Interim Evaluation

California Statewide Opt-in Time-of-Use Pricing Pilot

Second Interim Evaluation

November 1, 2017

Prepared for
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Southern California Edison Company

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1 Executive Summary

This document constitutes the second interim evaluation report and covers findings from the first full year of California's statewide, residential opt-in time-of-use (TOU) pricing pilots implemented by Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE) and San Diego Gas and Electric Company (SDG&E). These pilots were implemented in response to California Public Utilities Commission (CPUC) Decision 15-07-001. A key objective of the pilots is to develop insights that will guide the IOUs applications to be filed in January 2018 proposing the implementation of default TOU pricing for all residential electricity customers and the CPUC's policy decisions regarding default pricing. Findings from the first summer—June through October 2016—are documented in the "Statewide Opt-in TOU Evaluation First Interim Report"[1] dated April 11, 2017. The First Interim Report contains detailed background information on the pilot, a detailed methodology section, describes the pilot design and evaluation methodology used for analysis, discusses each IOUs pilot implementation and treatments, and presents load impacts, bill impacts, and survey findings covering the first summer period.

Collectively, the pilots implemented across the three IOUs are testing nine different TOU rate options. For eight of the nine options, more than 50,000 households were enrolled and assigned to one of the TOU rates or retained in the study on the standard tiered rate to act as a control group for those who were placed on the new tariffs. The ninth rate option is a complex, dynamic rate that SDG&E is testing on a very small group of customers. Recruitment for this rate led to enrollment of roughly 65 customers.

1.1 Pilot Evaluation

Evaluation of the opt-in pilots focused on a number of important research objectives, including:

- Determining the change in electricity use in different time periods for different customer segments and climate regions from each rate treatment and in response to the technology and information treatments that were also included in the pilot as described in the First Interim Report;
- Estimating the distribution of bill impacts associated with each rate option both before and after enrolling on the TOU rates;
- Assessing the extent to which the TOU rates cause unreasonable hardship among selected customer segments such as seniors and economically vulnerable customers in hot climate areas;
- Determining satisfaction with and perceptions about, understanding of and reported changes in behavior associated with different treatment options.

Load and bill impacts are estimated for CARE/FERA[2] and non-CARE/FERA customer segments in each of three climate regions (hot, moderate, and cool) in each IOU service territory. In the hot climate region in PG&E and SCE's service territories, senior households (e.g., households with at least one resident who is

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[2] California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance (FERA) customers receive significant electricity price subsidies. Participation in these programs is tied to income and household size.

65 years or older) and households with incomes below 100% of Federal Poverty Guidelines (FPG) were oversampled for one rate option in the hot climate region in order to assess whether TOU rates might cause undue hardship for these segments.

Load impacts for each rate and technology treatment were estimated by comparing loads for customers randomly assigned to each TOU tariff (e.g., treatment customers) with loads for customers randomly assigned to the OAT (e.g., control customers). The difference in loads between treatment and control customers in each rate period before customers are placed on the TOU rate (e.g., the pretreatment period) is subtracted from the difference after customers are placed on the rate (e.g., the treatment period) to ensure that there is no bias in the estimated impact due to random chance. This is referred to as a "difference-in-differences" (DiD) analysis. When applied to data collected through an RCT design, DiD analysis produces the most accurate load impact estimates possible through experimental research.

Bill impacts were estimated in a similar manner to load impacts in that a DiD analysis was conducted in order to control for exogenous factors that might impact bills between the pre- and post-treatment periods. Bill impacts were estimated as the difference between bills using pre- or post-treatment loads based on the TOU tariff compared with the OAT. Average bill impacts are reported as well as changes in the percent of customers who experience bill impacts above a certain threshold.

Assessing the extent to which TOU rates cause unreasonable hardship among selected customer segments such as seniors and economically vulnerable customers in hot climate areas is done primarily through survey questions designed to measure hardship. Two surveys were conducted, one following the first summer period and the second at the end of the first year on the pilot rates. Both surveys were sent to the entire treatment and control population using a mixed mode, email, mail and phone (EMP) methodology. Responses between treatment and control customers are compared to determine if TOU rates significantly increase the percent of customers that report hardship conditions. Satisfaction with, perceptions about, understanding of, and reported changes in behavior associated with different rate and other treatment options are also determined through surveys. Response rates varied across customer segments and treatment cells but were substantial to guard against bias.

1.2 Overall Findings

The first year of the TOU pilots produced a large amount of information that will be useful in guiding California's pricing strategy over the coming years. The first year has provided insights regarding changes in customers' energy use in response to TOU rates during the summer, winter, spring, and for the full year, a variety of bill impact metrics on an equivalent seasonal and annual basis, and insights into the customer's experience on the pilot through two surveys. One of the final research objectives for the pilot, to evaluate impact persistence, will follow in the final report after data from the second summer is available for analysis. When interpreting results to date, policymakers must keep in mind that statistically significant differences do not necessarily translate into material differences, especially for survey findings, since the large number of customers participating in the pilots (which was driven largely by the desire to estimate load impacts with reasonable precision) combined with the decision to survey all participants means that even very small differences in survey metrics can be found to be statistically significant. With this caution in mind, the remainder of this section provides a high level summary of key findings.

1.2.1 Load Impacts

Key findings for load impacts include the following:

- While many pricing pilots and programs have been evaluated in the electricity industry nationwide and in California, few if any have tested tariffs that have peak pricing periods that extend well into the evening hours when many residential households have occupants arriving home from work and engaging in evening activities. **This second interim report now evaluates how customers responded to the time-of-use rates during the winter and spring seasons.** All eight tariffs tested in these pilots had a substantial portion of the peak period covering key evening hours, which include more hours after the sun has set, compared to the summer season. Indeed, **the common hours across all eight tariffs are from 6 to 8 PM**. Some tariffs had peak periods extending until 9 PM and some had shoulder periods extending until midnight. **A key finding from the pilots in the winter season is that statistically significant load reductions were found for all rates tested for the service territory as a whole and for nearly all climate regions.** Table 1.2-1 summarizes the percentage and absolute peak period load reductions for each rate and service territory. As seen, the lowest load impact occurred for SCE's Rate 1, showing an average reduction of 1.4% and 0.01 kW, and the highest occurred for PG&E's Rate 1 and Rate 2, which had average percentage reductions of 3.6% and 0.03 kW.

Table 1.2-1: Winter Weekday Peak Period Load Reductions*

Utility	Metric	Rate 1	Rate 2	Rate 3
PG&E	Peak Period Hours	4-9 PM	6-9 PM	4-9 PM
	% Impact	3.6%	3.6%	3.5%
	Absolute Impact (kW)	0.03 kW	0.03 kW	0.03 kW
SCE	Peak Period Hours	2-8 PM	5-8 PM	4-9 PM
	% Impact	1.4%	2.0%	3.2%
	Absolute Impact (kW)	0.01 kW	0.02 kW	0.03 kW
SDG&E	Peak Period Hours	4-9 PM	4-9 PM	N/A
	% Impact	2.3%	1.7%	N/A
	Absolute Impact (kW)	0.02 kW	0.01 kW	N/A

* All impacts presented here are statistically significant

- Another important policy question given shifting load patterns at some utilities is the magnitude of peak period load reductions on weekends. Peak period load reductions on weekends and the pattern of load reductions across rate periods on weekends were generally similar to weekday impacts. **That is, customers can and will respond to TOU price signals on weekends.**
- Also often of interest when examining TOU rates is whether peak period reductions consist primarily of load shifting, in which case daily usage would remain roughly the same, load reductions that are not completely offset by increases in other rate periods, which would reduce usage overall, or whether customers actually take advantage of lower off-peak prices by consuming more in lower priced periods than is reduced during high priced periods in which case overall usage would increase. For the majority of rates, climate regions and customer segments, there was a small but statistically significant overall reduction in electricity use. **The**

reduction in total annual usage ranged from very small negative values (e.g., an increase) to as high as 3.1%.

- **For PG&E, winter load impacts in both absolute and percentage terms, were largest in the hot climate region, second largest in the moderate region, and lowest in the cool region for Rates 1 and 3** (although the differences were not always statistically significant). PG&E load impacts were slightly larger in the moderate climate region than the hot region for Rate 2, though the difference is not statistically significant. **At SDG&E, load impacts for Rate 2 in both absolute and percentage terms, were largest in the hot climate region, and there was not a statistically significant difference between the moderate and cool climate regions.** However, at SCE, the pattern of load reductions was not the same. **In general, the differences across regions at SCE were smaller and in some cases, the largest load reductions were found in the moderate or cool climate region and the smallest in the hot region.** It is noteworthy that SCE's hot region experiences some of the most extreme temperature swings both seasonally and daily. In fact, SCE's hot region is generally SCE's coldest region in the winter. Similar temperature patterns were also observed in PG&E's territory in regions such as Bakersfield.
- **Load impacts in the winter are slightly smaller than in the summer even though, according to survey results, customers mostly persisted in taking several actions to shift or reduce their usage during the summer and the winter. This is likely due to customers having fewer opportunities to take actions in the winter that have a large impact on their electricity load, such as reducing or turning off their air-conditioning.** Customers did report reducing or turning off their heat during the winter, for example, but most customers use natural gas for heating their homes, which would have little to no impact on electricity usage.
- **For the service territory as a whole for all three utilities, CARE/FERA customers had lower average percent and absolute peak period load reductions than non-CARE/FERA customers for all rates.** This pattern was typically (although not universally) true at PG&E, SCE, and SDG&E for all rates and climate regions.
- **Senior households in both PG&E's and SCE's hot climate region had load reductions generally similar to those for the general population in the hot climate region**. However, SCE Senior households had slightly lower impacts than the general population in the hot climate region, and PG&E Senior households had slightly larger impacts than the general population in the hot climate region.
- **Households with incomes below 100% of the Federal Poverty Guidelines (FPG) in hot climate regions did not reduce peak period loads in PG&E's service territory but had load reductions slightly larger compared to the general population in SCE's hot climate region.**
- **Households who had previously purchased smart thermostats reduced winter peak period usage by approximately 4.9% in the SCE service territory,** which was significantly higher compared to non-CARE/FERA population weighted load reductions of 1.8%. Nest offered its "Time of Savings" support service for the second summer, which could affect second summer impacts in the final report.
- **SDG&E customers who received Weekly Alert Emails in the moderate climate region had small but statistically significant increases in load reductions equal to approximately 0.01 kW**, whereas customers in the cool climate region had impacts decline by approximately 0.01 kW. In both cases, the difference was negligible due to the small impacts in general.
- **SDG&E offered rebates for smart thermostats to customers through the Whenergy program.** 2,214 customers were reached out to via direct mail and 4,889 customers were contacted via email for the $100 rebate offer. A similar number of customers were offered the $200 rebate

(2,201 direct mail and 4,920 email).[3] 349 applications were received, and of those, 246 were deemed eligible and ultimately accepted. **Of the 246 applications accepted, 95 were for the $100 rebate offer, and 151 were for the $200 rebate offer.**

- PG&E continued to offer a smart phone app that would provide a variety of information to those who downloaded it that might help them to manage their energy use. **The number of customers who successfully downloaded the app was quite low and there were not enough users to determine whether the app had an impact.**

1.2.2 Bill Impacts

Key findings concerning bill impacts include the following:

- **Total annual bill impacts were very small at all three utilities, with impacts between essentially 0% and 2% reductions for the average customer.** The 12-month bill impacts varied significantly by climate region and CARE/FERA status. At SCE, CARE/FERA customers faced greater bill increases than non-CARE/FERA customers in most cases (on a percentage basis).
- **At both PG&E and SCE, average monthly winter bills were lower for all TOU rates than they would have been on the OAT for nearly all customer segments and all climate regions.** The exception was CARE/FERA customers on Rate 3 in SCE's cool climate region. Average monthly bill reductions over the winter months ranged from a low of roughly $1 to as much as $12. Most segments on average were only able to save a small amount more in addition to the structural bill reduction by reducing or shifting usage. It is important to keep in mind that customers generally faced bill increases during the summer months of the pilot.
- **Bill impacts at SDG&E were quite different from those at PG&E and SCE, with very small structural impacts in the winter months.** Customers faced winter bill impacts that were generally less than 1% in either direction, at the territory level and at the CARE/FERA and non-CARE/FERA level.
- **Average annual total bill impacts varied significantly by utility, rate, and climate region.** The average customer at PG&E across all three rates either had no change in the total annual cost of energy or a slight reduction of up to $6. The largest decrease was $36 for CARE/FERA customers in the moderate climate region on Rate 1, and the largest annual bill increase was $40 for non-CARE/FERA customers on Rate 2 in the hot climate region. At SCE, the average customer across all three rates either had no change in the total annual cost of energy or a slight reduction of up to $10. The largest decrease was $47 for SCE non-CARE/FERA customers in the cool climate region on Rate 3, and the largest annual bill increase was $64 for non-CARE/FERA customers on Rate 1 in the hot climate region. At SDG&E, the average customer across both rates had a slight reduction of up to $10 in the total annual cost of energy. The largest decrease was $28 for SDG&E non-CARE/FERA customers in the cool climate region on Rate 2, and the largest annual bill increase was $20 for general population on Rate 2 in the hot climate region.

[3] It isn't known if there was overlap in marketing to customers between the email and direct mail channels. This will be clarified and additional details regarding acceptance rates by incentive level and treatment versus control group will be included in the final report. Load impacts were not estimated for the customers who received the rebates due the sample size being too small to yield statistically significant impacts.

Overall, the average customer across all utilities experienced a slight decrease in the annual cost of electricity. The findings varied significantly by utility, rate, climate region, and customer segment ranging from an increase of $64 to a decrease of $47 per year. While this is the net difference in total bills for the year, it's important to keep in mind that lower winter prices generally offset the higher summer prices. Many customers experienced summertime bill increases of $20 to $35 per month on average. While bill volatility is a legitimate concern in light of the relatively large bill increases experienced by many pilot participants over the few summer months covered in the initial evaluation period, this is not an indication that a good solution to this problem is to mute the TOU price signal.

Seasonal bill volatility exists even under the OAT in California due to tiered pricing and variation in usage over seasons. Importantly, SDG&E's pilot tariffs had TOU price signals higher than some of the PG&E and SCE pilot rates that were associated with much higher bill volatility. Designing TOU tariffs that account for the seasonal differentiation in the OAT (or lack thereof), and offering balanced payment programs, which allow customers to pay the same bill each month based on historical usage and current rates (with periodic true-ups), combined with first year bill protection, may be better solutions that will protect customers while improving economic efficiency through TOU prices that more accurately reflect cost causation. The extent to which this option might mute TOU price signals is subject to debate but will be examined in the default pilots that the IOUs will implement in 2018.

A final point to keep in mind as default tariff options are designed is that all customers who will be defaulted onto TOU rates in 2019 will receive bill protection for the first full year on the new tariff. As such, while summer bills may be higher than under the OAT, customers who stay for a full year will not pay a higher bill than they would under the OAT.

