saving (kWh)	% Saved [(2005-2004) /2004]
Rebated	Active	11,336	3,400	39.3%
	Inctive	8,901	3,669	42.9%
	Sample Total	9,622	3,590	41.8%
	Population Total			
Not Rebated	Active	13,750	579	-15.7%
	Inactive	8,260	-501	-34.2%
	Sample Total	8,872	-381	-32.1%
	Population Total			

*includes those who became aware after program was completed

The survey included a series of questions to determine in detail the actions undertaken by the respondents. These actions are illustrated in Figure 4.7 and Figure 4.8. The results show that the active groups purchased equipment more often than the other groups. For the remaining actions, the activities of the active participants are not significantly different than the behavior of the other groups.

Figure 4.7: Level of Activity by Group—Behavioral Actions

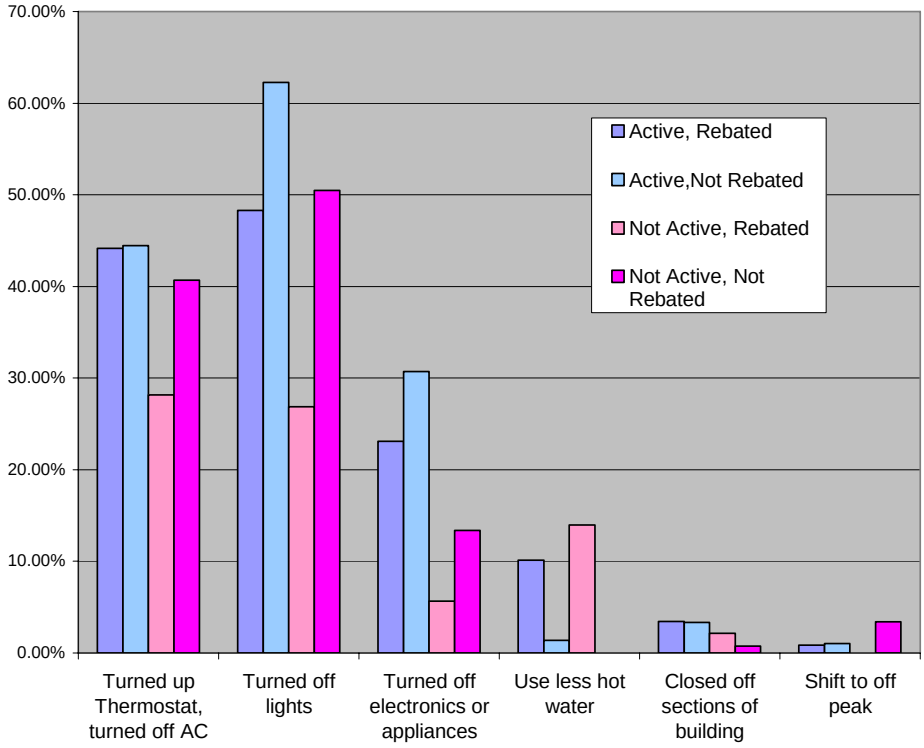
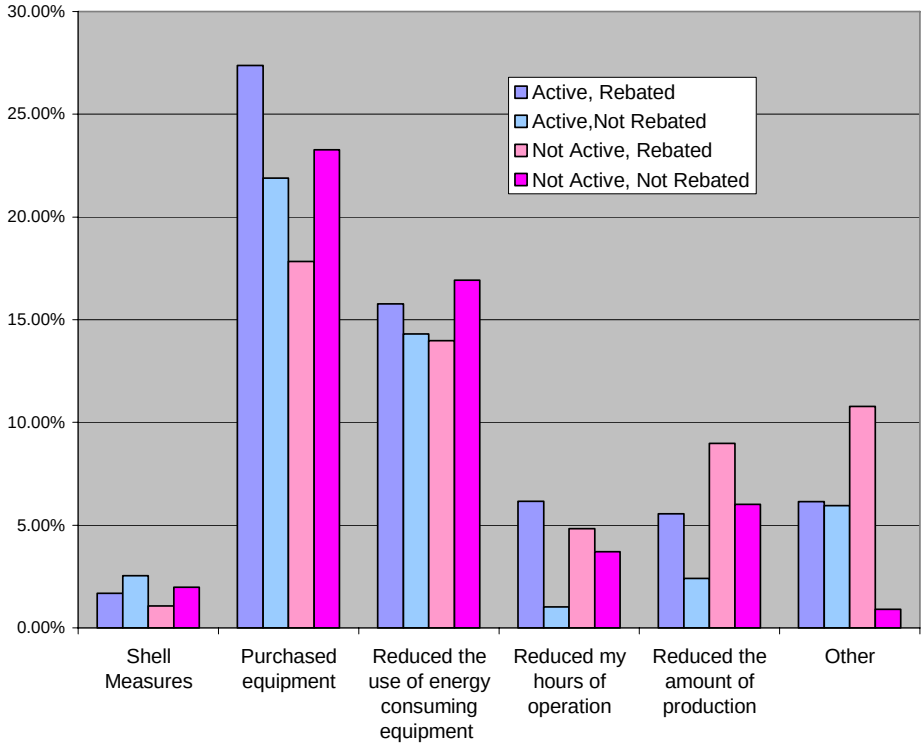
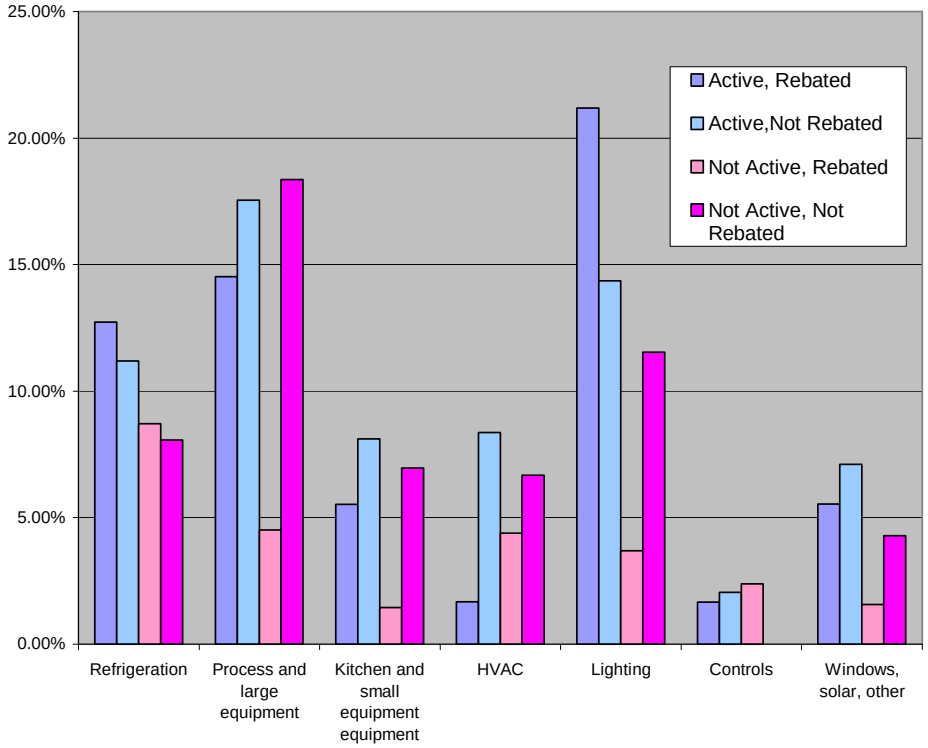


Figure 4.8: Level of Activity by Group—Purchases and Other Actions



The purchases were analyzed in more detail to identify the kinds of purchases made by the different groups. Figure 4.9 shows the results by group. Active participants purchased lights, refrigeration, and process and large equipment significantly more often than the other groups did.

Figure 4.9: Purchases of Energy Efficient Equipment by Group



4.2.3 Activity in Other Energy Efficiency Programs and Previous Years of the 20/20 Program

A set of questions was posed to investigate whether survey responded had participated in previous years of the 20/20 Program. Program records suggest that award rates in earlier years were generally very high, as high as 30% for some months, which could be due to the fact that the threshold was set on a monthly basis and rebates were distributed for a 20% reduction in any summer month. This monthly calculation made it possible for firms to qualify in consecutive years, a feat that would be difficult under the current, cumulative four-month method Table 4.10 shows that few businesses (3% of the 110 rebated and 1% of the 535 non-rebated firms) remember receiving earlier 20/20 rebates.

Table 4.10: Received 20/20 Rebate in Previous Years

Rebate Status		Received Rebate in Previous Year	Did Not Receive Rebate in Previous Year	% Received of Total *
Active	Rebated	2	31	6%
	Not Rebated	3	57	5%
	Total	5	88	5%
Inactive	Rebated	2	75	3%
	Not Rebated	0	476	0%
	Total	2	551	0%

Table 4.11 shows the reported participation in other energy efficiency programs. The results show a low level of participation. Not a single respondent could name a specific program that they participated in.

Table 4.11: Participation in Other Energy Efficiency Program

	Active	Inactive
Rebated	1	3
Not Rebated	1	18

4.2.4 Variations in Employees and Production

Another section of the survey contained questions regarding the number of employees in the summer of 2004 and 2005. Table 4.12 shows that the mean occupancy rates drop for the firms that received the rebate, and went up or stayed the same for the firms that did not receive a rebate.

Table 4.12: Employee Levels in Summers of 2004 and 2005

		Mean 2004 Occupancy	Mean 2005 Occupancy	Change 2004 to 2005	Percent Change
Active	Rebated	12.1	11.6	-0.5	-4%
	Not Rebated	12.0	13.7	+1.7	14%
	Total	12.1	13.0	+0.9	7%
Inactive	Rebated	10.6	10.1	-0.5	-5%
	Not Rebated	7.4	7.4	0.0	0%
	Total	7.9	7.8	-0.1	-1%

Table 4.13 shows the results of a question asking whether businesses had more or less production or sales in the summer of 2005 as compared to the summer of 2004. The largest number of businesses had the same production patterns for both years. Those firms not receiving rebates were more likely to have higher production levels in 2005.

Table 4.13: Comparison of Business Production/Sales in 2004 and 2005

		Higher in Summer of 2004	Same in Both Years	Higher in Summer of 2005	Total
Active	Rebated	9 (32%)	13 (46%)	6 (21%)	28
	Not Rebated	11 (22%)	21 (42%)	18 (36%)	50
	Total	20 (26%)	34 (44%)	24 (31%)	78
Inactive	Rebated	20 (32%)	22 (35%)	20 (32%)	62
	Not Rebated	27 (8%)	165 (48%)	150 (44%)	342
	Total	47 (12%)	187 (46%)	170 (42%)	404

Table 4.14 shows the level of reduction in energy use for 2005 for those businesses that reported their 2005 production or sales decreased as compared to their 2004 production or sales, and the increase in use for those that said production increased in 2005. There are more Active Received firms that had a decrease than an increase, however the differences are not statistically significant.

Table 4.14: Changes in Production/Sales

		Lower in 2005		Higher in 2005	
		Number of Businesses	Percent Decrease	Number of Businesses	Percent Increase
Active	Rebated	7	31%	5	19%
	Not Rebated	9	16%	16	17%
	Total	16	23%	21	17%
Inactive	Rebated	12	25%	14	19%
	Not Rebated	38	26%	67	18%
	Total	50	26%	81	18%

Table 4.15 shows the number of firms that reduced hours of operation in 2005 as compared to the hours of operation in 2004. Again, no pattern emerges that shows significant differences between those firms that received rebates and those that did not.

Table 4.15: Reduction in Hours per Week

		No Reduction	1-5 Hours per Week	6-10 Hours per Week	11-20 Hours per Week	20-60 Hours per Week
Active	Rebated	25	2	3	1	2
	Not Rebated	53	2	3	1	1
	Total	78	4	6	2	3
Inactive	Rebated	68	1	4	2	3
	Not Rebated	430	9	11	26	0
	Total	498	10	15	28	3

4.2.5 Firmographic Information

Information regarding the type of space and water heating fuel was also collected. Table 4.16 shows the space heat fuel and Table 4.17 the water heating fuel.

Table 4.16: Space Heating Fuel

		Electric	Gas	Oil	Don't Know/ Refused	Totals
Active	Rebated	13 (39%)	12 (36%)	4 (12%)	4 (12%)	33
	Not Rebated	23 (40%)	21 (36%)	4 (7%)	10 (17%)	58
	Total	36 (40%)	33 (36%)	8 (9%)	14 (15%)	91
Inactive	Rebated	30 (38%)	30 (38%)	7 (9%)	11 (14%)	78
	Not Rebated	135 (29%)	172 (37%)	56 (12%)	97 (21%)	460
	Total	165 (31%)	202 (38%)	63 (12%)	108 (20%)	538

Table 4.17: Water Heating Fuel

		Electric	Gas	Oil	Don't Know/ Refused	Totals
Active	Rebated	9 (28%)	16 (50%)	3 (9%)	4 (13%)	32
	Not Rebated	18 (32%)	24 (43%)	2 (4%)	12 (21%)	56
	Total	27 (31%)	40 (45%)	5 (6%)	16 (18%)	88
Inactive	Rebated	17 (22%)	38 (49%)	5 (6%)	18 (23%)	78
	Not Rebated	107 (23%)	165 (36%)	64 (14%)	123 (27%)	459
	Total	124 (23%)	203 (38%)	69 (13%)	141 (26%)	537

Table 4.18 shows whether or not the businesses have central air conditioning. Over 40% of the active businesses and 33% of the inactive businesses do not have central air conditioning system.

Table 4.18: Presence of Central Air Conditioning

		Yes	No	Total
Active	Rebated	17 (53%)	15 (47%)	32
	Not Rebated	35 (63%)	21 (38%)	56
	Total	52 (59%)	36 (41%)	88
Inactive	Rebated	46 (72%)	18 (28%)	64
	Not Rebated	282 (66%)	145 (34%)	427
	Total	328 (67%)	163 (33%)	491

Because the 20/20 program is a peak reduction program, it is important to determine if air conditioning reductions were practiced at the time of the peak. Customers who mentioned that they turned down their air conditioner in 2005 were asked what they did on the hottest day of the summer in 2005. The results for those businesses that turned down the air conditioning is shown in Table 4.19. Most of these respondents reported that they did not modify their conservation practices on the peak day. Table 4.20 presents the responses for those who turned off their air conditioning. A large number of these firms, 57 of 91 (62%), reported using the air conditioning for at least one hour on the peak day.

Table 4.19: Air Conditioning Use on Peak Day for Those Who Turned Down Air Conditioning

			Turned Down AC in 2005			
		Did Not Reduce AC in 2005	Made it Colder on Peak Day	Kept it the Same on Peak Day	Made it Warmer on Peak Day	AC Was Off on Peak Day
Active	Rebated	27	1	4	0	0
	Not Rebated	48	1	6	3	1
	Total	75	2	10	3	1
Inactive	Rebated	71	3	12	5	1
	Not Rebated	374	2	66	17	7
	Total	445	5	88	22	8

Table 4.20: Air Conditioning Use on Peak Day for Those Who Turned Off Air Conditioning

			Turned Off AC in 2005			
		Did Not Turn off AC in 2005	Kept it Off All Peak Day	Turned on for 1 Hour or Less	Turned on for a Couple of Hours	Turned on All Peak Day
Active	Rebated	24	1	2	3	2
	Not Rebated	48	1	1	5	4
	Total	72	2	3	8	6
Inactive	Rebated	63	2	0	6	3
	Not Rebated	395	19	13	13	35
	Total	458	21	13	19	38

Table 4.21 shows the business type using broad categories. In Table 4.22, we compress these into six broad categories.

Table 4.21: Respondent Business Types

	Active			Inactive		
	Rebated Active	Not Rebated	Total	Rebated Active	Not Rebated	Total
Office	5	11	16	12	80	92
Retail (non-food)	7	11	18	12	93	105
School	1	1	2	2	2	4
Grocery store	0	2	2	0	1	1
Convenience store	0	1	1	0	1	1
Restaurant	1	4	5	3	26	29
Health care/hospital	0	1	1	3	18	21
Hotel or motel	1	1	1	1	0	1
Warehouse	0	0	0	3	10	13
Personal Service	1	4	5	2	14	16
Community Service/Church/Temple/Municipality	1	4	5	5	18	23
Industrial Process/Manufacturing/Assembly	5	9	14	9	80	89
Condo Assoc/Apartment Mgmt	2	0	2	11	26	37
Agriculture	6	4	10	13	26	39
Recreation, golf course, bowling alley, gym	1	0	1	1	0	1
Repair shop	1	3	4	1	41	42
Other	0	2	2	0	19	19

Refused	0	0	0	0	1	1
Total	32	58	90	78	472	550

Table 4.22: Respondent Business by Categories

	Active			Inactive			
	Rebated Active	**Not Rebated**	**Total**	**Not Rebated**	**Rebated Active**	**Total**	**Total**
Office, personal service	7 (5%)	16 (12%)	23 (17%)	14 (10%)	102 (73%)	116 (83%)	139
Schools, colleges, community	2 (6%)	6 (17%)	8 (22%)	7 (19%)	21 (58%)	28 (78%)	36
Retail, stores, warehouse, restaurant	8 (5%)	19 (11%)	27 (15%)	18 (10%)	132 (75%)	150 (85%)	177
Manufacturing, repair	6 (4%)	12 (8%)	18 (11%)	10 (6%)	132 (82%)	142 (89%)	160
Hotel, hospital, condo	3 (5%)	2 (3%)	5 (8%)	15 (23%)	44 (69%)	59 (92%)	64
Agriculture, recreation	7 (13%)	5 (10%)	12 (23%)	14 (27%)	26 (50%)	40 (77%)	52

The respondents were asked to give the size of their building. More than a third did not answer or did not know. Table 4.23 breaks the responses into three categories: unknown, small (defined as less than 2500 square feet), and large (defined as more than 2,500 square feet). No respondent had a building larger than 20,000 square feet.

Table 4.23: Square Footage

		Small Less than 2,500 sqft	**Large Greater than 2,500 sqft**	**Refused, Don't Know, No Building**	**Total**
Rebated	Active	13 (43%)	10 (33%)	7 (23%)	30
	Aware	27 (49%)	13 (24%)	15 (27%)	55
	Total	40 (47%)	23 (27%)	22 (26%)	85
Not Rebated	Active	21 (29%)	27 (37%)	25 (34%)	73
	Aware	134 (29%)	145 (31%)	186 (40%)	465
	Total	155 (29%)	172 (32%)	211 (39%)	538

Table 4.24 shows the distribution of owners and renters.

Table 4.24: Property Ownership

		Rent	Own	Total
Active	Rebated	16 (48%)	17 (52%)	33
	Not Rebated	36 (62%)	22 (38%)	58
	Total	52 (57%)	39 (43%)	91
Inactive	Rebated	34 (45%)	41 (55%)	75
	Not Rebated	273 (62%)	168 (38%)	441
	Total	307 (59%)	209 (41%)	516

4.2.6 Awareness of the Program and Remembering the Rebate

The 20/20 Program included a large promotional campaign to expose customers to the program. All rebated businesses were asked the following question: “Do you recall receiving a 20% credit on your [utility] bill for the summer of 2005 for [service address]?” Table 4.25 provides the breakdown by whether the customer was classified as active or Inactive. Approximately 25% of the businesses that received the rebate remember getting it. Those respondents who did not recall the rebate were reminded that the utility records showed the rebate was paid. If the customer insisted that this was not the case, the survey was terminated; otherwise, we continued with the interview.

Table 4.25: Number of Businesses that Remember Receiving the Rebate

Did Customer Recall Receiving Rebate?	Active	Inactive	Total
Yes	13 (39%)	15 (19%)	28 (25%)
No	20 (61%)	62 (81%)	82 (75%)
Total Number	33	77	110

All rebated businesses were asked if they knew the reason for the rebate. Table 4.26 shows the responses for all the Rebated group and Table 4.27 shows the responses just for those who remembered receiving the rebate. Only 24 of all rebated businesses (22%) could tie the rebate to reduced energy use, and only 8 (7%) customers knew that they had reduced their use by 20%. Even among the businesses that remembered receiving the rebate, almost half did not know why they received it.

Table 4.26: Know the Reason for the Rebate (For all Rebated Group)

Utility	Knew 20% Energy Savings	Knew Energy Saving	Did not Know	Total
PGE	5 (9%)	10 (19%)	38 (72%)	53
SCE	3 (6%)	5 (10%)	40 (83%)	48
SDGE	0 (0%)	1 (13%)	7 (88%)	8
Total	8 (7%)	16 (15%)	85 (78%)	109

Table 4.27: Know the Reason for the Rebate (For Those That Remembered Receiving Rebate)

Utility	Knew 20% Energy Savings	Knew Energy Saving	Did not Know	Total
PGE	3 (20%)	4 (27%)	8 (53%)	15
SCE	3 (30%)	3 (30%)	4 (40%)	10
SDGE	0 (%)	1 (33%)	2 (67%)	3
Total	6 (21%)	8 (29%)	14 (50%)	28

The next step in the process was designating which customers were aware of the program at the time it was operating. Survey respondents were asked if they "knew about the 20/20 conservation program where customers who reduce energy use by 20% in the summer get a 20% rebate." Those that answered positively were then asked when they first learned about the program. The results are shown in Table 4.28. Respondents who said they learned about the program after the summer of 2005 are classified as unaware.

Table 4.28: When Businesses Became Aware of Program

Rebate Status	Utility	When Became Aware of Program				
		Before	During	Unsure When	Unaware	Total
Active	Rebated	21 (63%)	6 (18%)	6 (18%)		33
	Not Rebated	41 (79%)	18 (35%)	3 (6%)		52
	Total	62 (71%)	24 (28%)	9 (10%)		87
Inactive	Rebated	14 (19%)	6 (8%)		55 (73%)	75
	Not Rebated	30 (6%)	20 (4%)		425 (89%)	475
	Total	44 (8%)	26 (5%)		470 (85%)	550

The aware customers were asked how they first heard of the 20/20 program. Table 4.29 shows the results. It is clear that a bill insert from the utility companies was the most important initial source of information.

Table 4.29: First Source of Information on 20/20

Source	Active	Aware But Not Active	Totals
Newspaper	3 (3%)	9 (2%)	12 (2%)
Radio, TV	18 (20%)	34 (6%)	52 (8%)
Utility Bill	5 (5%)	36 (6%)	41 (6%)
Utility Insert	42 (46%)	108 (20%)	150 (23%)
Utility Letter	9 (10%)	25 (4%)	34 (5%)
Friend	4 (4%)	0	4 (1%)
Govt Announcement	1 (1%)	0	1 (0%)
Learned During This Survey	0	13 (2%)	13 (2%)
Did not know	7 (8%)	37 (7%)	44 (7%)
Other	3 (3%)	0	3 (0%)
Total			

4.3 Summary of C&I Survey

The results of the C&I survey indicate that the majority of rebated businesses from the 2005 Statewide 20/20 Program were not aware of the program or were not active program participants. The major findings are summarized below.

- About half of the rebated businesses were unaware of the program.
- Only 30% of the rebated businesses were active participants who were aware of the program in time to take action, said that they took action in direct response to the program, and could identify at least one action that they did take.
- None of the active rebated C&I participants are considered free-riders. All of them listed the rebate as the most important reason for taking the action
- There was almost no participation by businesses in other energy efficiency programs by firms interviewed.
- Active businesses were more likely than inactive businesses to make investments in energy efficient lighting and refrigeration; and to turn up or off thermostats, lights, and appliances.
- The peak savings from this program may less than expected because of firms' actions when the weather is hottest. 63% of the active businesses that reported turning off their AC units in the summer of 2005 also stated that those units were running for more than an hour on the hottest days.

Section 5. Residential Impact Results

Estimating impacts from the 20/20 program presents unique challenges to the evaluator. The 20/20 program provides a rebate to any customer who reduces summer use by at least 20%, effectively doubling the customer's savings. There is no enrollment process and the only definition of participation is that the summer use decreased, regardless of the reason for the lower use. This program mechanism raises the question of whether the rebates are actually promoting energy conservation and demand reduction, or simply discounting the electric bills for customers with unusual usage patterns.

This component of the impact evaluation is designed to achieve the following objectives:

- To estimate the energy savings from conservation activities and deliberate actions to reduce use,
- To provide a rough estimate of the reduction in use associated with incidental events, and
- To quantify the energy and demand savings that can reasonably be attributed to the program, to the extent possible.

In this evaluation, the customer survey is the primary vehicle for determining whether a specific customer is an active participant, as well as providing details regarding actions and events that occurred in the home. Savings estimates were based on integrating the information gathered from the customer surveys with the utility billing records and weather data to develop models for estimating impacts.

This strategy entailed using the responses from the survey questions to identify active participants and specific energy conservation actions. For example, survey participants who indicated that they used the air conditioning less, turned it off, replaced an AC unit with a new, efficient one, or purchased an evaporative cooler were marked as taking action to reduce cooling. The presence of air conditioning and electric space and water heat were also marked. This information was then integrated with billing data to estimate program impacts. The details of mapping the impact evaluation fields to the survey questions are described in Appendix D.

For the purposes of this analysis, residential use is divided into cooling and base load use. The cooling use is energy consumption associated with central and room air conditioners and with evaporative coolers. Base load includes all end uses that are not expected to vary widely with outside temperature, including refrigeration, lighting, water heating, etc.

The residential analysis is divided into three parts:

1) Assessing the relative impacts of cooling use between the 2004 and 2005 summer seasons and estimating the savings from cooling-related activities,

2) Quantifying the reduction in use related to efforts targeted at reducing base load and as well as from incidental, non-energy related events
3) Estimating the total energy and demand reduction that can reasonably be attributed to the 20/20 program.

The remaining sections of this chapter provide an overview of the 20/20 activity in the residential market, additional detail on the overall strategy of defining participation, the methodology, results and total program impacts.

5.1 Overview

This section provides a broad-brush perspective on the eligible and rebated residential accounts. PG&E issued rebates totaling $14,325,492 to 339,234 accounts, averaging $42.23 per account. SCE's total rebates are of a similar magnitude, with $13,555,409 distributed to 295,421 customers, for an average rebate of $45.89.[5] The percentage of the eligible accounts that received rebates was 10.4, 9.5 and 10.7% for PG&E, SCE and SDG&E, respectively.

This part of the analysis is designed to provide some insight into the following questions:

- What was the pattern of change in use for the entire eligible population over the 20/20 period?
- Were customers on a particular rate disproportionately represented among the rebated customers?
- Were very low use customers more likely to receive a rebate than homes with consumption levels within a more typical range?
- Were customers in more extreme cooling climates more or less likely to receive a rebate?
- What was the average level of change in use among the entire eligible population?

These results need to be interpreted in the proper context. Comparing rebated accounts to the total population of eligible accounts is useful to obtain a big picture view of the 20/20 period, but it is also important to keep in mind that the eligible population includes households who were active participants in the 20/20 Statewide Program. In contrast, a comparison group consists solely of customers who were unaffected by the program. Clearly, the total eligible population cannot be considered to be a proxy for a comparison group.

Figure 5.1 shows the distribution of the change in use between the summers of 2004 and 2005 for the total eligible population.[6] The first set of bars reflects the

[5] SDG&E did not provide this information.
[6] This chart is based on the calculation of the percentage change in use provided by the utilities. PG&E's data set of the eligible population contained 4,308,058 records of residential accounts. Of these, 1,060,720 were marked as having no use during the summer of 2004. These

percentage of customers who reduced use by 20% or more and consequently received the 20/20 rebate. The columns to the far right show the percentage of customers who increased their use by 20% or more. About 35 to 45% of the eligible population used less during the summer of 2005 than 2004, and 50 to 60% used more in 2005.

Figure 5.1: Distribution of Eligible Population by Change in Use

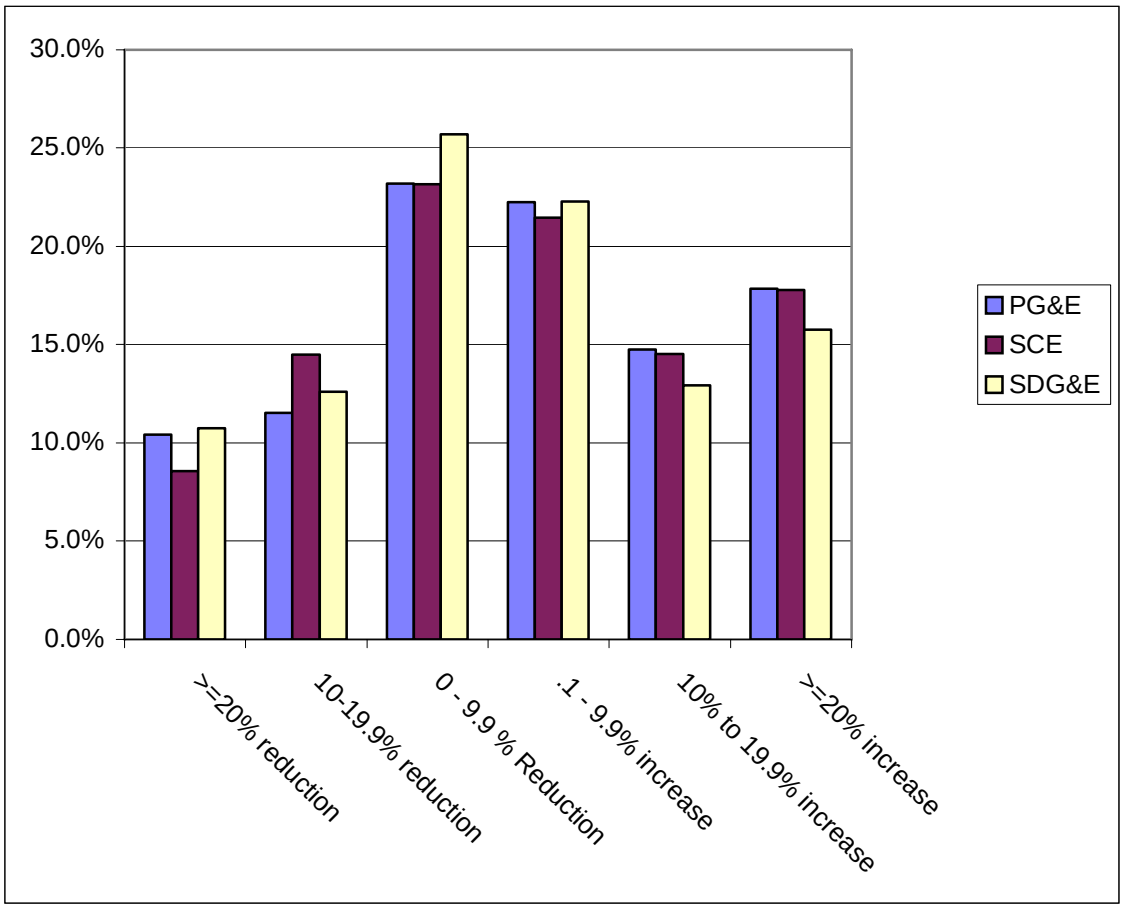


Table 5.2 shows how the rebates were issued by rate. For all three utilities, a large majority of the rebates (70 to 80%) went to customers on the residential general service rate, and customers on the CARE rate account for 15 to 25% of the rebates. The proportion of eligible customers who received the rebate varied across rates from about 6% to 13%, with the greatest variability found among the "other" rates.

accounts are not reflected in the chart and tables in this section due to the uncertainty regarding the status of these accounts. In addition, 40,621 of 3,098,184 SCE residential accounts (about 1.3%) were also removed from these analyses due to discrepancies in the SCE data which suggest that these accounts saved more in 2005 than the total used in 2004.

Table 5.2: Percent of Rebated and Eligible Accounts by Rate

	PG&E		SCE		SDG&E	
	% of Rebated Accounts	% of Total Accounts	% of Rebated Accounts	% of Total Accounts	% of Rebated Accounts	% of Total Accounts
General Service	74.1%	78.0%	70.1%	75.0%	81.8%	84.1%
CARE	20.7%	19.8%	24.5%	23.8%	17.4%	15.2%
TOU[7]	2.9%	2.3%	0.1%	0.1%	0.2%	0.2%
Other	2.3%	2.7%	5.2%	1.1%	0.6%	0.5%

Tables 5.3 and 5.4 summarize the results of similar analyses by 2004 usage level and by cooling climate zone. For SCE, smaller users (less than 450 kWh per month) are overrepresented among the rebated accounts, while PG&E's rebates were relatively evenly distributed throughout the usage levels.[8] The analysis by cooling zone indicates that customers in all of the cooling zones achieved the rebate at a similar rate.

Table 5.3: Percent of Rebated and Eligible Accounts by 2004 Usage Level

	PG&E		SCE	
Usage Level (kWh/month)	% of Rebated Accounts	% of Total Accounts	% of Rebated Accounts	% of Total Accounts
1-150	12.5%	9.9%	9.4%	4.5%
151-450	36.7%	38.5%	49.4%	36.8%
451-1050	24.4%	24.7%	24.6%	27.1%
>1050	26.4%	26.9%	16.6%	31.6%

Table 5.4: Percent of Rebated and Eligible Accounts by Cooling Zone[9]

	PG&E		SCE		SDG&E	
Cooling Climate Zones	% of Rebated Accounts	% of Total Accounts	% of Rebated Accounts	% of Total Accounts	% of Rebated Accounts	% of Total Accounts
1	40.9%	37.6%	20.2%	20.2%	69.9%	68.4%
2	22.8%	22.3%	51.7%	48.5%	28.1%	30.1%
3	25.4%	28.2%	16.8%	19.8%	0.0%	0.0%
4	10.7%	12.0%	11.3%	11.4%	2.0%	1.5%

[7] Customers on a CARE TOU rate are included in the "TOU" category. These numbers are quite small for all three utilities.
[8] SDG&E did not provide the 2004 summer consumption for its accounts.
[9] A small number (less than .5%) of the accounts could not be easily assigned to a cooling zone. These accounts are not reflected in this table.

Table 5.5 shows the reduction in use over the 20/20 period. The kWh reduction reflects the entire four months of the 20/20 period. Negative values indicate an increase in use. The median values are more robust in that they are less prone to fluctuation due to a small number of homes with large changes in use, and thus are more likely to be representative of the population.

This analysis indicates that the eligible population experienced a small increase in use between the summers of 2004 and 2005, amounting to less than 10 kWh per month for PG&E and SCE. The 20/20 rebated accounts had a median decrease in use of about 600 kWh or 28%.