1.2.3 Customer Attrition

Customer attrition is driven by three very different factors. One is customers who move, referred to as customer churn. Another is customers who become ineligible as a result of factors such as installing solar, going onto medical baseline, or switching to service from a Community Choice Aggregator (CCA). The final factor is customers who consciously opt out of the rate because they are unhappy being on a TOU rate. Key findings concerning customer attrition include the following:

- **Cumulative opt-out rates between enrollment and the end of June 2017 have been quite low for nearly all rates and customer segments.** For PG&E, the cumulative percent of treatment customers who dropped off the rate was between 1% and 7% and at SCE it was between 0.5% and 12%. For SDG&E, opt-out rates were between 1% and 3.5%. For example, PG&E experienced 7% attrition from Non-CARE customers in the hot climate region on Rate 3.
- At PG&E and SCE, there are small differences in the cumulative percent of opt outs between tariffs at each utility. Cumulative opt-out rates are greatest for PG&E and SCE's Rate 3 (about 4.5%). At SDG&E, the greatest cumulative opt-out rates, about 3.5%, are among customers in the hot climate region on Rate 2.
- **The number of customers dropping off the TOU rates was highest in the hot region,** second in the moderate and lowest in the cool climate region for all tariffs.

- **Opt-out rates were slightly lower for CARE/FERA customers in PG&E and SDGE's service territory compared with non-CARE/FERA customers. In SCE's territory, the differences between CARE/FERA and non-CARE/FERA were small. Opt-out rates leveled off over the course of the winter.**
- **Overall attrition ranged from as low as 10% to as high as 33% with the highest being for CARE/FERA customers in SCE's hot climate region on Rate 3.** Given that the pilot planning assumption was that total attrition would be roughly 25% over the course of the two summer periods, this segment may be at risk of having sample sizes that are lower than ideal by summer 2017.
- **Attrition has also been high in PG&E's moderate and cool climate regions for some segments due primarily to customers switching to CCAs,** which are quite active in PG&E's service territory.

1.2.4 Survey Findings

Key findings from the surveys that were administered include the following:

- **There were no statistically significant increases in the economic index values of treatment customers, compared to control customers, for segments of interest at SCE. PG&E Rate 3 CARE/FERA customers in the hot region** (and SDG&E Rate 1 CARE/FERA customers in the moderate region) **had higher economic index scores, or greater economic hardship, when compared with control group customers.** For context, the size of the difference in the economic index score is equivalent to the difference in the value of the index from using one additional non-income based method to pay bills or from having difficulty paying one additional bill since December 2016. An important policy question is whether TOU rates might increase economic hardship for selected customer segments in the hot climate region for PG&E and SCE. The surveys included questions pertaining to economic hardship and responses to several questions were combined to produce an economic index. The value of this index was compared between treatment and control customers to determine whether the TOU rates increase the value of the index.
- **There were no statistically significant increases in the health index values of treatment customers, compared to control customers, for segments of interest at PG&E and SCE.** SDG&E Rate 2 CARE/FERA customers in the moderate climate region had a higher health index score, or greater health hardship, when compared with control group customers. For context, the size of the difference in the health index score is equivalent to the difference in the value of the index from having a slightly higher frequency of experiencing poor health or having poor health limit usual activities (e.g. from rarely to sometimes, sometimes to often, etc.) since December 2016. Another important policy question is whether TOU rates might increase health hardship for selected customer segments in the hot climate region for PG&E and SCE. The surveys included questions pertaining to health hardship and responses to two questions were combined to produce a health index. The value of this index was compared between treatment and control customers to determine whether the TOU rates increase the value of the index.
- **No significant increases in the health metrics for treatment customers, compared to control customers, were found at PG&E. About 6% more SCE Rate 1 CARE/FERA customers and Rate 1 and 2 customers on or eligible for CARE/FERA, who have electric heat, reported seeking**

medical attention due to excessive cold when compared with control customers; there were no significant increases regarding excessive heat. About 5% more SDG&E Rate 1 and Rate 2 CARE/FERA customers in the moderate climate region with air conditioning sought medical attention due to excessive heat when compared to their control customers; there were no significant increases regarding excessive cold. The surveys also asked customers whether they had sought medical attention due to excessive heat or cold in their home (health metrics), and these responses were compared between treatment and control customers. The comparisons regarding excessive heat were made only for customers who reported having air conditioning, and for those who require air conditioning due to a medical condition. The comparisons regarding excessive cold were made only for customers who reported having electric heat, and for those who require heating due to a medical condition.

- **At PG&E and SCE, satisfaction ratings with the TOU rate and with the utility were typically slightly higher for TOU rate customers than for control customers, which is a reversal of trends from the first survey, and these differences were sometimes statistically significant but they were always less than 1 point on an 11-point scale.** Put another way, none of these differences are likely to be judged as material.
- S**atisfaction ratings for both the IOU and the rate were slightly higher for PG&E's and SCE's Rate segments, and SDG&E's Rate 2 segments, compared to 2016 survey results, indicating an improvement in satisfaction.** Average ratings were slightly lower, however, for all Control group segments and SDG&E's Rate 1 segments compared to 2016 survey results.
- The surveys revealed that **a much smaller percent of customers on TOU rates received bills during the previous six months that were higher than expected compared to the results from the first survey, which asked about bills during the summer months. The percentage difference on this metric between treatment and control customers was significantly lower for the majority of rates and customer segments in the hot and moderate climate regions at PG&E, and for one SCE and two SDG&E segments.** This is an important finding that should influence not only the timing of enrollment for customers on TOU rates (e.g., enrolling customers during winter or spring, not in summer or early-fall) but also the content of ME&O materials, which should be designed to prepare customers for higher than expected bills in the summer period (while reminding them about lower bills at other times of the year).
- The surveys showed that **about half to two-thirds of customers reported knowing when bill protection ends, but that customers' understanding of bill protection may depend on how the question is asked.** SCE and SDG&E customers were provided a brief explanation of bill protection and asked if they understand what it means using a yes/no answer scale. Over 86% reported they did understand. PG&E customers, however, were provided the same brief explanation but were asked to choose what bill protection means among four possible choices. Between 28% and 59% selected the correct meaning while 25% to 51% reported they did not know. Net of each IOU's outreach to customers about bill protection, customers may overwhelmingly understand bill protection generally, but many do not understand the specifics when presented with other possible meanings (e.g. several customers think they will receive a bill credit each month during the first year instead of receiving one credit after the first year).
- **The surveys also showed a significant disparity in understanding of the timing of the peak period between CARE/FERA and non-CARE/FERA customers.** For some rates and climate regions, between 14% and 44% of CARE/FERA customers could not identify a single hour that fell in the peak period rate window, while the percent of non-CARE/FERA customers that had the same level of misunderstanding was often significantly lower or even in the single digits. While many customers' understanding of rates improved compared to results from the first

survey, particularly for PG&E, the level of understanding for SCE's Rate 1 and 2 and SDG&E's Rate 2 customers worsened. This issue should be carefully addressed and studied further in the upcoming default pilots, where there is a much greater emphasis on and opportunity to test ME&O alternatives for all segments.

- **For all three utilities, customers on TOU rates were more likely to 'often' take time-specific actions than customers on the OAT.** For example, while a similar proportion of customers from control and treatment groups indicated they often turned off their lights to conserve energy, a larger proportion of treatment customers indicated they often shifted doing laundry and running the dishwasher during peak hours. In addition, substantial percentages of customer reported taking several of actions often to shift or reduce usage. Trends in the actions taken results suggest that many treatment customers did know about and take several actions that helped them shift usage even though fewer of them understood the nuances of their rates.
- Overall, the opt-in TOU pilot customer survey answered the research questions it was designed to address, including TOU rates' effects on customers' economic and health statuses, satisfaction, bill expectations, understanding of rates, actions taken to shift and/or reduce usage, and attitudes toward smart technologies, demand response and energy efficiency, and TOU outreach materials. However, the results also revealed some questions to begin or to continue exploring, such as how to improve customers' understanding of TOU rates (particularly the on-peak hours) and bill protection, their satisfaction with different aspects of the rates, and their persistence in taking actions to shift and/or reduce usage.

2 Introduction

In Decision 15-07-001, the California Public Utilities Commission (CPUC or the Commission) ordered California's three investor owned utilities (IOUs) to conduct certain "pilot" programs and studies of residential Time-of-Use (TOU) electric rate designs (TOU Pilots and Studies) beginning the summer of 2016, and to file applications no later than January 1, 2018 proposing default TOU rates for residential electric customers. The IOUs were also directed to form a working group (TOU Working Group) to address issues regarding the TOU pilots and to hire one or more qualified independent consultants to assist with the design and implementation of the TOU Pilots and Studies. Nexant, Inc. was engaged as the independent consultant.

Collectively, the pilots implemented across the three IOUs are testing nine different TOU rate options. For eight of the nine options, more than 50,000 households were enrolled and assigned to one of the TOU rates or retained in the study on the standard tiered rate to act as a control group for those who were placed on the new tariffs. The ninth rate option is a complex, dynamic rate that SDG&E is testing on a very small group of customers. Recruitment for this rate led to enrollment of roughly 65 customers.

Findings from the first summer—June through October 2016—are documented in the "Statewide Opt-in TOU Evaluation First Interim Report"[4] dated April 11, 2017. The First Interim Report contains detailed background information on the pilot, a detailed methodology section, describes the pilot design and evaluation methodology used for analysis, discusses each IOUs pilot implementation and treatments, and presents load impacts, bill impacts, and survey findings covering the first summer period. This document constitutes the second interim report and covers the findings from the first full year of the pilot. During pilot implementation, customers were enrolled onto the pilot rates throughout the month of June 2016 according to their regular billing cycle date. Consequently, the results presented in this report cover from July 2016 through June 2017 in order to reflect a complete year of enrollment for all customers on the pilot.

2.1 Pilot Evaluation

Evaluation of the opt-in pilots focused on a number of important research objectives, including:

- Determining the change in electricity use in different time periods for different customer segments and climate regions from each rate treatment and in response to the technology and information treatments that were also included in the pilot as described in the First Interim Report;
- Estimating the distribution of bill impacts associated with each rate option both before and after enrolling on the TOU rates;
- Assessing the extent to which the TOU rates cause unreasonable hardship among selected customer segments such as seniors and economically vulnerable customers in hot climate areas;
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Load and bill impacts are estimated for CARE/FERA[5] and non-CARE/FERA customer segments in each of three climate regions (hot, moderate, and cool) in each IOU service territory. In the hot climate region in PG&E and SCE's service territories, senior households (e.g., households with at least one resident who is 65 years or older) and households with incomes below 100% of Federal Poverty Guidelines (FPG) were oversampled for one rate option in the hot climate region in order to assess whether TOU rates might cause undue hardship for these segments.

Load impacts for each rate and technology treatment were estimated by comparing loads for customers randomly assigned to each TOU tariff (e.g., treatment customers) with loads for customers randomly assigned to the OAT (e.g., control customers). The difference in loads between treatment and control customers in each rate period before customers are placed on the TOU rate (e.g., the pretreatment period) is subtracted from the difference after customers are placed on the rate (e.g., the treatment period) to ensure that there is no bias in the estimated impact due to random chance. This is referred to as a "difference-in-differences" (DiD) analysis. When applied to data collected through an RCT design, DiD analysis produces the most accurate load impact estimates possible through experimental research.

Bill impacts were estimated in a similar manner to load impacts in that a DiD analysis was conducted in order to control for exogenous factors that might impact bills between the pre- and post-treatment periods. Bill impacts were estimated as the difference between bills using pre- or post-treatment loads based on the TOU tariff compared with the OAT. Average bill impacts are reported as well as changes in the percent of customers who experience bill impacts above a certain threshold.

Assessing the extent to which TOU rates cause unreasonable hardship among selected customer segments such as seniors and economically vulnerable customers in hot climate areas is done primarily through survey questions designed to measure hardship. Two surveys were conducted, one following the first summer period and the second at the end of the first year on the pilot rates. Both surveys were sent to the entire treatment and control population using a mixed mode, email, mail and phone (EMP) methodology. Responses between treatment and control customers are compared to determine if TOU rates significantly increase the percent of customers that report hardship conditions. Satisfaction with, perceptions about, understanding of, and reported changes in behavior associated with different rate and other treatment options are also determined through surveys. Response rates varied across customer segments and treatment cells but were excellent in all cases. The lowest response rate was around 66% and the highest exceeded 92%. The survey was designed, managed, and analyzed by Research Into Action (RIA).

2.2 Report Organization

The remainder of this report is organized as follows. Sections 3, 4 and 5 summarize the load impact and bill impact results along with a synthesis section for PG&E, SCE, and SDG&E, respectively. Each section starts with an update on customer attrition. Following the attrition section, load impacts by rate period are presented for each rate option and relevant customer segment for the winter and spring season, along with annual energy savings. The next subsection discusses bill impacts for the winter, spring, and

[5] California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance (FERA) customers receive significant electricity price subsidies. Participation in these programs is tied to income and household size.

on an annual basis. Findings from the second survey are available in a separate document discussed below. The final subsections of Sections 3 through 5 provide a high level summary and synthesis of the impact and survey results for each IOU.

Section 6 provides a comparison of results across the utilities as well as overall conclusions that can (or cannot) be drawn from the entire body of research. While the pilots were designed jointly and are meant to be complementary, they were not designed specifically to allow cross-utility comparisons in most instances. For example, it is not appropriate to compare Rate 1 from SCE's pilot to Rate 2 from PG&E's pilot and conclude that one rate produced greater load impacts than the other due to differences in rate structure because differences in other factors, such as climate, customer demographics, customer satisfaction, perceptions about the utility, economic conditions and perhaps others may partially or fully explain any observed differences in the load impacts between the two rate options. Nevertheless, cross-utility comparisons are likely to be made by reviewers and some comparisons are more valid than others. As such, we provide a brief comparison of some key findings across utilities in this final section.

Appendix A to this report contains a list of Microsoft Excel files that have been filed as electronic tables in conjunction with the primary report. These electronic tables allow readers to access the underlying data that created the figures and tables in the report, and to determine actual values for data points within the figures.

Detailed findings from the second survey are available in the second volume of this report "California Statewide Opt-In Time-Of-Use Pricing Pilot: 2017 Customer Survey Results", written by RIA. The survey discussion focuses on key research issues such as hardship and the customers' experiences on the pilot. A detailed summary of the responses to each survey question is contained in this volume.

The First Interim Report contained detailed background information on the pilot, a detailed methodology section, and detailed descriptions of each IOUs pilot implementation and treatments. Readers interested in this background information are encouraged to review the first report[4], as this information has not been carried forward into this report in an effort to manage the report length. Interested readers may also wish to review the TOU Pilot Design Report,[6] which contains a detailed discussion of research issues and explanations for the design decisions that were made by the TOU Working Group. The IOU advice letters[7] and the CPUC resolutions may also contain information of interest.[8]

[6] George, S., Sullivan, M., Potter, J., & Savage, A. (2015). Time-of-Use Pricing Opt-in Pilot Plan. *Nexant, Inc.*

[7] SCE: Advice Letter 3335-E; PG&E: Advice Letter 4764-E; and SDG&E: Advice Letter 2835-E.