Table 5.5: Mean and Median Reduction in Use for Rebated and Eligible Accounts

		All Eligible Accounts		Rebated Accounts	
		Mean	**Median**	**Mean**	**Median**
PG&E	KWh reduction per account	-74	-34	825	580
	Percent change in use	-8	-2	36	30
SCE	KWh reduction per account	-88	-31	783	610
	Percent change in use	-18	-2	30	27
SDG&E[10]	Percent change in use	-7	-1	34	29

5.2 Methodology

This section describes the data sources and methods for combining them, attrition from the customer surveys to the billing models, and the methods used to develop the cooling and base reduction models.

5.2.1 The Data

Data acquired from three distinct sources were combined to create the residential models:

1) Responses to the customer surveys provide detailed information regarding awareness of the program, active participation in the program, specific actions taken to reduce usage and other events during the same time frame that may result in decreased use although not intentionally pursued for that purpose.
2) The utility billing history records the energy use for each month during 2004 and 2005.

[10] SDG&E did not provide sufficient information to allow the calculation of the kWh reduction per account.

3) Climatic data from the National Weather Service for the 2004 and 2005 allows for the estimation of weather effects on cooling use.

A review of the survey data was used to establish indicators for the impact analysis. For example, survey participants who indicated that they used the air conditioning less, turned it off, replaced an AC unit with a new, efficient one or purchase an evaporative cooler were marked as taking action to reduce cooling. The presence of air conditioning and electric space and water heat were also marked. The details of mapping of the impact evaluation fields to the survey questions are described in Appendix D. The survey data was connected to the billing data via the utility account number.

The billing data covers the monthly reads from the beginning of 2004 through November of 2005.[11] The fields provided by the utilities include the account number, read date, date of the previous read or number of dates in the read period, the kWh use, and on-peak and off-peak kWh use for those customers on TOU rates. Modified CEC Title 24 climate zones were added according to the zip code, and weather indicators for the read period were incorporated directly into the billing file. The average summer use for 2004 and 2005, a TOU (time-of-use) rate indicator, minimum monthly use, base (non-cooling) use and weather indicators were calculated from the billing data and added to the survey file.

Weather data were incorporated into the billing records. The heating degree days (base 65), cooling degree days, and cooling degree hours (base 75) were calculated for each climate zone for the billing period and added to the billing file.

Various approaches to modeling the weather effects were considered, but the short time frame for this project limited the options that could be pursued. Given that detailed, hourly weather data was readily available for the entire state by CEC Title 24 climate zones, we decided to use this data. Three of the Title 24 zones were segmented to better reflect the utilities' service territories.
A total of 20 climate zones were used, with weather data from one source location in each climate zone. See Figure 5.6 for a map of the climate zones and the location of each weather station. A review of the cooling patterns suggests that aggregating these climate zones according to summer cooling degree days produces results that match up reasonably well to the mapping of cooling zones by utility weather station conducted by Charles River Associates, although it appears that some regional variations in cooling zones along the edge between the Central Valley and the Sierra Nevada Mountains may be lost with the modified CEC climate zones.[12]

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[11] For SDG&E, the data set started with the first summer read in 2004 and ended with the last summer read in 2005.

[12] *Statewide Pricing Pilot Summer 2003 Impact Analysis,* Charles River Associates, Oakland, California, October, 2004

The twenty climate zones described above were used for estimating cooling loads at the household level. For estimating total program impacts, the climate zones were collapsed into four cooling zones, as shown in Table 5.7 below. The modified Title 24 climate zones were combined into the cooling zones based on the cooling degree days for the summers of 2004 and 2005.

Figure 5.6: Climate Zone Map

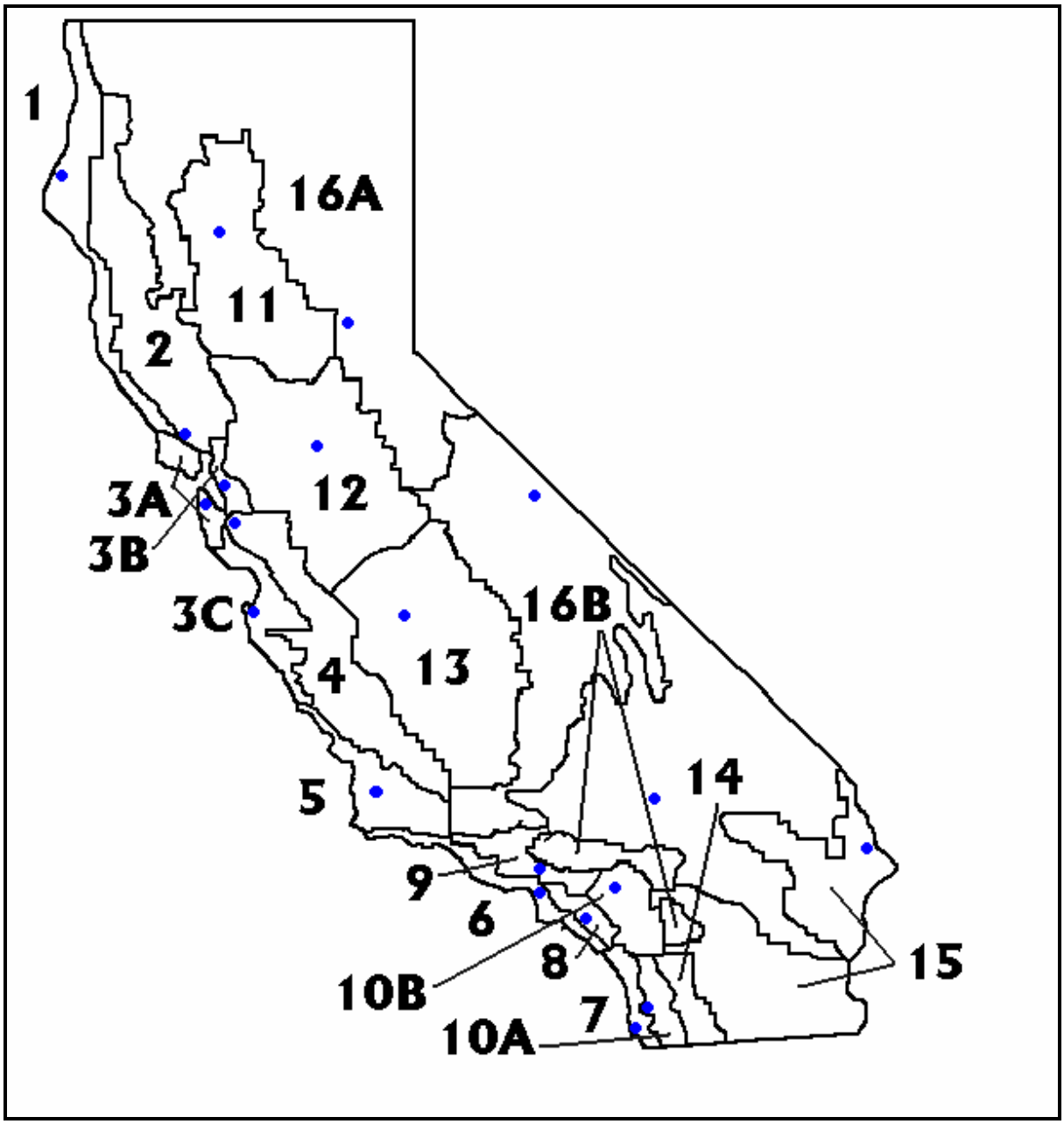


Table 5.7: Mapping Climate Zones to Cooling Zones

Weather Station	Cooling Climate Zone	Modified Title 24 Climate Zone
KACV	1	1
KBLU	1	16A
KLAX	1	6
KMRY	1	3C
KOAK	1	3B
KSAN	1	7
KSFO	1	3A
KSMX	1	5
KBUR	2	9
KLGB	2	8
KNKX	2	10A
KSJC	2	4
KSTS	2	2
KBIH	3	16B
KRBL	3	11
KRIV	3	10B
KSAC	3	12
KBLH	4	15
KDAG	4	14
KFAT	4	13

5.2.2 Attrition

Completed surveys are available for a total of 1581 customers. However, some of these customers were not included in the billing analysis for a variety of reasons. The purpose of the billing analysis is to estimate the reduction associated with specific actions, and survey respondents with erratic or incomplete billing history or responses that fail to provide any information about the reasons for the decrease in use are not good candidates for a billing analysis. A total of 359 survey respondents were eliminated from the analysis, for the reasons given in Table 5.8. These reasons are explained in the following list, with the corresponding row headings in Table 5.8 provided in parentheses.

- Billing data is not consistent with the utilities' estimates of percentage change in use, suggesting that the level of reduction did not support the 20/20 rebate or meet the 10% "Just Missed" threshold ("No savings").
- Potential sources of the reduction could not be identified through the customer survey ("No changes").

- Eligibility for the 20/20 rebate was due to one, extremely low (sometimes zero) monthly read ("Extra low read"),
- Usage levels were below typical residential levels of 150 kWh per month ("Extra low use"),
- Numerous (more than two) estimated reads created additional noise and made it more difficult to estimate conservation effects ("Estimated reads"), and
- Some SCE non-rebated homes had savings of less than 10% ("SCE no savings").

Table 5.8: Analysis of Attrition

	PGE		SCE		SDGE		Totals	
	Rebate	**Just Missed**	**Rebate**	**Just Missed**	**Rebate**	**Just Missed**	**Rebate**	**Just Missed**
Total Surveys	376	193	410	199	272	131	1058	523
No savings	3	9	1	5	1	0	5	14
No changes	8	1	8	0	10	0	26	1
Extra low read	12	60	12	39	11	53	35	152
Extra low use	18	2	13	1	18	2	49	5
Estimated reads	8	4	0	0	1	1	9	5
SCE no savings	0	0	0	59	0	0	0	59
Total Accounts in Billing Analysis	327	117	376	95	231	75	934	287

This process resulted in a sample that included 88% of the surveys customers who received rebates and 62% of those who just missed the rebate.[13] The high attrition in the just missed group relates primarily to the "extra low reads," i.e., those customers whose reduction in use is entirely attributable to a single low read. In comparison, few of the rebated customers (3%) fall into the "extra low read" category, suggesting that the changes in use in the just missed group are more variable and less likely to be related to sustained conservation efforts.

For the rebated customers, the removal of the 124 accounts seems unlikely to result in any identifiable bias in the subsequent analysis. The analysis group for the just missed may be more reflective of the activities of those customers who made consistent efforts to reduce consumption throughout the period.

[13] In calculating this percentage, the 59 SCE surveyed customers who were not actually in the just missed group were removed from the total.

5.2.3 Cooling Analysis

The cooling analysis was complicated by the nature of the program. The savings from cooling measures are often estimated through a regression analysis that incorporates the cooling degree days. This process is often effective for warmer climates in which cooling use tends to vary linearly with the temperature changes. An alternative strategy is to use a simple billing disaggregation, comparing use during the summer months to base months to estimate the difference in the cooling loads between the pre- and post-installation periods. This method may be more effective in milder climates, where the linear relationship between cooling use and outside temperature is not as strong.[14]

In this program, there is a combination of factors that suggest an integration of methods may be needed:

- The services territories of the utilities cover a large part of California, including both mild and extreme cooling climates, and many variations in between.
- By definition, 20/20 participants reduced their consumption during the summer of 2005, often through reductions in cooling use. Thus, even in warmer regions where regression would typically be an effective tool, the conservation activities or other reduction techniques are likely to obscure the linear relationship between the outside temperature and cooling use for the summer of 2005 summer.

Neither method is perfect. While regression techniques may understate cooling use in that they ignore any variations that are not linear with temperature change, simple disaggregation may include other seasonal changes in use that are not actually related to the cooling load. Where linear regression is appropriate, it should be the preferred strategy, as it is more likely to isolate actual cooling use.

The cooling analysis was conducted in a series of steps, as described below:

1. identify those survey respondents who have cooling systems and/or took specific actions to reduce their cooling use,
2. run a regression model to estimate 2004 cooling loads,
3. calculate cooling use for 2004 using a simple bill disaggregation for those homes in which the regression analysis did not produce reliable results,
4. calculate cooling use for 2005 through a simple bill disaggregation for all homes with cooling systems, and
5. estimate cooling savings or change in use (for homes that did not pursue cooling measures) for each home by taking the difference of the cooling loads in 2004 and 2005.

[14] For example, see *Ohio Electric Partnership Program Impact Evaluation, Final Report*, Prepared for the Ohio Office of Energy Efficiency, Michael Blasnik & Associates, September, 2004.

These steps are discussed in more detail below. The results from steps two through four were reviewed to assess whether the combination of methods created identifiable biases, as discussed further in below.

Identifying homes with cooling use. Homes with cooling loads were identified on the basis of the survey responses. The first criterion was that the customer must identify a specific cooling system used in their home, i.e., a central air conditioner, room A/C or evaporative cooler. If the survey respondent indicated that they engaged in specific activities for the purposes of reducing cooling load, such activities were recorded. These actions include (1) turning down or turning off the air conditioning, (2) replacing the central or room air conditioners with new efficient units, (3) purchasing a new or replacement evaporative cooler, or (4) improving shell efficiency in homes with air conditioning. The mapping of the survey responses to the model inputs is described in Appendix D.

Regression Analysis for Estimating 2004 Cooling Loads. The 2004 cooling slope for each home was calculated in a regression model incorporating all of the survey respondents, but allowing for separate regression slopes for each home. The results of this initial step were evaluated and the 2004 cooling slopes established from this analysis for all homes with significant, positive cooling slopes at the 20% confidence level. The limit on the Type I error was set at a high level for this part of the analysis due to the limited number of reads available.

The regression model is quite simple. All homes were included in the model and a variable holding the cooling degree hours per day was defined for each home with a cooling system. Billing reads from April, 2004 (where available) through October, 2004 were included in this analysis, regardless of whether the reads were in the 20/20 period. The monthly consumption from the billing records was the response variable and the cooling degree hours constituted the explanatory variables.

The results indicate that this method is not effective at estimating the cooling slopes for all homes, particularly those with lower cooling loads and located in the milder cooling zones. The regression analysis is based on the assumption that the cooling load is entirely linear with the increase in temperature, as well as assuming that cooling degree hours at base 75 are appropriate for all homes. It is also entirely possible that the regional weather data may not be a good fit for all areas within the climate zone. These assumptions are often particularly problematic in milder cooling zones.

Table 5.9 provides a summary of this part of the analysis. Both the regression and disaggregation methods indicated that 70 of the homes did not have any significant cooling load. The regression method was effective for estimating cooling use for almost 60% of the homes with a 2004 cooling load, ranging from 30% in the mildest climate to almost 90% in the warmest regions.

Table 5.9: Summary of 2004 Cooling Regression

Cooling Zone	# of Accounts with Cooling	# of Accounts with 2004 Cooling Load	2004 Cooling Load by Regression	% Estimated by Regression
1	150	123	35	28%
2	278	250	145	58%
3	210	200	147	74%
4	113	112	99	88%
Totals	751	685	426	57%

Disaggregation for estimating 2004 cooling loads. Simplified disaggregation was used to estimate cooling use for homes with no significant, positive cooling slope for 2004. This analysis was conducted by estimating the base use (averaging the three lowest months for 2004) and then calculating the cooling use as the difference between the base and summer usage levels. A potential pitfall in this strategy is that other summer seasonal use may be incorrectly attributed to the cooling load. For this reason, homes known to have pools were excluded from the cooling analysis. This decision has implications for our calculations, in that any savings from turning off pools or adding a pool timer may also incorporate some cooling savings.

Estimation of 2005 cooling loads. Estimating the 2005 cooling load is complicated by the defining fact that this group of customers reduced their use during the 2005 summer season, suggesting that the cooling slope may actually vary through the summer season in homes where the occupants took specific actions to reduce their cooling use, and that reductions in base load may confound the estimation of cooling use in all homes with cooling systems. Not surprisingly, a similar regression approach as used for the 2004 summer season did not yield much in the way of results.

For homes with cooling actions, the 2005 cooling load was estimated by disaggregation for the homes with cooling-related conservation actions. This process is the same as was used to disaggregate the 2004 cooling load (described above), but based on the billing records for 2005.

The estimation of the 2005 cooling load for homes without specific cooling reductions is more complicated. Other reductions in use may affect the disaggregated 2005 cooling load that in reality has nothing to do with the cooling. Since program participants are, by definition, those who reduced use during the summer of 2005, there is no clear solution to this problem. Given these concerns, homes with a cooling system and a positive cooling load for 2004 but no specific actions to reduce cooling load were assumed to have the same cooling slope as was calculated for the summer of 2004, and the 2005 cooling load was estimated

by multiplying the 2004 cooling slope by the cooling degree hours for the 2005 summer period.

Estimating the difference in cooling use. For all homes with a cooling system and a discernable cooling load for 2004 but no specific actions were taken to reduce cooling load, the difference in cooling consumption was calculated by subtracting the 2005 cooling load from the 2004 load. This difference in use, typically a small increase resulting from warmer weather in 2005, was then added to the total reduction and incorporated into the regression analysis for the base load actions on the assumption that any change in cooling loads would affect the overall use in the homes.

For homes with cooling conservation actions, the difference between 2004 and 2005 loads is the savings. If the analysis indicated an increase in cooling use, as occurred for 12 homes, and the survey responses indicated a reason to expect additional cooling load, this increase was added to the total reduction for the estimation of savings associated with actions designed to reduce base load. The increases in cooling use for these homes were small in magnitude, with the highest value being less than 300 kWh over the entire four month period. For homes in which the cooling savings were larger than the total decrease in use and the survey responses did not suggest an increase in use for other reasons, the total cooling savings were constrained by the total reduction in use.

Review of the Cooling Model. This approach allowed us to estimate cooling savings and generally yielded reasonable results. However, it is not always possible to disentangle base and cooling savings completely, and it is possible that this methodology could result in some base reduction being included in the cooling savings and *vice verse*.

One potential concern is that the 2004 cooling load was estimated by regression for some homes and then compared to the 2005 cooling consumption calculated by disaggregation, i.e., the two dissimilar methods are combined to estimate savings for the same home. This approach was selected because the regression coefficients, when they can be estimated, are likely to be closer to actual cooling loads, particularly in the warmer climates. Also, it is important to keep in mind that the base and cooling models are interconnected and savings not captured in one category are available in the other model. .

To assess the validity of this approach, two analyses were conducted for the 426 homes in which regression was used to estimate the cooling consumption for 2004. First, the correlation between the regression and disaggregated cooling loads for 2004 was calculated. This analysis indicated that Pearson's correlation coefficient is 0.81, showing a strong correlation between the two methods.

In addition, a comparison of the proportions of the estimated cooling load to the total summer 2004 consumption determined by the regression and

disaggregation methods was performed. The result shows a similar pattern in that about 39% of the total summer electric use on average is due to cooling loads estimated by disaggregation, whereas the regression method estimated 43%. These values are not significantly different at the 95% confidence level. The values are virtually identical for climate zones three and four, and show more variability for homes in the cooler regions.

It is also interesting to note that variations in the method of calculating the cooling loads did not have a substantial impact on the base model, suggesting that base and cooling savings are inextricably intertwined.

5.2.4 Base Load Reduction

The next step in the analysis was to estimate the savings associated with base load conservation activities and separate these reductions from incidental changes unrelated to energy conservation. This component of the analysis was implemented by calculating the base load reduction (adjusted for cooling use as appropriate), and conducting a regression analysis with one record per home, designating the base energy reduction as the response variable and explanatory variables based on the survey responses.

The range of explanatory effects considered for the base model is listed in Table 5.10. Appendix D provides more detail on the mapping of the survey responses to the variables.

Table 5.10: Explanatory Variables in the Base Model

Name	Type of Variable	Description	Survey Responses
Fuel Switch	Binary	Replace electric device with one using a different fuel	Fuel switch (dryer, water heater, stove, pool/spa) or install new solar PV or water heater
Refrigeration	Binary	Reduce refrigeration use	Turn off second refrigerator or purchase new, efficient one
Miscellaneous	Scaled, one for each type of action	Took a variety of small impact actions	Reduce use associated with lighting, small appliances, dryers, water heaters, etc. (Refer to Appendix C for a comprehensive list.)
Remodel	Binary	Reduction in use due to disruption of remodeling	Remodel among list of actions
Pool	Binary	Lower electricity used for heating and filtering pools	Turned off pool or purchased a pool timer
Fewer Occupants	Scaled, Change in number of occupants	Reflects decrease in occupancy in 2005 as compared to 2004	Comparison of responses to number of occupants in 2004 and in 2005
Very High Use	Binary	Identifies respondents with 2004 summer usage in the top 10% of all accounts in the base model	Determined from billing records

A variety of alternatives for defining the variables were considered. For example, a number of the variables (such as fuel switches and vacation length) were modeled as binary and also as scaled variables. In many cases, the results were similar and did not improve the fit of the model or the precision of the estimators. Under these circumstances, the variables were left in binary form.

The surveys provided a wealth of information, and other interventions that seemed to have the potential for significant savings, such as changes in length of vacations, major repairs (e.g., roof replacement) and participation in conservation programs, were also tried, but the estimators were either statistically insignificant or found to be of the wrong sign.

5.2.5 Estimating Demand Reduction

Demand savings are calculated for PG&E, SCE and SDG&E using load profiles from the SitePro database. This dataset provides 24 hour/365 day kW profiles for air conditioning, refrigerators, pools and miscellaneous end-uses. Separate profiles are available for each of the sixteen CEC climate zones.

The demand savings are calculated by scaling the estimated KW consumption for the end use on the peak hour of the peak day (from the load profiles) by the energy savings for the program in comparison to the total energy consumption assumed in the load profile. Based on the peak period reported by the utilities, the kW impacts are calculated as

$$D_{ijk} = \frac{kWh\ Savings_{ik}\ x\ peak\ KW_{ij}}{\sum_{n=1}^{8760} KW_{ijn}}$$

where D is the coincident peak demand reduction,
kWh saving is the energy savings for the measure,
peak KW is the demand at the hour of the coincident peak,
KW is the demand at each hour for the year as estimated in the load profile summed over the year,
i is subscript for the conservation action,
j is the subscript for the climate zone, and
k is the subscript for each home in the sample.

The cooling energy savings are calculated individually for each home in the sample. Base load savings are estimated using the average savings from the base regression model.

The demand impacts were calculated by CEC climate zone and then aggregated. For cooling actions, the selected load profile reflects central air conditioning use. Separate load profiles were used for refrigeration and pool savings. Fuel switching and the mix of small measures were modeled using the miscellaneous profile. For base measures, the profiles assumed gas space heating and no air conditioning.

SDG&E identified the peak hour as July 22nd at 3PM and PGE indicated their peak day was July 14th in 2005. SCE identified their peak day as July 21. In the absence of specific information from the utilities, we assumed a peak hour of 4 PM for both PG&E and SCE.

5.3 Results

5.3.1 Cooling

Table 5.11 below shows the number of homes in the cooling model. Of the 795 homes with a cooling system, 43 were eliminated from the cooling analysis due to the presence of a swimming pool, since the seasonal use associated with the pools cannot be effectively disentangled from the cooling use. This step left a total of 752 homes in the cooling model. Of those homes, billing records for 89 homes indicated no cooling use or additional cooling load was added in 2005.

Table 5.11: Residential Cooling Load Model Attrition

	Total Homes
Home with Cooling System	795
Homes with a pool	43
Homes in the Model	752
Took Action(s) to Reduce Cooling Load	464
No Cooling Savings	89
No Cooling Load in 2004	35
Used More for Cooling in 2005	54
Total Homes with Cooling Savings	375
Proportion of Homes with Cooling Actions	81%
Total Active Homes with Cooling Savings	180

The average cooling savings per home are presented in Table 5.12. The savings per home are slightly lower for the active homes, but the difference is not statistically significant. The upper and lower limits at the 10% confidence level are shown on the right. These confidence limits reflect only the uncertainty associated with using the sample to estimate cooling savings. Other sources of uncertainty relating to the methodology for estimating the cooling savings are not incorporated. The savings reflect the actual reduction in load, that is, they are not normalized for typical weather conditions.

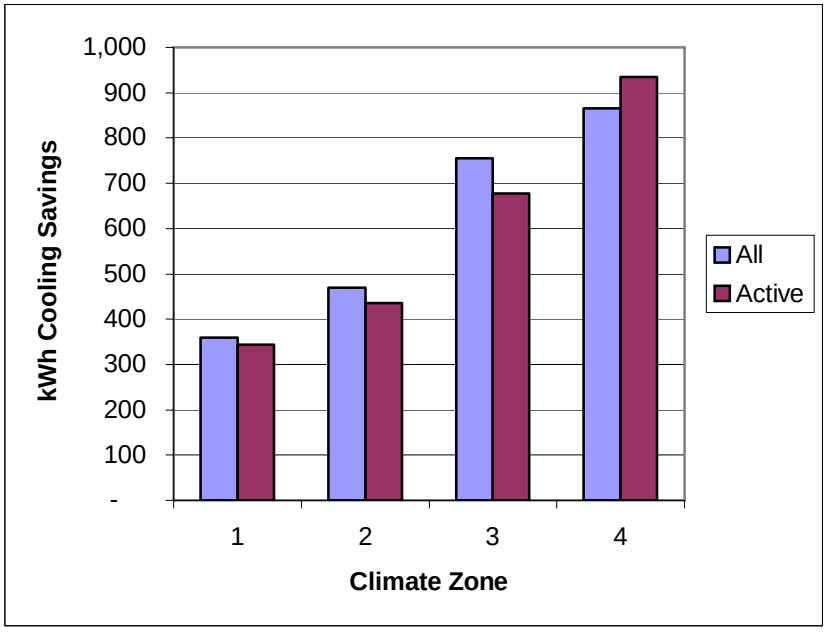
This analysis indicates that savings associated with cooling account for almost two-thirds of the total reduction in these homes. The final row in Table 5.12 shows the estimated difference in cooling load for homes where no actions were taken to reduce cooling load. This part of the analysis suggests a small, but significant, increase in use due to the warmer weather in 2005.

Table 5.12: Cooling Savings for All Homes and Active Homes

	# of Homes	Total kWh Savings	KWh Savings per Home	90% Confidence Interval	
				Lower Limit	Upper Limit
All Homes with Cooling Actions					
Cooling Savings	375	231,300	617	571	663
Total kWh Reduction	375	370,522	988		
% Reduction due to Cooling Actions			62%		
Active Homes with Cooling Actions					
Cooling Savings	180	107,612	598	538	658
Total kWh Reduction	180	173,610	965		
% Reduction due to Cooling Actions			62%		
Homes with no Cooling Actions					
Difference in Cooling Use	306	-16,347	-53	-78	-28

As would be expected, the cooling savings per home are higher in the more extreme climate zones. In Figure 5.13, the blue bars show the average savings for all homes with cooling actions and the red bars are the active homes with cooling actions.

Figure 5.13: Average Household Cooling Savings by Climate Zone



5.3.2 Comparison of Weather Conditions

A question has been raised about how much of the reduction in cooling use could be due to changes in weather patterns between 2004 and 2005, i.e., are these customers receiving the rebate solely because 2005 was a cooler summer? A review of the data leads to the conclusion that this is not the case. Table 5.14 shows the average cooling degree hours per day for the homes with cooling savings. For the most part, the summer of 2005 was somewhat warmer than 2004, with the exception of the mildest cooling zone.

Table 5.14: Comparison of 2005 and 2004 Average Weather Conditions

		Average Cooling Degree Hours/Day		
Climate Zone	**# of Homes**	**2004**	**2005**	**% Difference**
1	52	7.62	5.68	43%
2	135	33.17	34.23	-3%
3	122	99.04	112.68	-14%
4	66	199.45	225.25	-13%

Table 5.15 shows the percentage of days in which the maximum temperature was 90ºF or more by cooling zone for the period of June 1 through September 30, indicating the prevalence of extreme heat during the two periods. This analysis also suggests that 2004 was slightly warmer than 2005.

Table 5.15: Comparison of Extreme Temperatures in 2004 and 2005

	Days 90°F or Above	
Cooling Zone	**2004**	**2005**
1	2.6%	0.5%
2	16.1%	12.6%
3	66.8%	59.2%
4	89.1%	85.8%

5.3.3 Base Load Savings and Incidental Reduction

The analysis of savings activities to reduce base usage provides estimates of the savings associated with refrigeration, pools, fuel switching and a combination of miscellaneous, smaller actions. Non-conservation reductions related to remodeling, the decrease in number of occupants per home and the unexplained reduction in very high use homes (top tenth percentile) are also estimated.

The model gives reasonable estimates for the higher use, rebated customers and also indicates that there is no significant difference between the active and inactive homes. However, the explanatory effects identified from the survey and incorporated into the base model are not useful for explaining the reduction in the low-use homes (as defined in the sampling process) or the non-rebated, just-

missed homes. None of the explanatory variables are statistically significant for these groups. This result should not be interpreted to indicate that there are no savings for the low use or just missed homes, only that these effects are not large enough to be estimated in the regression model. The final model includes only the customers who received rebates, and the effects of the low use group are netted out by the inclusion of the "low use" indicator in the model.[15]

The penetration of the base actions among the high use, rebated group in the sample are shown in Table 5.16. The "number of items" column relates to the scaled variables discussed below.

Table 5.16: Penetration of Conservation and Incidental Actions for High Use, Rebated Homes

	Active		Inactive		Total	
Action	**# of Homes**	**# of Items**	**# of Homes**	**# of Items**	**# of Homes**	**# of Items**
Refrigerators	98	98	120	120	218	218
Fuel Switch	23	23	33	33	56	56
Pool	19	19	25	25	44	44
Miscellaneous	224	368	295	445	519	813
Remodel	7	7	8	8	15	15
Decrease in occupancy	95	154	153	257	248	411
Very High Use	37	37	58	58	95	95
Total Number of Homes	319		553		872	

The estimators from the models are presented in Table 5.17. Most of the actions are represented by binary variables, and each home is counted as one. Scaled variables are used for two of the explanatory effects, i.e., miscellaneous actions and increase in occupancy.

The variable representing the miscellaneous small actions is modeled by adding the number of categories of action. For example, if the occupants of a home reduced lighting and dishwasher use, this home is counted as having two miscellaneous actions. As shown in Table 5.16 above, these smaller conservation activities were pursued in 224 active homes, and in these homes, a total of 368 categories of actions were taken.

The decrease in occupancy is modeled by the change in the number of residents, that is, the explanatory variable is set at two for a home in which the number of occupants was four in 2004 and two in 2005.

[15] Excluding the low use homes and including them with the low use indicator produced essentially the same results.

The “very high use” variable accounts for the variation among customers in the top tenth percentile that is not associated with the other explanatory variables in the model.

Table 5.17: Regression Estimators for the Base Model

Parameter	Estimate	Standard Error	p-value	90% Confidence Interval	
				Lower	Upper
Intercept	532	35.57	<0.000	473	590
Refrigerators	151	47.48	0.002	72	229
Fuel Switch	49	70.53	0.487	(67)	165
Pool	573	93.57	<0.000	419	727
Miscellaneous	48	22.87	0.037	10	85
Remodel	523	166.41	0.002	249	797
Reduced Occupancy	143	22.13	<0.000	106	179
Very High Use	1,072	68.11	<0.000	960	1,184
Low Use	(318)	83.22	<0.000	(455)	(181)

A substantial part of the reduction in use remains unexplained by the model. The R-squared is 0.33, indicating that about 33% of the change in use is explained by the variables in the model. While these results are not uncommon for models of this type, it leaves open the possibility that some of the actual savings associated with conservation savings could be represented in the unexplained portion of the reduction and that the estimators could be understated. Unexpectedly low savings for the refrigerator and fuel switching actions (as discussed more below) also support this conclusion.

As is common with billing analysis, the modeling is complicated by the wide variation in usage patterns. Homes with higher use tend to exhibit higher savings and the regression results represent the range of usage levels in the sample. With the exception of fuel switching, all of the estimators are significant. While the confidence intervals are wide for some of the estimators, we would not necessarily expect a high degree of precision from this type of modeling process.

An alternative model was specified by defining usage levels and estimating the reduction for the regressors by usage level. This approach somewhat improves the fit of the model, and the results show higher savings for homes with higher usage levels and lower savings for homes with lower use. Thus, this alternative formulation would result in the application of higher savings to fewer homes, and would not be expected to materially affect the results of this analysis.

One positive outcome is that we were able to obtain significant (although imprecise) savings for the miscellaneous measures. At 48 kWh per item for the four 20/20 summer months (144 annualized kWh), this result would be the

equivalent of installing three CLF bulbs and seems to be well within a reasonable range for actions such as turning off lights or reducing dryer use.

The savings for refrigerators (annualized to 453 kWh) seem to be somewhat lower than would be expected. A series of recent impact evaluations for a low-income program in California estimated the savings from replacing refrigerators over ten years old in the range of 650 to 800 kWh per year.[16] We are not able to ascertain the age of the refrigerators replaced by households in this study and differences between the 20/20 and low-income program households may account for the lower savings.

The fuel switching result, both the low magnitude (157 annualized kWh) and poor precision, is surprising. The fuel switch questions used for the model reflect the replacement of electric water heaters, pool heaters or filters, stoves and dryers. Removing any of these electric devices should result in a large and noticeable reduction in use. According the EIA's 2001 Residential Energy Consumption Survey, average electric use for water heating is in the range of 2,400 kWh per year in the Pacific West and dryer use is over 1,000 kWh per year.[17] The reasons for the low savings associated with fuel switching are not immediately obvious. It is possible that some survey respondents misinterpreted the question.

Table 5.18, below, summarized the total reduction in use and explained savings for rebated, high use homes. On average, about 140 kWh of summer savings can be attributed to base load conservation in the active homes.

[16] West Hill Energy and Computing. July, 2005, Impact Evaluation of the 2002 California Low Income Energy Efficiency Program, Final Draft Report.
Kema-Xenergy. 2003. Impact Evaluation of the 2001 Statewide Low-Income Energy Efficiency (LIEE) Program;
Xenergy. 2002. Volume I: Impact Evaluation of the 2000 Statewide Low-Income Energy Efficiency (LIEE) Program.
[17] This survey can be accessed on the Web at http://www.eia.doe.gov/emeu/recs/recs2001.