[8] SCE: Resolution E-4761; PG&E: Resolution E-4762; and SDG&E: Resolution E-4769.

3 PG&E Evaluation

This report section summarizes the attrition, load impacts, and bill impacts for the first year of PG&E's pilot, with specific attention to the winter months and annual results. Load and bill impacts from the first summer season can be found in the First Interim Report.

3.1 Summary of Pilot Treatments

Figure 3.1-1 through Figure 3.1-3 summarize the three tariffs that are being tested in the PG&E service territory. All three tariffs have peak periods that include the prime evening hours from 6 to 9 PM. The rates have changed since the launch of the pilot, and the figures represent the tariffs that were in effect in March 2017 and do not reflect the baseline credit of 8.8 ¢/kWh. Appendix B shows the prices that were in effect in each rate period for each tariff, including the OAT. Two sets of prices are shown in the appendix, one covering the period from pilot start through February 2017, and the other beginning on March 1, 2017. While several minor rate changes occurred over the course of the pilot, the rate adjustment that occurred on March 1, 2017 was more significant and, as such, it was factored into the estimation of bill impacts summarized in Section 3.4 below.

Rate 1 is a simple, two-period rate with weekday peak period from 4 to 9 PM all year long and off-peak prices in effect on all other weekday hours and for all hours on weekends. The tier-2, peak-to-off-peak price ratio[9] in the summer is roughly 1.3 to 1 and is very modest in the winter (non-summer months).

Rate 2 is slightly more complex than Rate 1 as it adds a summer "Partial-Peak" period covering the two hours immediately preceding and the one hour immediately following the three-hour Peak period that runs from 6:00 to 9:00 PM on weekdays and weekends. In order to offset the additional complexity incurred with a third TOU period, PG&E kept the same prices in effect on both weekdays and weekends.

Rate 3 is more complex than Rates 1 and 2. It includes TOU pricing in the spring (from March until May) that differs from pricing in the winter in order to allow for lower prices during low-cost hours from 10:00 am until 4:00 PM to be charged in a "Super-Off-Peak" period. The "Super-Off-Peak" period coincides with the period CAISO identifies as being at high risk for excess supply in the future. Rate 3 has the same design as Rate 1 for the summer and winter seasons, with peak times from 4:00 to 9:00 PM and all other hours being off-peak. In the spring, the peak hours are also the same as Rate 1, but the remaining hours are divided into off-peak and super-off-peak periods.

[9] The peak-to-off-peak price ratio is equal to the peak price divided by the off-peak price.

Figure 3.1-1: PG&E Pilot Rate 1 (March 2017)[10]

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Off-Peak (30.7¢)																Peak (41.0¢)							
	Winter	Off-Peak (26.1¢)																Peak (28.0¢)							
	Spring	Off-Peak (26.1¢)																Peak (28.0¢)							
Weekend	Summer	Off-Peak (30.7¢)																							
	Winter	Off-Peak (26.1¢)																							
	Spring	Off-Peak (26.1¢)																							

Figure 3.1-2: PG&E Pilot Rate 2 (March 2017)

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Off Peak (28.6¢)																Partial Peak (38.3¢)		Peak (43.5¢)					
	Winter	Off Peak (26.0¢)																		Peak (28.6¢)					
	Spring	Off Peak (26.0¢)																		Peak (28.6¢)					
Weekend	Summer	Off Peak (28.6¢)																Partial Peak (38.3¢)		Peak (43.5¢)					
	Winter	Off Peak (26.0¢)																		Peak (28.6¢)					
	Spring	Off Peak (26.0¢)																		Peak (28.6¢)					

Figure 3.1-3: PG&E Pilot Rate 3 (March 2017)

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Off-Peak (27.8¢)																Peak (55.6¢)							
	Winter	Off-Peak (26.1¢)																Peak (28.0¢)							
	Spring	Off Peak (25.8¢)										Super Off-Peak (17.4¢)						Peak (34.7¢)							
Weekend	Summer	Off-Peak (27.8¢)																							
	Winter	Off-Peak (26.1¢)																							
	Spring	Off Peak (25.8¢)										Super Off-Peak (17.4¢)													

Figure 3.1-4 presents the seasons for each rate. For all three rates, the summer season covers the months of June through September. The winter season is October through May for Rates 1 and 2, and October through February for Rate 3. The spring period for Rate 3 is March through May.

Figure 3.1-4 Seasons by Rate

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rate 1	Winter					Summer				Winter		
Rate 2	Winter					Summer				Winter		
Rate 3	Winter		Spring			Summer				Winter		

The next section, Section 3.2, is a discussion of customer attrition over the first year of the pilot. Section 3.3 presents the load impact estimates for the winter period for each rate and Section 3.4 summarizes the bill impacts for the winter months and on an annual basis.

[10] See Appendix B for comparison of tariffs.

3.2 Customer Attrition

Figure 3.2-1 through Figure 3.2-3 show the cumulative opt-out rates over time for each test cell and climate region. As discussed in the First Interim Report, there is an important distinction between opt-out rates and overall attrition. Opt out refers to customers actively deciding to transfer off a pilot rate whereas attrition refers to customers that leave the study for any reason, including becoming ineligible due to closing their account (customer churn), taking service from a Community Choice Aggregator (CCA), becoming a net metered solar customer, and others. As seen, opt-out rates are much lower than attrition rates. It should also be noted that pilot customers had a financial incentive tied to staying on the pilot rates through completion of the second survey near the end of the first year of enrollment. As such, the overall opt-out rate may be biased downward compared to a situation where no incentive was offered. Since all rates had the same financial incentive to stay enrolled for a year, the relative opt-out rates across tariffs should not be biased.

Overall, opt-out rates are low and steady over the course of the 12 month period and the differences between customer segments are small. The cumulative number of opt-outs is highest in the hot region, second highest in the moderate region and lowest in the cool region. The number of control customers dropping out is very low in all climate regions. The cumulative opt-out rate in the moderate and cool regions is below 6% for all customer segments and rates. In the hot region, the opt-out rate exceeds 5% for three customer-segment/rate combinations, each of them involving non-CARE/FERA customers. Over 7% of non-CARE/FERA customers on Rate 3 in the hot climate region have dropped out of the study. Overall, opt-out rates were slightly higher for non-CARE/FERA customers than for CARE/FERA customers. While there is evidence of an upturn in the opt-out rates starting in late July, after the first bills were sent out, there is also evidence of a slight leveling off near the beginning of October that continues until June 2017.

Figure 3.2-1: Cumulative PG&E Opt Outs by Month – Hot Climate Region

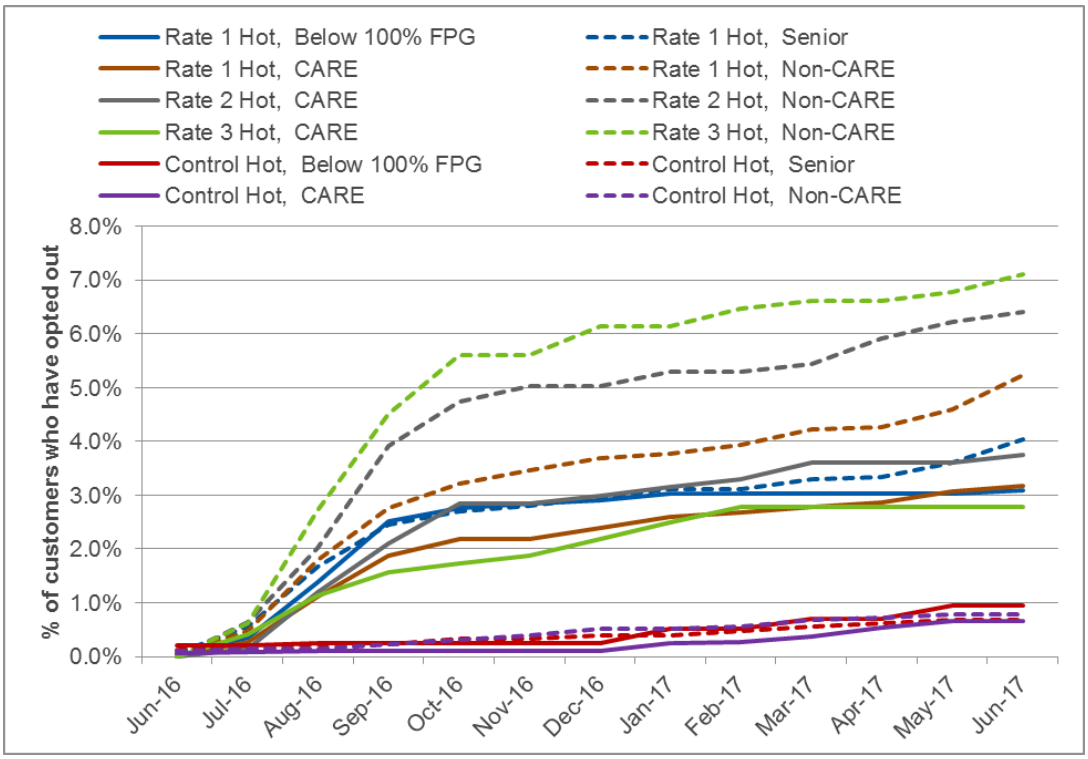


Figure 3.2-2: Cumulative PG&E Opt Outs by Month – Moderate Climate Region

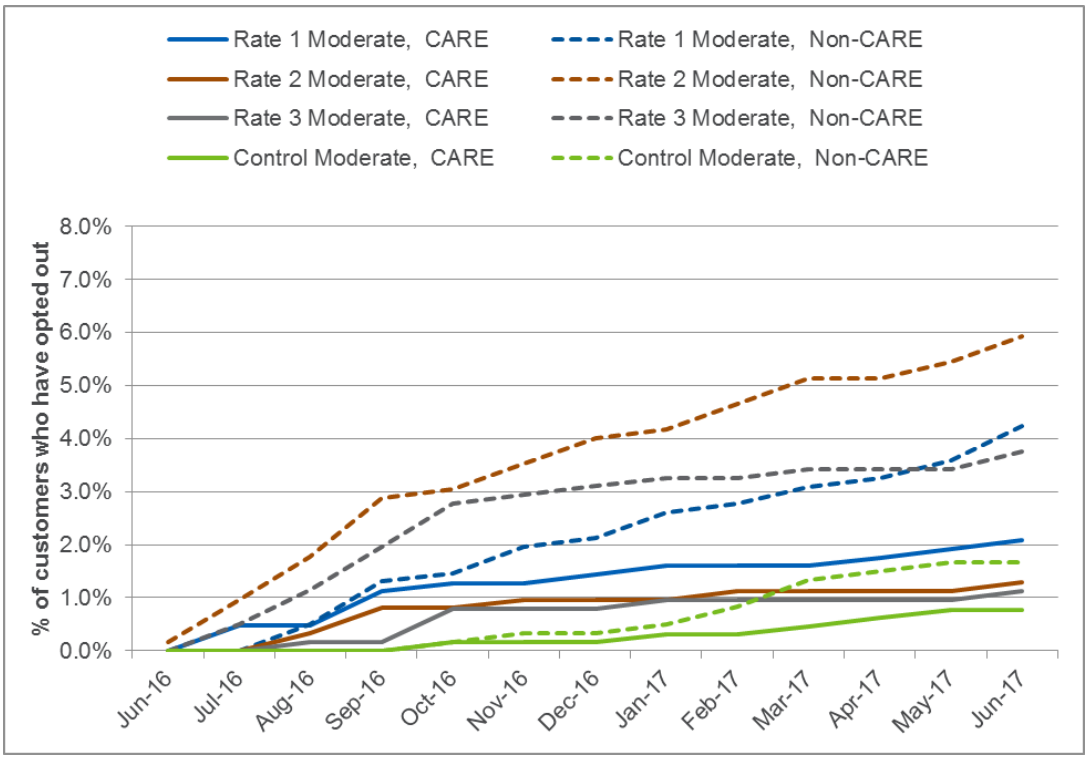


Figure 3.2-3: Cumulative PG&E Opt Outs by Month – Cool Climate Region

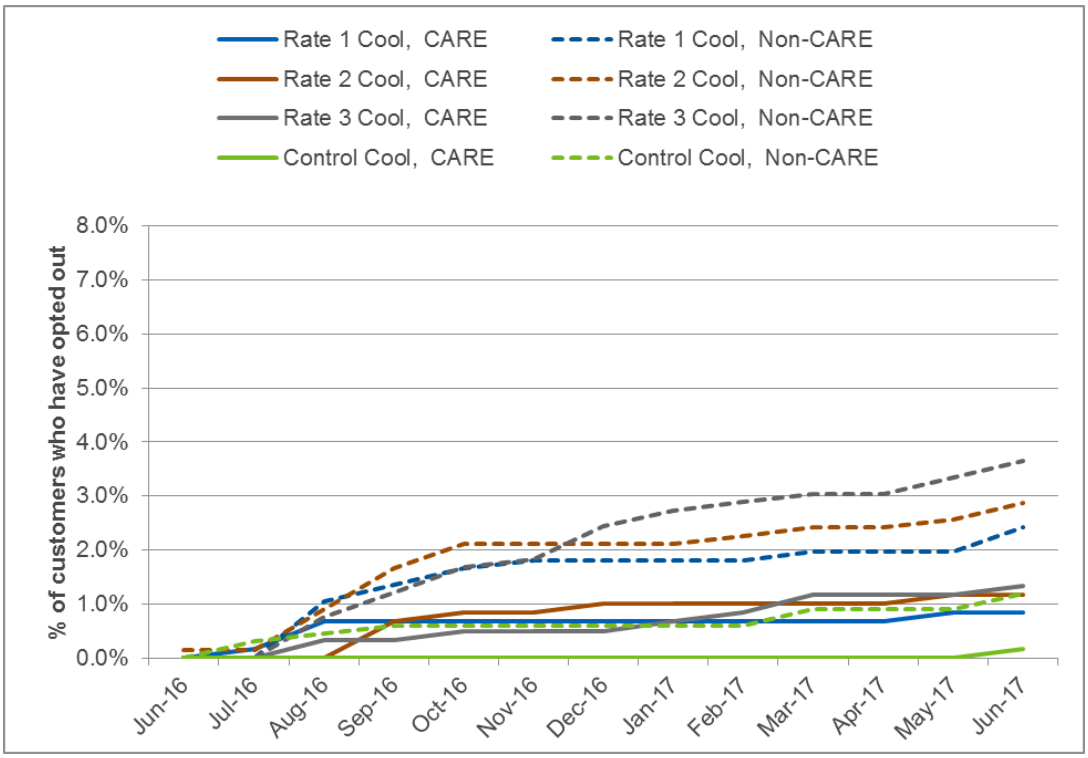


Figure 3.2-4 shows the cumulative percent of customers that opted out of each tariff for the CARE/FERA and non-CARE/FERA segments and for the total population across PG&E's service territory as a whole. As seen, the cumulative percent of customers opting out was quite low for all rates and segments. The lowest cumulative percent opt out was for CARE/FERA customers on Rate 3 and the highest was for non-CARE/FERA customers on Rate 2. For the service territory as a whole, Rate 2 saw the most opt outs, but there is no meaningful difference in the cumulative percent of opt outs between Rate 2 and Rate 3. Customers on Rate 1 had the lowest opt-out rate.

Figure 3.2-4: Cumulative Opt Outs by Rate and Customer Segment for the PG&E Service Territory

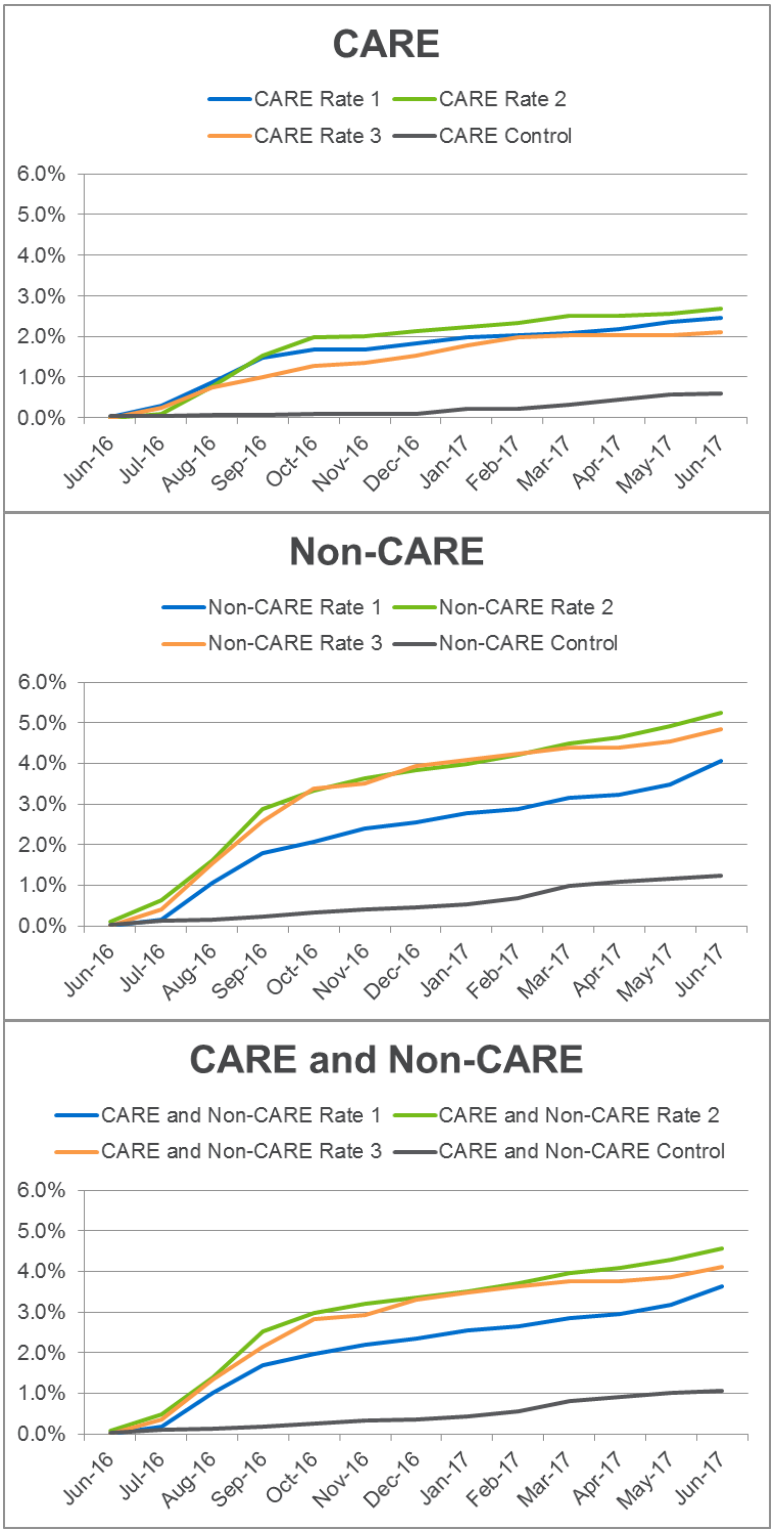


Figure 3.2-5 through Figure 3.2-7 show the overall attrition rate over time for each climate region, customer segment, and TOU rate. As seen in Figure 3.2-5, the attrition rate is quite constant over time in the hot region, with the final attrition rate ranging from a low of roughly 10% for the non-CARE/FERA control group and a high of over 20% for households with incomes below 100% of FPG in the hot climate region. The attrition graphs in the moderate and cool climate regions have a very different shape over time, with a significant increase in attrition starting in August in the moderate region and in September in the cool region. These higher rates coincide with more active transitions of customers to CCAs during those periods, especially among non-CARE/FERA customers in the cool climate region.

Figure 3.2-5: Cumulative PG&E Attrition by Month – Hot Climate Region

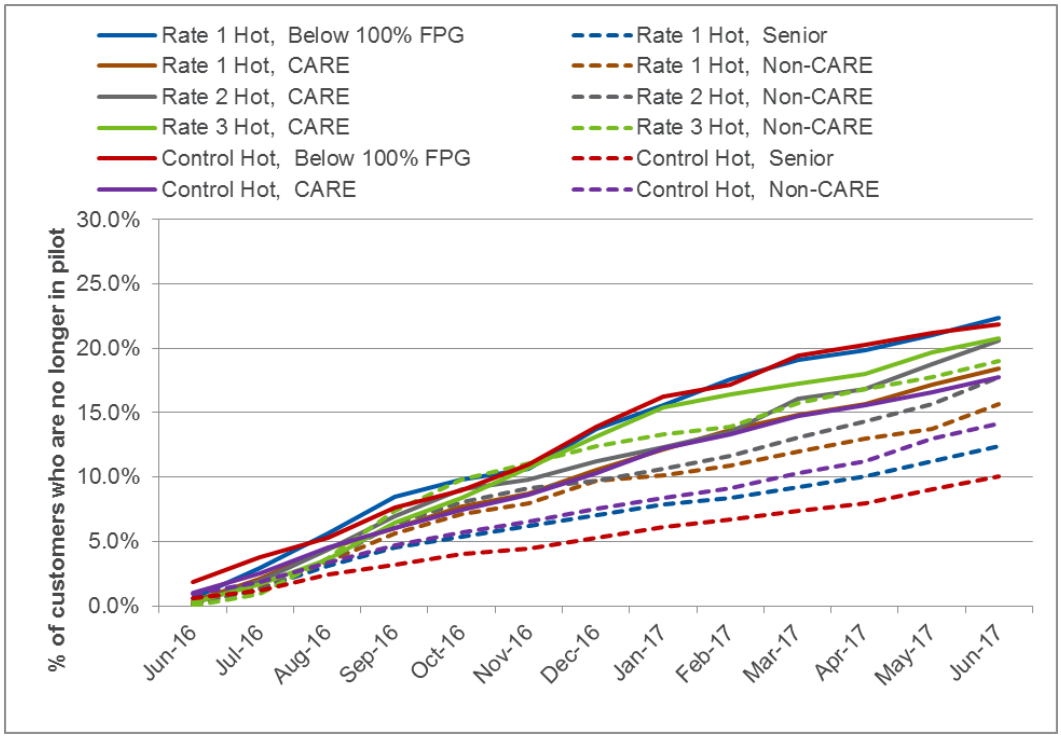
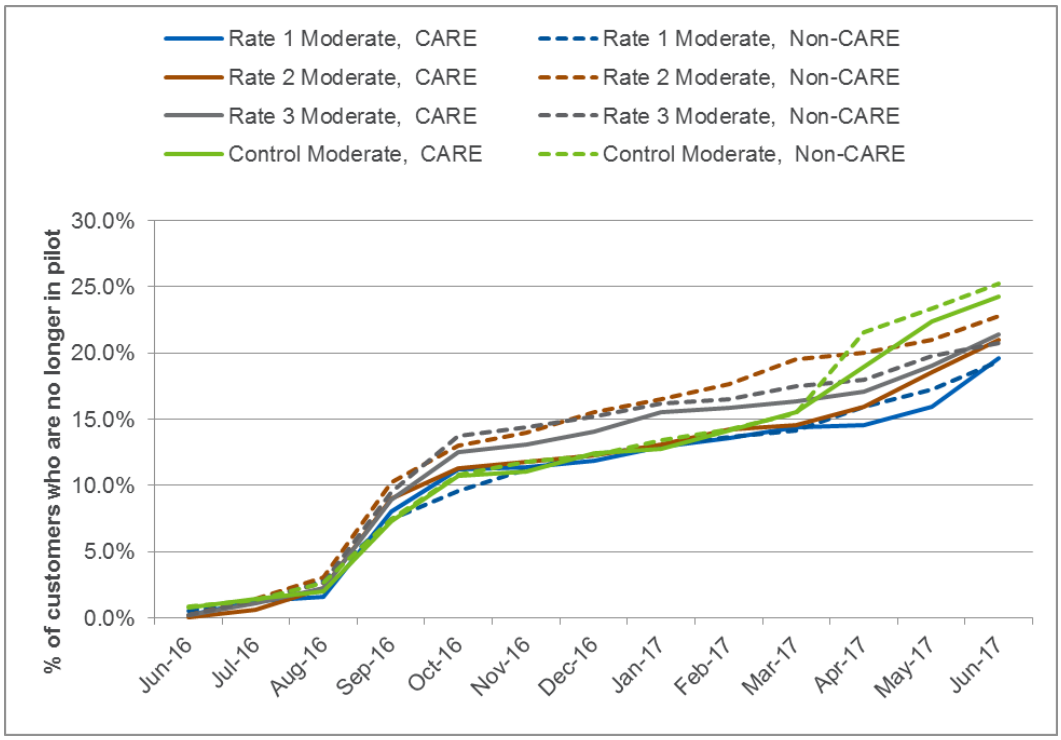
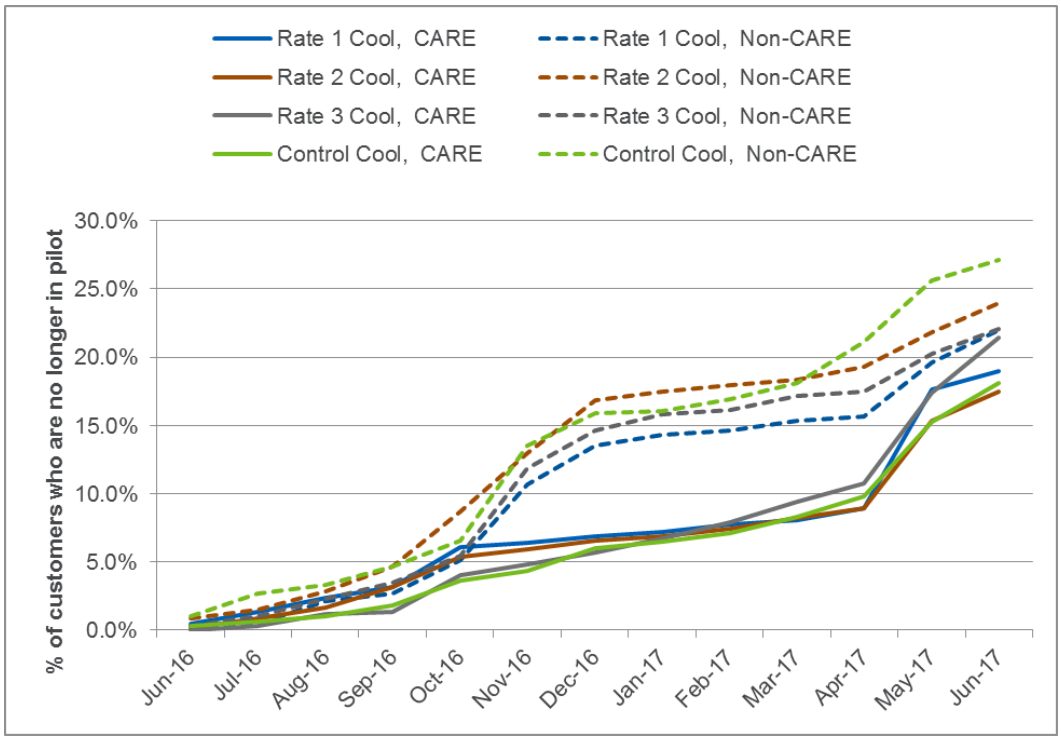


Figure 3.2-6: Cumulative PG&E Attrition by Month – Moderate Climate Region[11]



[11] There is a slight spike in ineligibilities in the Moderate climate region due to customers' transition to the Peninsula Clean Energy CCA, but the spike is not presented here. PG&E and PCE worked to accommodate participation of the Opt-in Pilot customers in the pilot during this scheduled transition by delaying the transition of Opt-in Pilot participants to PCE until the end of the pilot. However, over the course of PCE's final transition, a small number of pilot participants living in PCE territory and assigned to the Opt-in Pilot's control group were defaulted early to the PCE CCA. Because the transition of these customers from a full service PG&E customer to a PCE CCA customer did not lead to any changes in their underlying rate structure, Nexant retained these customers in the load and bill impacts analysis

Figure 3.2-7: Cumulative PG&E Attrition by Month – Cool Climate Region



3.3 Load Impacts

This section summarizes the load impact estimates for the three rate treatments tested by PG&E. The CPUC resolution approving PG&E's pilot requires that load impacts be estimated for the peak and off-peak periods and for daily energy use for the following rates, customer segments, and climate regions:

- Seniors, CARE/FERA customers, non-CARE/FERA customers and households with incomes below 100% of FPG in PG&E's hot climate region for Rate 1;
- For all three rates for all customers in PG&E's service territory as a whole and for all customers in PG&E's hot and moderate climate regions; and
- For CARE/FERA and non-CARE/FERA customers on each rate across PG&E's service territory as a whole.

In addition to these required segments, Nexant estimated load impacts for CARE/FERA and non-CARE/FERA customers for each rate for each climate region. Load impacts are reported for each rate period for the average weekday, average weekend and for the average monthly peak day for the winter months of October through May for Rate 1 and Rate 2 and October through February for Rate 3 and for the spring months of March through May for Rate 3. Impacts are reported for each rate, climate zone and customer segment summarized above. Underlying the values presented in the report are electronic tables that contain estimates for each hour of the day for each day type, segment and climate zone and for each month separately. These values are contained in Excel spreadsheets that are available upon request through the CPUC.