Table 5.18: Summary of Summer kWh Savings for High Use, Rebated Homes

	Active Homes (kWh/year)	Inactive Homes (kWh/year)
Cooling	85,019	111,284
Refrigeration	14,757	18,070
Fuel Switch	1,226	1,864
Pool	10,882	14,318
Miscellaneous	17,566	21,241
Total Conservation Actions	129,450	166,777
Incidental Reduction	65,306	103,044
Number of Homes	319	553
Total Explained Reduction	194,756	269,821
Total Reduction in Use	351,945	557,978
% of Reduction Explained	55%	48%
Total Reduction Per Home	1,103	1,009
Total Conservation Savings per Home	406	302
Base Conservation Savings per Home	139	100
Incidental Reduction per Home	205	186
Total Explained Reduction per Home	611	488
% of Total Reduction Explained by Conservation	37%	30%
Standard Error of Base Conservation Savings	52.1	37.8
Standard Error of Incidental Reductions	22.2	19.8

5.3.4 Demand Savings

The demand savings at time of the coincident peak in 2005 were calculated for all three utilities. The load profiles reflect average use, scaled to the level of energy savings estimated for the home. This method of estimation assumes that the coincident peak savings are the same in each home. System peaks often occur due to the heavy use of air conditioning on extremely hot days, and the individual reactions to the heat will tend to vary from house to house. In the customer surveys, some participants who specifically mentioned reducing their cooling load also responded that they used their cooling systems to some degree more on the hottest day of the summer, suggesting that peak savings may be somewhat lower than estimated. Table 5.19 shows the demand savings per home for cooling and base load actions.

Table 5.19: Demand Savings from Cooling Actions

Utility	Action	Climate Zone	KW Savings per Home
PG&E	Cooling	1	0.186
PG&E	Cooling	2	0.317
PG&E	Cooling	3	0.488
PG&E	Cooling	4	0.352
SDG&E	Cooling	1	0.452
SDG&E	Cooling	2	0.201
SCE	Cooling	1	0.367
SCE	Cooling	2	0.318
SCE	Cooling	3	0.474
SCE	Cooling	4	0.578
PG&E	Base	All	0.010
SDG&E	Base	All	0.014
SCE	Base	All	0.016

5.4 Attribution of Savings to the 20/20 Program

Attribution of savings to the 20/20 program is complicated by the nature of the program. Without an enrollment system, the definition of the program participant is unclear. In this evaluation, we use the designation active rather the familiar "program participants" to define as customers who deliberately took action to save energy due to the 20/20 program. These customers are identified as "active" in the analysis of the survey results. For cooling, customers who are active report that they took specific actions to reduce their cooling load, had some cooling load in 2004, and showed a reduction in their 2005 cooling use are included in the cooling savings analysis.

In the sampling process, we divided the population into three parts: "low use" customers who received a rebate, "high use" customers who received a rebate, and "just missed" customers who reduced their use by at least 10% but did not make it to the 20% reduction required for the rebate. The estimation of savings for each of these groups is discussed below.

5.4.1 Low Use Households with Rebates

This designation applies to PG&E and SCE only, and all customers receiving the rebate with summer usage lower than the median were marked as "low use." Thus, this category included the half of the customers with lower use. For the purposes of the survey, the sample was weighted heavily toward the high use group to ensure that a sufficient range of opportunities for conservation savings

would be represented. While the sample frame was weighted toward the higher users, the proportion of high users in the actual sample is even larger than would be expected, with only 105 (unweighted) of the 786 surveys of rebated customers from the low users in PG&E's and SCE's service territories. For the billing analysis, many of the low users (40%) were removed from the model due to erratic or extremely low usage patterns, leaving a sample of 63.

Of these 63, less than half (27) indicated that they had a cooling system and about a quarter (17) responded that they had take some action to reduce cooling use, but the billing analysis leads to the conclusion that only fourteen homes in this group actually achieved measurable, although very modest, cooling savings. The base model did not produce any estimate of savings for this group either, indicating that base load savings among this group are too small or too variable to identify through the regression analysis.

These results suggest that the savings for the low use customers are not large enough to be identified using the selected methodology and that the model does not support the estimation of savings for this group. A review of all accounts with rebates shows that about 25% of these accounts used less than 150 kWh per month on average during 2004, indicating that they may be inactive or only sporadically in use. The total reduction from the remaining 75% amounts to 17 GWh for PG&E and 3 GWH for SCE, adjusted for the penetration of active homes. It is likely that some portion of these savings could reasonably be attributed to the program, but we do not have a reliable method of determining program effects.

5.4.2 High Use Households with Rebates and "Just Missed" Homes

The cooling analysis shows measurable savings for both of these groups. The overall strategy for attributing savings to the program was to estimate the number of homes likely to (1) be active participants, (2) have taken actions to lower cooling use and (3) have achieved savings. These calculations were performed for each cooling zone, and the results then multiplied by the average kWh savings due to cooling actions for each of the four zones.

The savings per home were calculated as described above in 5.2.3. These savings were then average by cooling zone and by rebate status (received rebate and just missed). The estimation of the number of homes was conducted as follows.

- The number of residential accounts for the high use and just missed groups in each climate zone is counted from the utilities' list of customers provided in response to our first data request.
- The percentage of homes in which the residents made successful efforts to reduce cooling use is calculated by climate zone for the sample.

- The proportion of active participants to the total population as shown in Table 3.2 (accounting for the terminated surveys) for the rebated customers and the just missed group are used to attribute the cooling savings to the program.

The savings by climate zone, utility and rebate status are estimated using the following equation.

$$S_{ijk} = T_{jik} \times \% CS_j \times \% A_k \times HS_{ik}$$

where S is the total program savings,
T is the total number of homes,
CS is the percentage of homes with cooling savings,
A is the percentage of homes that actively participated from Table 3.2,
HS is the average savings per home for the climate zone and rebate status,
i is the utility designator,
j is the climate zone (1 through 4), and
k is the rebate status (received rebate or just miss).

The average cooling savings per household by climate zone is shown in Figure 5.13.

A similar method is used for estimating total program savings for base load reduction, with two modifications:

1. No differentiation is made among climate zones, and
2. Savings are not estimated for the just missed group, i.e., none of the regressors are statistically significant for the just missed homes.

5.4.3 Cooling Savings

The gross cooling savings that can reasonably be attributed to the 20/20 program are shown for each utility in Tables 5.20 to 5.22. The cooling savings are not weather-normalized and may be understated since 2005 was, on average, a warmer summer than 2004. These savings are not adjusted for free riders. The percentage of active homes is estimated from the customer survey and is constant across all rebated homes and across all Just Missed homes.[18]

[18] The percentage of active homes as estimated from the survey are presented in Table 3.2. For the Just Missed group, the percentage of active homes is given in Table 3.2 as 28%, but 30% is used in Tables 5.17 through 5.19. This small discrepancy would have very little impact on the final results.

Table 5.20: PG&E's Gross Program Savings for Cooling

Climate Zone	Total # of Accounts	% with Cooling Savings	% Active	MWh Savings	90% Confidence Intervals	
					Lower	Upper
Rebate						
1	44,793	11%	31%	554	458	650
2	37,256	31%	31%	1,896	1,665	2,127
3	54,346	51%	31%	7,441	6,483	8,398
4	25,741	50%	31%	3,807	3,092	4,522
Subtotal	162,136			13,698	12,477	14,918
Just Missed						
1	148,589	11%	30%	1,345	820	1,870
2	91,294	31%	30%	2,354	1,655	3,052
3	91,249	51%	30%	6,609	5,297	7,921
4	38,805	50%	30%	3,244	2,782	3,706
Subtotal	369,937			13,552	11,909	15,194
Total	532,073			27,249	25,203	29,296

Table 5.21: SCE's Gross Program Savings for Cooling

Climate Zone	Total # of Accounts	% with Cooling Savings	% Active	MWh Savings	90% Confidence Intervals	
					Lower	Upper
Rebate						
1	20,369	11%	31%	252	208	295
2	69,296	31%	31%	3,527	3,098	3,955
3	28,014	51%	31%	3,835	3,342	4,329
4	21,508	50%	31%	3,181	2,584	3,778
Subtotal	139,187			10,795	9,908	11,681
Just Missed						
1	73,999	11%	30%	670	409	931
2	186,588	31%	30%	4,810	3,382	6,238
3	56,958	51%	30%	4,125	3,306	4,944
4	35,440	50%	30%	2,963	2,541	3,384
Subtotal	352,985			12,568	10,849	14,288
Total	492,172			23,363	21,428	25,298

Table 5.22: SDG&E's Gross Program Savings for Cooling

Climate Zone	Total # of Accounts	% with Cooling Savings	% Active	MWh Savings	90% Confidence Intervals	
					Lower	Upper
Rebated						
1	64,455	11%	31%	797	660	935
2	25,952	31%	31%	1,321	1,160	1,481
3	0	0%	0%	-	-	-
4	1,830	0%	0%	271	220	321
Subtotal	92,237			2,389	2,171	2,606
Just Missed						
1	72,593	11%	30%	657	401	914
2	30,470	31%	30%	786	552	1,019
3	0	51%	30%	-	-	-
4	1,108	50%	30%	93	79	106
Subtotal	104,171			1,535	1,189	1,882
Total	196,408			3,924	3,515	4,334

5.4.4 Statewide 20/20 Program Savings from Residential Base Load Reductions

As with the cooling measures, savings are only estimated for active homes. Thus, the number of homes with base load savings are calculated using the penetration of active homes as presented in Table 3.2 above. These savings are estimated only for the rebated, high use homes. The poor precision of the estimator for the small but common miscellaneous actions are the major contributor to the wide confidence intervals. Table 5.23 shows the total program savings for the base load reduction with the 90% confidence intervals.

Table 5.23: Gross Program Base Load Savings for Rebated, High Use Homes

	Total # of homes	% Active	20/20 MWh Savings	90% Confidence Intervals	
				Lower	Upper
PG&E	162,136	31%	7,023	2,704	11,343
SCE	139,187	31%	6,029	2,321	9,737
SDG&E	92,237	31%	3,995	1,538	6,453

5.4.5 Coincident Peak Demand Savings due to the 20/20 Program

Table 5.24 presents the demand savings at coincident peak for PG&E and SDG&E. The cooling savings are presented separately for the just missed and high use with rebate customers. The 20/20 program resulted in a reduction of almost 20 MW for PG&E and 3 MW for SDG&E, approximately 0.1% of the coincident peak.

Table 5.24: Gross Coincident Peak Program Savings

	Just Missed	High Use, Rebated		Program Savings
	Cooling KW	Cooling KW	Base KW	Total KW
PG&E	8,335	8,001	508	16,844
SCE	6,698	6,403	606	13,707
SDG&E	1,340	1,569	465	3,374

5.5 Summary and Conclusions

5.5.1 Summary of Program Energy Savings

The energy savings discussed in the previous sections are summarized in Table 5.25. The cooling savings from the just missed group are larger than the high use, rebated customers for PG&E and SCE due to the larger size of the population, as can be seen in Tables 5.20 and 5.22. The combined savings of 72 GWh reflect that savings that could be estimated from the model. However, additional unexplained reductions among the just missed and both high use and low use customers with rebates suggest that the 20/20 program savings may be understated. There is an additional 101 GWH of reduction that the model could not definitively determine to be, or not be, program related.

Table 5.25: Gross Program Savings

	Just Missed	High Use, Rebate		Program Savings	90% Confidence Interval	
	Cooling Savings (MWh)	Cooling Savings (MWh)	Base Savings (MWh)	(MWh)	Lower	Upper
PG&E	13,552	13,698	7,023	34,273	29,493	39,052
SCE	12,568	10,795	6,029	29,392	25,210	33,575
SDG&E	1,535	2,389	3,995	7,919	5,428	10,411
Totals	27,655	26,881	17,048	71,584	60,131	83,038

Tables 5.26 and 5.27 below provides a summary of the program savings adjusted for free riders. These results indicate that total direct program savings in the residential sector are approximately 46 GWh. Estimated coincident peak savings are approximately 11, 9 and 2 MW for PG&E, SCE and SDG&E, respectively.

Table 5.26: Summary of Net Program Savings

	PGE	SCE	SDGE	Totals
20/20 Credits issued	339,234	300,023	92,325	731,582
Total MWh Reduction	279,732	265,013	70,899	615,644
% Active	31%	31%	31%	31%
Gross MWh Reduction for Active Participants	86,997	82,419	22,050	191,465
% Free Riders	32%	32%	32%	32%
Net MWh Reduction for Active Participants	59,158	56,045	14,994	130,196
Incidental/non-Program	14,707	13,007	4,003	31,717
Direct Program Savings	14,090	11,440	4,341	29,872
Uncertain Attribution	30,361	31,598	6,650	68,608
Just Missed Total MWh Reduction	129,933	134,925	35,314	300,172
% Active	31%	31%	31%	31%
Gross MWh Reduction for Active Participants	40,279	41,827	10,947	93,053
% Free Riders	43%	43%	43%	43%
Net MWh Reduction for Active Participants	22,959	23,841	6,240	53,040
Incidental/non-Program	5,534	6,058	1,949	13,540
Direct Program Savings	7,724	7,164	875	15,764
Uncertain Attribution	9,701	10,620	3,416	23,737
Total Net Program Savings	21,815	18,604	5,216	45,635

Table 5.27: Net Coincident Peak Program Savings

	Just Missed	**High Use, Rebated**		**Program Savings**
	Cooling KW	**Cooling KW**	**Base KW**	**Total KW**
PG&E	4,751	5,441	345	10,537
SCE	3,818	4,354	412	8,584
SDG&E	764	1,067	316	2,147
Total				21,268

5.5.2 Concluding Comments

The residential modeling shows that there are measurable savings associated with the 20/20 program. Active participants took a wide range of actions to lower their energy use, including large impact items such as turning off the pool as well as many smaller behavioral modifications, such as turning off lights. It is also clear from this analysis that incidental activity in the house often contributed to meeting the 20% reduction criterion. Non-energy related activities in the house, such as remodeling and decreasing household size, have a measurable and significant impact on the total reduction.

Intentional energy conservation actions taken by active participants are estimated to have saved a total of 72 GWh for the three utilities during the 20/20 summer months in 2005. Coincident peak demand savings are estimated at almost 17 MW for PG&E and 3 MW for SDG&E, about 0.1% of the peak system.

Cooling is clearly an important driver of the total reduction. Lowered cooling use accounts for over 75% of the total program savings, and these savings are found both in the homes of the rebated participants as well as the “just missed” group. Cooling and base load reductions cannot be entirely disentangled and it is possible that a portion of the base savings could be embedded within the cooling savings, or *vice verse*.

Base savings are much smaller and more variable and could only be estimated in the rebated homes in the high use category. The residential model provides reasonable savings for refrigeration, turning off pools, and the small but significant impacts of the miscellaneous, small-scale actions. Although the estimator for the miscellaneous measures was significant at the 5% confidence level, the imprecision in this estimator has a negative effect on the overall precision of the program savings. Surprisingly, the estimator for fuel switching measures is not statistically significant and is unexpectedly low, raising concerns about other, unknown factors occurring in these homes and the survey respondents’ understanding of the question.

The residential model does not explain all of the variation within the homes. This result is largely due to the wide variations in patterns of use from one home to the next. On average for the homes in the sample, the conservation actions (cooling and base) accounted for about 35% of the total reduction, and incidental events for about 20%, leaving approximately 45% of the savings unexplained. The model was not effective at estimating base load savings for the just missed households.

In addition, it was not possible to estimate savings for the low users. These customers were identified as using less than the median for summer use in 2004 in PG&E’s and SCE’s territories. This lack of results for estimating savings among low users and base savings for the just missed households should not be interpreted as evidence that these customers did not take conservation actions

that could result in savings, but only that these effects are too small to be estimated by billing analysis.

The total reduction for low use, rebated households adds up to about 42 GWh, (18 in PG&E's territory and 24 in SCE's). If the 37% savings from conservation measures found among the high use, rebated household is also applied to active low use homes, it would add approximately 16 GWh to the program savings, increasing program savings by about 20%.

The residential analysis indicates that the 20/20 program has been effective at achieving modest savings in the residential sector. Concerns that changes in weather may have resulted in less cooling use, making it easier for many customers to meet the 20/20 rebate criteria proved to be unfounded for the 2004/2005 period. For most of the homes in the residential sample, the summer of 2005 was somewhat warmer than the summer of 2004. While conservation actions clearly account for a major part of the reduction in use, it is also evident that incidental events have a significant impact on the customers' ability to meet the 20/20 criteria and account for at least 20% of the total reduction. Since the billing analysis was not effective for estimating savings for the low users, our estimated program savings may be understated by as much as 20%.

Section 6. Statewide 20/20 Commercial and Industrial Impact Results

Conducting an impact analysis of C&I customers has many challenges. The wide range of types of businesses, usage levels and end uses complicates any analysis.

We initially considered the type of analysis constructed for the residential sector, that is, combining billing analysis with the survey results to try to estimate savings for some major end uses. In the residential sector, we found some low use and erratic patterns among the survey respondents, resulting in the removal of about 20% of the potential sample. (Please refer to Section 5.2 for a description of this process.) In contrast, using the same type of exclusion criteria for the C&I survey would result in the removal of 371 of the 635 surveyed accounts; an attrition rate of almost 60%. This approach would leave only 264 accounts (with and without rebates) for the billing analysis.

Further, the smaller size of the C&I customer survey and greater variations in the C&I sector were a matter of concern. The process of matching the survey data with the billing history highlighted major study constraints beyond those already identified. This is because of the multiple accounts used by some C&I customers, making it more difficult to track total use. For these reasons, we decided not to continue with this strategy of analyzing the billing data for only the survey sample.

This finding led us to step back and review the C&I 20/20 rebate process from a more global perspective. Further analysis suggests that the type of issues arising with the sample of surveyed customers also extends to the 20/20 population as a whole. Our review of the billing data for the C&I customers suggests that many recipients of the 20/20 rebates are very small users or have erratic patterns of usage that are not necessarily consistent with concerted conservation efforts. Accordingly, we have adopted a methodology that combines analysis of the survey sample and the much larger sample of accounts for which we have the billing data.

Our C&I analysis is presented in three parts: first, the distribution of rebated accounts by revenue class, next a review of the 20/20 rebates by usage level and finally an analysis of erratic usage patterns that could be affecting the results. The final two subsections discuss issues related to the time-of-use (TOU) and agricultural customers.

The analysis is based on data from three sources:

- The initial utility data set, which included a few critical fields for all accounts eligible for the 20/20 rebate (successful and unsuccessful),

- The full set of billing data provided for the sample frame used for the customer surveys (36,425 C&I accounts), and
- The customer surveys.

The initial data request included basic information such as account, revenue class, rate, and percentage reduction for all customers. PG&E and SCE also provide their calculations of the 2004 summer use and total kWh reduction.

When constructing the sample frame for the customer surveys, we deliberately requested data for a large number of customers to ensure that the list would be more than sufficient to meet the target, since we did not know the percentage of active participants and the time constraints of the project would not allow us to make a second data request. One by-product of this method is that the utilities provided billing data for almost 34,000 randomly-selected C&I customers. The distribution of the billing data for the sample frame is provided below in Table 6.1.

Table 6.1: Distribution of Billing Data

Utility	Rebate	No Rebate	Totals
PGE	6,000	4,446	10,446
SCE	10,000	4,000	14,000
SDG&E	4,992	4,557	9,549
Totals	20,992	13,003	33,995

The customer surveys provided additional detail on the actions taken at 635 commercial establishments, as presented in Chapter 4.

6.1 Analysis by Revenue Class

The 20/20 success rate is defined as the percentage of total accounts that received the rebate. The overall success rate in the C&I sector is higher than the residential for all utilities (about 14% as compared to around 10%). The final two columns in Tables 6.2 to 6.4 relate to the prevalence of accounts on time-of-use (TOU) rates. The average success rate for the entire C&I sector masks some major differences among the revenue classes, as shown in the following series of tables and in Figure 6.5.

This analysis shows that the success rate among agricultural accounts (24% to 34%) is much higher than other commercial accounts (13% to 16%), and that the small C&I success rate (15% to 16%) is higher than that of the larger C&I customers (8%). These patterns are consistent across the utilities.

Table 6.2: PG&E's Success Rates by Revenue Class

Revenue Class	Rebates (# of Accts)	Total (# of Accts)	% Rebated	% of Acct on TOU	% TOU Rebated
Agricultural	24,373	78,198	31%	47%	33%
Small Commercial	52,932	391,912	14%	7%	18%
Med/Large Commercial	4,255	71,405	6%	20%	25%
Totals	81,560	541,515	15%	15%	26%

One aspect of PG&E's program that is not mirrored by the other utilities is the prevalence of the TOU accounts. Over a quarter of all of PG&E's C&I customers are on a TOU rate. For the agricultural and small commercial customers, the success rate is fairly consistent for customers with and without TOU rates. However, the larger commercial customers on a TOU rate show a much higher success rate (25% and compared to 6%). This result suggests that PG&E may be benefiting from load shifting among this small subset of its C&I customers.

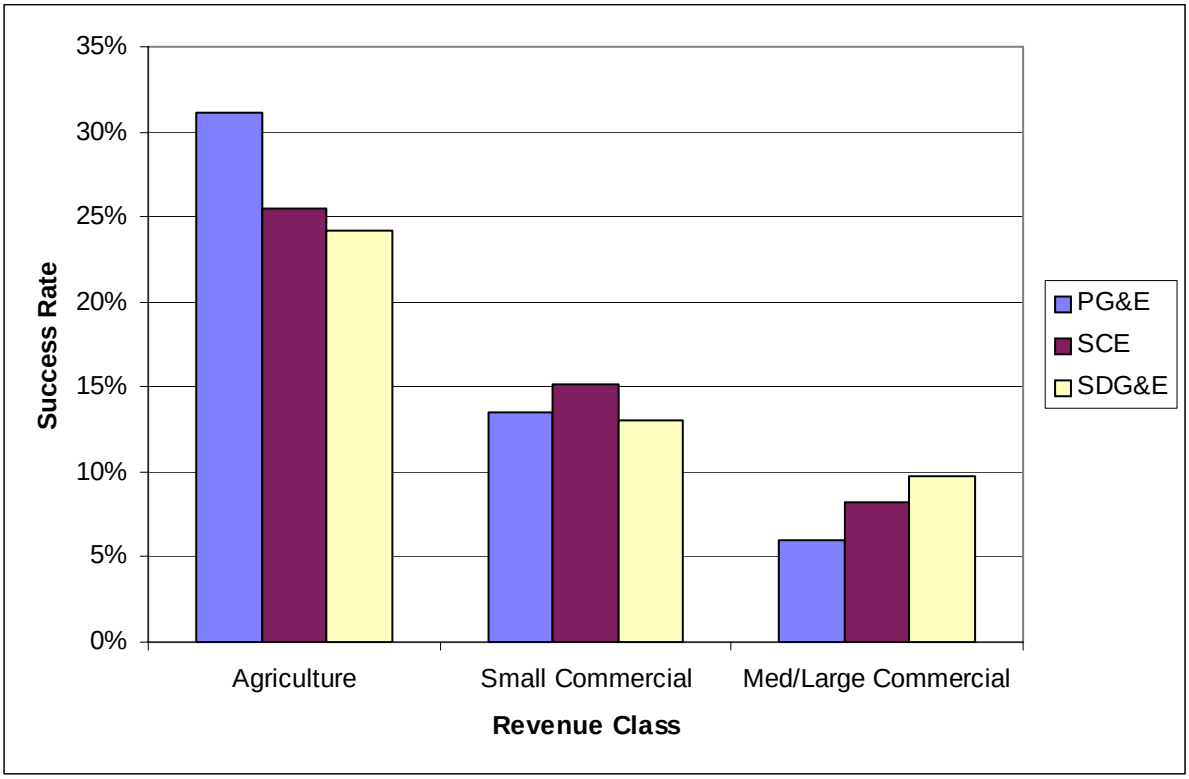
Table 6.3: SCE's Success Rates by Revenue Class

Revenue Class	Rebates (# of Accts)	Total (# of Accts)	% Rebated	% of Accts on TOU	% TOU Rebated
Agricultural	6,108	23,949	26%	12%	23%
Small Commercial	56,475	372,456	15%	1%	10%
Med/Large Commercial	8,102	98,710	8%	2%	6%
Totals	70,685	495,115	14%	2%	13%

Table 6.4: SDG&E's Success Rates by Revenue Class

Revenue Class	Rebates (# of Accts)	Total (# of Accts)	% Rebated	% of Accts on TOU	% TOU Rebated
Agricultural	14	58	24%	0%	NA
Small Commercial	12,564	96,345	13%	4%	8%
Med/Large Commercial	20	205	10%	0%	NA
Totals	12,578	96,403	13%	1%	8%

Figure 6.5: Success Rates by Revenue Class



6.2 Analysis by Summer Usage Level

We reviewed the distribution of the rebates by the level of summer energy use in 2004. This component of the analysis is designed to address two questions:

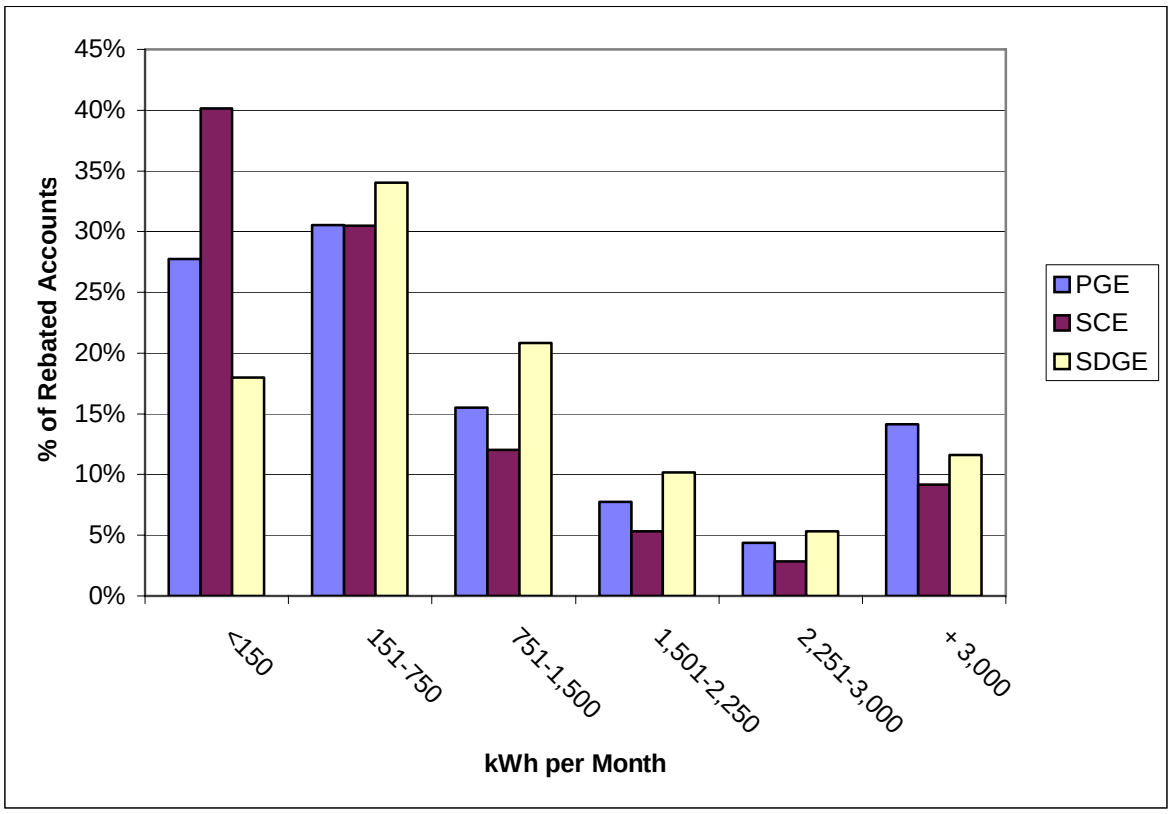
- What percentage of the rebates is given to accounts with extremely low usage suggesting little or no summer activity?
- How many rebates were issued to accounts with sufficient usage to suggest that common commercial energy conservation strategies may be effective?

Table 6.6 shows the distribution of rebates according to the 2004 average summer usage. The rows are defined by monthly energy use, and the columns reflect the cumulative percent, e.g., 74% of PG&E's rebates were issued to accounts using less than 1,500 kWh per month during the 20/20 summer months in 2004. PG&E's and SCE's rebates reflect a census of all the rebates issued. We did not have sufficient information to perform a similar analysis for SDG&E, and consequently the distribution for SD&GE is based on the billing data provided for the survey sample frame. Figure 6.7 shows the proportion of accounts in each of the usage bins.

Table 6.6: Rebates Issues by Usage Level

Usage Categories (kWh per month)	PGE (Cum %)	SCE (Cum %)	SDG&E (Cum %)
< 150 kWh	28%	40%	18%
151 – 750 kWh	58%	71%	52%
751 - 1,500 kWh	74%	83%	73%
1,501 – 2,250 kWh	81%	88%	83%
2,251 – 3,000 kWh	86%	91%	88%
3,000 kWh or more	100%	100%	100%
Total # of Accounts in Analysis	81,560	70,685	4,974

Figure 6.7: Percent of Rebates Issued by Usage Level



This analysis shows that about 20% to 40% of the rebates are issued to accounts that are most likely inactive (using less than 150 kWh per month), and 50% to 70% to accounts using less than 750 kWh per month. Thus, the preponderance of rebates is going to businesses with low use that are unlikely to have substantial opportunities for savings.

A review of the non-rebated accounts from the billing sample indicates that this pattern of usage is similar across all of the C&I accounts eligible for the 20/20 program. For the non-rebated group, about 40% used less than 750 kWh per month in 2004, and 14% used more than 2,500 kWh.

6.3 Other Erratic Patterns

Further analysis was conducted to assess the extent to which rebates were issued to accounts with erratic use patterns that are not consistent with a deliberate effort to improve efficiency and reduce use. The purpose of this step is to identify patterns that explain the 20% reduction in use but are not compatible with typical monthly variations for a business in continuous operation. For example, one or two months of absolutely no energy use suggest some sort of interruption of the business cycle rather than conservation energy reduction efforts on the part of the business owners. This analysis was restricted to the C&I accounts with monthly energy use of 1,500 kWh or more in 2004.

Four criteria were developed to define common patterns of disruption:

- Extremely low average use in 2005: The average daily use in 2005 drops from the 2004 level of 1,500 kWh per month or more to less than 150 per month. This type of extreme drop in usage suggests either a major disruption of business or, for businesses with multiple accounts, the possibility that the load could have been moved to a different account.
- One extremely low read: A low month in 2005 completely accounts for the greater than 20% reduction in use or a single month in 2005 indicates use of less than 150 kWh (10% or less of the average daily use in 2004).
- Summer seasonal patterns: visual inspection of the billing data suggests that some accounts have summer seasonal activity and the ramp up and ramp down periods can vary from year to year, creating large percentage differences that can probably be attributed to the normal business cycle.

The results of this analysis are show in Table 6.8 below. This analysis was conducted using the billing data provided for the sample frame used for the customer surveys, and indicates that erratic use is likely to be a factor in a substantial portion of the rebates for these higher use customers, especially in PG&E's territory.

Table 6.8: Erratic Usage Patterns in Higher Use C&I Accounts

	PG&E	SCE	SDG&E	Total
Total Accounts	2175	2674	1349	6198
2005 Low Average Use	506	337	74	917
One Extremely Low Read	177	11	73	261
Summer Seasonal	142	61	5	208
Total Accts with Erratic Use	825	409	152	1386
% of Total	38%	15%	11%	22%

It is important to emphasize that these results do not lead to the conclusion that the businesses with erratic use failed to pursue energy efficiency or other reduction strategies, only that any conservation efforts were not likely to have been the primary reason for receiving the rebate. This point is supported by the survey of the C&I customers. The survey respondents identified as active participants have accounts with erratic patterns in about the same proportion as indicated in this analysis (about 20%), suggesting that these customers may indeed have taken action to reduce use. These survey respondents represent a wide range of types of businesses, including restaurants, industrial customers, offices, and agricultural operations. They reported efforts to lower their electric bills by reducing cooling, lighting, refrigeration and other uses.

6.4 Agricultural Customers

The analysis by revenue class demonstrates that customers on agricultural rates meet the 20% reduction criteria at a much higher rate than other C&I customers. A review of the billing data shows that the incidence of the erratic usage patterns described above are much more prevalent among the agricultural accounts, at 53% on average as opposed to 22% for all C&I accounts. This result suggests that a greater percentage of the rebates to agricultural accounts could be related to incidental or other non-energy related changes in use. The wetter 2005 may have reduced the need for irrigation. The customer survey yielded only eleven respondents on agricultural rates, which is insufficient for any further analysis.

6.5 TOU Rates

A remaining question is whether the 20/20 program is effective for customers on TOU rates, i.e., in shifting load away from the peak periods. Using the billing data from the sample frame, the TOU customers were categorized as follows:

- Those who did not have any on peak use in 2004,
- Those who increased the total kWh, but decreased on peak kWh,
- Those who decreased their on peak use by 20% or greater than the reduction in overall energy use,

- Those whose decreased in peak and overall energy use were approximately the same (within 20%), and
- Those who reduced their on peak use *less* than their overall use.

Table 6.9 shows that the first group (those with no on peak use in 2004) was eliminated from the analysis for obvious reasons. The second and third groups appear to be moving part of their load from peak to off peak to meet the 20/20 criteria. The remaining two groups met the criteria based on a general reduction in use rather than load shifting. About half of the TOU accounts, and 40% of the higher use TOU accounts (monthly use more than 1,500 kWh) met the 20/20 criteria by shifting load to off peak.

Table 6.9: TOU Rates and Load Shifts

	Rebated Accounts	% of Accounts	High Use Rebated Accounts	% of Accounts
Total Accounts on TOU	1447			
No 2004 Peak Use	80			
Accounts with 2004 Peak Use	1367		1121	
Shifted Load				
Increased overall use and reduced peak	203	15%	137	12%
Reduced peak more than overall use	489	36%	350	31%
Subtotal	692	51%	487	43%
No Load Shift				
Peak and overall reduction the same	494	36%	394	35%
Reduced peak less than overall use	181	13%	240	21%
Subtotal	675	49%	634	57%

6.6 Conclusions

The analysis of the rebated accounts indicates that a substantial majority of the recipients of the 20/20 rebates are low use accounts or accounts with erratic use. About 60% of 20/20 rebates are accounts using less than 750 kWh per month, and an additional 20% are accounts using between 750 and 1,500 kWh per month. The prevalence of small users suggests that typical commercial load reduction strategies are not likely to be appropriate for these accounts. Of the remaining larger accounts, more than 20% exhibit erratic use that could account for their reduction, indicating that these rebates were issued largely for incidental changes in use rather than concerted load reduction.

Agricultural accounts benefit from this program at double the rate of other revenues classes and also are twice as likely to exhibit erratic usage patterns, again highlighting the likelihood that many rebates are issued for incidental

reductions. Among larger customers on TOU rates, the 20/20 rebate was somewhat successful in encourage load shifting. About 40% of the larger customers on TOU rates met the 20/20 criteria by shifting load to the off peak period.

These observations should not lead to the conclusion that there are no savings in the commercial sector. About 75% of the larger accounts, accounting for about 15% of the total rebates issued, have relatively consistent usage and show a substantial reduction in use. In total, the reduction in use associated with these accounts comes to approximately 620 GWh.[19] Using the weighting factor for active participants from Table 4-2 (20% active) gives a reduction by active firms of 124 GWh. How much of this reduction is due to program activities and how much is incidental is not known. If we use the residential results as a rough guide, then 46 GWh (37%) is from program actions, 24 GWh (20%) is incidental, and 55 GWh cannot be determined.

[19] For PG&E and SCE, the total reductions are based on all commercial, rebated customers using more than 1,500 kWh during the summer of 2004. . . . . For SDGE, this information was not available for all rebated customers, and this analysis is based on the sample of 1,349 commercial rebated accounts, with results scaled to the total population of 3,404 accounts.

Section 7. Statewide 20/20 Summary and Recommendations

The goal of this evaluation was to assess the design and impact of the Statewide 20/20 Programs, as well as the SDG&E C&I 20/20 Program, in order to provide recommendations regarding the future use of these or similar programs as mechanisms for achieving demand reduction goals. The evaluation was designed to estimate program impacts for both program types and to provide process-related information for the SDG&E C&I 20/20 Program.

We provide in this section a summary of key findings for the Statewide 20/20 Program, as well as our assessment of the usefulness of these programs from a policy perspective. Discussion of the SDG&E C&I Program begins with Section 8.

7.1 Overview of Results

The results from the Statewide 20/20 evaluation indicate that, while the program does provide some level of energy and demand savings, the program does not provide an efficient means of obtaining these savings.

Table 7.1 shows the number of accounts who qualified for the 20% rebate.

Table 7.1: Summary of Customer Rebates in 2005

	PG&E		SCE		SDG&E	
Revenue Class	No. of Rebated Accounts	% of total accounts	No. of Rebated Accounts	% of total accounts	No. of Rebated Accounts	% of total accounts
Agricultural	24,373	31%	6,108	26%	14	24%
Small Commercial	52,932	14%	56,475	15%	12,564	13%
Med/Large Commercial	4,255	6%	8,102	8%	20	10%
Total C&I	81,560	15%	70,685	14%	12,578	13%
Residential	332,576	11%	300,023	10%	89,383	10%
Total Program	**414,136**	**12%**	**370,708**	**11%**	**101,961**	**10%**

Table 7.2 shows the kWh savings associated with the customers who reached the 20% threshold.

Table 7.2: Total Change in kWh Use by Rebated Customers as Measured by Utility Bills

(Summer 2004 kWh – Summer 2005 kWh)

	PG&E	SCE	SDG&E	Total
Total C&I	288,447	254,464	24,953	567,864
Residential	279,732	265,013	70,899	615,644
Total Program	568,179	519,477	95,852	1,183,508

The reductions shown in Table 7.2 are for all customers who received a rebate. However, this total reduction is not a true measure of the savings produced by the Statewide 20/20 Program. To estimate program savings, two types of adjustments must be made to the values in Table 7.2:

1. Decreasing savings to account for the fact that some of the total reduction in energy use was incidental to the program and cannot be reasonably attributed to the 20/20 program efforts.

2. Increasing savings to capture legitimate reduction in energy use resulting from participants who tried to reach the 20% reduction but were ultimately unsuccessful.

These adjustments are discussed in more detail in the following two sections.

7.1.1 Adjustments to Program Savings for Rebated Customers

These adjustments were developed to account for activity that does not reflect actual 20/20 program impacts. Adjustments needed to be made at two levels in order to estimate net program savings, as described below.

1. Inactive Customers and Free Riders

   Reduction in energy use related to homes or businesses that were not active or were free riders should be removed in their entirety. Some rebated customers may have been unaware of the existence of the program or have achieved the 20% reduction without taking any energy saving actions (inactive customers), and others may have pursued energy conservation strategies even if the rebates had not been offered (free riders). The savings associated with these inactive customers and free riders cannot be reasonably attributed to the program.

2. Incidental Activity

   Specific activities or events that resulted in lower energy use may have been incidental to the program, even within active homes and businesses. For

example, customers may have pursued specific conservation strategies, and yet lower occupancy or production levels may also have contributed to their ability to achieve the 20% threshold. These incidental, non-program energy reductions within the home or business also cannot be reasonably attributed to the program.

Adjustments at the household or business level were based on the results of the customer survey and the energy reductions associated with incidental activities were estimated through combining the survey data with billing records. It was not possible to develop a firm estimate of the impacts of incidental activities in the C&I sector.

7.1.2 Adjustments at the Customer Level

We fielded a survey of 1,177 households and 810 businesses who received the rebate, the purpose of which was to assess customer awareness and actions. With this information, we were able to identify which customers were actively trying to reach the rebate savings levels and whether or not they were motivated by the offer of the rebate. The surveys asked questions about awareness, actions taken, customers' energy use, and housing characteristics.

From the survey, we categorized customers as active or inactive. To be *active*, a customer needed to meet the following conditions:

- have been aware of the program in time to take action,
- have taken deliberate action to try and receive the rebate, and
- been able to identify at least one energy saving action taken to reduce their 2005 summer energy use.

Active customers were considered to be program participants. Any reductions achieved by inactive customers were not included in the final 20/20 Program savings.

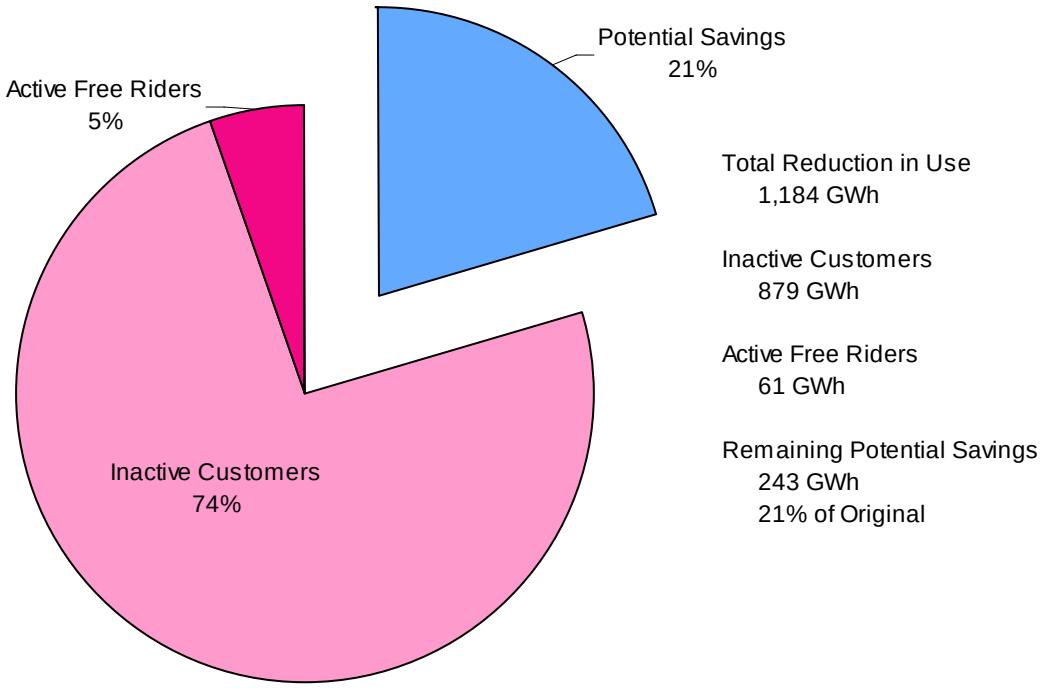
However, some active customers may well have taken the same actions to lower their energy use in the absence of the 20/20 program and thus were considered free riders. Net program savings should not include the decrease in energy use from these homes. Active customers whose survey responses indicated that the rebate did not play a significant role in their energy related decisions are identified as *active free riders* and the savings from these homes were not included in the net program impacts.

In the residential survey, approximately one in three of the rebated customers in the sample met the criteria for active participation, and about one-third of these respondents stated that the 20/20 program was *not* an important factor in encouraging them to reduce energy use. Among the surveyed C&I customers, 20% were active and all reported that the rebates were a very important factor in

making the decision to take energy savings actions, indicating that no reductions are necessary to account for free riders in the C&I sector.

Figure 7.3 illustrates the adjustments made to the total reduction to account for inactive customers and active free riders. The net impact of these adjustments suggests that only 21%, or 243 GWh, of the total reduction associated with rebated customers could possibly be attributed to the program.

Figure 7.3: Impacts of Active and Inactive Rebated Customers



7.1.3 Energy Savings vs. Incidental Activity

The blue shaded area in Figure 7.3, indicates that 21% of the total reduction in rebated homes could potentially be attributed to the program. However, it is entirely possible that a portion of this reduction was due to incidental activity or events and should therefore not be attributed to the program. For example, a family member moving out will lower occupancy and decrease energy use, but such a move is most likely precipitated by events that are wholly unrelated to energy conservation. This issue was investigated through the customer surveys and, in the residential sector, by conducting a billing analysis for surveyed homes.

The surveys of the residential and C&I customers asked each respondent to recall "what actions did you take that would have lowered your electricity use in the summer of 2005?" The results of those responses are shown in Table 7.4. This table shows that the active households and businesses generally engaged in more energy saving activities than their inactive counterparts.

Table 7.4: Most Frequently Mentioned Energy Reducing Activities by Rebated Customers

	Residential		**C&I**	
	Active	**Inactive**	**Active**	**Inactive**
Purchased EE equipment or appliance	**53%**	**40%**	27%	18%
Turned off lights	**52%**	**35%**	48%	27%
Turned up Thermostat, turned off AC	**39%**	**29%**	44%	28%
Reduced no. of occupants	33%	28%		
Occupied house/operated business fewer hours	23%	29%	6%	1%
Turned off electronics or appliances	22%	16%	23%	6%
Reduced the use of energy consuming equipment			16%	14%
Used less hot water	**15%**	**6%**	10%	14%

By combining the residential survey results with billing records, we were then able to develop statistically valid models for the residential households that explain a portion of the variation in consumption. This approach was designed to estimate the savings associated with specific actions and explain the reductions among rebated homes in the 2005 program year. Separate models were constructed to estimate the changes in consumption related to base load activities and cooling-related actions, using a combination of disaggregation and regression techniques, as presented in Section 5. Unfortunately, we were not able to explain, with acceptable statistical confidence, the variation in the C&I use patterns.

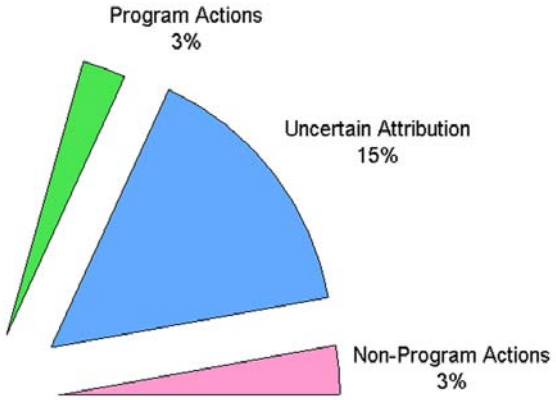
Of the 243 GWh of potential savings from Figure 7.3, only 30 GWh (3%) could be statistically attributed to energy savings associated with known cooling and baseload actions. About 32 GWh (3%) was associated with non-energy saving activities, particularly changes in occupancy levels and remodeling. The remaining 181 GWh represent the reductions in use that could not be definitively attributed to the program, i.e., it may represent program effects or just normal variations in summer use resulting from events incidental to the program. Figure 7.5 illustrates the impacts attributable to the program.

Figure 7.5: Attribution of Savings for Rebated Customers

Attributable to Program: 30 GWh

Uncertain Attribution: 181 GWh

Non-Program Activities: 32 GWh



7.1.4 Savings from Active, Non-Rebated Customers

Some customers may have tried unsuccessfully to reach the 20% reduction threshold, and their energy saving actions should be counted as program savings. Our survey of non-rebated customers covered 1,121 households and 958 businesses, and included the same battery of questions that was asked of the rebated customers.

For the residential survey, our sample was limited to those customers who reduced their 2005 use between 10 and 20%; in other words, they just missed receiving the rebate. Our purpose was to establish whether this group was conserving energy to try to meet the 20/20 threshold. Given the budget and time constraints, we concentrated only on this “Just Missed” sample.

Our survey results indicate that this group did save energy by taking specific energy saving actions. However, since the survey was restricted to the Just Missed segment of the residential population, it does not provide direct evidence of the program impact on customers with reductions less than 10% or with increases in use. To estimate the potential impacts for this group, we extrapolated savings by establishing an active household trend line for the 20% to 10% households and projecting those figures to the remainder of the residential households.

The business sample represents a random sample, stratified by utility, of all non-rebated customers. Thus, the sample included some customers who just missed receiving the rebate and others whose use in the summer of 2005 actually increased. Accordingly, unlike the residential sample, no extrapolation was necessary. Only 11% of the C&I sample of non-rebated firms were active in the program.

Some differences between the rebated and Just Missed customers are summarized below.

- On average, the residential Just Missed sample was less active (27%) and consisted of more free riders (43%) than the rebated customers (at 31% and 32%, respectively).
- Active, rebated households were almost 350% more likely to have had a reduction in household size as the active, Just Missed group. The change in occupancy is a major determinant as to why households qualified for the rebate.
- The number of energy reduction activities was slightly lower among Just Missed respondents
- The active, Just Missed group was less likely to have purchased refrigerators and energy efficient lighting since the summer of 2004.

The same modeling approach for the Just Missed customers was also used for the analysis of rebated customers. The results indicated that the Just Missed residential group had 15.7 GWh of savings that were attributable to the program, and 23.7 GWh of savings that are of uncertain attribution. Based on these results, we estimate that the remainder of the residential, non-rebated households may have generated an additional 31.6 GWh of attributable savings and 23.7 of uncertain attributable savings. All 36.9 GWh of the C&I non-rebated reduction is of uncertain attribution. The results of the model building for the non-rebated groups is shown in Table 7.6

Table 7.6: Program Savings for Non-Rebated Customers

	Residential Just Missed Rebate	C&I Did Not Receive Rebate	Total
Potential Program Savings	53,040	36,901	89,941
Attributable to Program Just Missed	15,763		15,763
Uncertain Attribution	23,737	36,901	60,638
Attributable to Non-Program Activities	13,540		13,540
Extrapolation to All Residential Customer Who Did Not Receive Rebate	Residential Did Not Receive Rebate		
Attributable to Program	47,289		47,289
Uncertain Attribution	47,474	36,901	84,375

7.1.5 Demand Saving from Statewide 20/20 Program

Demand savings at coincident peak were estimated using the energy savings and adjusting these results on the basis of hourly load profiles and the peak month and hour provided by the utilities. The projected program savings for the residential sector is 21,200 kW, net of free riders.

Sixty-two percent of the active households and 19% of active businesses, who reported that they turned off their AC units during the summer of 2005, also reported that on the hottest summer days they reversed that practice and ran the AC units more than two hours. It is therefore possible that applying the average load profiles to the coincident peak day may overestimate the kW savings.

7.1.6 Net Program Savings and Cost-effectiveness

Table 7.7 combines all of the energy saving elements into an estimate of net program impacts. Savings are presented in two ways:

1. The first includes only those activities with statistically significant savings attributable to the program.
2. The second estimate includes all of the savings identified above, *plus* all reductions in use by active households with uncertain attribution.

This latter method produces the most generous estimate of savings. Actual program impacts are somewhere between these two extremes.

Table 7.7: Statewide 20/20 Program Savings in 2005

	Statewide Total (MWh)
Directly Attributable	
Rebated Customers	29,872
Active, Non-rebated Customers	47,289
Total Directly Attributable to Program (MWh)	77,161
Add back: Uncertain attribution	
Rebated Customers	181,500
Active, Non-rebated Customers	84,375
Total Directly Attributable to Program and Uncertain Attribution (MWh)	265,875
Total Change in kWh Use by Rebated Customers as Measured by Utility Bills (Table 7.2)	1,183,508

Table 7.8 provides the cost of efficiency and demand resources procured by this program. Even under the best of all possible indicators, the program performs poorly in achieving the intended results. The estimated cost per kWh ranges from approximately $0.29 cents to $1.00, depending upon what is included in the savings estimates. The estimated cost per kW is over $3,600.

Table 7.8: Statewide 20/20 Program Costs Relative to Savings Achieved

	Total
Program Costs	
Rebates	$67,450,469
Admin	$9,753,452
Total	$77,203,921
Energy Savings (MWh)	
Directly Attributable to the Program	77,161
Including Uncertain Attribution to the program	265,875
Cost per kWh Saved	
Directly Attributable to the Program	$1.00
Including Uncertain Attribution to the program	$0.29
Demand Savings (kW)	21,200
Cost per kW Saved	$3,642

7.2 Statewide 20/20 Program Conclusions and Recommendations

The 20/20 concept represents a catchy message that the utilities can easily broadcast across the state. However, this evaluation demonstrates that the program distributes very large incentives, principally awarding customers who took no actions or took actions that they would have taken in the absence of the program. The evaluation results indicate that the program is not cost-effective and should not be continued, as is demonstrated by the following findings.

- Customer surveys indicate that 30% or fewer of rebated customers were even aware of the program and had undertaken any effort to achieve the rebate.
- A substantial portion of the observed reduction among customers who actively tried to achieve the rebate was likely to be due to free ridership and incidental actions not related to the program, as indicated by the customer survey and residential modeling.
- The cost paid for each kWh by this program was at least $0.29, and maybe as high as $1.00, both are costs that far exceed the costs experienced by even the least effective energy efficiency program.
- The program was even less effective in achieving its intended goal of reducing peak demand; the cost per kW saved is estimated to be over $3,600. This figure may itself be an overstatement, as many survey respondents relaxed their conservation practices on the summer's hottest days.

Beyond the catchy message and the generous incentives, the program did little to assist customers in overcoming the market barriers that impede the adoption of energy saving actions and investments. The 20/20 Program did not provide direct education to consumers, support markets for energy-efficiency goods and services, or encourage the development of new products. Much of the savings generated by the 20/20 Program represents short-term energy conservation rather than long-term structural change.

In a state without a developed energy efficiency industry, there might be a short-lived role for a 20/20 type of effort in the event of an emergency. In such a situation, the population would be faced with many opportunities for improving efficiency but the infrastructure to deliver efficiency quickly and effectively would be lacking, and the program's simple message might produce enough benefits to be justified, particularly in the face of major power supply shortages. However, in California with its energy efficiency history and existing infrastructure, the Statewide 20/20 Program represents a wasteful alternative to additional funding

Section 8. SDG&E C&I 20/20 Process Evaluation

Most of our process evaluation effort was directed toward the San Diego Gas & Electric Commercial Load Reduction Program, hereafter referenced as the SDG&E C&I 20/20 Program. We conducted face-to-face interviews with ten (10) SDG&E staff connected with the C&I 20/20 Program and in-depth interviews with 6 of the largest participating businesses, followed by a telephone survey of 75 enrolled customers.

This program is unique because, unlike the Statewide 20/20 Program, the SDG&E C&I 20/20 Program was originally targeted at small-mid sized commercial and industrial customers, with loads between 20 and 200 kW, and required that customers *enroll* in order to participate. Given these requirements, the trigger approach may provide more reliable demand reductions. As such, there is interest among all of the utilities in reviewing the delivery of this program and developing a better understanding of the potential benefits for designing future demand response efforts.

An overview of key program statistics is provided below in Table 8.1.

Table 8.1: SDG&E C&I 20/20 Program Statistics

Total applications	1,496
Mailed in	619
On-line enrollment	306
Other	571
Meter changes performed	385
Potential Load Reduction	51 MW
Number of unique customers	589
Total participating meters	1,303

Reported by SDG&E staff, current as of 9.30.05

Below is a review of the program history and timeline, program development and operation, and key implementation-related issues.

8.1 Program History and Timeline

The 2001 California energy crisis spawned a rulemaking in 2002 by the California Public Utilities Commission (CPUC) to develop demand response capabilities as an overall system resource. On November 5, 2004, SDG&E received an Assigned Commissioner's Ruling (ACR) directing the Investor Owned Utilities (IOUs) to implement 20/20 programs for 2005. This ruling required all three IOUs to develop proposals for a residential 20/20 program that was based upon the 2001-02 20/20 program but addressed concerns raised about cost-effectiveness,

free-ridership, and baseline calculations. The ruling also provided utilities with the opportunity to design a rebate for medium and large customers who reduce their peak loads by 20 percent on days when needed. Proposals had to be filed on November 15, 2004. SDG&E completed its response filings on November 15, 2004 for the 2005 Peak Day C&I 20/20 program and on December 1, 2005 for the residential & small commercial program.

With the issuance of D.05-01-056, dated January 27, 2005, and a clarifying decision (focused primarily on budget corrections) adopted in D. 05-02-030, dated February 22, 2005, the CPUC approved SDG&E's various demand response programs. These included the SDG&E C&I 20/20 program, as well as technology implementation to automate customer response to demand reduction signals and technical assistance programs to educate customers about their ability to manage their energy costs by shifting load off peak.

On March 19, 2005, the CPUC approved the establishment of two new 20/20 programs for summer 2005:

- Schedule 20/20 (Residential & Small Business applicable to bundled service customers with peak demands less than 20kW) and
- Schedule 20/20-TOU (Commercial & Industrial applicable to commercial, industrial, Direct Access, Community Choice Aggregation and agricultural customers with peak demands between 20 kW and 300 kW, served under a TOU rate).

The prior Schedule 20/20-TOU was not available to customers who elected to participate in other demand response programs. Additionally, on May 11, 2005, SDG&E was authorized to modify Schedule 20/20-TOU to expand the program eligibility to customers with an annual maximum demand of 20kW or greater.

Based on the late decision and a program effective date of May 1, 2005, the C&I 20/20 program (hereafter referred to as the SDG&E C&I 20/20 Program) needed to be placed on the fast track in terms of implementation. The SDG&E Project Team held their initial project kickoff meeting February 2, 2005. Approximately 40 people attended, representing several impacted groups within SDG&E including DRP, Billing, CST, the Call Center, Accounting, Regulatory, IT, Rate Support, MDO, Customer Communications, Media Relations.

Table 8.2 below provides an overview of the program implementation timeline.

Table 8.2: SDG&E C&I 20/20 Implementation Timeline

Period	Activities
January 2005	▪ Final Decision approving SDG&E programs
February 2005	▪ Initial Project Team meeting February 2, 2005 ▪ Received clarifying decision (budget corrections) adopted by D. 05-02-030 ▪ Program Tariffs filed with CPUC
March 2005	▪ Program collateral designed ▪ Kickoff initial marketing campaigns and internal program promotion ▪ Manual Enrollment process developed ▪ Customer event notifications set up
April 2005	▪ Customer Enrollment ▪ Continued program promotion ▪ Meter installs ▪ Internal system modifications work (billing/IT)
May 2005	▪ C&I 20/20 Program Effective May 1-September 30, 2005 ▪ Continued Customer Enrollment ▪ Continued Meter Installs ▪ Outreach campaign #2 ▪ Updated Tariffs filed (all customer segments > 20 kW)
June-September 2005	▪ Continued Customer Enrollment ▪ Continued Meter Installs ▪ Filed to allow Multiple Program Participation (Demand bidding & Peak Gen programs) ▪ Reminder postcards and appreciation certificates sent to enrolled customers
2005 Event Dates	▪ 7/21/05 ▪ 7/22/05 ▪ 8/26/05 ▪ 9/30/05

8.2 SDG&E C&I 20/20 Program Development and Operation

Provided below is a discussion of key program implementation steps, including the following:

- Metering
- Billing and IT system Changes
- Marketing

Metering. A critical success factor for the program was the installation of metering capable of supporting the program. As such, SDG&E needed to give its metering group as much time as possible to install meters for the "enrolled" customers that did not have interval data meters in place. As intended by the

program proposals submitted to the CPUC, Interval Data Recorder (IDR) meters (with no communications) were part of the program requirements for customers participating in this program. In addition to metering considerations, the customer outreach and development of the enrollment process needed to be expedited. Program marketing and promotion had to be in place by early March to allow time for customers to respond and internally for meter installs. A March launch date gave the program developers only one month to initiate the initial outreach efforts and accept customer enrollments. The remaining time was needed to install the IDR meters.

While it was not necessary to have all meter installations completed by May 1 (the official program start date), the internal goal was to have as many of the meters as possible in place by that time in order to capture any summer load reduction that might be needed. As it turned out, meters were installed throughout the summer as customers joined the program.

Another factor affecting the implementation of the C&I program was the pending 2005 Default Critical Peak Pricing (CPP) Decision. At the time, it was expected that customers with average demands in excess of 200 kW would be subject to a new default CPP rate that would preclude their participation in other programs. SDG&E staff anticipated that this decision would go into effect on June 1, 2005. If the CPP decision were approved, customers eligible for participating in the 20/20 program would be limited to customers with maximum demands between 20 kW and 200 kW. This default CPP rate also affected the resources available to install meters because SDG&E needed to be prepared to install approximately 400 meters to meet the CPP requirements. If this came about, meter installation resources would have been strained due to the unknown and unpredictable quantity of meters needed for the 20/20 program. SDG&E determined that it needed to prepare for this resource issue and, when promoting the program, make customers aware that “If customer interest in the 2005 C&I Peak Day 20/20 is substantially higher than projected, there is a possibility that the customer may not have an IDR meter installed in time for full summer 2005 participation.” SDG&E maintained that “the Utility would make every effort to complete IDR meter installation requests in a timely manner and ID meter installations will be performed by the Utility contingent up time and resource availability.”

As it turned out, the Default CPP rate was not required in 2005. SDG&E therefore filed new program tariffs to request all customers >200 kW be able to participate in the program. This was approved and SDG&E staff then adjusted their marketing accordingly (with a heavy emphasis on assigned accounts).

Billing and IT System Changes. Systems had to be created and reprogrammed to accommodate 20/20 baseline calculations. Key changes included:

- New screens were created (BIDR).
- Existing accounting system interactions were modified
- New rebate tracking methodologies were created

- System changes were enacted to accommodate participation in multiple programs
- Billing statements were modified to accommodate 20/20 bill messages

This program implementation period was limited to 2005 and development efforts were constrained by both time and funding.

Marketing. Marketing efforts sought to avoid confusing customers regarding summer program participation (especially with the undefined Default CPP rates). Careful attention was made to dissuade those customers that were interested simply in getting IDR meters installed as opposed to load reduction. The program was characterized by staff as having a message that was difficult to understand, i.e. customers needed to reduce 20% against an unknown baseline. Because customers may not have known their specific peak energy use, general tips and guidelines for peak reduction were provided as part of the program communications messaging.

Direct mail was conducted in February and March to recruit customers. As noted above, this was necessary to be able to install meters in the spring so that customers could participate during the summer months. The program first marketed to customers with average maximum demands of 20 – 200 kW. Subsequently, with the determination that CPP would not be implemented in 2005, account executives were involved in recruiting customers with demands in excess of 200 kW who had IDR meters installed and were not participating in other DR initiatives.

Postcard reminders were sent to enrolled customers in July, August, and September in order to keep awareness of the program fresh. In these mailings, customers were provided with tips on how they might achieve the 20% reduction. Additionally, there were recommendations for no-cost items as well as those requiring some investment. Certificates were mailed to participating customers if they succeeded in meeting the 20% reduction target.

A review of the program marketing materials indicates that many of these tips centered on efficiency measures (installing energy efficient lighting) as opposed to steps that focus on demand response objectives. While the message to conserve is important, the reality is that buying and installing energy efficient lamps does not actually help the customer achieve a 20% peak reduction because installing these lamps also lowers the baseline values upon which the peak reduction is calculated.

Direct access (DA) customers were eligible for the SDG&E C&I 20/20 Program but the DA portion of the rebate budget was left out of the initial CPUC Decision. SDG&E had to delay marketing to DA customers until this item was handled within Regulatory. To avoid delays in launching the program outreach, it was determined to create two versions of the marketing collateral: one where DA is

eligible and one without DA The non- DA campaign was launched on time and the DA eligible campaign was launched when the filing discrepancy was cleared up.

In order to respond to inquiries, SDG&E's call center needed extensive procedures to prepare for customer calls. Internal employee education was also needed since many internal groups were not familiar with demand reduction programs, generally, and or with 20/20 program specifically. It was especially challenging during this education process to let staff know how this program was different from previous 20/20 efforts, specifically that the program design utilized baselines and specific event triggers that were intended to minimize "free riders".

8.3 SDG&E C&I 20/20 Program Key Program Design and Policy Issues

A broad number of topics were discussed during these interviews. Below is a synthesis of key issues:

- Peak-day Event Determination
- Customer Notification
- Baseline and Rebate Calculation
- Net vs. Gross Savings
- Limited Customer Access to Real-Time Data
- Participation in Multiple Programs
- Value of DR and this Program to SDG&E

Peak-day Event Determination. Since the SDG&E C&I 20/20 Program is classified as a "day-ahead" program, much of the success of the program is determined, ultimately, by the success with which the utility is able to forecast the weather and load conditions that create peak demand situations. A regression analysis was performed to determine the conditions under which a peak day event would be called. This analysis identified a high correlation between the 13 highest day-ahead forecast weather temps and system peaks. It was therefore determined that a peak day event would be called (triggered) by the following conditions:

- The forecast temperature at Miramar (weather.com) for the following day is 84 degrees or above, and
- The system peak for the current day hit 3620 MW.

It was noted that the 84 degree temperature does not seem high enough to warrant a system constraint, and the Miramar forecast systematically under-forecasted the next day temperature (i.e., an 84 degree forecast is more often 90 degrees). The day-ahead forecast approach was deemed only marginally effective in accurately forecasting system constraints.

Shifting to a day-of trigger may address some of the issues but may also make the program less reliable because customers may not be able to respond on such short notice.

Customer Notification. Customers were notified of the day-ahead event through a combination of communications consisting of emails, pages, and personal contact from account executives. From the perspective of utility staff, these approaches worked well in communicating with customers.

Baseline and Rebate Calculation. Customers receive a financial rebate to reduce their baseline energy usage by 20% over a calculated baseline. If event-day consumption drops equaled at least 19.5 % (rounded up to 20%), then a customer would receive the 20/20 rebate. If more than one event occurs during a billing cycle, the average reduction for all events is calculated as the reduction value. The rebate provides a 20% discount on the following components of the customer's bill:

- On-peak UDC charges (T&D)
- On-peak demand charges
- On-peak commodity charges (except direct access customers)

If a customer achieved more than 20% savings, the rebate was still limited to 20%. Three bill messages were designed, one for each of the following scenarios:

- Qualified - met the 20% for the month -- "Congratulations! You reduced electricity use by XX% for bill ending mm/dd/yy. You've earned a Peak Day 20/20 credit for meter #000000000."

- Insufficient load reduction that month (did not meet the 20% target) – "You reduced electricity use by XX% for bill ending mm/dd/yy. Unfortunately, you have not earned a Peak Day 20/20 credit for meter #000000000. For more energy-saving tips, visit our Web site at …."

- No events -- "There were no 20/20 Peak Day events for bill ending mm/dd/yy. Thank you for your continuing efforts to conserve energy."

The definition of the program baseline is perhaps one of the most controversial issues of this program. The baseline for the customer usage is defined as the average of the 3 highest usage days during the ten previous non-event business days, during the 11am – 6PM local time peak period.

The baseline calculation utilized for this program is the same as that used for other day-ahead programs. There is substantial debate as to whether or not these baseline criteria accurately represent what a customer's load would have been on the actual day of the event. If, for example, a customer's three highest

loads occurred on mid-week days, and the event is called for a Friday (as three of the four events were during 2005), then the baseline may not be a good measure of what the customer's load would have been in the absence of the program. This could make it easier or harder for the business to make the 20% reduction threshold. To better understand the impacts of this definition, one element of our evaluation (presented in Section 10.4 of this report) is an analysis of program impacts assuming varying baseline definitions.

Net vs. Gross Savings. There are a number of possible methods that may be used to estimate program savings. Ideally, program savings would reflect the change in use among those enrollees who intentionally took action to reduce savings on the trigger day, mirroring the "active" participant defined for the 20/20 Statewide programs. In addition, there are actions taken by active businesses that are incidental to the program and should not be incorporated into the program-related benefits. A good example of this effect is the savings realized by firms who have lower loads on Friday. However, given the short time frame for completing this study, we were not able to field the detailed surveys that are necessary to establish motivation and opportunity or to establish a comparison group to reflect the changes in peak period consumption of inactive businesses. The effects of the incidental reductions may be partially mitigated by normalizing use for differences in schedules.

Unlike the 20/20 Statewide programs, free ridership is not likely to be a significant factor for the SDG&E C&I 20/20 program. As discussed in the earlier section on the Statewide Program, free ridership reflects those participants who would have taken the action to reduce savings without the 20/20 program. Businesses that generally try to conserve energy will have a lower baseline, but there is no reason to assume that they would reduce usage suddenly on an event day in the absence of some type of stimulus. While the degree of motivation to reduce usage upon request and the ability to shed load with only one-days' notice varies widely from one business to the next, neither of these factors are criteria for defining free ridership.

Given these limitations, we identified two strategies for estimating program savings: 1) adding the net change for all enrolled customers, regardless of whether their use went up or down ("All Enrollees") and 2) estimating the gross savings only for participants who met the threshold and received the rebate ("Rebated Savers"). In the next section, we describe the pros and cons of each of these methods, the results from the two analytical methods and the statistical approach used to estimate savings.

The real truth to this argument is that neither the "All Enrollees" nor the "Rebated Savers" captures the real effects of the program. To calculate the true savings, it is still necessary to determine and subtract any free-ridership and incidental savings included in the Rebated Savings total, and to include program-related savings achieved by those firms that did not reach the threshold.

Limited Customer Access to Real-time Data. As noted above, not all of the IDR meters installed for this program had the communication capabilities required to support real-time customer access to their baseline and usage profile via Kwikview, SDG&E's online bill viewing software. This decision was largely an economic one, based upon the higher capital cost of communication-enabled meters and the installation costs associated with the time and expense of installing communication lines. At this time, cellular-based technology is considered by SDG&E to be less than reliable and the relative cost of a landline connection expensive. Adding the communication feature meant an increase in installation cost of over $1000 per meter from an average of $400 to around $1400 per meter. Also, because the landline connection requires coordination of multiple parties to facilitate the installation, installation of the communication lines would have slowed significantly meter installation.