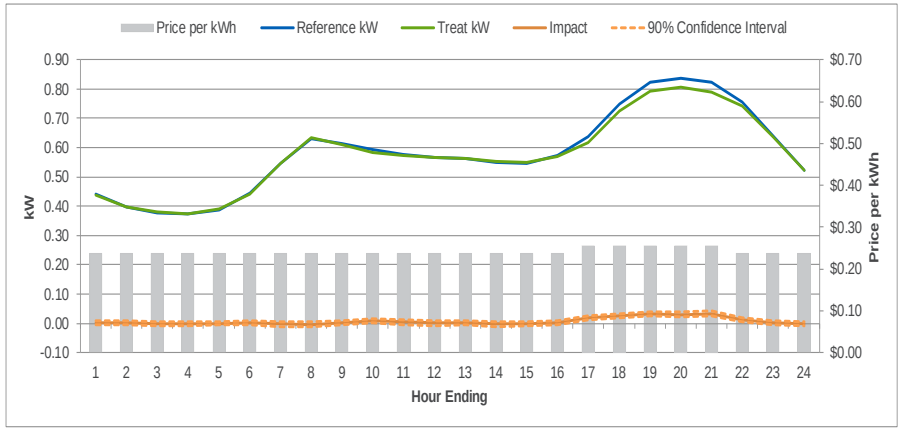
Figure 3.3-1 shows an example of the content of these tables for PG&E Rate 1 for all eligible customers in the service territory. Pull down menus in the upper left hand corner allow users to select different customer segments, climate regions, day types (e.g., weekdays, weekends, monthly peak day) and time period (individual months or the average of each season).

The remainder of this section is organized by rate treatment – that is, load impacts are presented for each relevant customer segment and climate region for each of the three rates. Following the summary for each rate, load impacts are compared across rates. This comparison is made only for the hours within each peak period that are common across all three rates (6 to 9 PM). Because the rates differ with respect to the length and timing of peak and off-peak periods, differences in load impacts across rates for any particular rate period may be due not only to differences in prices within the rate period but also due to differences in the length or timing of the rate periods

Figure 3.3-1: Example of Content of Electronic Tables Underlying Load Impacts Summarized in this Report (PG&E Rate 1, Average Winter Weekday, All Customers)

Segment	All
Rate	Rate 1
Month	Winter 2016 2017 - Rate 1 or 2
Day Type	Average Weekday
Treated Customers	6,096

Period	Reference kW	Treat kW	Impact	Percent Impact	90% Confidence Interval	
Peak	0.77	0.75	0.03	3.6%	0.02	0.03
Partial Peak	N/A	N/A	N/A	N/A	N/A	N/A
Off Peak	0.53	0.53	0.00	0.3%	0.00	0.00
Super Off Peak	N/A	N/A	N/A	N/A	N/A	N/A
Daily kWh	13.96	13.79	0.17	1.2%	0.13	0.20



Hour Ending	Reference kW	Treat kW	Impact	Percent Impact	90% Confidence Interval		Price	Period
1	0.44	0.44	0.00	0.3%	-0.01	0.01	$0.24	Off Peak
2	0.40	0.40	0.00	0.3%	-0.01	0.01	$0.24	Off Peak
3	0.38	0.38	0.00	-0.3%	-0.01	0.01	$0.24	Off Peak
4	0.37	0.37	0.00	-0.3%	-0.01	0.00	$0.24	Off Peak
5	0.39	0.39	0.00	-0.1%	-0.01	0.01	$0.24	Off Peak
6	0.45	0.44	0.00	0.8%	0.00	0.01	$0.24	Off Peak
7	0.55	0.55	0.00	-0.5%	-0.01	0.00	$0.24	Off Peak
8	0.63	0.63	0.00	-0.6%	-0.01	0.00	$0.24	Off Peak
9	0.61	0.61	0.00	0.5%	0.00	0.01	$0.24	Off Peak
10	0.59	0.58	0.01	1.6%	0.00	0.02	$0.24	Off Peak
11	0.58	0.57	0.00	0.7%	0.00	0.01	$0.24	Off Peak
12	0.57	0.57	0.00	0.1%	-0.01	0.01	$0.24	Off Peak
13	0.56	0.56	0.00	0.3%	-0.01	0.01	$0.24	Off Peak
14	0.55	0.55	0.00	-0.5%	-0.01	0.00	$0.24	Off Peak
15	0.55	0.55	0.00	-0.5%	-0.01	0.00	$0.24	Off Peak
16	0.57	0.57	0.00	0.5%	0.00	0.01	$0.24	Off Peak
17	0.64	0.62	0.02	3.1%	0.01	0.03	$0.26	Peak
18	0.75	0.72	0.02	3.3%	0.02	0.03	$0.26	Peak
19	0.82	0.79	0.03	3.8%	0.02	0.04	$0.26	Peak
20	0.84	0.81	0.03	3.6%	0.02	0.04	$0.26	Peak
21	0.82	0.79	0.03	4.0%	0.02	0.04	$0.26	Peak
22	0.75	0.74	0.01	1.7%	0.01	0.02	$0.24	Off Peak
23	0.64	0.64	0.00	0.5%	0.00	0.01	$0.24	Off Peak
24	0.52	0.52	0.00	0.0%	-0.01	0.01	$0.24	Off Peak
Daily kWh	**13.96**	**13.79**	**0.17**	**1.2%**	**0.13**	**0.20**	**N/A**	**N/A**

3.3.1 Rate 1

PG&E's Rate 1 is a two-period rate with a peak-period from 4 to 9 PM on weekdays. In winter, for electricity usage above the baseline quantity, prices equal roughly 29.0 ¢/kWh[12] in the peak period and 27.1¢/kWh in the off-peak period. All usage on weekends is priced at the off-peak price. For usage below the baseline quantity, a credit of 11.7 ¢/kWh is applied.

Winter Load Impacts

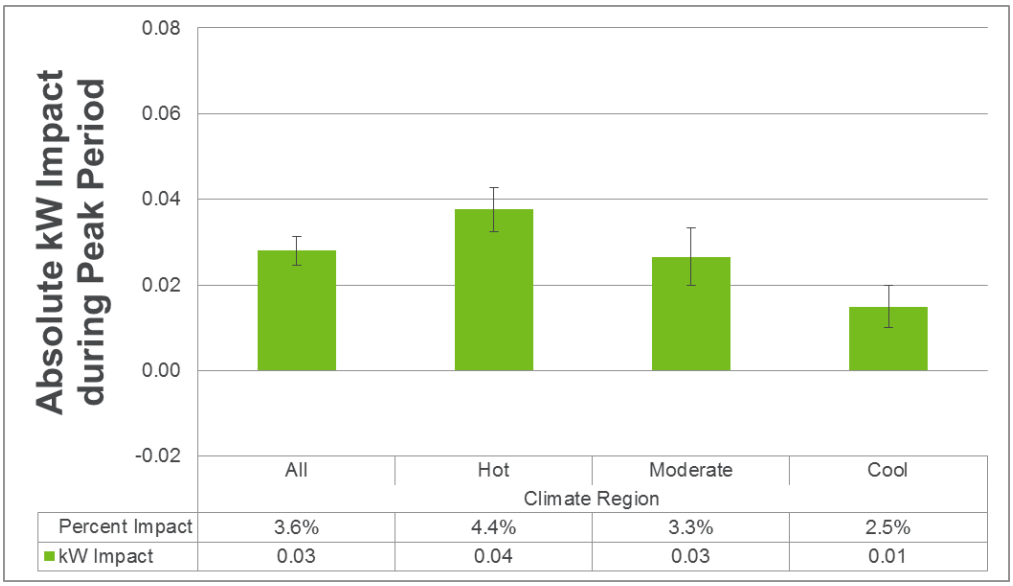
Figure 3.3-2 shows the absolute peak period load reduction for Rate 1 for PG&E's service territory as a whole and for each climate region. The lines bisecting the top of each bar in the figure shows the 90% confidence band for each estimate. If the confidence band includes 0, it means that the estimated load impacts are not statistically different from 0 at the 90% level of confidence. If the confidence bands for two bars do not overlap, it means that the observed difference in the load impacts is statistically significant. If they do overlap, it does not necessarily mean that the difference is not statistically significant[13]. In these cases, t-tests were calculated to determine whether the difference is statically significant.[14] It should also be noted that in many cases, the climate regions that are the hottest in the summer are also the coldest in the winter—often facing the most extreme temperature variation. This is important because under extreme temperature conditions (both hot and cold) it is more likely that customers are using more heating or cooling, leading to greater opportunities to curtail load, compared to customers in the moderate climate region who use less heating or cooling overall.

[12] Prices reflect tariffs in effect at the launch of the pilot through the end of February 2017. As indicated above and shown in Appendix B, rates changed on March 1, 2017.

[13] For further discussion of this topic, see https://www.cscu.cornell.edu/news/statnews/stnews73.pdf

[14] The test was applied at the 90% confidence level which means that a t-value exceeding 1.65 indicates statistical significance

Figure 3.3-2: Average Load Impacts for Peak Period for PG&E Rate 1[15] (Positive values represent load reductions)



As seen in the figures, all of the average peak-period load impacts for the service territory as a whole and for each climate region are statistically significant at the 90% level of confidence. On average, pilot participants across PG&E's service territory reduced peak-period electricity use by 3.6% or 0.03 kW[16], across the five-hour peak period from 4 to 9 PM. The average peak-period load reductions range from a high of 4.4% and 0.04 kW in the hot climate region to a low of 2.5% and 0.01 kW in the cool climate region. In the moderate climate region, load reductions equal 3.3% or 0.03 kW. The variation in absolute impacts across climate regions is greater than the variation in percent impacts due in large part to variation in electricity usage (e.g., the reference load) across regions. The difference in load impacts is statistically significant between the three climate regions.

Table 3.3-1 shows the average percent and absolute load impacts for each rate period for weekdays and weekends and for the average monthly system peak day for the PG&E service territory as a whole and for the participant population in each climate region. The percent reduction equals the load impact in absolute terms (kW) divided by the reference load. Shaded cells in the table contain load impact estimates that are not statistically significant at the 90% confidence level. The percentage and absolute values in the first row of Table 3.3-1, which represent the load impacts in the peak period on the average weekday, equal the values shown in Figure 3.3-2, discussed above.

[15] PG&E Rate 1 winter impacts represent October 2016 through May 2017.

[16] The kW value represents the average kWh/hour across the five our peak period. It is not an instantaneous measure of peak demand during the period. The value can be multiplied by the number of hours in the peak period to determine the total reduction in energy use (kWh) that occurred over the period.

Table 3.3-1: Rate 1 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

Rate 1														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.77	0.03	3.6%	0.86	0.04	4.4%	0.80	0.03	3.3%	0.61	0.01	2.5%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.53	0.00	0.3%	0.60	0.01	1.1%	0.54	0.00	-0.5%	0.41	0.00	-0.1%
	Day	**All Hours**	**0.58**	**0.01**	**1.2%**	**0.66**	**0.01**	**2.0%**	**0.59**	**0.00**	**0.5%**	**0.45**	**0.00**	**0.6%**
Average Weekend	Off Peak	All Hours	0.61	0.01	0.9%	0.69	0.01	1.8%	0.62	0.00	0.1%	0.48	0.00	0.3%
	Day	**All Hours**	**0.61**	**0.01**	**0.9%**	**0.69**	**0.01**	**1.8%**	**0.62**	**0.00**	**0.1%**	**0.48**	**0.00**	**0.3%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.89	0.04	4.3%	1.00	0.06	6.3%	0.91	0.03	2.9%	0.67	0.02	2.4%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.58	0.00	0.8%	0.66	0.01	1.8%	0.58	0.00	-0.5%	0.44	0.00	1.1%
	Day	**All Hours**	**0.64**	**0.01**	**1.8%**	**0.73**	**0.02**	**3.0%**	**0.65**	**0.00**	**0.5%**	**0.49**	**0.01**	**1.5%**

* A shaded cell indicates estimate is not statistically significant

The reference loads shown in Table 3.3-1 are based on a control group and represent estimates of what customers on the TOU rate would have used if they had not responded to the price signals contained in the TOU tariff[17]. As seen in the table, average hourly usage during the peak period on weekdays is roughly 0.77 kW for the service territory as a whole, and around 0.58 kW over the 24 hour average weekday. In the hot climate region, average usage in the peak period is more than 10% larger, at 0.86 kW. Average usage in the moderate region is 0.80 kW and in the cool region, at 0.61 kW, it is roughly two thirds what it is in the hot region.

When examining the change in usage across rate periods, it is important to keep in mind a reduction in peak-period usage could result from conservation (e.g., using less electric space heating without significantly pre-heating ahead of time or increasing the thermostat significantly afterwards) or from load shifting (doing laundry in the off-peak period rather than the peak period). An increase in off-peak usage could be the result of load shifting from the peak to the off-peak period, from increased energy use during the off-peak period unrelated to load shifting (e.g., less careful attention to lighting usage because rates are lower in the off-peak period), or both.

In the hot region, there was a statistically significant reduction in average electricity use in the off-peak period on the average weekday. This indicates that customers are conserving energy rather than shifting their loads to off-peak periods. This was not the case in the moderate and cool climate region, where customers reduced peak period usage but did not make significant changes during the other hours of the day.

A reduction in daily electricity use (depicted by positive values in the row labeled Day in the table) means that the combination of changes in use across all rate periods resulted in less electricity use for the day as a whole. As seen in Table 3.3-1, for the service territory as a whole, there was a 1.2% reduction in daily electricity use on the average weekday. In the hot climate region, the estimated conservation effect equals 2.0% while in the moderate region, it is 0.5%. In the cool climate region, the estimated reduction in electricity use equals 0.6%.

While the daily reduction in electricity use for Rate 1 is small in percentage and absolute terms, this average is spread over 24 hours each day, so the average reduction in electricity use on weekdays equals roughly 0.17 kWh. Over eight months, this adds up to about 40.5 kWh per customer. If this average conservation effect was provided under default conditions and, say, 90% of the eligible population of roughly 3.5 million customers in PG&E's service territory remained on the rate, the total reduction in electricity use over the three-month period would equal more than 142 GWh. This is quite significant.

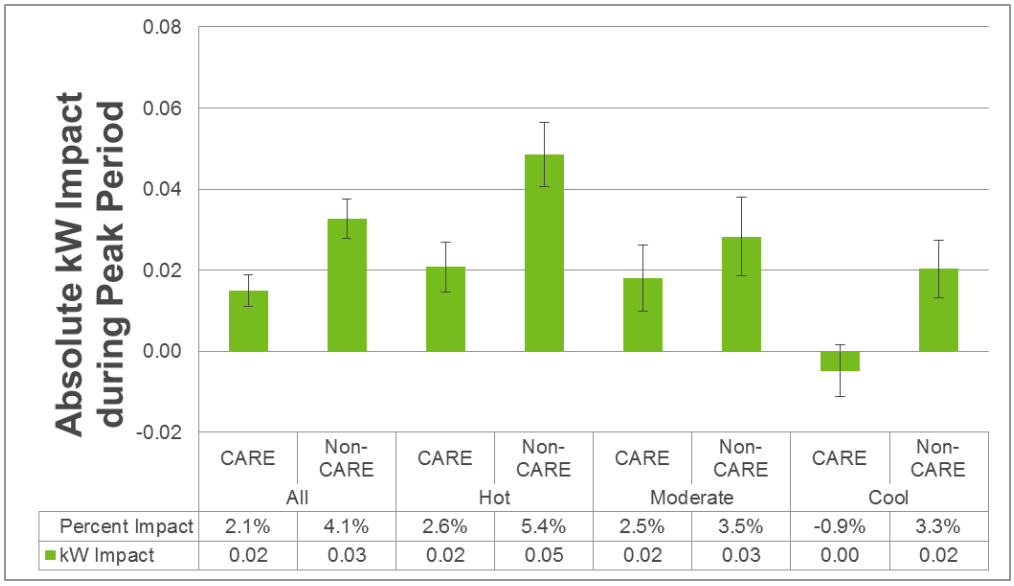
On PG&E's Rate 1, off-peak prices are in effect all day on the weekend. In spite of these lower prices, for the service territory as a whole, the load impact estimate indicates that participants reduced electricity usage on the weekend relative to what they would have used on the OAT. Statistically significant conservation savings are also seen on the weekend in the hot climate region.