The impact of this decision is the source of some debate among SDG&E staff. While some maintain that the ability of customers to reduce their loads depends upon having access to real-time data, others are of the opinion that such information is of limited usefulness, and that resources are better spent informing customers of specific steps that they may take to reduce their loads.

Participation in Multiple Programs. One issue addressed during program design and implementation was that of customer participation in multiple demand response programs. Initially, customers could not participate in existing DR programs and 20/20 concurrently. SDG&E pursued the allowance of multiple program participation late in the program year based on feedback from interested customers. SDG&E worked with the Energy Division in designing acceptable methodologies for Peak Gen and the Demand Bidding program participants to also enroll in 20/20. The concern of the utility was minimizing customer confusion, avoiding double rebates, and eroding participation in the other DR efforts by large customers. The favorable rates given for 20/20 were causing some large customers to want to abandon the other DR options and enroll in 20/20. SDG&E filed a modified tariff to allow participation in the multiple programs. The tariff established the policy that if 20/20 was called a day ahead, and then a day-of event was called, the day-of program would take precedence over the 20/20 Program. This policy was not tested in 2005 since the conflict was never encountered.

Value of DR and this Program to SDG&E. A key issue that arose from our discussions with program staff is the uncertainty regarding the value of demand reductions to SDG&E. This, in turn, makes it difficult to determine the cost effectiveness of the program and the appropriateness of the rebates provided. If the demand reductions achieved by the program were truly deferring capacity needs at the margin on an extreme usage day, we can envision that these reductions would provide considerable value. If, however, the reductions are

achieved at a time when these reductions have only marginal value, then it may be that the rebates are not warranted.

One perspective that was captured during our interviews is that this program may be viewed as one of many steps (and investments) that will be necessary as the utility evolves toward a different type of relationship with its customers; one in which pricing fluctuates according to usage and market prices. When this type of pricing is in place, then all the issues regarding advance awareness of emergency-mitigating programs dissipate, and customers are reinforced for being knowledgeable decision makers.

One of the factors limiting the value of this program is that, since it is a day-ahead program, it cannot be used to address system constraints that occur on a Monday since a majority of the enrolled customers would be closed on the day ahead when notification would need to be sent out. This limitation could be overcome if the program were changed to a day-of program in which notification was sent to customers early on the morning of an event day. This would also provide potentially greater accuracy in establishing whether or not the demand reduction was truly needed. The ability of customers to respond to such a modified approach was explored in our customer survey, the results of which are reported later in Section 9.2.7.

8.4 SDG&E C&I 20/20 Program Applicability to Other Utilities

As noted earlier, there is some interest in the results of SDG&E's C&I 20/20 Program as a possible model for other utilities. Ultimately, the applicability of the SDG&E C&I 20/20 program to other utilities will depend upon a variety of factors, including:

- Certainty of load shape impacts -- To ensure that the potential economic value of the program is attained through peak demand reductions, the utilities need to demonstrate the load shape impacts of the program.

- Minimization of transaction costs -- SCE staff highlighted a desire to move away from customers enrolling in DR programs. This is because the enrollment process is viewed as being costly and, when added to the financial rebates provided, limits the economic value of the program. For this same reason, SDG&E has expressed an interest in automating the enrollment process so that this is less labor intensive.

- Interval metering capability -- The feasibility of this program is limited, from a technical perspective, by each utility's metering capabilities. While PG&E has deployed AMR technology in recent years, SCE does not yet have the same level of capability, particularly among customers with demand less than 200kW.

- Conflict with other DR programs -- It was noted that SCE and PG&E may be more challenged than SDG&E in sorting out potential conflicts between a Peak Day 20/20 initiative and other DR initiatives. This may ultimately limit the transferability of this model.

- Use of “crisis” appeal must be limited to ensure legitimacy -- The effectiveness of 20/20 programs is driven, in part, by a sense of urgency or potential crisis. In order to maintain the credibility of this message, then it will be important that the utilities limit the use of this appeal for times when peak load conditions truly pose a potential threat to system reliability. If the program is to be utilized on a more active basis, as something other than an emergency demand response tool, then the marketing message will need to be modified.

8.5 Summary and Recommendations on SDG&E C&I 20/20 Program

- Screen customers – Requiring customers to apply for the program, including the submission of a plan identifying how they intend to reduce their loads, may help to minimize free riders and ensure the reliability of program-induced savings. Survey results indicate that customers who have been able to identify a relatively short list of steps for reducing their load have had the most success with this program.

- Determine the economic value of load reductions – Without a deeper understanding of the economic value of the loads that are shed in response to these programs, it is impossible to gauge the appropriateness of the rebates.

- Link auditing and technical assistance programs to DR – to the extent that program success is dependent upon customers’ knowledge about ways in which their loads may be reduced, customer education may be an important factor for success. This may be accomplished through providing customer audits to identify specific demand reduction measures that will enable the customer to meet specified targets.

Section 9: The San Diego Gas & Electric C&I 20/20 Survey

This section reports the results of the customer surveys conducted with selected participants of the SDG&E C&I 20/20 Program. The summary of the approach is highlighted below, followed by the results.

9.1 Survey Approach

9.1.1 Survey Purpose and Content

The survey was designed to provide process and marketing information on who is participating.

The survey contained questions related to the following topics:

- Screening
- Participation
- Marketing / Enrollment
- Event Notification
- Utilization of Kwikview
- Rebates
- Suggestions for Program Improvement

Information regarding this survey can be found in Appendix C.

9.1.2 Sample Design

The initial dataset containing the SDG&E C&I 20/20 Program data included 1026 unique account numbers. Off these, 272 accounts (27%) had a least one event in which they reduced peak load by 20%.

A sample was needed to select cases for the survey. Since the impact analysis was based on all of the enrolled accounts, the sampling approach for the survey did not affect the impact results. The actual sample was pared down in two ways. First, many of the accounts represent multiple accounts at a single firm or institution. For example, a school district registered 76 accounts. We collapsed the account information into an individual case by randomly selecting one account. When some of a firm's accounts were successful and others were not, we made sure that the selected case was successful at least once. Second, we pulled from the sample the twelve firms that achieved the largest savings reductions. These 12 firms were isolated so that they could be contacted as part of the process interviews.

The list of firms to call for the survey consisted of 361 firms that had no accounts with a successful reduction, and 159 firms with at least one successful event. The quotas for interview were set at 50 successful firms and 25 unsuccessful firms. The final completed sample contains 56 records of successful firms and 31

records of unsuccessful firms. In addition, six unsuccessful firms were terminated because no one at the firm could remember participating in the SDG&E C&I 20/20 program.

There are no weights applied to these results. Accordingly, the results presented are not necessarily representative of the entire population of participating SDG&E C&I 20/20 firms or accounts. The savings assessment in Chapter 10 includes all participating accounts and is representative of the program impacts.

9.2 Results of the SDG&E C&I 20/20 Program Survey

9.2.1 Screening Questions

The first set of screening questions was designed to identify the most appropriate person to respond to the survey. Following this identification process, an additional question was asked to determine whether the respondent recalled participating in the program. If the response was positive, the survey proceeded. Six firms that had signed up for the SDG&E C&I 20/20 Program, but had never successfully lowered use and could not recall participating in the program. These interviews were terminated and not included in the analysis.

9.2.2 Participation

After the initial screening, customers were asked questions related to their actions on the trigger events days. To explore a customer's general understanding of how the process works, they were asked how many "load reduction trigger" events they recalled. The results are illustrated in Table 9.1, below. Given there were four events, one would hope that the majority of customers recollected four notifications. However, only 23% of the surveyed firms remembered all four. Surprisingly, 11% of the respondents believe they were notified more often than the four curtailments.

Table 9.1: Recollection on Notification of Trigger Events

Number of Perceived Events	Savings Status					
	Never Successful		Successful at Least Once		Total	
	Number	%	Number	%	Number	%
0	2	6.5%	6	10.7%	8	9.2%
1	4	12.9%	2	3.6%	6	6.9%
2	7	22.6%	11	19.6%	18	20.7%
3	4	12.9%	11	19.6%	15	17.2%
4	**7**	**22.6%**	**13**	**23.2%**	**20**	**23.0%**
5	3	9.7%	1	1.8%	4	4.6%
6	0	0.0%	4	7.1%	4	4.6%
8	1	3.2%	0	0.0%	1	1.1%
10	0	0.0%	1	1.8%	1	1.1%
Don't Know	3	9.7%	7	12.5%	10	11.5%
Total	31		56		87	

Customers were asked how often their business was open during the load reduction trigger events. These results were compared to the number of events from Table 9.1. Only three firms noted that they were closed on one of four event days.

The follow-on question was whether the respondent recalled making an effort to reduce energy during an event. Respondents were first told that there were four trigger events in 2005. They were then asked" How many of these trigger events did you attempt to reduce your energy use?" The responses, shown in Table 9.2, suggest that a high level of effort was made to reduce load. These results indicate that only 10 of the 87 interviewed did not attempt to save. There were a total of 348 trigger firm-events, and for 256 of these (74%), the firms were trying to reduce their use. Another interesting finding is that conservation efforts were made for same percentage of events both by firms that successfully achieved at least one 20% reduction and those that never did.

Table 9.2: Number of Events Where Firm Tried to Reduce Use

Number of Perceived Events in Which They Tried To Reduce	Savings Status					
	Never Successful		Successful at Least Once		Total	
	Number	%	Number	%	Number	%
0	3	9.7%	7	12.5%	10	11.5%
1	3	9.7%	3	5.4%	6	6.9%
2	4	12.9%	9	16.1%	13	14.9%
3	6	19.4%	2	3.6%	8	9.2%
4	15	48.3%	35	62.5%	50	57.5%
Total	31		56		87	

9.2.3 Program Activity and Success

A notable difference arises in the responses when examining whether an organization has a specific plan in place to reduce load. Customers that have a management plan in place appear more likely to succeed during the curtailment events (63 percent to 55 percent). This is illustrated in Table 9.3.

Table 9.3: Plan in Place to Reduce Load

Response	Savings Status				
	Never Successful		Successful at Least Once		Total
Yes	17	55%	35	63%	52
No or Don't Know	14	45%	21	37%	35
Total	31		56		87

In addition to a load reduction management plan, customers described steps taken to reduce loads during curtailments. These actions are illustrated in Table 9.4. A few observations related to the table include the following:

- Those customers that notify employees to reduce energy loads appear more likely to succeed.
- Facilities appear more likely to succeed by focusing on shutting down high-load equipment or altering their production/operation schedule.
- Those customers that focus on lighting reduction or installation appear less likely to succeed.

Table 9.4: General Steps Taken to Reduce Load

Response (multiple responses accepted)	Savings Status					
	Never Successful		Successful at Least Once		Total	
Shut down equipment	2	3.3%	9	7.4%	11	6.0%
Altered production/operation schedules	1	1.6%	8	6.6%	9	4.9%
Reduced fan use	1	1.6%	2	1.6%	3	1.6%
Turned down lights	24	39.3%	37	30.3%	61	33.3%
Turned down air conditioning	17	27.9%	32	26.2%	49	26.8%
Notified employees to reduce energy use	9	14.8%	24	19.7%	33	18.0%
Installed energy efficient lights	3	4.9%	3	2.5%	6	3.3%
Installed energy efficient equipment	2	3.3%	1	0.8%	3	1.6%
Turned down refrigeration	1	1.6%	2	1.6%	3	1.6%
Used emergency generator	0	0.0%	1	0.8%	1	0.5%
We did nothing / No answer	1	1.6%	3	2.5%	4	2.2%
Total	61		122		183	

Some specific examples of actions taken during curtailments are listed below.

- "Dishwasher, shredder, and copy machines were turned off. Any machine except for the computers was turned off."
- "Fast injection loading machines were stopped and restarted later - after the events."
- "Machines are used at fifty percent. We shut down 50% of machines that manufacturer [the product]."
- "Ran machines at night instead of during the day."
- "Running equipment on evening hours and put timers on equipment."

An important question is whether customers believe they were successful at the time of the trigger events. A summary of their responses is shown in Table 9.5. Some participants experienced a relatively high degree of uncertainty regarding their success. This conclusion is supported by the number of Don't Know responses (29 percent in total), and further bolstered by the 26% of respondents that believe their companies were unable to achieve the 20% reduction in any trigger events when in fact they did succeed at least once. Furthermore, there were more non-savers that thought they had reached the 20% than there were non-savers who correctly knew that they had not succeeded.

Further evidence of the poor recognition of program performance is the fact that only eight of the 56 firms that were successful at least once knew the exact number of times they had successfully saved. Part of the confusion for those in the successful category may be that they manage more than one successful account. We did not point them to a specific account when asking this question.

Seventeen of the 56 firms in the successful group did have more than one account registered as eligible.

Table 9.5: Success at Reaching 20% Goal

Number of Events	Savings Status			
	Never Successful		Successful at Least Once	
	Reported	Actual	Reported	Actual
0	10	31	13	0
1	5	0	4	24
2	2	0	8	14
3	3	0	6	13
4	1	0	10	5
Don't Know	10		15	
Total	31	31	56	56

Customers were asked what steps they took to prepare for a trigger event. A summary of their responses is shown in Table 9.6. By far the most common response was notifying employees prior to the event. Other responses included:

- Turning off lights
- Changing control systems
- Initiating an internal audit

Table 9.6: Steps to Prepare for Trigger Event

Response (Multiple Responses Accepted)	Savings Status					
	Never Successful		Successful at Least Once		Total	
Notified employees	20	62.5%	40	65.6%	60	64.5%
Altered shift schedules	1	3.1%	6	9.8%	7	7.5%
Nothing	4	12.5%	12	19.7%	16	17.2%
Other (please specify)	2	6.3%	1	1.6%	3	3.2%
Turned Down AC	4	12.5%	2	3.3%	6	6.5%
Don't Know	1	3.1%	0	0.0%	1	1.1%
Total	32		61		93	

The in-depth interviews of the 12 largest savers found that a couple customers were able to reduce an unusually large portion of their load, because they were not open on Fridays. (Three of the four events happened on a Friday). This observation led to asking customers about their business operations on a typical Friday. The results are shown in Table 9.7. As evident from Table 9.7, a larger

proportion of savers (almost 29%) operate on a lower than normal schedule or capacity on Fridays.

Table 9.7: Business Operations on Friday

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Operating on normal schedule / capacity	23	74.2%	35	62.5%	58	66.7%
Operating on a HIGHER than normal schedule / capacity	5	16.1%	5	8.9%	10	11.5%
Operating on a LOWER than normal schedule / capacity	3	9.7%	16	28.6%	19	21.8%
Total	31		56		87	

9.2.4 Program Materials Received

Customers were also asked whether they recall receiving any recommendations from SDG&E regarding ways to reduce energy loads. These results are listed in Table 9.8. A majority of the customers recall receiving information. Responses are similar for both groups.

Table 9.8: Recollection of Information to Reduce Loads

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Yes	23	74.2%	40	71.4%	63	72.4%
No	7	22.6%	14	25.0%	21	24.1%
Don't Know	1	3.2%	2	3.6%	3	3.4%
Total	31		56		87	

In addition to their recollection, customers were asked if the information they received was helpful. Table 9.9.shows that both savers and non-savers express that the materials are useful (close to 80 percent overall), however, only one-third of savers and one-fifth of non-savers found the material very helpful.

Table 9.9: Usefulness of Information

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Very helpful	5	21.7%	14	35.0%	19	30.2%
Somewhat helpful	14	60.9%	17	42.5%	31	49.2%
Not very helpful	1	4.3%	7	17.5%	8	12.7%
Not at all helpful	2	8.7%	1	2.5%	3	4.8%
Don't know	1	4.3%	1	2.5%	2	3.2%
Total	23		40		63	

All of the respondents were asked whether there was additional information that SDG&E could provide that would be useful. Fifteen customers expressed ideas. Quotes that illustrate the recurring themes from customer feedback include:

- “A bar graph that shows our usage comparing July 05 vs. July 04.”
- “Computer analysis of our company to compare our usage with others. A way of knowing how much electricity usage we are using.”
- “To know of the amount of watts I am using and to know how much I am reducing. Notifying after the fact via phone how much energy was reduced. A courtesy call would be nice. I don’t know how much I am saving or using. A table of how much [energy] appliances use.”
- “More creative information on how to reduce my energy without losing my customers and productivity. How do I reduce my demand costs, when I shut down my equipment during the peak times?”
- “Better notification of trigger events.”

9.2.5 Barriers to Participation

To explore possible barriers to participation, customers were asked to provide the primary factor that prevented participation in all of the events. There were 37 responses to this question, as shown in Table 9.10. By far the most common response was no awareness of trigger event. Other reasons are listed below:

- Not having an established management plan for load reduction, and
- Not open or operating during one of the four events.

Table 9.10: Reasons for Non-participation in All Four Events

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Not aware of other events	10	62.5%	16	76.2%	26	70.3%
Could not alter schedules	2	12.5%	2	9.5%	4	10.8%
Not notified far enough in advance	1	6.3%	0	0.0%	1	2.7%
Did not get signed up in time	0	0.0%	1	4.8%	1	2.7%
Other (please specify)	1	6.3%	1	4.8%	2	5.4%
Don't Know	2	12.5%	1	4.8%	3	8.1%
Total	16		21		37	

A related question was why customers were unable to achieve the full 20% reduction to qualify for the financial rebate. As shown in Table 9.11, the most common response for the Successful group was their inability to identify loads to shed. For the non-savers, the most common response is they did not have the load available on the trigger event day.

Table 9.11: Reasons for Not Achieving 20 Percent Load Reduction

Response	Savings Status					
	Was Never Successful		Was Successful at Least Once		Total	
We did not know how to identify loads to shed	3	21.4%	7	38.9%	10	31.3%
We did not have the load available to shed	4	28.6%	2	11.1%	6	18.8%
We could not alter schedules	2	14.3%	4	22.2%	6	18.8%
It was too hot to reduce AC	3	21.4%	1	5.6%	4	12.5%
Loads we planned to reduce were not available for reduction	0	0.0%	1	5.6%	1	3.1%
We were not notified far enough in advance	0	0.0%	1	5.6%	1	3.1%
Don't Know	2	14.3%	2	11.1%	4	12.5%
Total	14		18		32	

9.2.6 Marketing / Enrollment

A series of questions were asked to assist with the design of future program marketing efforts. Customers were asked how they first found out about the program. The results are shown in Table 9.12. Correspondence from SDG&E

was the most common response overall. Note that a higher percentage of savers indicated e-mail and personal contact as methods for learning about the program. Other responses included the SDG&E website and heard from a colleague or friend.

Table 9.12: First Source of Information Regarding the Program

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Letter from SDGE	23	74.2%	37	66.1%	60	69.0%
Email from SDGE	1	3.2%	5	8.9%	6	6.9%
Personal contact from Account Representative	3	9.7%	9	16.1%	12	13.8%
Newspaper	1	3.2%	1	1.8%	2	2.3%
Other (please specify)	3	9.7%	2	3.6%	5	5.7%
Don't know	0	0.0%	2	3.6%	2	2.3%
Total	31		56		87	

Customers were asked their primary reason for enrolling in the program. Not surprisingly, the financial rebate is indicated most often. In addition, as Table 9.13 illustrates, almost 36 percent expressed being a good corporate citizen as a reason for participating.

Table 9.13: Primary Reason for Enrolling in the Program

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Receive financial rebate	19	61.3%	33	58.9%	52	59.8%
To be a good corporate citizen	11	35.5%	20	35.7%	31	35.6%
Aid in stabilizing the electric grid	0	0.0%	1	1.8%	1	1.1%
Don't know	1	3.2%	2	3.6%	3	3.4%
Total	31		56		87	

Other responses generally suggest some customers have a minimal understanding of the difference between energy efficiency and load reduction. Support for this observation is illustrated in Table 9.14, where we asked customers to state in their opinion, “How does a load reduction program differ from an energy efficiency program?” A much higher percentage of successful firms identify load reduction as reducing peak or temporary in nature as opposed to non-savers (55.4 percent to 32.3 percent). A lower percentage of savers also responded “Don’t Know.”

Table 9.14: Comparing Load Reduction to Energy Efficiency

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Load reduction reduces peak demand rather than savings	7	22.6%	17	30.4%	24	27.6%
Load reduction is temporary	3	9.7%	14	25.0%	17	19.5%
There is no difference	2	6.5%	3	5.4%	5	5.7%
Other (please specify)	5	16.1%	7	12.5%	12	13.8%
Load reduction does not require a capital investment	1	3.2%	0	0.0%	1	1.1%
Don't know	13	41.9%	15	26.8%	28	32.2%
Total	31		56		87	

The final question related to marketing and enrollment involved the firm's likelihood of participating in this same program again. The results are listed in Table 9.15. A vast majority (over 93 percent) are at least somewhat likely to participate again in this program. The biggest difference is that non-savers tend towards somewhat likely while savers tend towards very likely.

Table 9.15: Likelihood of Participating Again

Response	Savings Status					
	Was Never Successful		Was Successful at Least Once		Total	
Very likely	21	67.7%	48	85.7%	69	79.3%
Somewhat likely	7	22.6%	5	8.9%	12	13.8%
Somewhat unlikely	1	3.2%	0	0.0%	1	1.1%
Very unlikely	2	6.5%	3	5.4%	5	5.7%
Total	31		56		87	

9.2.7 Event Notification

Program participation hinges on customers being aware of called events. Customers were asked how they were notified of the load reduction trigger events. Their first response was recorded and the results are shown in Table 9.16. Surprisingly, a large percentage of non-savers indicate a phone call from SDG&E (45 percent). The expectation may be that the more personal the contact, the higher the rate of participation.

Table 9.16: Method of Notification Remembered First

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
E-mail from SDGE	14	45.2%	35	62.5%	49	56.3%
Phone call from SDGE	14	45.2%	13	23.2%	27	31.0%
Personal contact from Account Rep	1	3.2%	2	3.6%	3	3.4%
Were not notified	2	6.5%	5	8.9%	7	8.0%
Regular Mail	0	0.0%	1	1.8%	1	1.1%
Total	31		56		87	

The follow-up question was to identify the preferred method of notification. Customer responses are summarized in Table 9.17. The one item of note is the suggestion of a combination phone and e-mail communication. This response may imply the combination could reinforce the importance of the event.

Table 9.17: Preferred Method of Notification

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
E-mail	13	41.9%	36	64.3%	49	56.3%
Phone call	13	41.9%	11	19.6%	24	27.6%
Combination of phone and email	2	6.5%	6	10.7%	8	9.2%
Page/Beeper	1	3.2%	0	0.0%	1	1.1%
Fax	0	0.0%	1	1.8%	1	1.1%
Other (please specify)	2	6.5%	2	3.6%	4	4.6%
Total	31	100.0%	56	100.0%	87	100.0%

Most customers indicated that notification one day in advance is enough time to reduce loads (70 percent overall), as shown in Table 9.18. Some customers (almost 30 percent) would like even more advanced notification.

Table 9.18: One Day Advanced Notification Sufficient to Participate

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Yes	23	74.2%	38	67.9%	61	70.1%
No	8	25.8%	18	32.1%	26	29.9%
Total	31		56		87	

Finally, customers were asked what percentage load reduction they could achieve if SDG&E was only able to announce the trigger at 6 am of the day of the load reduction trigger. As illustrated in Table 9.19, approximately 49 percent of the customers could achieve at least 50 percent of what they were able to achieve with a full day notice.

Table 9.19: Savings Achievable with Same Day Notification

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
None	5	16.1%	3	5.4%	8	9.2%
1-25%	7	22.6%	6	10.7%	13	14.9%
26-50%	4	12.9%	7	12.5%	11	12.6%
51-75%	1	3.2%	3	5.4%	4	4.6%
76-99%	1	3.2%	3	5.4%	4	4.6%
100%	9	29.0%	24	42.9%	33	37.9%
Don't know	4	12.9%	10	17.9%	14	16.1%
Total	31		56		87	

9.2.8 Utilization of Kwikview

One of the benefits of participation is that customers receive a copy of the Kwikview software that they can use to monitor loads during an event or whenever they choose. Customers were asked first if they were familiar with this software and these results are shown in Table 9.20. An overwhelming majority (almost 87 percent) were not familiar with the software. The low use of Kwikview may also be related to the fact that most interval meters installed specifically for this program did not have the communication hardware that would allow a customer to have a real-time look at their usage patterns.

Table 9.20: Familiarity with Kwikview

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Yes	2	6.5%	9	16.1%	11	12.6%
No	29	93.5%	47	83.9%	76	87.4%
Total	31		56		87	

The eleven customers that expressed familiarity with the software were asked if they utilized the Kwikview software to view usage data. Only four of the customers said yes as shown in Table 9.21. This was followed by whether the

software was useful or not. Three customers said it was very useful and the other customer found it somewhat useful.

Table 9.21: Utilization of Kwikview

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Yes	1	50.0%	3	33.3%	4	36.4%
No	1	50.0%	6	66.7%	7	63.6%
Total	2		9		11	

9.2.9 Rebates

The next set of questions involved the customers' understanding of the rebates. Customers were asked if they recalled receiving a credit on their bill. The results are shown in Table 9.22. Most customers did not recall whether they received the credit.

Table 9.22: Recollection of Bill Credit

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Yes	6	19.4%	16	28.6%	22	25.3%
No	23	74.2%	32	57.1%	55	63.2%
Don't know	2	6.5%	8	14.3%	10	11.5%
Total	31		56		87	

As a follow-up to familiarity with the rebate credit, customers were asked if they understand how it is calculated. Their understanding is expressed in Table 9.23. The majority of customers indicated unfamiliarity with the process.

Table 9.23: Knowledge Related to How Credit Is Calculated

Response	Savings Status					
	Never Successful		Successful at Least Once		Total	
Very Knowledgeable	3	9.7%	2	3.6%	5	5.7%
Somewhat Knowledgeable	8	25.8%	15	26.8%	23	26.4%
Not Very Knowledgeable	7	22.6%	16	28.6%	23	26.4%
Not At All Knowledgeable	11	35.5%	21	37.5%	32	36.8%
Don't know	2	6.5%	2	3.6%	4	4.6%
Total	31		56		87	

To gauge sensitivity to changes in the rebate level, customers rated their likelihood to participate given different percentage reductions in the rebate level. The results are shown in Table 9.24. The percentages shown in the center of the table are the customers at each level that are likely to remain in the program. For example, 67% of the remaining 56 customers are likely to participate if the rebate is reduced by 20%. So at each level of reduction, the utility runs the risk of losing approximately a third of the remaining customers in the program.

Another way of looking at it is to note where customers are likely to drop out (rated the question a likely) if the rebate is reduced. This effect is shown at the far right of the table. It appears that the utility could lose 12 to 13% of the customers at each level of rebate reduction with a spike occurring at 40%. Cumulatively, a 50% reduction in the rebate level could result in 52 of the 87 customers opting out of participation (almost 60 percent).

Table 9.24: Likelihood of Participation at Various Rebate Levels

Reduction in Rebate	Likely or very likely			Unlikely	
	Never Successful	Successful at Least Once	Total	Remaining Customers	% Drop Out
10%	61.3%	66.1%	64.4%	74	14.9%
15%	66.7%	62.0%	63.5%	64	13.5%
20%	66.7%	58.1%	60.9%	56	12.5%
30%	61.1%	60.5%	60.7%	50	10.7%
40%	47.1%	66.7%	60.0%	40	20.0%
50%	72.7%	65.5%	67.5%	35	12.5%

9.2.10 Suggestions for Improving the Program

The last question provided customers the opportunity to suggest program improvements. These suggestions are grouped by similarity and include the following:

- Additional technical information including how to reduce appliance load and other load reducing technologies (ten respondents)
- Information related to program performance and/or recognition—an example given is to provide comparison charts of energy usage, and feed back of success stories from other similar-size companies that were able to achieve the 20% load reduction (eight respondents)
- Better or more communication from SDG&E including where to find credit information on the bill (eight respondents)
- Better or advanced notification including two to three day advance notice of curtailments (seven respondents)
- Larger rebate (four respondents)

- Graduated rebate levels for different levels of participation—10% savings for 10% reduction (three respondents)
- A way of monitoring loads on-site (i.e., Kwikview) (two respondents)
- Additional advertising of program (one respondent)

Section 10: The San Diego Gas & Electric C&I 20/20 Impact Results

This section reports on the impact results for the SDG&E's C&I 20/20 component of the 20/20 Program.

10.1 Program Background

The SDG&E C&I 20/20 program was offered to non-residential customers. Initially, SDG&E planned to make the program available to non-residential customers with demands from 20 kW to 200 kW. It was thought that customers over 200 kW would be placed on Critical Peak Pricing (CPP) rates. This restriction was removed and customers of sizes outside the initial design were permitted to enroll.

The SDG&E C&I 20/20 Program was operated as a "day-ahead" type demand response program where customers were required to enroll. Enrollment was permitted throughout the summer of 2005. Enrolled customers were asked to shed load on specific event days. Notification would occur by phone the afternoon of the day before an event day. Event days were defined as those where the temperature was forecasted to reach at least 84 degrees at the Miramar weather station and the system load was forecasted to reach at least 3,620 MW. The utilities declared four event days during the summer of 2005. These events occurred on July 21st, July 22nd, August 26th, and September 30th. With the exception of July 21st, all events occurred on Fridays.

Table 10.1 shows the actual maximum temperatures and the times at which they occurred on each of the four event days.

Table 10.1: Maximum Temperature on Trigger Event Days

Event Day	Maximum Temperature	Time of Maximum
7/21/2005	91	12:00 PM
7/22/2005	90	12:00 PM
8/26/2005	91	11:00 AM
9/30/2005	89	1:00 PM

Rebates equal to a 20% bill reduction were paid to customers that showed a drop in load of 20% based on a comparison of their actual load to a baseline. The event hours included the seven hours between 11 AM and 6 PM. The baseline was determined on a customer specific basis. To calculate the baseline, the prior 10 business-day, non-event days were taken and the electric consumption across the peak period hours (11 AM to 6 PM) was summed. Next, the three highest consumption days were determined by examining the peak period consumption. The consumption in the peak period for these three highest peak period consumption days was then averaged to produce the baseline. The load

reduction was computed by subtracting the actual load during the event hours from the baseline. The percentage impact was then computed to determine if the enrolled customer was eligible for a rebate payment. If more than one event occurred within a customer's billing cycle, the average reduction of all the events in that cycle had to be greater than 20% to receive the rebate.

10.2 Impact Evaluation Objectives

There are three main objectives to this impact evaluation. These are:

- Validate SDG&E's baseline and impact calculations,
- Evaluate the SDG&E C&I 20/20 program's impacts, and
- Perform a baseline assessment.

10.3 Validation of Baseline and Impact Calculations

SDG&E provided the interval data collected for all enrolled customers along with the baseline calculations for those enrollees who achieved the 20% savings threshold for each of the event days. These data were subsequently used to validate the baseline and impact evaluations.

Direct validation was completed for the list of enrollees that reached the threshold of 20% load reduction or greater. This was sufficient to confirm that the correct methodology was being used.

SDG&E reported enrollment is shown in Table 10.2

Table 10.2: SDG&E Reported Monthly Enrollment

Month	April	May	June	July	August	September
Enrollment	122	379	621	1,114	1,226	1,271

The interval data were reviewed to determine which enrollees had sufficient data for calculating baselines and estimating the impacts of the SDG&E C&I 20/20 program. Additional information supplied for enrollees included SDG&E C&I 20/20 Program start and termination dates as well SIC and NAICS codes. This information was used to summarize the available data. The available data are summarized in Table 10.3.

Table 10.3: Interval Data Summary

Status	Number of Accounts	Percent
Total enrolled with at least some interval data	1,265	100.0
Enrolled w/ data but never reached 20% threshold	933	73.7
Enrolled w/ data and reached 20% at least once	332	26.2
Reached 20% on 7/21/05	130	10.3
Reached 20% on 7/22/05	193	15.3
Reached 20% on 8/26/05	117	9.2
Reached 20% on 9/30/05	163	12.9

An enrolled customer is uniquely defined by its account number and service point number. There were a number of unique sites with multiple channels of recorded interval load data. In these instances, the channels were totalized. The calculation of the baseline was performed for all unique sites. In addition, the event-day peak-period consumption and calculated savings were verified for those sites that were reported to have reached the 20% savings threshold.

Because SDG&E was still installing meters in the middle of the summer, not all of the reported sites had available interval data for each event. Of those with sufficiently available interval data, there were a small number where either the baseline calculation could not be verified or the event-day consumption during the peak period could not be verified. The source of this discrepancy was not investigated due to the limited available time for the overall analysis. These results are summarized in Table 10.4.

Table 10.4: Verified Baseline and Impact Summary

Event	Reported	Available	Verified	Percent of Reported that Are Verified
July 21, 2005	131	130	124	95%
July 22, 2005	195	193	177	91%
August 26, 2005	119	117	114	96%
September 30, 2005	165	163	159	96%
Total	610	603	574	95%

With the baseline and impact methodology and calculations verified, the next step was to summarize the potential impacts based on the sum of the individual enrollees calculated savings. It stands to reason that if the baseline is a good proxy for what a customer's load would have been if a Trigger event was not declared, the sum of all the individual estimated load changes (baseline minus

actual) would be the total net program savings, because it includes reductions and increases of both those who qualified for the rebate and those that did not. This calculation does not, however, distinguish between reductions that were made because of the program and reductions and increases that may have occurred incidentally.

Table 10.5 shows the sum of the baseline consumption, actual consumption and calculated savings over the seven hour peak period for all enrolled. This calculation is the net savings and includes accounts where load increased. For reasons that will be explained in the next section on impact modeling, there were a total of 1,017 enrollees used in this summarization.