[17] See Section 3.1 in the First Interim Report for more detail.

The monthly system peak day estimates represent the average across the eight monthly PG&E system peak days in the winter months. This day type is a standard one for which impacts are estimated for all demand response programs and is included here so that results can be compared with other rate and demand response programs at PG&E. Peak period reference loads are higher on these days than on the average weekday. For the service territory as a whole, the percent reduction in peak period loads, 4.3%, is greater than on the average weekday (3.6%).

Figure 3.3-3 shows the absolute peak period load impacts for Rate 1 for CARE/FERA and non-CARE/FERA customers for the service territory as a whole and for each climate region. For the service territory as a whole, and in the hot and cool climate regions, both the percent and absolute load impacts in the peak period are greater for non-CARE/FERA customers than for CARE/FERA customers, often significantly greater. For example, in the hot climate region, the average weekday peak period reduction is 5.4% and 0.05 kW for non-CARE/FERA customers whereas for CARE/FERA customers, the average reduction is 2.6% or 0.02 kW, which is less than half as much as for non-CARE/FERA customers. Load reductions in the cool climate region are significantly less than in the hot region for both segments and the difference between the two segments is also significant. Interestingly, CARE/FERA customers had small but not statistically significant load increases during the peak period in the cool climate region.

Figure 3.3-3: Average Load Impacts for Peak Period for PG&E Rate 1 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	All		Hot		Moderate		Cool	
Percent Impact	2.1%	4.1%	2.6%	5.4%	2.5%	3.5%	-0.9%	3.3%
kW Impact	0.02	0.03	0.02	0.05	0.02	0.03	0.00	0.02

Table 3.3-2 shows the estimated load impacts for each rate period and day type by climate zone and for the service territory as a whole for non-CARE/FERA customers and Table 3.3-3 shows the estimated

values for CARE/FERA customers. It should be noted that, for the service territory as a whole and within each climate region, CARE/FERA customers have average peak-period loads that are slightly smaller than non-CARE/FERA customers (0.72 kW for CARE/FERA and 0.79 kW for non-CARE/FERA).

For the service territory as a whole, both customer segments reduced average daily usage on weekdays by a statistically significant amount. On weekends, non-CARE/FERA customers reduced electricity use by 1.1% while CARE/FERA customers had a statistically insignificant reduction in electricity use (0.3%). In the hot climate region, non-CARE/FERA customers reduced total daily electricity use on weekdays by 2.5%, nearly three times more than for CARE/FERA customers (1.1%). In the cool climate region, CARE/FERA customers had a small but statistically significant increase in daily electricity use on weekdays while non-CARE/FERA customers had a small, statistically significant reduction in electricity use.

Table 3.3-2: Rate 1 Load Impacts by Rate Period and Day Type – Non-CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 1														
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.79	0.03	4.1%	0.90	0.05	5.4%	0.81	0.03	3.5%	0.62	0.02	3.3%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.54	0.00	0.3%	0.64	0.01	1.5%	0.55	-0.01	-0.9%	0.42	0.00	0.5%
	Day	**All Hours**	**0.60**	**0.01**	**1.4%**	**0.69**	**0.02**	**2.5%**	**0.60**	**0.00**	**0.3%**	**0.47**	**0.01**	**1.3%**
Average Weekend	Off Peak	All Hours	0.63	0.01	1.1%	0.73	0.02	2.4%	0.64	0.00	-0.1%	0.49	0.01	1.0%
	Day	**All Hours**	**0.63**	**0.01**	**1.1%**	**0.73**	**0.02**	**2.4%**	**0.64**	**0.00**	**-0.1%**	**0.49**	**0.01**	**1.0%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.90	0.04	4.6%	1.04	0.07	6.9%	0.94	0.03	3.1%	0.69	0.02	3.4%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.59	0.00	0.8%	0.69	0.01	1.8%	0.59	0.00	-0.6%	0.45	0.01	1.8%
	Day	**All Hours**	**0.65**	**0.01**	**1.9%**	**0.77**	**0.02**	**3.3%**	**0.66**	**0.00**	**0.5%**	**0.50**	**0.01**	**2.3%**

* A shaded cell indicates estimate is not statistically significant

Table 3.3-3: Rate 1 Load Impacts by Rate Period and Day Type – CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

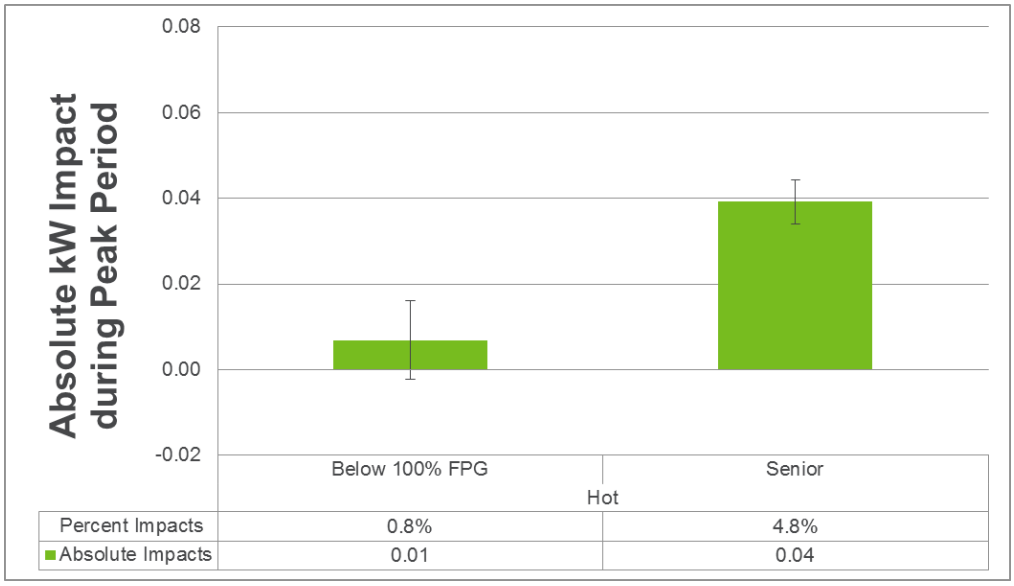
Rate 1														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.72	0.02	2.1%	0.79	0.02	2.6%	0.71	0.02	2.5%	0.55	0.00	-0.9%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.50	0.00	0.3%	0.55	0.00	0.5%	0.49	0.01	1.6%	0.36	-0.01	-2.8%
	Day	**All Hours**	**0.54**	**0.00**	**0.8%**	**0.60**	**0.01**	**1.1%**	**0.53**	**0.01**	**1.9%**	**0.40**	**-0.01**	**-2.3%**
Average Weekend	Off Peak	All Hours	0.57	0.00	0.3%	0.62	0.00	0.7%	0.56	0.01	1.3%	0.42	-0.01	-3.1%
	Day	**All Hours**	**0.57**	**0.00**	**0.3%**	**0.62**	**0.00**	**0.7%**	**0.56**	**0.01**	**1.3%**	**0.42**	**-0.01**	**-3.1%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.84	0.03	3.3%	0.93	0.05	5.1%	0.80	0.01	1.4%	0.60	-0.01	-1.9%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.55	0.00	0.8%	0.61	0.01	1.7%	0.53	0.00	-0.3%	0.39	-0.01	-1.7%
	Day	**All Hours**	**0.61**	**0.01**	**1.5%**	**0.68**	**0.02**	**2.7%**	**0.58**	**0.00**	**0.2%**	**0.43**	**-0.01**	**-1.8%**

* A shaded cell indicates estimate is not statistically significant

Figure 3.3-4 shows the absolute load reduction during the peak period on average weekdays for seniors and households with incomes below 100% of FPG in the hot climate region. Table 3.3-4 shows the estimated values for other rate periods and day types for each segment and for the hot climate region as a whole.

A comparison of the values in Figure 3.3-4 with those for the hot region in Figure 3.3-2 shows that load impacts for senior households were very similar to the hot climate region, participant population as a whole in both percentage (well over 4%) and absolute (0.04 kW) terms. The reference load for senior households (0.81 kW) is also similar to that of the general participant population in the hot climate region (0.86 kW). That is, senior households do not, on average, consume materially less electricity than the average customer in PG&E's hot climate region. Estimated load impacts in the off-peak period, which were statistically different from 0, and a 2.6% reduction in daily energy use on weekdays indicates that senior households did more conservation than load shifting. This conservation effect carried over into the weekend, which showed a 2.2% load reduction on average over the winter. Peak-period load reductions on the average monthly system peak day were greater in percentage terms (5.3%) than on weekdays and were higher in absolute terms because average reference loads were higher on the monthly system peak days.

Figure 3.3-4: Average Load Impacts for Peak Period for PG&E Rate 1 for Senior Households and Households with Incomes Below 100% FPG in the Hot Climate Region (Positive values represent load reductions)



Load impacts for households with incomes less than or equal to 100% of FPG were quite different from those of senior households or the general population. These households did not reduce load at all during the peak period (the estimated values were not statistically different from 0). In fact, low income households increased usage significantly in the off-peak period on average weekdays. It is also worth noting that reference loads for these households were nearly identical to loads for CARE/FERA

customers in the hot climate region (as shown previously in Table 3.3-3). Put another way, low income households are not, on average, low users of electricity in PG&E's hot climate region but they are low responders to TOU price signals in this instance.

Table 3.3-4: Rate 1 Load Impacts by Rate Period and Day Type for PG&E for Senior Households and Households with Incomes Below 100% FPG in the Hot Climate Region* (Positive values represent load reductions, negative values represent load increases)

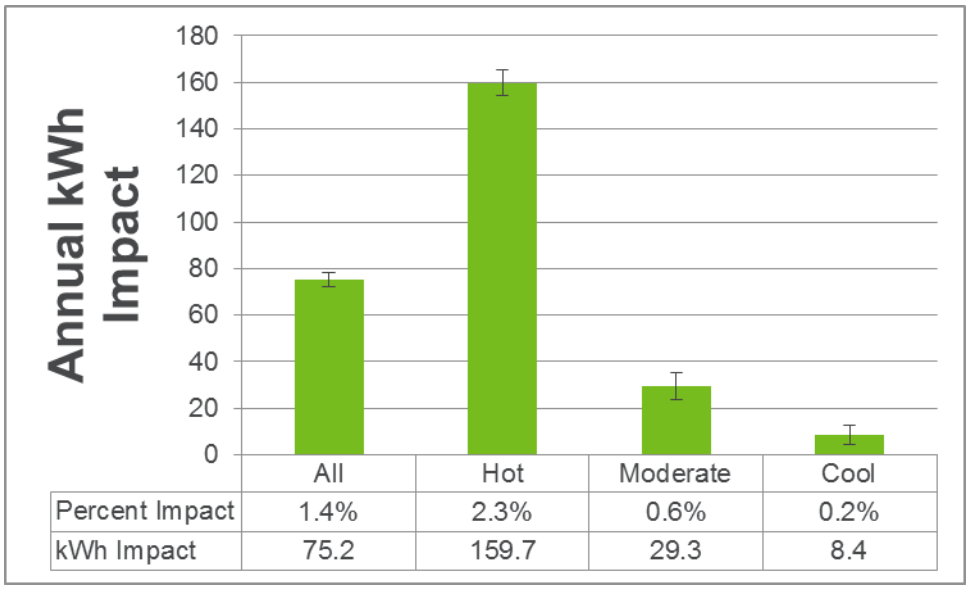
Rate 1								
Day Type	Period	Hours	Hot, Below 100% FPG			Hot, Senior		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.81	0.01	0.8%	0.81	0.04	4.8%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.56	-0.01	-1.2%	0.60	0.01	1.8%
	Day	**All Hours**	**0.61**	**0.00**	**-0.7%**	**0.65**	**0.02**	**2.6%**
Average Weekend	Off Peak	All Hours	0.63	0.00	-0.6%	0.66	0.01	2.2%
	Day	**All Hours**	**0.63**	**0.00**	**-0.6%**	**0.66**	**0.01**	**2.2%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.95	0.03	3.1%	0.93	0.05	5.3%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.62	-0.01	-1.0%	0.65	0.01	1.8%
	Day	**All Hours**	**0.69**	**0.00**	**0.2%**	**0.71**	**0.02**	**2.7%**

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 3.3-5 shows the annual conservation effect for customers in each climate region. Each region showed statistically significant reductions in annual energy use. On average, customers reduced their consumption by 1.4% or 75.2 kWh per customer during the first year of the pilot. Customers in the hot climate region had the greatest conservation effect of 2.3% or 159.7 kWh. Those in the cool climate region saw the smallest, but still statistically significant, reduction of 0.2% or 8.4 kWh. These impacts are in line with what was presented in Table 3.3-1. During the winter months (eight months out of the year) customers reduced their daily usage on the average weekday and in some cases on the average weekend.

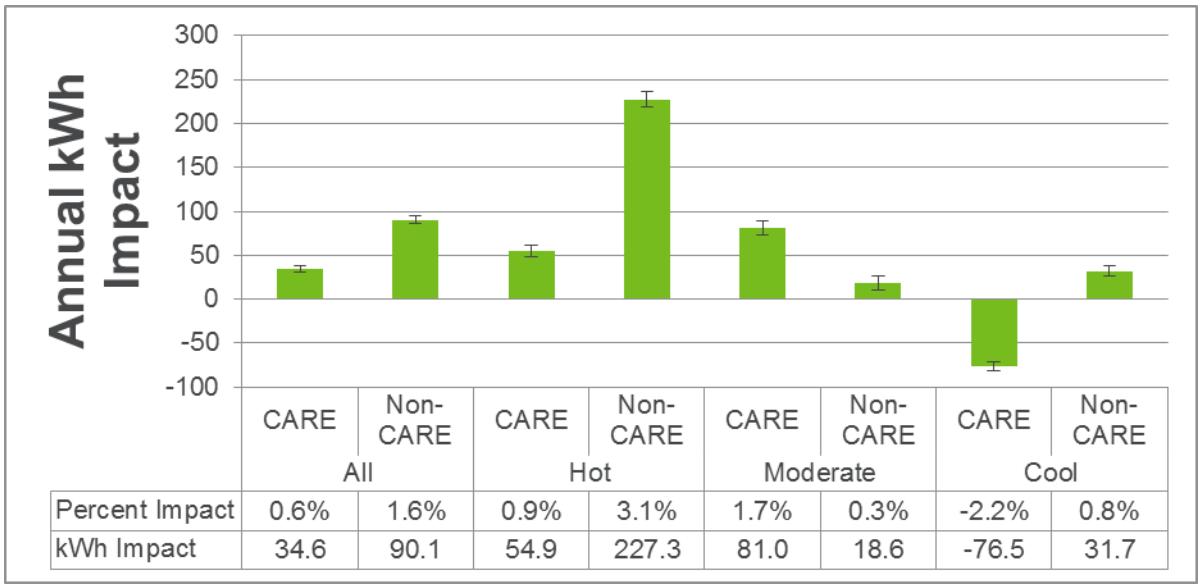
Figure 3.3-5: Average Annual Conservation Effect for PG&E Rate 1 (Positive values represent usage reductions)



	All	Hot	Moderate	Cool
Percent Impact	1.4%	2.3%	0.6%	0.2%
kWh Impact	75.2	159.7	29.3	8.4

Figure 3.3-6 shows annual energy impacts for Rate 1 for CARE/FERA and non-CARE/FERA customers for the service territory as a whole and for each climate region. Each customer segment had statistically significant reductions in energy usage except for CARE/FERA customers in the cool climate region, who showed statistically significant increases in usage. As shown in Table 3.3-3, these customers increased their daily consumption by 2.3% on weekdays and 3.1% on weekends in the winter months, so this is not surprising.

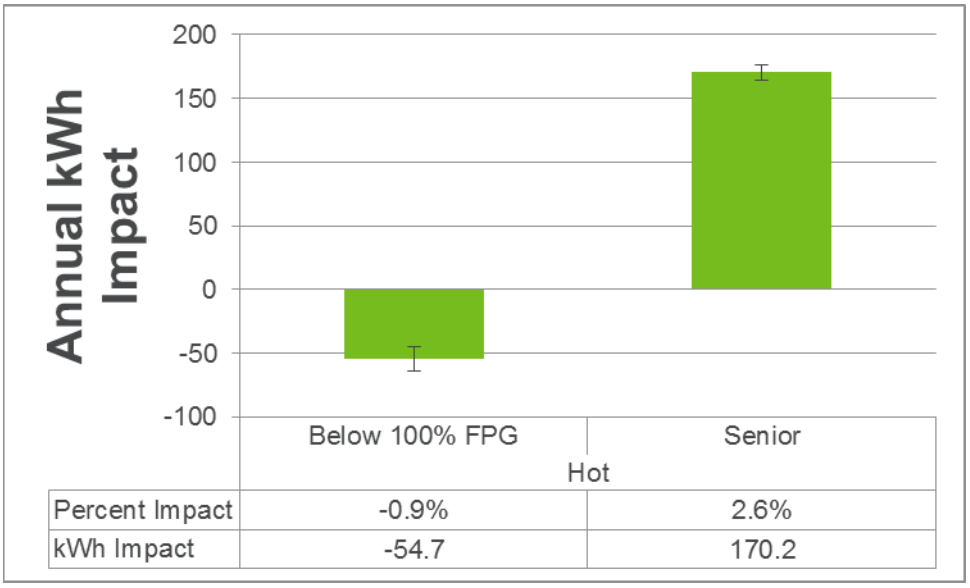
Figure 3.3-6: Average Annual Conservation Effect for PG&E Rate 1 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	0.6%	1.6%	0.9%	3.1%	1.7%	0.3%	-2.2%	0.8%
kWh Impact	34.6	90.1	54.9	227.3	81.0	18.6	-76.5	31.7

Figure 3.3-7 shows the average annual kWh impact for the households with incomes below 100% FPG and senior households in the hot climate region. Senior households saved just over 170 kWh during the first year of the pilot, which is equal to 2.6%. Households with incomes below 100% of FPG, on the other hand, increased their energy consumption by 0.9%.

Figure 3.3-7: Average Annual Conservation Effect for PG&E Rate 1 for Senior Households and Households with Incomes Below 100% FPG (Positive values represent load reductions)



	Hot	
	Below 100% FPG	Senior
Percent Impact	-0.9%	2.6%
kWh Impact	-54.7	170.2

3.3.2 Rate 2

PG&E's Rate 2 differs from Rate 1 in two important ways. First, on weekends, the same two rate periods as on weekdays are in effect with Rate 2, whereas for Rate 1, all weekend hours are charged at the off-peak, weekday price. Second, the Rate 2 peak period is shorter, with a three-hour peak period covering only the evening hours from 6 to 9 PM compared with the five-hour peak period from 4 to 9 PM in Rate 1. Rate 2 peak-period prices above the baseline usage amount are similar to Rate 1, at 29.6 ¢/kWh and off-peak prices are nearly identical (27.0 ¢/kWh)[18].

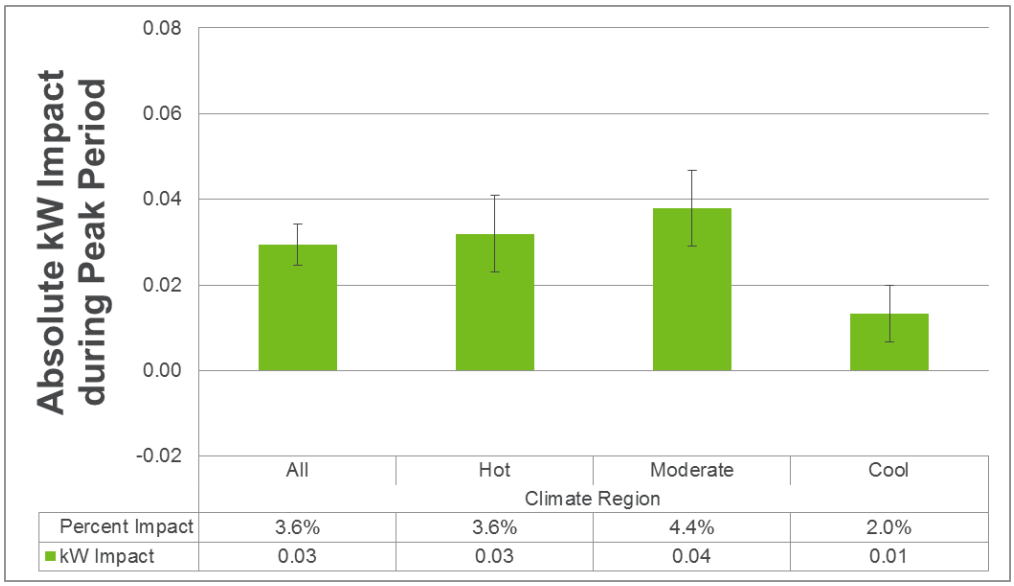
Winter Load Impacts

Figure 3.3-8 shows the absolute load impacts for the weekday peak period for Rate 2 for PG&E's service territory as a whole and for each climate region. From a policy perspective, it is important to note that there are statistically significant and materially significant load reductions in the Rate 2 peak period, which coincides completely with evening hours from 6 to 9 PM. The magnitude and pattern of load reductions across climate regions are similar for Rate 2 compared with Rate 1. The average weekday peak-period load reduction for Rate 2 equals 3.6% and 0.03 kW, the same as the peak-period load reductions for Rate 1. The estimated impact in the hot region is also 3.6% or 0.03 kW. In the moderate climate region, the percent reduction in the peak period on weekdays for Rate 2, 4.4%, is higher than the 3.3% reduction for Rate 1. The difference in peak-period impacts between the moderate and hot climate regions is not statistically significant, but the difference between the moderate and cool climate region is.

Table 3.3-5 contains load impact estimates for each rate period and day type for Rate 2. Importantly, peak-period load reductions are similar on weekends, weekdays, and monthly system peak days. All day types show statistically significant decreases in daily usage for Rate 2, but the reductions were smaller than those seen for Rate 1. Load impacts in the off-peak period are not statistically significant in the majority of instances.

[18] Prices reflect tariffs in effect at the launch of the pilot through the end of February 2017. As indicated above and shown in Appendix B, rates changed on March 1, 2017.

Figure 3.3-8: Average Load Impacts for Peak Period for PG&E Rate 2[19] (Positive values represent load reductions)



[19] PG&E Rate 2 winter impacts represent October 2016 through May 2017.

Table 3.3-5: Rate 2 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

Rate 2														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	6 PM to 9 PM	0.83	0.03	3.6%	0.90	0.03	3.6%	0.86	0.04	4.4%	0.66	0.01	2.0%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.55	0.00	-0.3%	0.62	0.00	-0.5%	0.55	0.00	0.2%	0.42	0.00	-0.7%
	Day	**All Hours**	**0.58**	**0.00**	**0.4%**	**0.66**	**0.00**	**0.2%**	**0.59**	**0.01**	**1.0%**	**0.45**	**0.00**	**-0.2%**
Average Weekend	Peak	6 PM to 9 PM	0.82	0.03	3.1%	0.90	0.03	3.6%	0.86	0.03	3.1%	0.66	0.01	2.1%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.58	0.00	0.0%	0.66	0.00	0.3%	0.59	0.00	-0.1%	0.45	0.00	-0.5%
	Day	**All Hours**	**0.61**	**0.00**	**0.5%**	**0.69**	**0.01**	**0.9%**	**0.62**	**0.00**	**0.5%**	**0.48**	**0.00**	**-0.1%**
Monthly System Peak Day	Peak	6 PM to 9 PM	0.94	0.03	3.4%	1.03	0.04	4.3%	0.98	0.03	3.6%	0.73	0.01	1.3%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.60	0.00	0.3%	0.69	0.00	0.5%	0.60	0.00	0.1%	0.45	0.00	0.1%
	Day	**All Hours**	**0.64**	**0.01**	**0.9%**	**0.73**	**0.01**	**1.2%**	**0.65**	**0.00**	**0.8%**	**0.49**	**0.00**	**0.3%**

* A shaded cell indicates estimate is not statistically significant

Figure 3.3-9 shows the estimated peak period load impacts for Rate 2 for CARE/FERA and non-CARE/FERA households for the service territory as a whole and for each climate region. All of the peak period load reductions are statistically significant except for CARE/FERA customers in the cool climate region. There is not a statistically significant difference between reductions among CARE/FERA and non-CARE/FERA customers in the hot or moderate climate regions. In fact, all four of these groups had very similar absolute load reductions (about 0.04 kW).

Figure 3.3-9: Average Load Impacts for Peak Period for PG&E Rate 2 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)

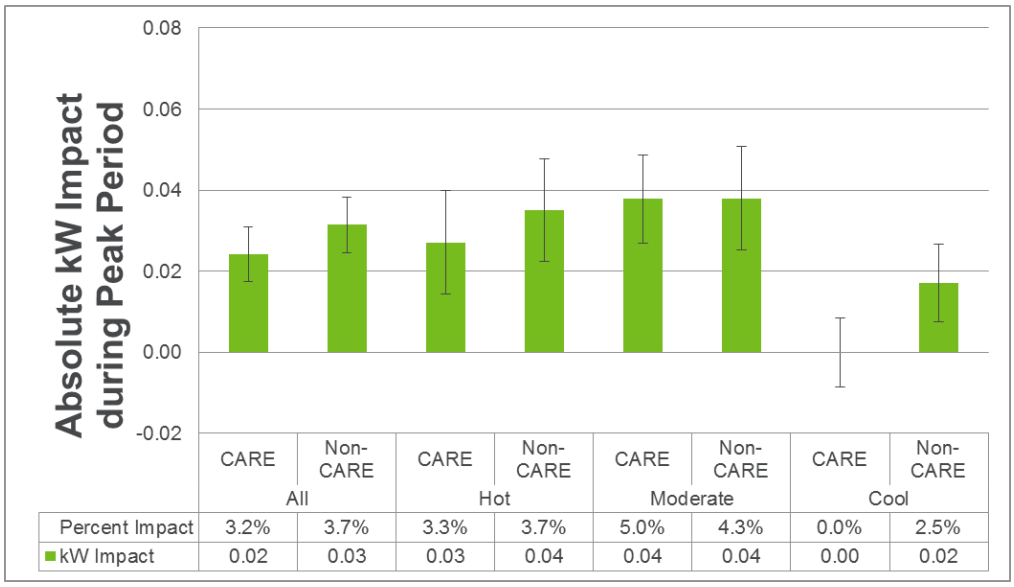


Table 3.3-6 and Table 3.3-7 show the load impacts for non-CARE/FERA and CARE/FERA customers, respectively, for each rate period and day-type. As a reminder, the values in the first row of each table are the same as those found in Figure 3.3-9. CARE/FERA customers had statistically significant daily load reductions on the average weekday and weekend in the hot and moderate climate regions and in the PG&E territory as a whole, while CARE/FERA customers in the cool climate region increased their daily consumption by a statistically significant amount. Non-CARE/FERA customers generally did not reduce their consumption by a significant amount in the off-peak periods.