Table 10.5: Summary of Baseline, Actual and Savings for All Enrolled

Event	Baseline	Actual	Savings	%Savings
July 21, 2005	1,093,853 kWh	1,090,157 kWh	3,696 kWh	0.34
July 22, 2005	1,093,853 kWh	1,077,474 kWh	16,378 kWh	1.50
August 26, 2005	1,111,653 kWh	1,100,342 kWh	11,312 kWh	1.02
September 30, 2005	1,126,255 kWh	1,089,780 kWh	36,475 kWh	3.24

The baseline, actual consumption, and energy savings can also be expressed in terms of the average hourly demand impacts. This is shown in Table 10.6

Table 10.6: Summary of Average Hourly Demand Baseline, Actual and Savings for All Enrolled

Event	Baseline	Actual	Savings
July 21, 2005	156,265 kW	155,737 kW	528 kW
July 22, 2005	158,808 kW	157,192 kW	2,340 kW
August 26, 2005	158,808 kW	157,192 kW	1,616 kW
September 30, 2005	160,894 kW	155,683 kW	5,211 kW

It should be noted that most of the reduction achieved is due to the performance of a small number of participants. On the first event, 12 enrollees contributed 80% of the reported savings to those who received rebates. On the second, third, and fourth events, 80% of the savings were the result, respectively of the reductions of 34, 10, and 45 customers. The most notable observation was that on all but one event there were two enrollees that contributed between 43.6% and 59.6% of the savings for those that received a rebate. These two accounts were the same customer but in two adjacent buildings with separate electric services.

The distribution of estimated enrollee savings expressed as a percent of their baseline is shown in Figures 10.7 through 10.10

Figure 10.7: Distribution of Savings on July 21, 2005

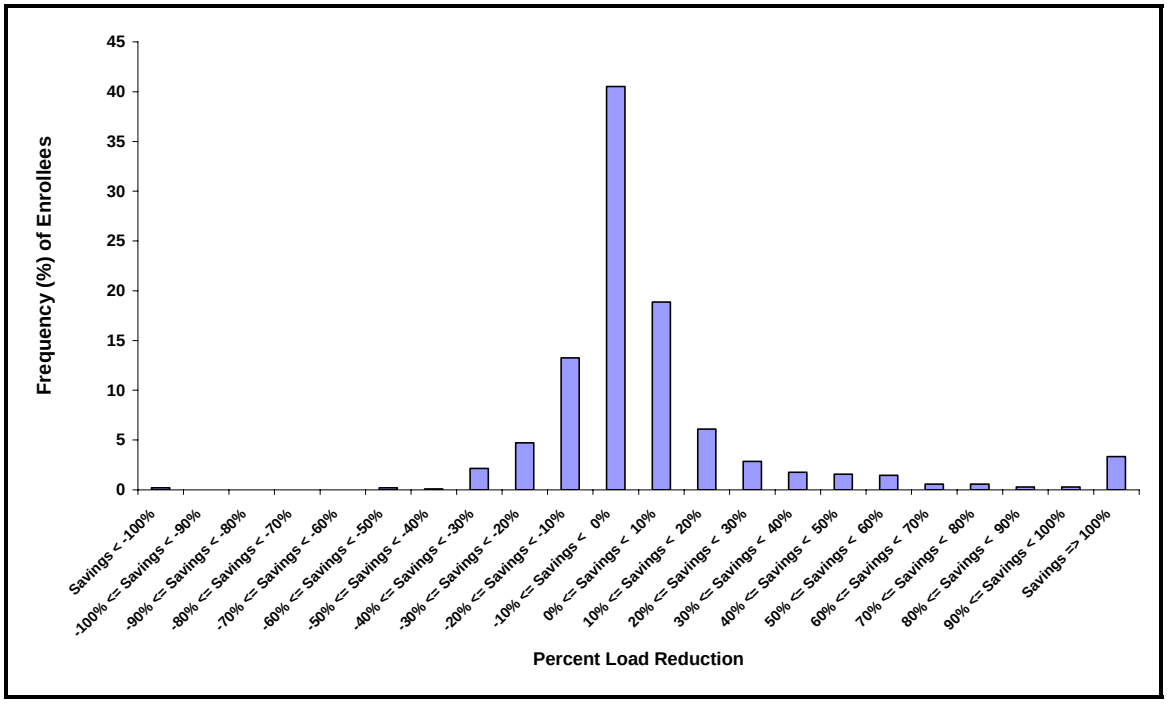


Figure 10.8: Distribution of Savings on July 22, 2005

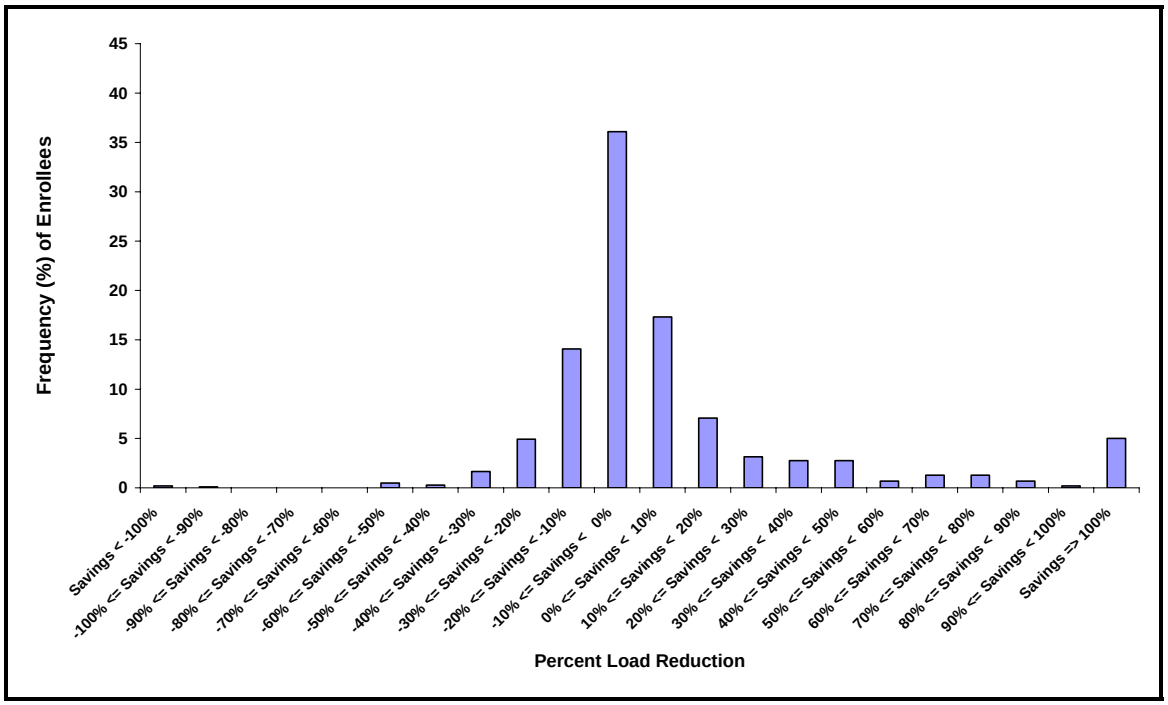


Figure 10.9: Distribution of Savings on August 26, 2005

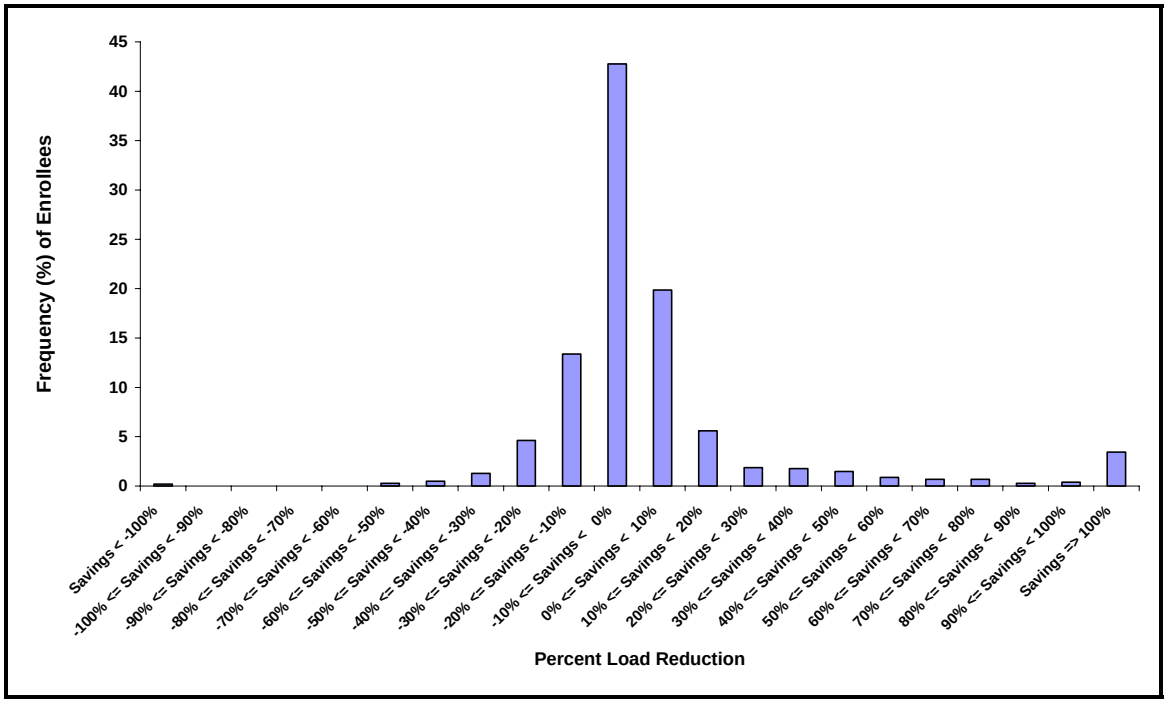
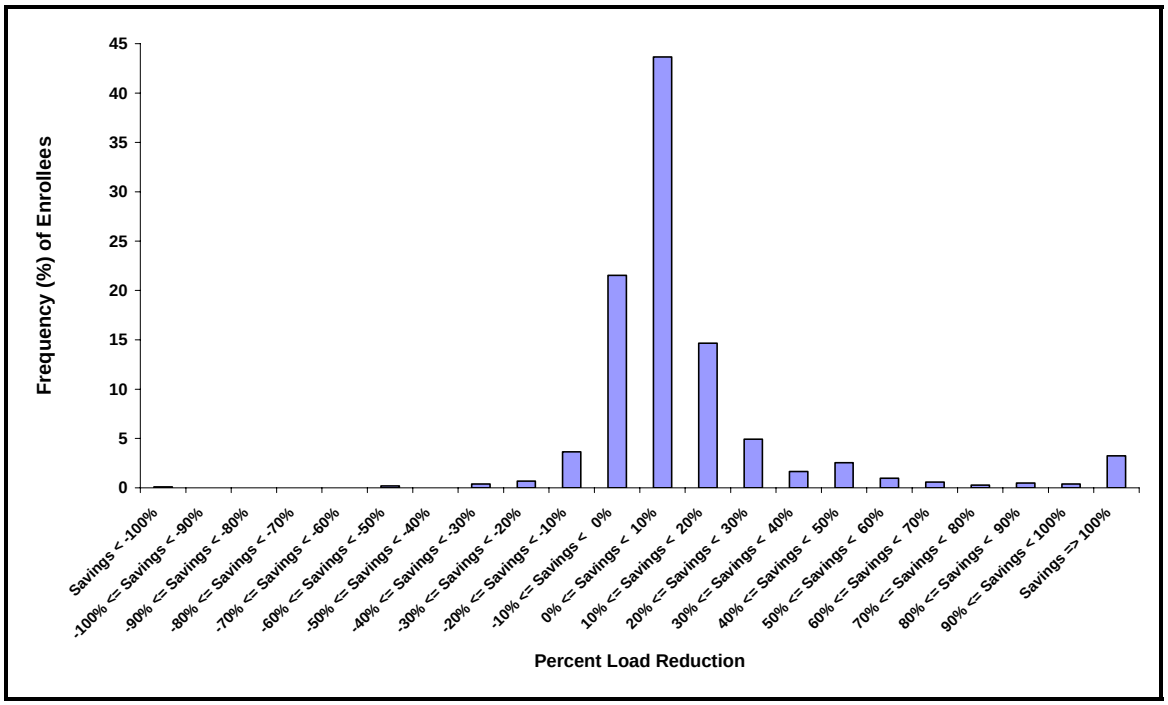


Figure 10.10 Distribution of Savings on September 30, 2005



In Table 10.11, for comparison purposes, the impacts associated with those who reached the 20% savings threshold are shown next to the savings for all enrollees.

Table 10.11: Comparison of Gross and Net Savings

Event	Rebated Savers SDG&E Reported (>= 20%)	All Enrollees SDG&E
July 21, 2005	7,338 kW	-183 kW
July 22, 2005	9,968 kW	2,544 kW
August 26, 2005	7,450 kW	654 kW
September 30, 2005	4,449 kW	7,634 kW

There is heated debate among those involved in the SDG&E C&I 20/20 Program as to whether the gross or net savings, as defined here, are the proper measure of the program's impact. If the baseline is a reasonable proxy, limiting reported impacts only to those who received rebates (using the gross measure) has the potential of overstating the total program impacts. On the other hand, those not qualifying for the rebate include those who took no actions and those who took actions to reach the threshold, but were unsuccessful. Because the program is voluntary, businesses can chose to do nothing. Those that do nothing are effectively not in the calculation. If the load goes down or up, the difference is not attributable to the program. For this reason, neither the gross nor the net savings as defined here is true measure of the program impacts.

10.4 Impact Evaluation of the SDG&E C&I 20/20 Program

In an ideal situation, this study would have conducted a detailed survey of each enrollee and built an econometric model combining billing and survey data as was done in the Statewide 20/20 Program impact assessment. The survey data are needed to differentiate reductions that are program related from other changes in load that are incidental to the program. The budget and timing of the project did not permit us to conduct a large and complex survey of the SDG&E C&I firm's that could have been used for this purpose. Therefore, with the exception of day of the week variations, we cannot separate out the incidental and program related impacts.

To evaluate the program's impacts, a few econometric models were developed. The basic model developed was a load estimation model. The objective was to estimate the loads for the program enrollees in aggregate for each of the four trigger event days during the summer of 2005.

The aggregate load estimation model is almost identical in structure to those used for next day forecasting, but in this case it is used for back-casting. The two

estimation methods presented here differed only in the treatment of the event day hourly load values.

The basic model structure is as follows:

$$ActualHrlyLoad = f\left(MorningLoad, Weather, DayTypes\right)$$

Where:

- $ActualHrlyLoad =$ The actual average hourly load during the peak period for all days.
- $MorningLoad =$ The consumption during the morning pre-event hours (hours ending 9 AM to 11 AM). This captures daily operational differences that are otherwise not known.
- $Weather =$ A series of weather variables such as temperature, dew point, cloud cover, and lagged temperature effect.
- $DayTypes =$ A series of daytype indicator variables to capture differences in load levels primarily due to day to day intra-site activity differences. These are typically weekday, weekend and holiday indicators.

In the first impact estimation method, the loads for the event days were excluded from the analysis. After the model is estimated, the event day variables are used to simulate what the load would have been on the event day had an event not been declared. The impact of the event is then estimated by taking the difference between the simulated load and the actual load on each of the four event days.

In the second impact estimation method, the loads for the event days are included in the analysis. In this instance, indicator variables are included for each of the event days. At the time the model is estimated, the coefficient estimated for each event-day indicator variable takes on the value of the estimated impact. If modeled correctly, the results from these two models should be identical and they were. Because we get identical results, we only present the first application results in Table 10.12 in section 10.4.3.

10.4.1 Data Preparation

Because an aggregate model was being used, it was necessary to only use enrollees that had interval data for all the days in the analysis period and were eligible to participate in each of the four events. If load data were not available for all the days in the analysis period the model would not accurately estimate loads for the aggregate group as a whole.

There were a total of 1,017 enrollees that satisfied these criteria. The final analysis period was July 1, 2005 through September 30, 2005. The range of data was limited to this period primarily due to the fact that most enrollees did not have an interval meter installed before enrolling in the SDG&E C&I 20/20

program. A meter had to be installed after the customer enrolled and enrollment was open during most of the summer.

The weather data used for modeling were from the Miramar weather station in San Diego. The temperature forecasts for this weather station are used to trigger program events. Since the geographic area involved is relatively small compared to that involved with the evaluation of other statewide 20/20 program aspects, it was decided that this would be the single best weather station to use for modeling the SDG&E C&I 20/20 program.

10.4.2 Model Specification

Ideally, the model to use would have been a traditional statistically adjusted engineering (SAE) framework for the estimation of savings. SAE models typically use estimates of loads from engineering and/or thermal load models and adjust the loads on the bases of observed customer-level loads.[20] This is a typical approach for studying panel data where a priori savings estimates (i.e., baseline minus actual) are available. Panel datasets contain many cross-sectional units (i.e., enrollees) with multiple observations for each unit (i.e., daily data). For this framework to work, however, the load data need to be normalized across units or else the size of the savings is highly correlated to the total energy usage of the enrollee and the model will give a false estimation of savings. Usually, normalization is accomplished by dividing all units by their respective square footage. In our case, square footage was not available and this model framework was not selected.

An alternative was to specify an aggregate load model with a similar structure as the SAE framework. For this model, the loads for the individual enrollees are aggregated together by hour into a single time-series dataset. As was mentioned before, all enrollees must have interval data for the entire analysis period in order to rely upon this model. The specific form of the model used in the analysis of the SDG&E C&I 20/20 program evaluation is:

$$\begin{aligned} AvgPkCons_t = {} & \beta_0 + \beta_1 AvgPkTemp_t + \beta_2 LagAvgPkTemp_t + \beta_3 AvgPkDewP_t + \beta_4 AvgPkCloud_t + \\ & \beta_5 AvgMornCons_t + \beta_6 Fri_t + \beta_7 Wkend_t + \beta_8 Holiday_t + \beta_9 July_t + \beta_{10} Sept_t + \\ & \beta_{11} Event721 + \beta_{12} Event722 + \beta_{13} Event826 + \beta_{14} Event930 + \varepsilon_t \end{aligned}$$

where the following definitions apply:

- $AvgPkCons_t$ = average hourly electric load during peak period (11AM to 6PM) on day t.
- $AvgPkTemp_t$ = average hourly temperature during the peak period on day t.

[20] *End-Use Load-Shape Estimation*, Electric Power Research Institute, prepared by Cambridge Systematics, Inc., Christensen Associates, Inc., and Scientific Systems, Inc., Palo Alto, California, January 1991.

- $LagAvgPkTemp_t$ = previous day $AvgPkTemp_t$
- $AvgPkDewP_t$ = average hourly dew point during the peak period on day t.
- $AvgPkCloud_t$ = average hourly cloud cover during the peak period on day t.
- $AvgMornCons_t$ = average hourly morning (8AM to 11AM) load on day t.
- Fri_t = binary indicator for Fridays.
- $Wkend_t$ = binary indicator for weekend days.
- $Holiday_t$ = binary indicator for holidays.
- $July_t$ = binary indicator for days in July.
- $Sept_t$ = binary indicator for days in September.
- $Event721$ = binary indicator for event day on July 21.
- $Event722$ = binary indicator for event day on July 22.
- $Event826$ = binary indicator for event day on August 26.
- $Event930$ = binary indicator for event day on Sept. 30.
- ε_t = a random error term.

The model is designed to control for changes in weather as well as non-weather-related seasonal influences through the inclusion of monthly dummies. In this framework, the coefficient on the event-day indicators can be considered the average hourly load reduction resulting from the program.

The weather variables in the final model came about through a small degree of trial and error. There are numerous temperature constructs that could be attempted. Based on Itron's extensive experience in the area of short term, frequently referred to as next day, forecasting, we limited our search for effective variables to those that we have had success with. Short term load estimation models such as the one described here need to be able to forecast loads at extreme conditions. Their ability to forecast accurately at average or typical weather conditions is usually not difficult. Other temperature variables that were tested included lags from the morning period prior during the same day and the highest temperature within the peak period. Neither of these proved to be any more effective than those in the final model.

When modeling, there are always numerous potential sources for bias. As will be seen later in this section, we attempted to minimize some bias by examining different groupings of participants. The groupings were intended to isolate participants that were potentially more homogeneous.

10.4.3 Aggregate Model Impacts

The aggregate model was estimated using the aggregated load data for 1,017 SDG&E C&I 20/20 program enrollees with complete data spanning July 1, 2005 through September 30, 2005. The results are shown in Table 10.12

Table 10.12: All Enrollee Aggregate Model Results

Variable	Estimate	t-Value
Intercept	-15821	-2.76
AvgPkTemp	603.4	7.91
LagAvgPkTemp	20.3	0.22
AvgPkDewPt	268.6	3.35
AvgPkCloud	-25.5	-3.39
AvgMornCons	0.7241	17.71
Fri	-2007	-3.39
Wkend	-8807	-6.17
Holiday	-11024	-5.54
July	-1272	-2.73
Sept	2260	3.72
Event721	-3905	-2.14
Event722	-7989	-4.08
Event826	-1542	-0.72
Event930	-3245	-1.53
Adjusted R^2	0.99	
Durbin-Watson statistic	1.70	

To minimize any potential for bias in our coefficient estimates, the presence of serial correlation was tested for using the Durbin-Watson test and not detected. Heteroscedasticity was not detected either, as would be expected since the variance across customers is not present in the aggregated model form. The appropriate tests were conducted to detect potential estimation bias and none was found.

The coefficients that are estimated all have the expected signs and the majority of them are significant. The morning consumption has a dominant effect on the ability of the model to estimate the actual load during the peak hours for any given day and this is expected. There is often a concern that customers will pre-cool on the morning of such an event. Pre-cooling was tested for using the morning consumption variable crossed with an event day indicator and there is no significant evidence that it had occurred.

A number of alternative weather-related variables were tested in the model, including actual temperature, lagged temperature from the previous day, and the maximum temperature during the peak period (results for this variable not

presented). While weather variables are included in the model specification, it is generally difficult to formulate a model so that it predicts well at extreme temperatures. As can be seen in the above table, the lagged temperature variable is not significant. Cloud cover is significant suggesting that cloud cover may have a cooling effect. The dew point temperature also is significant which indicates that cooling loads are greater on more humid days.

The monthly trend variables show that there was an increasing trend in energy consumption as the summer progressed. This may have been partially due to the number of schools enrolled in the program. This trend is consistent with school activity being low in July, increasing in August as schools start to prepare for opening and then being open in September.

The event day dummies all have the expected sign but not all are significant. The largest impact is observed for the July 22nd event. This was immediately preceded by the first event day which may have been a contributing factor to the larger impact. It should be noted that July 21 was the only event that did not fall on a Friday.

A subset of the population of enrollees that excluded the three largest enrollees in the SDG&E C&I 20/20 program was also analyzed. These enrollees were removed from the dataset used to estimate the model as well as from the aggregated baseline. The three large enrollees have very irregular operating schedules, and therefore their loads also have significant variation. The modeling results from this subset are shown in Table 10.13.

Table 10.13: Smaller Enrollees Aggregate Model Results

Variable	Estimate	t-Value
Intercept	-12096	-2.35
AvgPkTemp	599.8	8.79
LagAvgPkTemp	30.4	0.36
AvgPkDewPt	253.1	3.53
AvgPkCloud	-23.2	-3.49
AvgMornCons	0.69	16.36
Fri	-1968	-3.49
Wkend	-10204	-7.05
Holiday	-11709	-6.25
July	-1803	-4.28
Sept	2154	3.97
Event721	-3452	-2.10
Event722	-6247	-3.54
Event826	-1269	-0.66
Event930	-3827	-1.99
Adjusted R^2	0.99	
Durbin Watson statistic	1.71	

Operating schedules were obtained for the three largest enrollees and the inclusion of this information was tested by estimating models for each of the enrollees using the same structure as the aggregate model. The schedule variable included in the analysis is binary in nature, with a value of 1 when the enrollee is in operation and a value of 0 otherwise. Results for one of the enrollees are presented in Table 10.14. The schedule is significant in estimating peak period loads for this enrollee and indicates that the enrollee's peak period loads did go down significantly on two of the four event days.

Table 10.14: Large Enrollee Model Results

Variable	Estimate	t-Value
Intercept	-11746	-2.33
AvgPkTemp	589.2	8.78
LagAvgPkTemp	31.2	0.38
AvgPkDewPt	260.5	3.70
AvgPkCloud	-22.0	-3.37
AvgMornCons	0.68	16.63
Fri	-2030	-3.67
Wkend	-10320	-7.27
Holiday	-11446	-6.22
July	-1909	-4.59
Sept	2120	3.99
Event721	-3029	-1.86
Event722	-5728	-3.28
Event826	-787	-0.41
Event930	-4257	-2.24
Schedule	349.9	2.03
Adjusted R^2	0.99	

The savings estimate for this large enrollee for the July 21 event is not significant, though it is close to the significance threshold. The interview determined that the company had indeed taken action on July 21st to reduce load. While the inclusion of the data on schedule variation for this firm does improve the model, the end result is the model as specified is unable to verify that the reduction that occurred for this firm on July 21st was due to the actions taken by the firm to reduce load. The results show that even with the schedule variation as an input to the model, the model could not confirm with certainty that the customer's actions are associated with a reduction in load.

Operating schedules were included in models for the other two enrollees, however in these cases, the schedule variable was insignificant. In other words, no significant change in load is detected regardless of whether the enrollees were in operation or not. When they were modeled, the only significant explanatory variable found is morning energy consumption.

A subset of 159 of the enrollee population that had positive savings as determined by the operational baseline for all four events was modeled. This group didn't necessarily reach the 20% threshold but their event-day loads were below the baselines for all four events. The results from this analysis are shown in Table 10.15.

Table 10.15: Positive Savings for All Four Events

Variable	Estimate	t-Value
Intercept	4836	5.24
AvgPkTemp	34.3	3.26
LagAvgPkTemp	15.52	1.36
AvgPkDewPt	32.6	2.99
AvgPkCloud	-0.75	1.02
AvgMornCons	0.44	13.62
Fri	-614	-7.07
Wkend	-3276	-15.7
Holiday	-3893	-12.97
July	203	3.15
Sept	40.95	0.49
Event721	-1067	-4.23
Event722	-1038	-3.89
Event826	-443	-1.51
Event930	-750	-2.57
Adjusted R^2	0.98	
Durbin Watson statistic	1.87	

This group appears to be somewhat weather sensitive and its responses to event days appear to be significant on all but the August 26th event.

A third subset of the enrollees was modeled to see if the customers that had been successful in reaching the 20% rebate threshold at least once during the four events contributed to the majority of the observed savings. There were 262 enrollees that had complete data for this aggregate model. The results are shown in Table 10.16.

Table 10.16: Received-Rebate Enrollees Aggregate Model Results

Variable	Estimate	t-Value
Intercept	-7510	-2.50
AvgPkTemp	109.6	2.68
LagAvgPkTemp	-17.8	-0.38
AvgPkDewPt	37.8	0.90
AvgPkCloud	-7.8	-1.92
AvgMornCons	0.92827	20.10
Fri	-467.8	-1.39
Wkend	323.9	0.77
Holiday	-446.5	-0.53
July	158.1	0.64
Sept	-1.7	-0.01
Event721	-939.0	-0.97
Event722	-2476	-2.41
Event826	-533.6	-0.47
Event930	-990.8	-0.90
Adjusted R^2	0.95	
Durbin Watson statistic	1.51	

The results from this aggregate group are somewhat surprising. They only appear to have been a significant contributor to the overall impact on one of the four event days. In addition, these enrollees proved to be much less weather sensitive than the overall enrollee population.

A final subset was tested that excluded the three largest enrollees from the prior group of enrollees that had been successful in reaching the 20% rebate threshold at least once during the four events. In this last case, the coefficient estimates for event day dummies have the expected sign but none are significant.

These results suggest that reaching the 20% threshold once is not a good predictor of reaching it again. The frequency in the number of times the 20% threshold was reported to have been reached is shown in Table 10.17.

Table 10.17: Reported Rebate Threshold Achievement Frequency

Number of Events	Frequency	% of All Achievers (N=337)
One Event Only	157	46.6
Two Events Only	111	32.9
Three Events Only	45	13.4
All Four Events	24	7.1

Nearly half of all the 337 unique enrollees that achieved the 20% threshold at least once never reached the threshold again. Only 20.5% ever reached the threshold more than twice.

It also appears that those enrollees that are relatively weather insensitive consistently provided some degree of load drop. This is not to say that on any one event this group had the most number that reduced by 20%, but rather across all of the events they were the group that showed the most success.

10.4.4 Summary of Impact Results

The results of the various models that were estimated show that the three-day baseline used by the SDG&E C&I 20/20 program is not an efficient proxy for all enrollees. There are variations in load that occur incidental to the program, and these variations make it difficult to isolate program savings. However, none of the other baseline approaches is much an improvement in that none of them provides an accurate measure of program savings across the full range of customer loads.

The study built individual models for each of three largest enrollees,[21] and these results are indicative of the problems encountered in trying to develop a simple baseline procedure that works across the board. What is apparent from modeling of the three largest customers in detail is that customers with very irregular schedules make it difficult to estimate the program impacts without normalizing the load data. Even when we include detailed scheduling variations in the model for the largest three customers, we cannot always detect program savings, even when we know actions have been taken by the firm to reduce load.

The same variations and external influences evident in the models of the three largest customers are likely present in many of the smaller customer loads. Yet, while we have demonstrated that we can building more complex baselines for very large customers in many cases, or identify alternative baseline approaches that are more accurate representations of that specific building's load in absence of the program, all of these approaches require collection of firm specific data and time-intensive analysis. It would certainly be impractical to collect the data and build a separate baseline for each small customer enrolled in the program.

Table 10.18 shows our best estimate of the program savings given the data constraints discussed above. Table 10.18 uses the results of the three individual models built for the three largest enrollees and the model as shown in Table 10.13, which is the net savings from all other enrollees.

[21] In order to protect these customers' identities, the results are not presented.

Table 10.18: Summary of Estimated SDG&E C&I 20/20 Program Impacts

	7/21/05	7/22/05	8/26/05	9/30/05
3 Largest Enrollees	3,029 kW	5,728 kW	0 kW	4,257 kW
All Smaller Enrollees	3,452 kW	6,247 kW	0 kW	3,827 kW
Total	6,481 kW	11,975 kW	0 kW	8,084 kW

There appears to be some evidence that enrollees took action on the first, second and fourth events to produce peak period impacts. The August 26 event, however, does not show any significant impacts. The resulting aggregate SDG&E C&I 20/20 Program impact estimates have wide confidence bands around them suggesting that the actual average peak period impacts may have been higher or nothing at all, but these are the best estimates.

10.4.5 Business Sector Make-up of Enrollees

The business sectors that comprise the enrollee population were examined to determine whether a discernable pattern for the successful program enrollees exists. Table 10.19 presents the mix of businesses enrolled as well as those achieving the 20% threshold by event day. This analysis was limited to those customers for which complete interval data exists.

Table 10.19: Business Sectors Represented in the SDG&E C&I 20/20 Program

Business Sector	All Enrollees		≥20% on 7/21	≥20% on 7/22	≥20% on 8/30	≥20% on 9/30
	Freq.	% of Total	Freq.	Freq.	Freq.	Freq.
Office	193	19%	19	22	17	15
Restaurants	74	7%	0	2	2	4
Retail	71	7%	5	7	6	5
Grocery	72	7%	3	4	0	2
Warehouse	27	3%	3	3	3	4
Schools	178	18%	31	48	9	17
Colleges	10	1%	2	2	0	1
Hospitals	40	4%	0	0	2	5
Lodging	43	4%	4	3	6	3
Miscellaneous	146	14%	26	33	27	35
Construction	4	0%	0	0	0	2
Ag&Pumping	3	0%	0	1	1	1
Unclassified	52	5%	6	6	6	7
Tel/Comm/Utility	11	1%	0	0	0	0
Process/Assembly /Unclassified Industrial	89	9%	14	28	23	25
Refrigerated warehouse	4	0%	0	0	0	0
Total	1,017		113	159	102	126

There are four sectors that comprise the majority of the enrollees and those achieving the 20% threshold. These business sectors are Offices, Schools, Miscellaneous, and Process/Assembly/Unclassified Manufacturing. Even though these sectors consistently achieve the 20% threshold across event days, the results shown in Table 10.19 suggest that it isn't the same set of customers that consistently achieve the threshold.

10.5 Assessment of Baselines

An important issue to consider when measuring the savings generated from this type of demand response program is whether the baseline used to rebate customers that take action is in fact identifying those who do take action. This examination presents evidence to show that the operational baseline relied upon for the SDG&E C&I 20/20 program in SDG&E's service area overstates the econometrically estimated impacts, which is not what would be expected. The events days were noticeably hotter than those used to compute the baseline.

This therefore suggests that if the enrollees' loads were weather sensitive, the savings computed using the baseline would understate those found using the econometric model. A few possible explanations exist. One is that the baseline used is too sensitive to weather relative to the enrollees' weather sensitivity. Another is that the enrollees are split between being weather sensitive and insensitive with a significant number falling into each category. Finally, there may be a significant number of weather insensitive enrollees who also have irregular consumption patterns. This would make their loads difficult to predict without customer specific information.

Alternative baseline definitions are available and may have provided a more accurate estimate of the true program impacts. There were four other baseline definitions besides the one used by the SDG&E C&I 20/20 program that were tested in this analysis. The five baselines tested are:

- Three day (used by SDG&E),
- Three day with calibration,
- Ten day,
- Ten day with calibration, and
- One day prior to event.

The three day baseline is the one relied upon for SDG&E's C&I 20/20 program during the summer of 2005. The three day with calibration uses the same three day baseline as the SDG&E C&I 20/20 program but adjusts the baseline based on the ratio of the consumption during morning hours (8 AM to 11 AM) on the event day to the average of the morning consumption on the three days that comprise the baseline. The ten day baseline is calculated as the average consumption of energy during the peak period (11AM to 6PM) over the ten non-weekend, non-holiday, and non-event days immediately preceding an event. This ten day baseline can also be calibrated in the same manner as the three day baseline, thereby resulting in a ten day calibrated baseline. The last baseline option evaluated in this analysis is equal to the energy consumption during the peak period during the day just prior to the event.

Theoretically, the efficiency of these baselines is determined by modeling them in comparison to actual loads using a cross-sectional time-series model including both participants and non-participants. The specific form of the model used is:

$$ActualCons_{it} = \beta_0 + \beta_1 Temp_t + \beta_2 DewPt_t + \beta_3 Cloud_t + \beta_4 Baseline_{it} + \beta 5(part_i \times Baseline_{it}) + \varepsilon_t$$

where the following definitions apply:

- $ActualCons_{it}$ = actual electric load during peak period for customer i on day t.
- $Temp_t$ = average hourly temperature during the peak period on day t.
- $DewPt_t$ = average hourly dew point during the peak period on

day t.

- $Cloud_t$ = average hourly cloud cover during the peak period on day t.
- $Baseline_{it}$ = baseline estimate for customer i on day t.
- $Part_i$ = participant dummy variable
- ε_t = a random error term.

To act as non-participants, a load research sample from SDG&E was used. The non-participants were from the most predominant rate class (ALTOU) represented by the SDG&E C&I 20/20 program enrollees. The ALTOU class is comprised of non-residential customers with peak demands less than or equal to 500 kW. There were 105 non-participants and 1,017 SDG&E C&I 20/20 Program enrollees used in the model. There were 1,122 SDG&E C&I 20/20 program enrollees used in the model. The results of this model are shown in Table 10.20.

Table 10.20: Baseline Assessment Model Results

Variable	Estimate	t-Value
Intercept	581.99	1.52
Temp	-6.527	-1.53
DewPt	-0.234	-0.65
Cloud	-0.266	-2.50
Baseline	1.006	225.29
Part*Baseline	-0.044	-7.58
Adjusted R^2	0.98	

The model was estimated only for event days. It is apparent that the cross-sectional variation of the observations is far greater than the time-series variation in the data and it is the time-series variation that is of greatest importance. The model produces a high adjusted R2 and significant coefficients for the baseline variable but the estimated model provides marginal value to this assessment. Without normalizing the actual load and the baseline with a variable such as square footage, the model tells us little more than the size of the customer is strongly correlated to the size of the baseline. The change in the baseline for any given customer is small across trigger event days so the efficiency of the baseline can not be captured without normalization. This approach of assessing the validity of the SDG&E C&I 20/20 program baseline, and the other possible baselines, was abandoned because the load data could not be normalized. Even though this approach was not ultimately utilized, we felt it important to discuss this approach and its short comings as it has been used in the evaluation of other demand response type programs.

The baselines were compared to each other and to the econometric results in an attempt to assess their validity. Each of these baselines was computed and they are summarized in Table 10.21 through 10.25. The savings is computed as the sum of the peak period hourly electric consumption from the baseline less the actual peak period energy consumption during the event day. The average hourly impact across the seven hour peak period is also shown along with the equivalent aggregate percent savings.

Table 10.21: Three Day Baseline

Event	Baseline (kWh)	Actual (kWh)	Savings (kWh)	Average Hourly Impact (kW)	Aggregate Percent Savings
7/21/05	1,093,852.70	1,090,156.76	3,695.94	527.99	0.34%
7/22/05	1,093,852.70	1,077,474.48	16,378.22	2,339.75	1.52%
8/26/05	1,111,653.33	1,100,341.82	11,311.51	1,615.93	1.03%
9/30/05	1,126,254.86	1,089,780.23	36,474.63	5,210.66	3.35%

Table 10.22: Three Day with Calibration Baseline

Event	Baseline (kWh)	Actual (kWh)	Savings (kWh)	Average Hourly Impact (kW)	Aggregate Percent Savings
7/21/05	1,141,328.94	1,090,156.76	51,172.18	7,310.31	4.69%
7/22/05	1,183,207.13	1,077,474.48	105,732.65	15,104.66	9.81%
8/26/05	1,157,497.57	1,100,341.82	57,155.75	8,165.11	5.19%
9/30/05	1,164,503.85	1,089,780.23	74,723.62	10,674.80	6.86%

Table 10.23: Ten Day Baseline

Event	Baseline (kWh)	Actual (kWh)	Savings (kWh)	Average Hourly Impact (kW)	Aggregate Percent Savings
7/21/05	1,114,203.09	1,090,156.76	24,046.33	3,435.19	2.21%
7/22/05	1,156,164.31	1,077,474.48	78,689.83	11,241.40	7.30%
8/26/05	1,142,826.30	1,100,341.82	42,484.48	6,069.21	3.86%
9/30/05	1,128,175.65	1,089,780.23	38,395.42	5,485.06	3.52%

Table 10.24: Ten Day with Calibration Baseline

Event	Baseline (kWh)	Actual (kWh)	Savings (kWh)	Average Hourly Impact (kW)	Aggregate Percent Savings
7/21/05	983,478.23	1,090,156.76	-106,678.53	-15,239.79	-9.79%
7/22/05	983,477.74	1,077,474.48	-93,996.74	-13,428.11	-8.72%
8/26/05	997,666.18	1,100,341.82	-102,675.64	-14,667.95	-9.33%
9/30/05	1,027,038.18	1,089,780.23	-62,742.05	-8,963.15	-5.76%

Table 10.25: Prior Day Baseline

Event	Baseline (kWh)	Actual (kWh)	Savings (kWh)	Average Hourly Impact (kW)	Aggregate Percent Savings
7/21/05	1,051,917.51	1,090,156.76	-38,239.25	-5,462.75	-3.51%
7/22/05	1,051,917.51	1,077,474.48	-25,556.97	-3,651.00	-2.37%
8/26/05	1,102,530.87	1,100,341.82	2,189.05	312.72	0.20%
9/30/05	1,135,200.36	1,089,780.23	45,420.13	6,488.59	4.17%

There is little consistency in the results across baseline calculation methods. Even when compared to the econometrically estimated impacts shown in Table 10.16, there does not appear to be a single best method. Once again, the conclusion to draw from this is that one baseline method does not work efficiently in capturing the impacts that result from the program. It may be possible through further research to determine which methods work best with specific types of customers. It may be best to use the ten day adjusted baseline for non-weather sensitive customers and the three day adjusted baseline for weather sensitive customers. However, further research is required. This evaluation has shown that there are customers with unpredictable loads that should not be included in this type of voluntary demand response program.

10.6 How Much Peak Hour Demand Reduction Is Realized by the Program

The evaluation of the SDG&E C&I 20/20 program was conducted on an average hourly demand savings basis. The peak hour contribution realized was not specifically addressed. The load shape for the enrollees will give some idea as to the hours where most of the impact was likely to have happened. Figures 10.26 through 10.29 shows the baseline and actual load profiles for the enrollees for each of the four event days.

Figure 10.26: July 21st Event Day Load Profile for All Enrollees

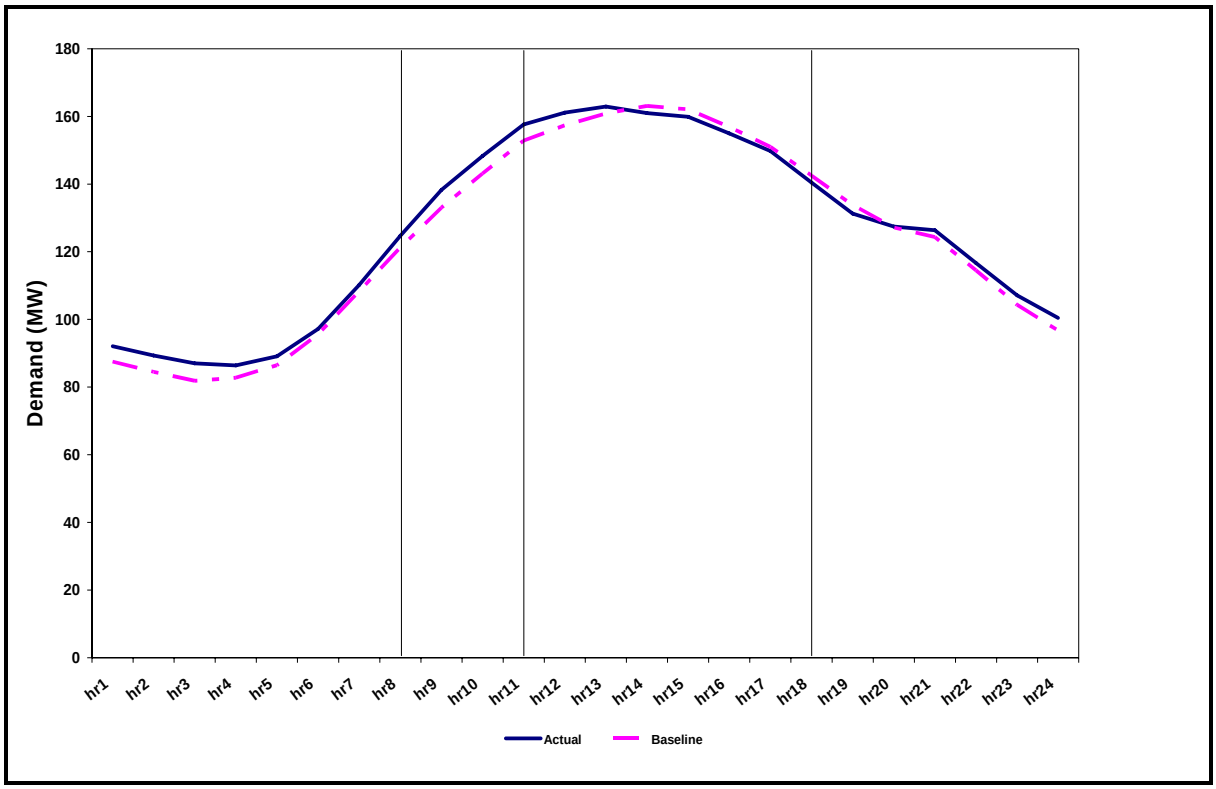


Figure 10.27: July 22nd Event Day Load Profile for All Enrollees

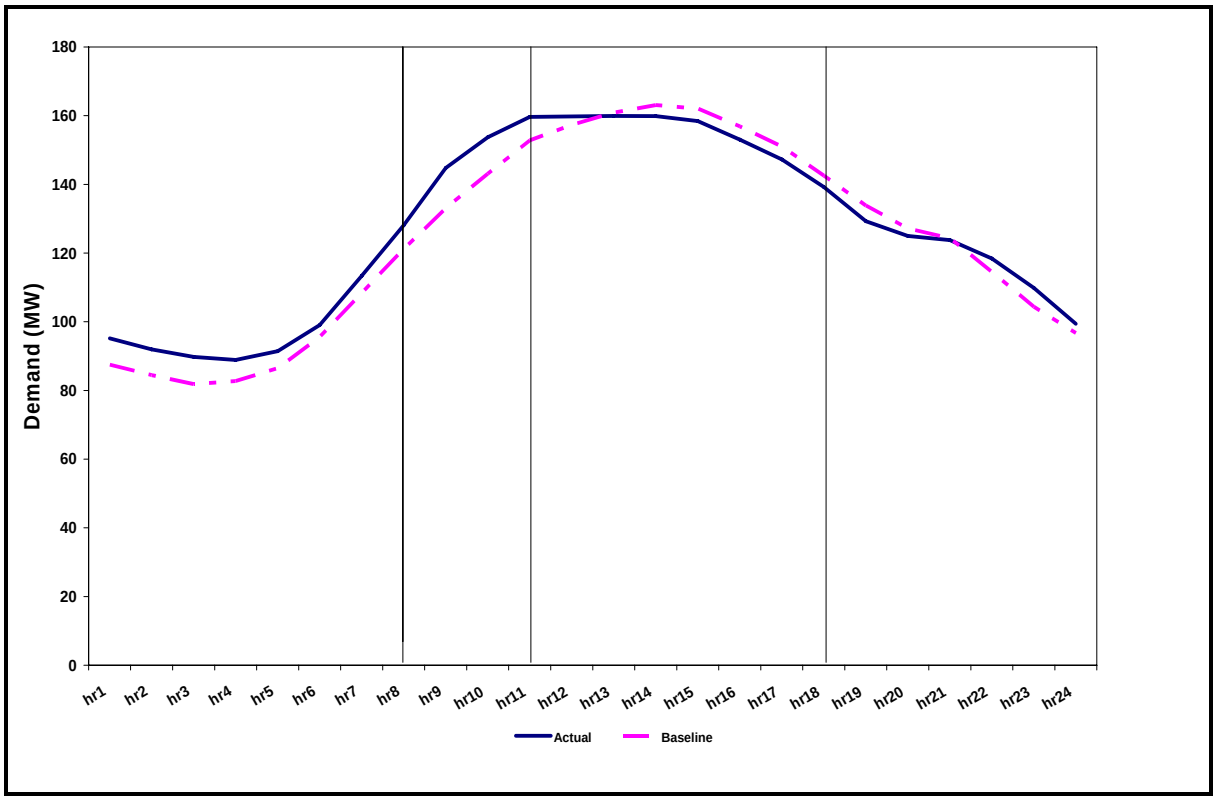


Figure 10.28: August 26th Load Profile for All Enrollees

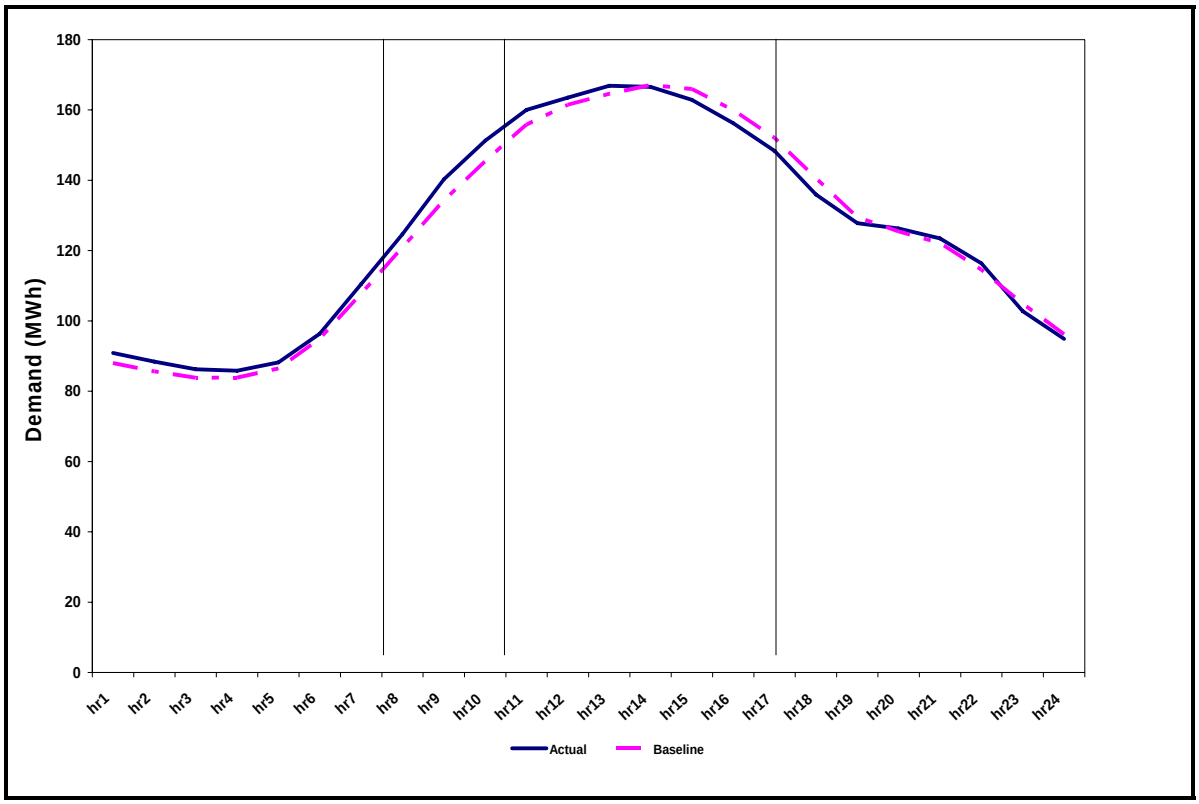
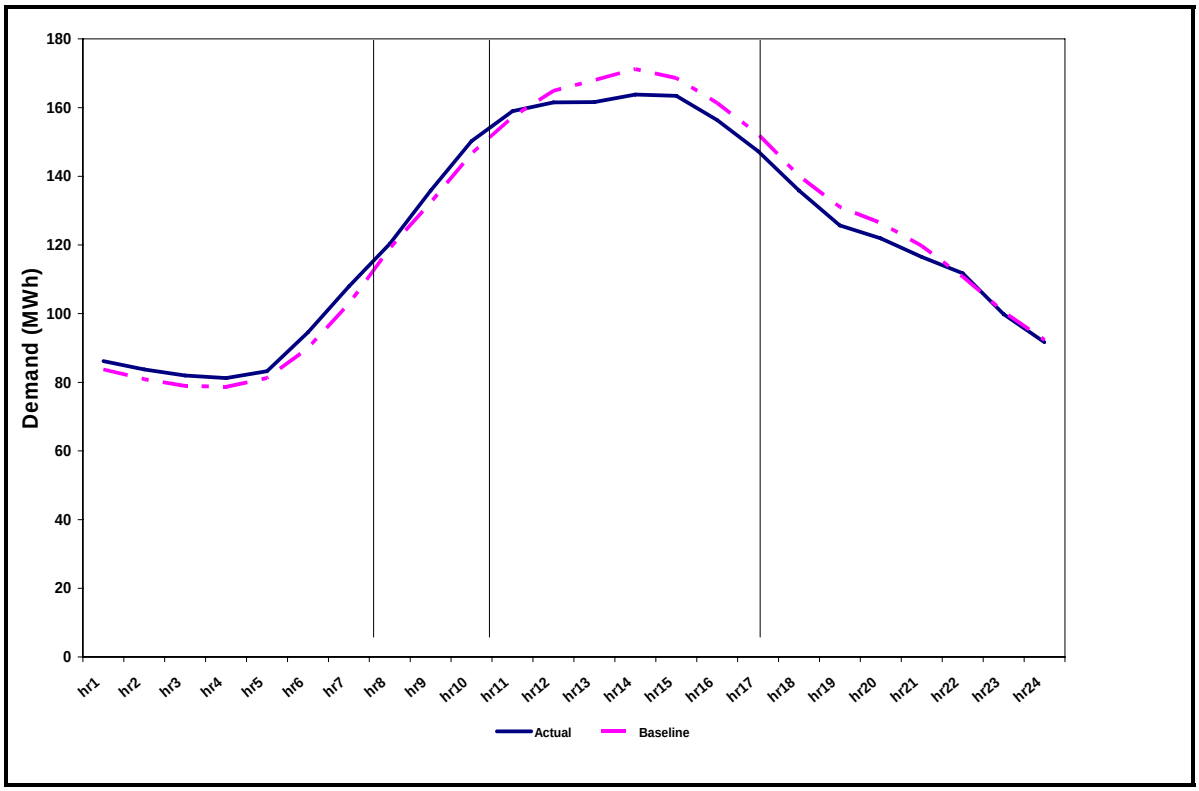


Figure 10.29: September 30th Load Profile for All Enrollees



The enrollees' peak occurred between 1 PM and 2 PM on the event days. If the baselines were to be believed, they exceeded the actual load beginning after 1 PM on most events and remained above the actual load for several hours after the end of the peak period.

Section 11. SDG&E C&I 20/20 Program Summary and Conclusions

11.1 Cost Effectiveness and Reliability

An analysis of program costs and benefits indicates that the program provides limited capacity resource but only at significant cost. As shown in Table 11.1, peak demand reductions achieved under this program cost the utility approximately $30 to $80 per kW of demand reduced per event. Adjusting for inactive businesses would raise those values.

Table 11.1: Estimated Cost of Demand Reduction

	SDG&E C&I 20/20 Program	All Enrollees SDG&E	Rebated Savers SDG&E Reported (>= 20%)	Evaluation Modeled Results (net)
Costs				
Rebates	$503,254			
Admin	$374,000			
Total	$877,254			
Total Peak Demand Saved		10,649 kW	29,205 kW	26,540 kW
Cost per kW Saved per Event		$82.38	$30.04	$33.05

It was reported anecdotally during interviews with utility staff that this cost is significantly higher than the incentives paid under other DR programs where a customer might provide 100's to 1000's of kW reduction for as little as $1000 in bill credits. While a complete comparison of incentives was not within the scope of this effort, the inconsistency is potentially significant and a broader comparison of incentive levels across all DR programs may be warranted.

The reliability of savings is also an important issue that was highlighted by the evaluation results and is, ultimately, directly related to the cost effectiveness of such a program. As shown in Table 10.14, the capacity resource that was provided by the program on a given event day varied widely, ranging from 0 kW to almost 12 MW. As a demand resource, the program will ultimately only be able to justify paying for those savings that are reliable and therefore truly "dispatchable" as a resource. Absent this reliability, the value of the resource will be extremely limited.

11.2 SDG&E C&I 20/20 Program Conclusions and Recommendations

The C&I program variant offered in 2005 by SDG&E is an attempt to bring demand response opportunities to smaller C&I customers. While this program targets and rewards demand reductions that coincide with utility maximum demand conditions, it still suffered many of the same problems that confronted the Statewide 20/20 program.

Principal among these is the high costs and low benefits associated with the program, especially when compared to some other DR programs. These high costs are incurred in spite of the fact that other DR programs have identifiable loads that are reduced with short notification windows, while 20/20 is a day-ahead effort with customers being rewarded for unspecified actions. The continued existence of high 20/20 rebates is likely to exert pressure on the utilities to raise the incentives offered for other DR programs.

While the SDG&E Program may provide more robust demand impacts than the Statewide 20/20 Program, SDG&E's program also sometimes rewards customers who are not actively trying to save while providing no rebates to others who may just miss reaching the 20% threshold. Reaching the 20% threshold may be an insurmountable hurdle for many firms who are willing to help reduce peak demand during emergencies. For reliability purposes, it may also be preferable to identify actual equipment that businesses can curtail and contract for that reduction, rather than using the 20% threshold.

A relevant policy question is whether it is the design of the SDG&E Program or the focus of the program on small customers that makes it not cost-effective. It is certainly more difficult to recover the program costs associated with a business shedding 5 kW than it is for one shedding 50 or 500 kW. Among small C&I customers, there are many customers that can shed production or close off building sections. Collectively, this represents a valuable asset. Contracting for these loads to be curtailed can probably be made to be cost-effective.

Both 20/20 programs fail because they scatter high rewards to many customers whose reduction in use are of dubious value to the utility. A major problem with the SDG&E C&I 20/20 Program is that its marketing was effective in attracting many customers who could not deliver DR savings. Because there was no cost to the customer, many enrolled even though they did not have the necessary understanding of the program requirements and/or the capacity within their businesses to shed 20% of their load at peak times. As was the case with the Statewide Program, gaining customer attention through marketing is only likely to be effective if it is supported by effective education, technical support, and access to actionable solutions.

Finally, from a policy perspective, a key constraint limiting the usefulness of this program is the ability to forecast needs for demand reduction on a day-ahead

basis. Forecasting abilities are limited at this point and, as a result, the actual need for peak reduction may never materialize. Moreover, there is as yet considerable uncertainty regarding the precise value of the peak demand. Continuation of these programs may be justified only if there is a clear value to the savings.

Future use of this type of program may be warranted for the purposes of developing a more sophisticated relationship with this class of customers. Such efforts should probably be designated as pilots, however, rather than being implemented under the guise of true demand response programs.

Appendix A: Residential Received Rebate Instrument

20/20 Telephone Survey
Residential Customers
Respondents Who Received 20% Rebate in 2005

Introduction

CONTACT_NAME
UTILITY_NAME
SERVICE_ADDRESS
IS20% = YES if received rebate (reduced energy use by 20% in 2005 v. 2004 summer)

[SCREENING MODULE]

If [CONTACT NAME] is available
INTRO1**********
Hello, my name is [INTERVIEWER_NAME] and I am calling from Population Research Systems on behalf of [UTILITY_NAME]. May I please speak with [CONTACT_NAME]? This is not a sales call.

If [CONTACT NAME] is not available:
Hello, my name is [INTERVIEWER_NAME] and I am calling from Population Research Systems on behalf of [UTILITY_NAME]. May I please speak with the person most knowledgeable about the energy use in your home, and about your [UTILITY_NAME] bill? This is not a sales call.

INTRO2**********
We are calling to talk to you about rebates customers can get on their [UTILITY_NAME] bill. Your information will help [UTILITY_NAME] evaluate the effectiveness of this program and improve services to residential customers like you. This survey will take 10 to 15 minutes and your answers will remain confidential.

Are you the person who is most familiar with your household's [UTILITY_NAME] bill?
1 Yes
2 No
88 Refused
99 Don't know

If INTRO2 = YES skip to SCREEN5
If INTRO2 = NO – get recommended person on the phone PROCEED to INTRO3 or RESCHEDULE

INTRO3**********
Hello, my name is [INTERVIEWER_NAME] and I am calling from Population Research Systems on behalf of [UTILITY_NAME]. This is not a sales call.

We are calling to talk to you about rebates customers can get on their [UTILITY_NAME] bill. Your information will help [UTILITY_NAME] evaluate the effectiveness of this program and improve services to residential customers like you. This survey will take 10 to 15 minutes and your answers will remain confidential.

Questions for Received Rebate Only
[SCREENING MODULE]

SCREEN5**********[RECALL]
Do you recall receiving a 20% credit on your [UTILITY_NAME] bill for the summer of 2005 for [SERVICE ADDRESS]?

1 Yes, recalls receiving rebate (: Skip to Screen10)
2 No (: Skip to Screen6)
3 Incorrect Address (: Skip to Term1)
88 Refused
99 Don't know (: Skip to Screen6)

SCREEN6**********
Our records indicate that you received a 20% credit on your [UTILITY_NAME] bill for the summer of 2005.
1 To continue (: Skip to Screen10)
2 Respondent argues that he/she definitely did not receive rebate and does not want to continue (: Skip to Term1)

SCREEN10**********[WHYREBATE]
Do you know the reason for the rebate?
1 Reduced energy use by 20%
2 No
3 Reduced energy use
4 Other (specify) _____
88 Refused
99 Don't know

If SCREEN10 = 1 or 3 AWARE = YES (Skip to Screen20)
IF SCREEN10 = 2, 4, 88, 99, AWARE = NO

SCREEN15**********[KNOW2020]
Do you know about the "20/20" conservation program where customers who reduce energy use by 20% in the summer get a 20% rebate?

1 Yes (set AWARE = YES)
2 No
88 Refused
99 Don't know
SCREEN5**********

Questions for Just Missed Survey

Do you recall hearing about a program in California where you could receive a 20% discount on your [UTILITY_NAME] bill last summer if you reduced your summer use by 20%?

1 Yes (AWARE=YES)
2 No (terminate)
88 Refused (terminate)
99 Don't know (terminate)

SCREEN6**********
Our records show that your street address is {Street Address]

3 Yes
4 No [TERMINATE]
88 Refused [TERMINATE]
99 Don't know [TERMINATE]

Received and Just Missed Surveys are the Same from Here to End

(Ask Screen 20 only if AWARE = Yes, else skip to Screen 25.) Note this should have skipped to Screen 35, we have corrected the responses in ACTSTATU, after the fact, so that anyone who was unaware of the program cannot be considered active

SCREEN20**********[WHENAWARE], ALSO [AWAREWHN]
When did you become aware of the 20/20 program?

1 More than a year ago, that is, before 2005
2 Before the beginning of this summer, that is between January and May of 2005
3 Sometime during the summer, that is after May of 2005
4 When I received the discount
88 Refused
99 Don't know

If SCREEN20 = 4, then ACTIVE = NO
If SCREEN20 = 4 skip to AW35, otherwise ask

SCREEN25**********[ONPURPOSE]
Did you purposely try to earn the 20% discount by taking steps to reduce your energy use last summer?

1 Yes
2 No
88 Refused
99 Don't know

IF SCREEN25 = 1 SET ACTIVE = YES
IF SCREEN25 > 1 SET ACTIVE = NO. SKIP TO SCREEN35. IF QUOTA FILLED, TERMINATE.

AW30 **********[FIRSTHEAR]
How did you first hear about the 20/20 discount program?

1 Newspaper
2 Radio, TV
3 Internet
4 [UTILITY] bill
5 Insert in [UTILITY] bill
6 Letter from [UTILITY]
7 Friend, relative, word of mouth
8 Announcement by governor, state or local agency
9 School, church, community group
77 Other, please specify_____
88 Refused
99 Don't know

AW35 **********[ACT1=ACT10, ACTOTHER]
IF ACTIVE =YES ASK,
Your electricity use in the summer of 2005 was significantly lower than that of 2004. What actions did you take?
IF ACTIVE=NO ASK.
Your electricity use in the summer of 2005 was significantly lower than that of 2004. What actions did you take that would have lowered your electricity use in the summer of 2005?
[Do not read list. Repeat prompt "Anything else?" up to 3 times or until R. says 'no'.]

1 Used less air conditioning, that is, settling for a warmer temperature
2 Used air conditioning less frequently by turning it off sometimes or not turning it on at all.
3 Turned off lights
4 Turned off pool, spa, sauna, water bed, sprinklers, or irrigation pumps
5 Turned off/reduced use of electronics (TV, computer, etc.)
6 Turned off/reduced use of small appliances (hair dryer, alarm clock, etc.)
7 Disconnected/got rid of second refrigerator or freezer
8 Closed off rooms
9 Hung clothes to dry or used dryer less
10 Washed clothes/dishes using cold water rather than hot, ran full loads, or used washer less often

11 Use less hot water
12 Weather stripping or purchased efficient shell measures like insulation for roof, door, wall or window
13 Purchased or added equipment
14 Purchased or added appliances
15 Switched electric appliance to gas or other fuel
16 Remodeled
17 Was away, on vacation, in home less
18 Less people, someone died, someone moved
19 used appliance in off peak, washed at night

20 turned off heater
21 major repair
22 cooked less, used grill more, used microwave

77 Other, specify_____
78 No Actions taken (terminate)
88 Refused (terminate)
99 Don't know (terminate)

AW37 ********** [IMPORTANT]
For the energy saving measures that you just mentioned, how important was the prospect of receiving the 20% rebate in taking those actions?
1 It was the most important reason I took the actions I did
2 It was an important reason I took the actions I did
3 It was a reason but not an important one
4 It was not a reason, I would have taken these actions even without the potential discount
88 Refused
99 Don't know

IF AW35-13 OR 14=true, SKIP TO AW40, OTHERWISE ASK

AW38 ********** [NEWEQUIP]
After the summer of 2004, did you purchase any new energy efficient appliances or equipment?

1 Yes
2 No
88 Refused
99 Don't know

[If AW35-13 OR 14=TRUE or AW38=1 ask, otherwise skip to AW45

AW40 ********** [EQUIP1-EQUIP10, EQUIPOTH]
What energy efficient equipment or appliances did you buy after the summer of 2004?
1 Refrigerator/freezer
2 Swamp cooler
3 Central air conditioning or heat pump
4 Room air conditioner
5 Indoor efficient lighting, bulbs, CFLs
6 Outdoor efficient lighting
7 Solar PV or water heater
8 Pool pump timer, pool pump
9 Stove/oven
10 Washer/Dryer/Dishwasher
11 fan, attic fan
12 water heater
13 windows or doors

14 thermostat
15 furnace or heater
16 stove of microwave
17 TV
18 computer
77 Other, specify
88 Refused
99 Don't know

FOR EVERY ONE SELECTED, ASK

AW41**********[REPNEW1-REPNEW11]
Is this …….
1 A replacement unit
2 A first-time unit
3 An additional unit

IF AW35 15=TRUE SKIP TO AW50

AW45 ********** [FSWITCH]
Did you switch the use of any electrical appliances to equipment that used gas or another fuel?
1 Yes
2 No
88 Refused
99 Don't know

[IF AW35-15=TRUE OR aw45=1 CONTINUE ELSE SKIP TO AW55]

AW50 ********** [FS1-FS6,FSOTH]
What equipment did you switch to another fuel? (check all that apply)
1 Water heater
2 Pool/spa heater
3 Stove
4 Dryer
5 Grill
6 Other, specify
88 Refused
99 Don't know

[IF AW35-1=YES, OTHERWISE SKIP TO AW60

AW55********** [ACHOTLESS]
You mentioned that you used less air conditioning last summer. On the very hottest day of last summer did you .....
1 Change the temperature to make it colder than you kept it the rest of the summer
2 Kept it exactly the same as the rest of the summer

3 Change the temperature to make it warmer than you kept it the rest of the summer.
4 It was not turned on at all that day

88 Refused
99 Don't know

[IF AW35-2 =YES ASK AW60, OTHERWISE SKIP TO AW65]

AW60********** [ACHOTOFF]
You mentioned that you turned the air conditioner off last summer. On the very hottest day of last summer did you still not turn the air conditioner on?
1 Kept it off completely
2 Turned it on for less than 15 minutes
3 Turned it on for less than 1 hour
4 Turned it on for a couple of hours
5 Turned it on all day.
6 Turned on all night
7 Turned on all day and night

88 Refused
99 Don't know

AW65********** [PREVREB]
Before 2005, did you receive a 20% discount for reducing your summer electricity use?
1 Yes
2 No
88 Refused
99 Don't know

[IF AW65=1 ASK OTHERWISE SKIP TO DEMO1]
AW70 ********** [PREVYR1-PREVYR4]
In what year or years did you receive the discount, [check all that apply]
1 2004
2. 2003
3. 2002
4. Before 2002
88 Refused
99 Don't know

DEMOGRAPHIC MODULE
The next several questions ask about differences in the number of people living or staying at your home in the summer of 2005 as compared with the summer of 2004, and whether there were differences in the amount of time people spent away from home.

DEM01 ********** [NUMOCC05]
How many people, including children, other family members and permanent guests, lived in your home in the summer of 2005 (*last* summer)?

_____

[RECORD NUMBER]
88 Refused
99 Don't know

DEM05 ********** [NUMOCC04]
How many people, including children, other family members and permanent guests, lived in your home in the summer of 2004 (the summer *before* last)?

_____
[RECORD NUMBER]
88 Refused
99 Don't know

DEM10 ********** [AWAY]
Please compare differences in the amount of time people were away from home last summer –2005 -- and the summer before --2004. This may include vacations, trips, or other reasons. Was the amount of time household members were away from home …
:
[READ LIST, RECORD ONE RESPONSE]
1 The same
2 2005 away-time shorter than 2004 (Stayed home more in 2005)
3 2005 away-time longer than 2004 (Stayed home more in 2004)

If DEM10 = 1 then SKIP to DEM25
If DEM10 – 2 then PROCEED to DEM15
If DEM10 = 3 then SKIP to DEM20

DEM15 ********** [AWAYSHORT]
Was the away-time in 2005 shorter by
[READ LIST, RECORD ONE RESPONSE]

1 A week or less
2 One to two weeks
3 Two to three weeks
4 More than three weeks?
88 Refused
99 Don't know

DEM20 ********** [AWAYLONG]
Was the away-time in 2005 longer by
[READ LIST, RECORD ONE RESPONSE]

1 A week or less
2 One to two weeks
3 Two to three weeks
4 More than three weeks?
88 Refused

99 Don't know

Section E: model questions
The following few questions are for characterization purposes only

EW1********** [OTHPROG1- OTHPROG8, OTHRPROG]
Did you participate in any other energy efficiency programs?
1. Multi-family rebate
2. Single family rebate
3. Low income energy efficiency
4. Appliance rebate
5. Unspecified rebate
6. Utility/someone insulated my home
7. Utility/someone gave me free light bulb
8. Utility/someone gave me free refrigerator,
9. Utility/someone gave me setback thermostat
10. Utility/someone gave me air conditioner or swamp cooler
11. Utility/someone paid to take old refrigerator/freezer
12. Other, specify
13. Did not participate in any other programs
14. Flex your power
15. Appliance recycling
16. CARE, Senior, Medical
17. MF or low income
88 Refused
99 Don't know

EW2 ********** [SHFUEL]
What fuel do you use to heat your home?
1. Electric
2. Gas/Propane
3. Oil
4. Wood
5. Solar
6. Geothermal
88 Refused
99 Don't know

EW3 ********** [WHFUEL]
What fuel do you use to heat your water?
a Electric
b Gas/Propane
c Oil
d Wood
e Solar
88 Refused
99 Don't know

EW7 ********** [HTYPE, HTYPEOTH]

What type of dwelling do you live in?
1. Mobile home
2. Apartment/Condominium/Flat
3. Row home/Townhouse
4. Single family
5. Other specify

88 Refused
99 Don't know

EW5 ********** [NUMROOMS]
How many rooms, including the kitchen, dining room, living rooms, dens, playrooms, and bedrooms are there in your home? Do not count the garage, bathrooms, hallways or unfinished basement.

_____
[RECORD NUMBER]

EW4 ********** [CLGSYS, CLGSYSOTH]
What type of cooling system do you have?
1. Central air
2. Room air conditioner
3. Evaporative
4. Swamp
5. Other specify
6. No cooling system / Fan only

88 Refused
99 Don't know

IF EW4 > 4, go to EW9

EW6 ********** [CLDROOMS]
How many of those rooms do you typically air condition?

_____
[RECORD NUMBER]

EW5********** [ACTIMEDAY, ACTIMEOTH]

On hot days, when do you tend to turn on the air conditioning? Is it:
[READ LIST, RECORD ONE RESPONSE]

1 All day and night
2 All day, morning through evening
3 Early or mid-afternoon
4 Just for the hottest hour or two of the afternoon
5 Late afternoon only/at the end of the workday
6 At night only

7 Other specify
8 Rarely
9 Never, not at all
10 Regulated by automatic thermostat
11 Irregularly
88 Refused
99 Don't know

EW10********** [ACSAMETIME]
Do you use the air conditioning during the same times on weekends and weekdays, or differently?

1 Same
2 More on weekends
3 Less on weekends
88 Refused
99 Don't know

EW15********** [ACMORE0405]
Was the pattern of use the same during the summer of 2004 and 2005, or did it change?

1 Same
2 Used more in 2004
3. Used more in 2005
88 Refused
99 Don't know

EW9 ********** [INCOME]
What is your combined gross family income?
1. Less than $25,000 per year
2. Between $25,000 and $50,000 per year
3. Between $50,000 and $100,000 per year
4. Between $100,000 and $150,000 per year
5. More than $150,000 per year
88 Refused
99 Don't know

EW11**********
Do you rent or own?
1. Rent
2. Own
3. Other specify
88 Refused

99 Don’t know

Exit **********
Thank you very much. Your answers will help [UTILITY_NAME] serve its customers better. Remember your answers to this survey are confidential and used only for this research.

Term1 **********
Thank you. We appreciate your taking the time to answer our questions.

Appendix B: C&I Received Rebate Instrument

20/20 Telephone Survey
C&I Customers
Respondents Who Received 20% Rebate in 2005

Introduction

CONTACT_NAME
UTILITY_NAME
SERVICE_ADDRESS
IS20% = YES if received rebate (reduced energy use by 20% in 2005 v. 2004 summer)

[SCREENING MODULE]

If [CONTACT NAME] is available
INTRO1**********
Hello, my name is [INTERVIEWER_NAME] and I am calling from Population Research Systems on behalf of [UTILITY_NAME]. May I please speak with [CONTACT_NAME,]? This is not a sales call.

If [CONTACT NAME] is not available:
Hello, my name is [INTERVIEWER_NAME] and I am calling from Population Research Systems on behalf of [UTILITY_NAME]. May I please speak with the person most knowledgeable about the energy use at your company, and about your [UTILITY_NAME] bill? This is not a sales call.

INTRO2**********
We are calling to talk to you about rebates customers can get on their [UTILITY_NAME] bill. Your information will help [UTILITY_NAME] evaluate the effectiveness of this program and improve services to commercial and industrial customers like you. This survey will take 10 to 15 minutes and your answers will remain confidential.

Are you the person who is most familiar with your firm's [UTILITY_NAME] bill?
1 Yes
2 No
88 Refused
99 Don't know

If INTRO2 = YES skip to SCREEN5
If INTRO2 = NO – get recommended person on the phone PROCEED to INTRO3 or RESCHEDULE

INTRO3**********

Hello, my name is [INTERVIEWER_NAME] and I am calling from Population Research Systems on behalf of [UTILITY_NAME]. This is not a sales call.

We are calling to talk to you about rebates customers can get on their [UTILITY_NAME] bill. Your information will help [UTILITY_NAME] evaluate the effectiveness of this program and improve services to commercial and industrial customers like you. This survey will take 10 to 15 minutes and your answers will remain confidential.

[SCREENING MODULE]

SCREEN5********** [RECALL]
Do you recall receiving a 20% credit on your [UTILITY_NAME] bill for the summer of 2005 for [SERVICE ADDRESS]?

1 Yes, recalls receiving rebate (Skip to Screen 10)
2 No (Skip to Screen 6)
3 Incorrect Address [TERMINATE]
88 Refused (Terminate)
99 Don't know (skip to Screen 6)

SCREEN6********** [DIDGETIT]
Our records indicate that you received a 20% credit on your [UTILITY_NAME] bill for the summer of 2005.

1 To continue (Skip to Screen10)
2 Respondent argues that he/she definitely did not receive rebate and does not want to continue (Skip to Term1)

SCREEN10********** [WHYREBAT]
Do you know the reason for the rebate?
1 Reduced energy use by 20%
2 No
3 Reduced energy use
4 Other (specify) _____
88 Refused
99 Don't know

If SCREEN10 = 1 or 3 AWARE = YES (skip to screen 20,
IF SCREEN10 = 2, 4, 88, 99, AWARE = NO

SCREEN15********** [AWARE202]
Do you know about the "20/20" conservation program where customers who reduce energy use by 20% in the summer get a 20% rebate?

1 Yes (set AWARE = YES)
2 No
88 Refused
99 Don't know

Ask Screen 20 only if aware = Yes, else skip to Screen 25.

SCREEN20********** {WHENAWAR]
When did you become aware of the 20/20 program?

1 More than a year ago, that is, before 2005
2 Before the beginning of 2005 summer, that is between January and June
3 Sometime during the summer, that is after June of 2005
4 When I received the discount
88 Refused
99 Don't know

If SCREEN20 = 4, then ACTIVE = NO
If SCREEN20 = 4 skip to AW35, otherwise ask

SCREEN25********** [ONPURPOS]
Did you purposely try to earn the 20% discount by taking steps to reduce your energy use last summer?

1 Yes
2 No
88 Refused
99 Don't know

IF SCREEN25 = 1 SET ACTIVE = YES
IF SCREEN25 > 1 SET ACTIVE = NO. SKIP TO SCREEN35. IF QUOTA FILLED, TERMINATE.

AW30 ********** [FIRSTHEA]
How did you first hear about the 20/20 discount program?

1 Newspaper
2 Radio, TV
3 Internet
4 [UTILITY] bill
5 Insert in [UTILITY] bill
6 Letter/email from [UTILITY]
7 Friend, relative, word of mouth
8 Announcement by governor, state or local agency
9 School, church, community group
10 This interview
11 Acct Rep
77 Other, please specify_____
88 Refused
99 Don't know

AW35 ********** [ACT1=ACT10, ACTOTHER]
IF ACTIVE =YES ASK, Your electricity use in the summer of 2005 was significantly lower than that of 2004. What actions did you take?

IF ACTIVE=NO ASK.

Your electricity use in the summer of 2005 was significantly lower than that of 2004. What actions did you take that would have lowered your electricity use in the summer of 2005?
[Do not read list. Repeat prompt "Anything else?" up to 3 times or until R. says 'no'.]

1 Used less air conditioning, that is, settling for a warmer temperature
2 Used air conditioning less frequently by turning it off sometimes or not turning it on at all.
3 Turned off lights
4 Turned off pool or spa
5 Turn off/reduce use of electronics (TV, computers, etc.)
6 Turn off/reduce use of small appliances (coffee maker, electric kettle)
7 Disconnected/got rid of refrigerator or freezer
8 Closed off sections of building
9 Reduced the use of energy consuming equipment used in my production
10 Reduced my hours of operation, away
11 Reduced the amount of production, sales, or output I normally do in the summer
12 Weatherstripping or purchased efficient shell measures like insulation for roof, door, wall, window
13 Purchased or added equipment
14 Purchased or added appliances
15 Switched electric appliance or equipment to gas or other fuel
16 Remodel
17 Use less hot water
19 Less people, vacant
21 less agric pumping or crop drying
22 major repair
23 equipment repair (not AC)
24 A/C repair, other AC reduction
25 Shift use to off peak

66 Nothing that I know of
77 Other, specify_____
88 Refused
99 Don't know

IF ACTIVE =NO SKIP TO AW37, OTHERWISE ASK AW36

AW36 ********** [IMPORTANT]
For the energy saving measures that you just mentioned, how important was the prospect of receiving the 20% rebate in taking those actions?
1 It was the most important reason I took the actions I did
2 It was an important reason I took the actions I did
3 It was a reason but not an important one
4 It was not a reason, I would have taken these actions even without the potential discount
88 Refused
99 Don't know

IF AW35-13 OR 14=true, SKIP TO AW40, OTHERWISE ASK

AW37 ********** [NEWEQUIP]
After the summer of 2004, did you purchase any new appliances or equipment that you think reduced your electric bill?

1 Yes
2 No
88 Refused
99 Don't know

[If AW35-13 OR 14=TRUE or AW37=1 ask, otherwise skip to AW42

AW40 ********** [EQUIP1-EQUIP10, EQUIPOTH]
What efficient equipment or appliances did you buy after the summer of 2004?
1 Refrigeration/freezing system
2 Bigger electronic appliances/equipment (computer, copier,
3 Smaller electronic appliance/equipment (coffeemaker,
4 Restaurant Stove/Oven/Toaster
5 Central air conditioning or heat pump
6 Room air conditioner
7 Indoor efficient lighting
8 Outdoor efficient lighting
9 Solar PV or water heater
10 Process equipment (conveyor belts, machines, robots, welder)
11 Boilers/furnaces
12 Washers/Dryers/Dishwashers
13 More efficient pumps or motors
14 Energy management system
15 Occupancy controls
16 Photo controls
17 windows or doors
18 thermostat
19 timers
20 window blinds, covers
77 Other, specify
88 Refused
99 Don't know

IF AW35-11 = TRUE SKIP TO AW43, OTHERWISE ASK
AW42 ********** [HIGHPROD]
Which summer has a higher production, output or sales? 2005 or 2004?
1 Summer of 2005
2 Same for both summers
3 Summer of 2004
88 Refused
99 Don't Know

IF AW42=3 OR AW35-11=YES CONTINUE, OTHERWISE SKIP TO AW44
AW43 ********** [PERCLOW0]
How much lower was your 2005 production compared to 2004?
Record %_____(accept 1 to 100)_
88 Refused
99 Don't Know

IF AW42=1 CONTINUE, OTHERWISE SKIP TO AW45
AW44 ********** [PERCHIGH]
How much higher was your 2005 production compared to 2004?
Record %_____(accept 1 to 100)_
88 Refused
99 Don't Know

IF AW35 15=TRUE SKIP TO AW50

AW45 ********** [FSWITCH]
Did you switch the use of any electrical appliances to equipment that used gas or another fuel?
1 Yes
2 No
88 Refused
99 Don't know

[IF AW35-15=TRUE OR aw45=1 CONTINUE ELSE SKIP TO AW55]

AW50 ********** [FS1-FS6,FSOTH]
What equipment did you switch to another fuel? (check all that apply)
1 Refrigerator/freezer
2 Swamp cooler
3 Central air conditioning or heat pump
4 Room air conditioner
5 Indoor efficient lighting
6 Outdoor efficient lighting
7 Solar PV or water heater
8 Process equipment
9 Boilers/furnaces
10 Washer/Dryer/Dishwasher
11 More efficient pumps or motors
12 Energy management system
13 Occupancy controls
77 Other, specify
88 Refused
99 Don't know

[IF AW35-1=YES, OTHERWISE SKIP TO AW60

AW55********** [ACHOTLESS]
You mentioned that you used less air conditioning last summer. On the very hottest day of last summer did you .....
1 Change the temperature to make it colder than you kept it the rest of the summer
2 Kept it exactly the same as the rest of the summer
3 Change the temperature to make it warmer than you kept it the rest of the summer.
88 Refused
99 Don't know

[IF AW35-2 =YES ASK AW60, OTHERWISE SKIP TO AW61]

AW60********** [ACHOTOFF]
You mentioned that you turned the air conditioner off last summer. On the very hottest day of last summer, was your air conditioning
1 Kept completely off
2 Turned on for less than 15 minutes
3 Turned on for less than 1 hour
4 Turned on for a couple of hours
5 Turned on all day.
6. Turned on all night
7. Turned on all day and night
88 Refused
99 Don't know

[IF AW35-10=YES SKIP TO AW62

AW61 ********** [OPHRSRED]
Did you reduce the hours that you operate or are open?
1 Yes
2 No
88 Refused

[IF AW35-10=YES OR AW61=1 CONTINUE ELSE SKIP TO AW65]

AW62 ********** [NUMHRSRE]
You mentioned that you reduced hours of operation. How many hours per week did you reduce your hours of operation or hours you were open?
Record hours_____

AW65********** [PREVREB]
Before 2005, did you receive a 20% discount for reducing your summer electricity use?1 Yes
2 No
88 Refused
99 Don't know

[IF AW65=1 ASK OTHERWISE SKIP TO DEMO1]
AW70 ********** [PREVYR1-PREVYR4]
In what year or years did you receive the discount, [check all that apply]
1 2004
2. 2003
3. 2002
4. Before 2002
88 Refused
99 Don't know

DEMOGRAPHIC MODULE
The next several questions ask about your firm for classification purposes only.

DEM01 ********** [BIZTYPE]
What kind of business or institution is this?
1 Office
2 Retail (non-food)
3 College/university
4 School
5 Grocery store
6 Convenience store
7 Restaurant
8 Health care/hospital
9 Hotel or motel
10 Warehouse
11 Personal Service
12 Community Service/Church/Temple/Municipality
13 Industrial Process/Manufacturing/Assembly
14 Condo Assoc/Apartment Mgmt
15 Agriculture
16 recreation, golf course, bowling alley, gym
17 repair shop
77 Other (SPECIFY)_____
88 Refused
99 Don't Know

DEM05 ********** [NUMEMP05]
How many full time equivalent employees worked at this location in the summer of 2005 (Last summer)?

_____
[RECORD NUMBER]
88 Refused
99 Don't know

DEMO6
How about in the summer of 2004? [NUMEMP04]

_____
[RECORD NUMBER]
88 Refused
99 Don't know

Section E: model questions
The following few questions are for characterization purposes only

EW1********** [OTHPROG1- OTHPROG8, OTHRPROG]
Did this business participate in any other energy efficiency programs?
1. Express Efficiency
2. Multi-family Rebate
3. Energy Audit
4. Savings By Design
5. Standard Performance Contract
6. Utility/someone insulated my building
7. Unspecified Rebate
8. Other, specify
9. Did not participate in any other programs

88 Refused
99 Don't know

EW2 ********** [SHFUEL]
Is your building's main heating system powered by
7. Electricity
8. Gas (Interviewer: Propane falls under gas)
9. Something else

88 Refused
99 Don't know

EW3 ********** [WHFUEL]
Is your building's main water heater powered by
1. Electricity
2. Gas (Interviewer: Propane falls under gas)
3. Something else

88 Refused
99 Don't know

EW4 ********** [CLGSYS, CLGSYSOTH]
Do you have central air conditioning?
7. Yes
8. No

88 Refused
99 Don't know

EW5 ********** [SQFT]
How many square feet does your firm occupy at this address?

1 Less than 2,500 square feet
2 2,500 but less than 5,000 square feet
3 5,000 but less than 10,000 square feet
4 10,000 but less than 20,000 square feet
5 20,000 but less than 50,000 square feet
6 50,000 but less than 100,000 square feet
7 Ag/Non-facility – Outdoors
88 Refused
99 Don't know

EW6 ********** [RENTOWN]
Is the business space leased or owned?

1. Leased/Rent
2. Owned
3. Other specify

88 Refused
99 Don't know

Exit **********
Thank you very much. Your answers will help [UTILITY_NAME] serve its customers better. Remember your answers to this survey are confidential and used only for this research.

Appendix C: SDG&E C&I 20/20 Questionnaire

20-20 SMALL COMMERCIAL C&I 20/20 PROGRAM CUSTOMER TELEPHONE SURVEY - FINAL

February 2006

Screen

Hello, my name is ___ and I am calling on behalf of San Diego Gas & Electric. Our records show that your organization participated in the 20/20 program, and I am interested in talking with you about your experiences with this program.

S1. Are you the person most familiar with this program at your organization?
1. Proceed
2. Can you please refer me to the most appropriate person?

S2. Do you recall participating in this program?
1. Continue
2. No

S3. Is there someone else there who deals with utility-related issues and might be familiar with this program?
1. Continue
2. No – terminate (Disposition = No Qualified Person)

Participation

P1. Do you recall how many "load reduction trigger" events your firm was notified about?
Type 888 for Don't know.

_____ Record the number of events indicated by the customer

P2. Of all the load reduction trigger events, during how many was your business open and operating?
Type 888 for Don't know.

_____ Record answer

P3. In all of last summer, there were four load reduction trigger events. How many of these trigger events did you attempt to reduce your energy use?
Type 888 for Don't know.

_____ Record number

P4. Did your organization have a specific plan in place for achieving the 20% reduction in peak demand?

1. Yes
2. No
3. Don't know

P5. Generally, what steps did you take to reduce your energy use for these load reduction trigger events? [Do not read: choose all that apply]

1. Closed operations
2. Shut down equipment
3. Altered production schedules
4. Reduced fan use
5. Turned down lights
6. Turned down air conditioning
7. Notified employees to reduce energy use
8. Installed energy efficient lights
9. Installed energy efficient equipment
10. We did nothing
11. Other (specify)
12. Don't know
13. Turned down refrigeration
14. Used emergency generator

P5A. [If P5 = 1, 2, or 3] You mentioned that you (SHOW ANSWER when P5 1 to p5 3 are true). Please describe in more detail the changes that you made. OPEN END

P6. Of the _____ (Recall answer from P3) events in which you participated, in how many cases were you successful in reducing your energy use by 20%?
Type 888 for Don't know.

_____ Record number

P7. What steps, if any, did you take in preparation for reducing your loads on the day of the requested reduction?

1. Notified employees
2. Altered shift schedules
3. Decided to close for the day
4. Nothing
5. Other specify
6. D/K
7. Turned down ac

P8. On a typical Friday, is your business…

1. Operating on normal schedule / capacity
2. Operating on a HIGHER than normal schedule / capacity
3. Operating on a LOWER than normal schedule / capacity
4. We are closed on Fridays
5. D/K

P9. Do you recall receiving any information from SDG&E about recommended ways to reduce your energy loads?

1. Yes
2. No
3. D/K

[IF P9 = YES ASK, OTHERWISE SKIP TO P10

P9a. How helpful was the information?

1. Very helpful
2. Somewhat helpful
3. Not very helpful
4. Not at all
5. Don't know

P10. Is there additional information that would have been helpful to you in attempting to reduce your loads?

1. Yes
2. No
3. D/K

[IF P10=1, ASK, OTHERWISE CONTINUE]
P10a. What helpful information could SDG&E have provided? (OPEN END)

[If P3 < 4 ask, otherwise skip to P12

P11. What was the primary factor that prevented your organization from participating in all four events?

1. Not aware of other events
2. Could not alter schedules
3. Incentive not significant enough
4. Not notified far enough in advance
5. Did not get signed up in time
6. Other (specify)
7. D/K

[If P3 – P6 >0 ask, otherwise skip to M1

P12. What factor prevented you from achieving the 20% reduction in order to qualify for the financial incentive?

1. We did not know how to identify load to shed
2. We did not have the load available to shed.
3. The loads that we planned to reduce were not available for reduction on that date.
4. It was too hot to reduce AC
5. We could not alter schedules
6. We were not notified far enough in advance
7. Other specify
8. D/K

Marketing / Enrollment

M1. How did you first find out about the program?

1. Letter from SDGE
2. Email from SDGE
3. Personal contact from Account Representative
4. Government announcement
5. TV, radio
6. Newspaper
7. Other (*specify*)
8. Don't know

M2. What was your primary reason for enrolling in the program?

2. Receive financial incentive
3. Aid in stabilizing the electric grid
4. To be a good corporate citizen
5. Other, specify
6. D/K

M3. In your opinion, how does a load reduction program differ from an energy efficiency program?

1. Load reduction reduces peak demand rather than savings energy.
2. Load reduction does not require a capital investment
3. Load reduction is temporary
4. Other (*specify*)
5. D/K
6. There is no difference

M4. How likely is it that you would participate again in the same program?

1. Very likely
2. Somewhat likely
3. Somewhat unlikely
4. Very unlikely
5. D/K

Event Notification

N1. How were you notified of the load reduction trigger events?

1. Email from SDGE
2. Phone call from SDGE
3. Personal contact from Account Rep
4. Other _____
5. D/K
6. Were not notified

N2. Which form of notification primarily works best for you? Single choice

1. Email
2. Phone call
3. Page/Beeper
4. Fax
5. Combination of phone and email
6. Other (*specify*)
7. D/K

N3. The program is set up to notify customers one day ahead of when the load reduction is requested. Does this provide you with enough time to take steps to reduce your load?

1. Yes
2. No
3. Depends on the workload for that day
4. D/K

N4. If SDG&E was only able to announce the trigger at 6 am of the day of the load reduction trigger, what percentage of the savings you achieved for the 2005 trigger events would you have been able to achieve?
Type 888 for Don't know.

_____Record %

Utilization of Kwikview

K1. Are you familiar with the Kwikview software that SDG&E has developed?

1. Yes
2. No
3. D/K

IF K1 > 1, Skip to I1
K2. Did you utilize the Kwikview software to view your usage data?

1. Yes
2. No
3. D/K

If K2 = 1 ask, otherwise skip to I1
K3. How useful was this software during your efforts to reduce your loads?

1. Very useful
2. Somewhat useful
3. Not very useful
4. Not at all useful
5. Don't know

Incentives

I1. Do you recall receiving a credit on your bill?
1. Yes
2. No
3. D/K

I2. How knowledgeable are you of the way the bill reduction is calculated? Would you say you are…
1. Very knowledgeable
2. Somewhat knowledgeable
3. Not very knowledgeable
4. Not at all knowledgeable
5. Don't know

Using a scale where 1 means very unlikely and 5 means very likely, how likely is it that your organization would participate again if the incentive were reduced by
[Skip to S1 when answer = 1]

I3. …10 percent?
I4. What is it's reduced by 15 percent?
I5. Reduced by 20 percent?
I6. Reduced by 30 percent?
I7. Reduced by 40 percent?
I8. Reduced by 50 percent?

Suggestions for Improving Program

S1. What suggestions would you have for making this program more effective? Open end

Thank you very much for your time.

Appendix D: Mapping Residential Survey to Model

This is a comprehensive list of the fields created for modeling purposes. A subset of these fields was used in the regression model, as listed in Table 6.3.

Impact Evaluation Field	Survey Question	Description
Cooling actions	AW35, AW40, AW41	Action 1: kept dwelling warmer Action 2: used air conditioning less Equipment 2: swamp cooler 1 as a replacement 2 as a first-time purchase 3 as an additional unit Equipment 3: central air conditioning 1 as a replacement Equipment 4: energy-efficient room air conditioner 1 as a replacement Equipment 13: replaced windows or doors (and have a cooling system) Equipment 14: purchased or added a thermostat (and have a cooling system)
Lighting actions	AW35, AW40, AW41	Action 3: turned off lights Equipment 5: purchased energy-efficient indoor lighting 2 as a first-time purchase Equipment 6: purchased energy-efficient outdoor lighting 2 as a first-time purchase

Impact Evaluation Field	Survey Question	Description
Fuel switch	AW40, AW45, AW50	Action 1: yes; Action 2: no Equipment switched: 1 Water heater 2 Pool/spa heater 3 Stove 4 Dryer Equipment 7: solar PV or water heater 2 as a first-time purchase
Solar replacement	AW40	Equipment 7: purchased solar PV or water heater 1 as a replacement
Other purchase	AW40, AW41	Equipment 10: washer/dryer/dishwasher 1 as a replacement
Pool off	AW35	Action 4: turned off pool or spa
Pool timer	AW40, AW41	Equipment 8: purchased pool pump timer 1 as a replacement 2 as a first-time purchase
Refrigerator	AW 35, AW40, AW41	Action 7: disconnected/discarded second refrigerator/freezer Equipment 1: purchased energy-efficient refrigerator/freezer 1 as a replacement
Major repair	AW35	Action 22: major repair
Off peak	AW35	Action 20: remodel

Impact Evaluation Field	Survey Question	Description
Miscellaneous (cumulative)	AW35, AW40, AW41	Action 5: reduced electronics use Action 6: reduced small appliances use Action 8: closed off rooms Action 9: air-dried clothes/used dryer less Action 10: washed clothes/dishes with cold water, ran full loads, ran fewer loads (with electric water heater) Action 11: used less hot water (with electric water heater) Action 12: added weatherstripping or purchased efficient shell measures (with electric space heat) Equipment 11: purchased fan/attic fan 2 as a first-time purchase 3 as an additional unit Equipment 12: purchased water heater (with electric water heater) 1 as a replacement
New air conditioning	AW35, AW40, AW41	Equipment 3: central air conditioning 2 as a first-time purchase 3 as an additional unit Equipment 4: energy-efficient room air conditioner 2 as a first-time purchase 3 as an additional unit
Remodeling	AW35	Action 16: remodel

Impact Evaluation Field	Survey Question	Description
Other program	EW1	Responses: 10. Multi-family rebate 11. Single family rebate 12. Low income energy efficiency 13. Appliance rebate 14. Unspecified rebate 15. Utility/someone insulated my home 16. Utility/someone gave me free light bulb 17. Utility/someone gave me free refrigerator 18. Utility/someone gave me setback thermostat 19. Utility/someone gave me air conditioner or swamp cooler 20. Utility/someone paid to take old refrigerator/freezer 21. Other, specify
Time away 2004/2005	DEM10, DEM15, DEM20	Response 1: same Response 2: away longer in 2004 Response 3: away longer in 2005 Response 2/3 amount: 1 A week or less 2 One to two weeks 3 Two to three weeks 4 More than three weeks
Number of occupants 2004/2005	DEM01, DEM05	Number of occupants summer 2004 Number of occupants summer 2005

Impact Evaluation Field	Survey Question	Description
Electric space heat	EW2	Response 1: main heating system is electricity
Electric water heat	EW3	Response 1: main water heating system is electricity
Central air conditioning	EW4	Response 1: type of cooling system
Room air conditioning	EW4	Response 2: type of cooling system
Other cooling	EW4	Response 5: specify other type of cooling system
Housing type	EW7	Responses: 1 Mobile home 2 Apartment/Condominium/Flat 3 Row home/Townhouse 4 Single family 5 Other specify

Appendix E: Statewide 20/20 Tariff –PG&E

SCHEDULE EZ-20/20—CALIFORNIA 20/20 REBATE PROGRAM

1. APPLICABILITY: Schedule EZ-20/20 rewards customers a twenty percent (20%) discount for achieving a twenty percent (20%) or more average reduction in energy usage from June 1 through September 30, 2005. With the exceptions listed below, this schedule is applicable to residential, commercial, industrial, and agricultural customers served by one of the following PG&E rate schedules: non-Time-Of-Use (TOU) Rate Schedules E1, EL-1, E-8, EL-8, EM, EML, ES, ESL, ESR, ESRL, ET, ETL, A-1, A-10, and AG-1, or TOU Rate Schedules E-3, E-7, E-A7, EL-7, EL-A7, E-9, A-6, A-10 (TOU), E-19V (voluntary), AG-R, AG-V, AG-4, and AG-5. (N)

The following are excluded from participating in this schedule: (1) unmetered electric service customers; (2) commercial, industrial, and agricultural customers on a billing demand rate schedule with a maximum demand of 200 kW or greater during any one of the previous energy statements covering bill periods June 1, 2004 through May 31, 2005; (3) customers with less than 12 months of continuous service (as of June 1, 2005) at the same service address; and (4) customers with electric generators receiving service under a provision of a Net Energy Metering rate schedule or Schedule S.

Schedule EZ-20/20 establishes a limited term "Rate Reward" for energy conservation program and demand response for 2005. Regardless of the customer's billing cycle, the start and end dates of this program are June 1 and September 30 respectively for all customers. The EZ-20/20 rebate program will terminate December 31, 2005.

2. TERRITORY: This schedule applies everywhere PG&E provides electric service.

3. RATES: Non-TOU Rate Schedule

- The rate reward (20% credit off of bill) will be based on achieving a minimum twenty percent (20%) reduction in the average daily usage amount (ADUA) as calculated over the period June 1 to September 30, 2005 compared to the exact corresponding periods (June 1 – September 30) in year 2004.

TOU Rate Schedule

- The rate reward (20% credit off of bill) will be based on achieving a minimum twenty percent (20%) reduction in the average daily on-peak usage amount (ADOPUA) as calculated over the period June 1 to September 30, 2005, compared to the exact corresponding on-peak periods (June 1 – September 30) in year 2004.

The customer's bill will continue to be calculated according to the customer's otherwise applicable tariff or rate schedule during the season.

If the participant is able to achieve the appropriate twenty percent (20%) or more average reduction in energy usage between June 1 and September 30, PG&E will issue a credit at the end of the season equal to twenty percent (20%) of the energy charges for period June 1 to September 30. Direct Access customers participating in this program who achieve the appropriate twenty percent (20%) or more average reduction in energy usage between June 1 and September 30 will be issued a credit at the end of the season. The credit for Direct Access customers will be equal to twenty percent (20%) of the PG&E portion of the energy charges for period June 1 to September 30. (N)

SCHEDULE EZ-20/20—CALIFORNIA 20/20 REBATE PROGRAM
(Continued)

4. SPECIAL CONDITIONS:

1. Participants will continue to receive service under their otherwise applicable schedule while participating in the EZ-20/20 Rebate Program. (N)

2. To be eligible for the EZ-20/20 "Rate Reward", customer must receive service and meet the applicability criteria of the program continuously during the summer season that covered the period June 1 to September 30, 2005.

3. For the purpose of classifying an eligible customer, only those customers with TOU history from June 1, 2004 to September 30, 2004, and continue to be on a TOU service within the same periods in the current year will qualify for the TOU provisions of the EZ-20/20 Rebate Program.

4. If successful in reducing their average daily usage amount (ADUA), or the average daily on-peak usage amount (ADOPUA), for non-TOU and TOU rate schedules respectively by 20%, the participants will receive a credit based on their electric bill, excluding Utility User's Taxes, state fees, and franchise fee surcharges (applicable only for Direct Access Customers).

5. For TOU schedules, the on-peak time periods used for the purpose of this program will be the same as the summer on-peak TOU period that is defined in the customer's otherwise-applicable tariff.

6. Customers whose billing periods do not align exactly with the June 1 and September 30 respective start and end date of the program will have their usage prorated during those months to determine the ADUA or ADOPUA during the summer season.

7. The customer's ADUA or ADOPUA reduction will be rounded to the nearest whole number percentage point for the purpose of determining eligibility for the season end rebate.

8. No corrections or normalization of the baseline usage amounts will be made for weather differences that might occur during the current summer season relative to weather during the previous summer season.

9. PG&E is not required to develop an adjusted baseline usage amount for customers that might have experienced increased consumption due to occupancy increases during the current year, or for customers who have implemented efficiency and conservation measures during the previous year to allow these customers to qualify for the credits during the current year.

10. No provisions will be made for observed energy and demand reductions that fall short of meeting the twenty percent (20%) qualification standard. A minimum reduction of twenty percent (20%) is required to receive the twenty percent (20%) rebate. Similarly, customers exceeding twenty percent (20%) reductions will only be rewarded with a twenty percent (20%) credit.

11. For customers with multiple accounts, summary billings, or multiple meters at a premise, the twenty percent (20%) rebate will be calculated and applied, if applicable, to each of the customer's individual service agreements. (N)

SCHEDULE EZ-20/20—CALIFORNIA 20/20 REBATE PROGRAM
(Continued)

4. SPECIAL CONDITIONS:

12. For master-meter customers that sub-meter, the twenty percent (20%) rebate shall be determined by usage measured by the master-meter. Master-metered customers, including mobile home park owners with sub-metered tenants, receiving a rebate shall distribute the rebate to sub-metered tenants consistent with Public Utilities Code Section 739.5(b). (N)

13. Any disputes arising from the provision of service under this Schedule or other aspects of the EZ-20/20 Rebate Program will be deemed disputes over amounts billed for electricity and will be handled as provided for in PG&E's Rule 10, Disputed Bills.

14. The electric generator exclusion applies to any customer who is a Departing Load customer, a customer operating a generating facility, or any customer served under Schedule S - Standby Service.

15. PG&E will normally read meters each month with minor exceptions. If, because of unusual conditions or for reasons beyond PG&E's control, the customer's meter cannot be read on the scheduled reading date, or if for any reason accurate meter data is not available, PG&E will make estimates according to its applicable tariff rules. In these instances, the estimated reads will form the basis of the large comparisons in determining whether customers qualify for the EZ-20/20 rebate.

16. Commercial, Industrial, and Agricultural Customers participating in other PG&E demand response programs (i.e., Schedules E-DBP, E-BIP, etc.), are not eligible to participate in the EZ-20/20 Rebate Program. (N)

Appendix F: SDG&E C&I 20/20 Tariff

[not attached to Word document]