Table 3.3-6: Rate 2 Load Impacts by Rate Period and Day Type – Non-CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 2														
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	6 PM to 9 PM	0.85	0.03	3.7%	0.95	0.04	3.7%	0.89	0.04	4.3%	0.68	0.02	2.5%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.56	0.00	-0.5%	0.66	-0.01	-1.0%	0.56	0.00	-0.2%	0.43	0.00	-0.1%
	Day	**All Hours**	**0.60**	**0.00**	**0.2%**	**0.69**	**0.00**	**-0.2%**	**0.60**	**0.00**	**0.6%**	**0.47**	**0.00**	**0.4%**
Average Weekend	Peak	6 PM to 9 PM	0.85	0.03	3.5%	0.96	0.04	4.6%	0.88	0.03	2.9%	0.68	0.02	2.7%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.60	0.00	-0.2%	0.70	0.00	0.0%	0.60	0.00	-0.6%	0.46	0.00	0.1%
	Day	**All Hours**	**0.63**	**0.00**	**0.4%**	**0.73**	**0.01**	**0.7%**	**0.64**	**0.00**	**0.0%**	**0.49**	**0.00**	**0.5%**
Monthly System Peak Day	Peak	6 PM to 9 PM	0.96	0.03	3.5%	1.08	0.05	4.4%	1.01	0.04	3.6%	0.76	0.01	1.9%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.61	0.00	0.0%	0.72	0.00	-0.2%	0.61	0.00	-0.2%	0.47	0.00	0.6%
	Day	**All Hours**	**0.65**	**0.00**	**0.6%**	**0.77**	**0.00**	**0.6%**	**0.66**	**0.00**	**0.5%**	**0.50**	**0.00**	**0.8%**

* A shaded cell indicates estimate is not statistically significant

Table 3.3-7: Rate 2 Load Impacts by Rate Period and Day Type – CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

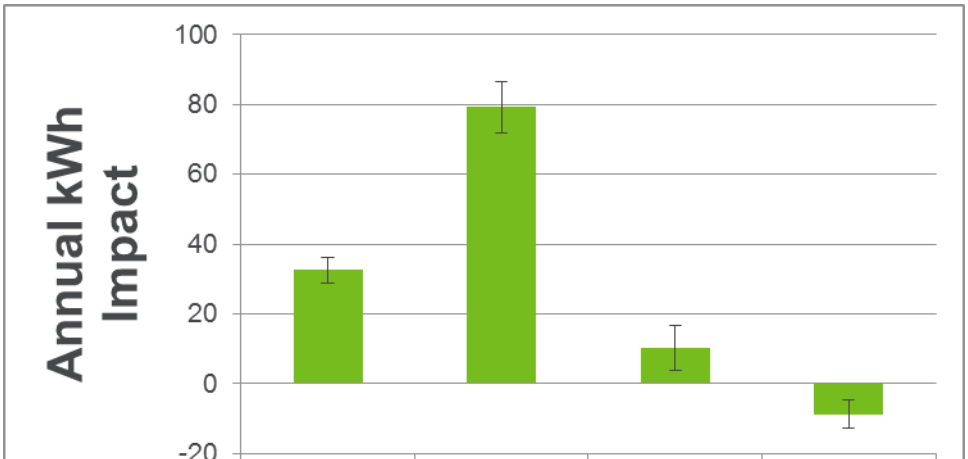
Rate 2														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	6 PM to 9 PM	0.76	0.02	3.2%	0.82	0.03	3.3%	0.76	0.04	5.0%	0.59	0.00	0.0%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.51	0.00	0.3%	0.57	0.00	0.3%	0.50	0.01	2.6%	0.38	-0.01	-3.4%
	Day	**All Hours**	**0.54**	**0.00**	**0.8%**	**0.60**	**0.01**	**0.8%**	**0.53**	**0.02**	**3.0%**	**0.40**	**-0.01**	**-2.8%**
Average Weekend	Peak	6 PM to 9 PM	0.74	0.01	2.0%	0.80	0.02	1.9%	0.74	0.03	4.1%	0.57	0.00	-0.8%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.54	0.00	0.8%	0.60	0.01	1.0%	0.53	0.01	2.6%	0.40	-0.01	-3.0%
	Day	**All Hours**	**0.57**	**0.01**	**1.0%**	**0.62**	**0.01**	**1.2%**	**0.56**	**0.02**	**2.8%**	**0.42**	**-0.01**	**-2.6%**
Monthly System Peak Day	Peak	6 PM to 9 PM	0.87	0.03	3.2%	0.95	0.04	4.1%	0.85	0.03	3.6%	0.64	-0.01	-1.1%
	Off Peak	12 AM to 6 PM, 9 PM to 12 AM	0.57	0.01	1.2%	0.64	0.01	1.7%	0.55	0.01	1.7%	0.40	-0.01	-1.9%
	Day	**All Hours**	**0.61**	**0.01**	**1.6%**	**0.68**	**0.01**	**2.1%**	**0.58**	**0.01**	**2.1%**	**0.43**	**-0.01**	**-1.8%**

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 3.3-10 shows the annual conservation effect for PG&E's Rate 2. While the pattern is similar to Rate 1, with customers in the hot climate zone reducing their consumption the most, the magnitude of savings is about half as large. For example, for the service territory as a whole, customers on Rate 1 saved 75.2 kWh while those on Rate 2 saved 32.6 kWh. This may be due in some part to the shorter three hour peak period for Rate 2 compared to the 5 hour peak period for Rate 1.

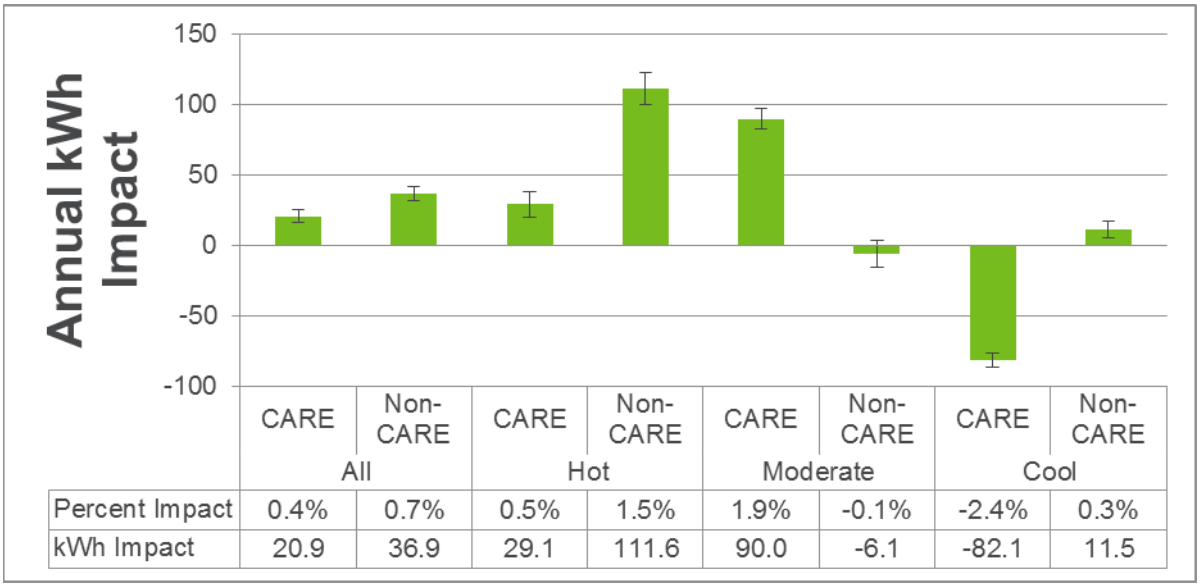
Figure 3.3-10: Average Annual Conservation Effect for PG&E Rate 2
(Positive values represent usage reductions)



	All	Hot	Moderate	Cool
Percent Impact	0.6%	1.2%	0.2%	-0.2%
kWh Impact	32.6	79.3	10.4	-8.7

The increase in annual energy use in the cool climate region is attributable to CARE/FERA customers, as seen in Figure 3.3-11. These customers increased their energy use by 82.1 kWh over the course of the year. Like Rate 1, non-CARE/FERA customers in the hot climate region had the greatest energy savings of about 1.5% or 111.6 kWh during the first year of the pilot. It is interesting that non-CARE/FERA customers saved more than their CARE/FERA counterparts in the hot and cool climate regions, but not in the moderate climate region. The same was true for Rate 1 and Rate 3.

Figure 3.3-11: Average Annual Conservation Effect for PG&E Rate 2 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	0.4%	0.7%	0.5%	1.5%	1.9%	-0.1%	-2.4%	0.3%
kWh Impact	20.9	36.9	29.1	111.6	90.0	-6.1	-82.1	11.5

3.3.3 Rate 3

PG&E's Rate 3 is structurally identical to Rate 1 in the winter periods, with a peak period from 4 to 9 PM on weekdays and off-peak prices in effect for all hours on the weekends. In spring, Rate 3 has a super off-peak price in effect from 10 AM to 4 PM on weekdays to encourage increased electricity use during a time when high levels of hydroelectric generation combined with below average electricity use create minimum load issues for the CAISO. In winter the Rate 3 peak period and off-peak prices are similar to the other rates (29.0 ¢/kWh and 27.1 ¢/kWh). In the spring, the peak period, super off-peak, and off-peak prices are 36.1 ¢/kWh, 18.0 ¢/kWh and 26.7 ¢/kWh, respectively[20].

Winter Load Impacts

Figure 3.3-12 shows the peak period load reductions on average weekdays for Rate 3. Once again, the overall load reduction and the pattern in the load reductions across climate regions are very similar to Rates 1 and 2. There are no statistically significant differences in the load reductions between Rate 3 and Rate 2. The differences in absolute load impacts across climate regions are all statistically significant and the difference in percentage impacts between hot and moderate regions is also statistically significant. The difference between moderate and cool percentage impacts is also statistically significant.

[20] Prices reflect tariffs in effect at the launch of the pilot through the end of February 2017. As indicated above and shown in Appendix B, rates changed on March 1, 2017.

Figure 3.3-12: Average Load Impacts for Peak Period for PG&E Rate 3[21] (Positive values represent load reductions)

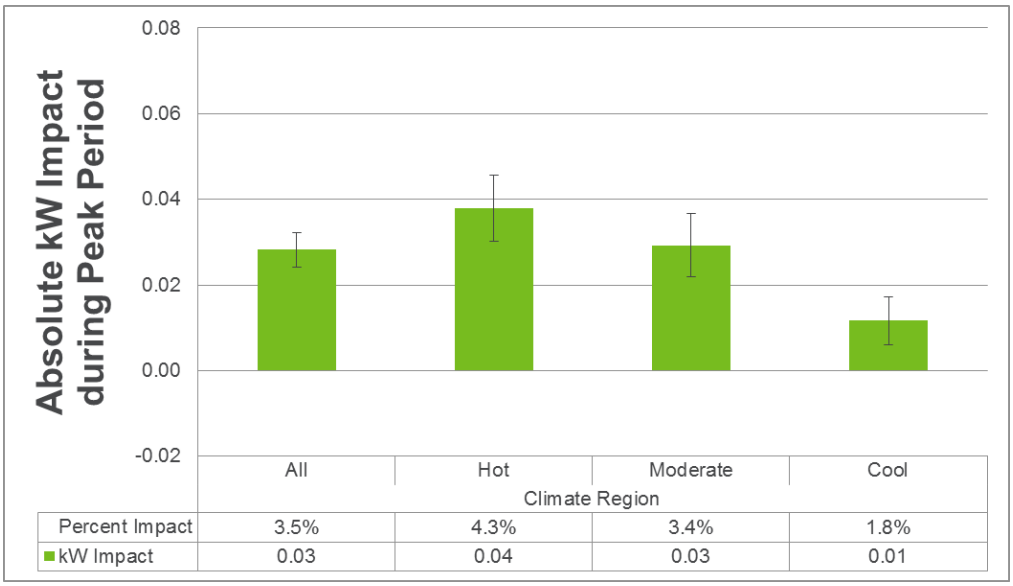


Table 3.3-8 contains estimates of load impacts for all relevant rate periods and day types. On weekdays, the change in usage in the off-peak period is not statistically significant in any climate region. There is an overall conservation effect of 1.1% for the service territory as a whole with a larger, 1.5%, reduction in the hot region. In the cool climate region, there was no change in daily electricity use on weekdays. The reduction in daily electricity use on weekends is similar to the reduction on weekdays for the for the hot climate region.

[21] PG&E Rate 3 winter impacts represent October 2016 through February 2017.

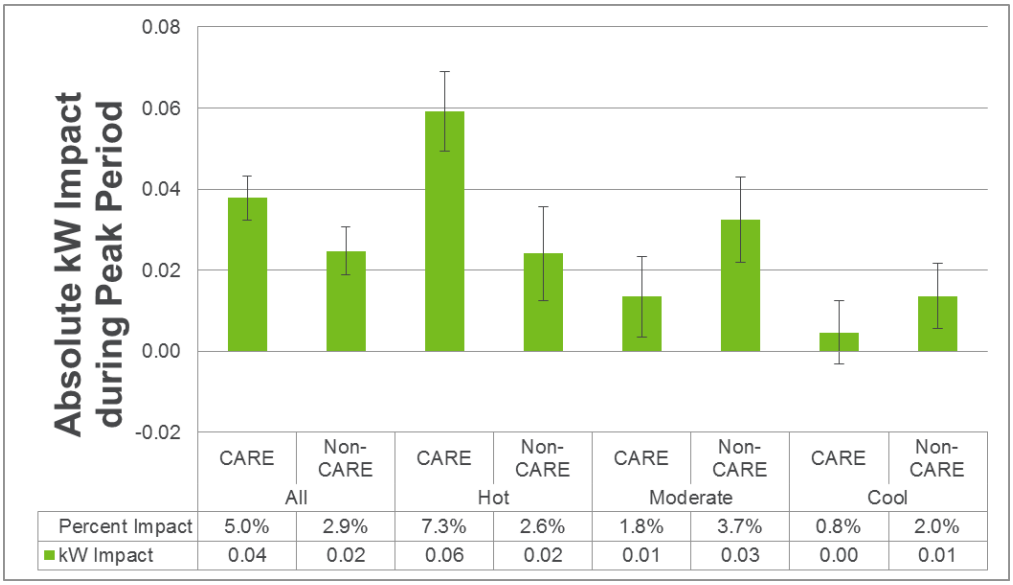
Table 3.3-8: Rate 3 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

Rate 3														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.82	0.03	3.5%	0.89	0.04	4.3%	0.85	0.03	3.4%	0.65	0.01	1.8%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.55	0.00	0.2%	0.63	0.00	0.5%	0.56	0.00	0.2%	0.43	0.00	-0.6%
	Day	**All Hours**	**0.61**	**0.01**	**1.1%**	**0.68**	**0.01**	**1.5%**	**0.62**	**0.01**	**1.1%**	**0.47**	**0.00**	**0.1%**
Average Weekend	Off Peak	All Hours	0.64	0.00	0.5%	0.72	0.01	1.3%	0.65	0.00	-0.2%	0.50	0.00	-0.2%
	Day	**All Hours**	**0.64**	**0.00**	**0.5%**	**0.72**	**0.01**	**1.3%**	**0.65**	**0.00**	**-0.2%**	**0.50**	**0.00**	**-0.2%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.89	0.04	4.1%	0.98	0.05	4.7%	0.93	0.04	4.2%	0.71	0.02	2.6%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.59	0.00	-0.2%	0.67	0.00	-0.5%	0.59	0.00	-0.1%	0.45	0.00	0.1%
	Day	**All Hours**	**0.65**	**0.01**	**1.0%**	**0.73**	**0.01**	**0.9%**	**0.66**	**0.01**	**1.2%**	**0.51**	**0.00**	**0.8%**

* A shaded cell indicates estimate is not statistically significant

Figure 3.3-13 shows the peak period load reductions on weekdays for non-CARE/FERA and CARE/FERA customers and Table 3.3-12 and Table 3.3-13 show the load impacts for each rate period and day type for the two segments. As seen in the figures, there are large and statistically significant differences in peak period reductions between CARE/FERA and non-CARE/FERA customers in the service territory as a whole and in the hot region. The pattern here is different from what was shown for Rate 1 in that CARE/FERA customers in the hot climate region had greater impacts than non-CARE/FERA customers.

Figure 3.3-13: Average Load Impacts for Peak Period for PG&E Rate 3 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	All		Hot		Moderate		Cool	
Percent Impact	5.0%	2.9%	7.3%	2.6%	1.8%	3.7%	0.8%	2.0%
kW Impact	0.04	0.02	0.06	0.02	0.01	0.03	0.00	0.01

As seen in Table 3.3-9 and Table 3.3-10 there are also significant differences in the load impacts between CARE/FERA and non-CARE/FERA customers for other rate periods and day types. While non-CARE/FERA customers generally did not reduce their daily electricity use, CARE/FERA customers did in the hot and moderate climate zones and in the PG&E territory as a whole – both on weekdays and weekends.

Table 3.3-9: Rate 3 Load Impacts by Rate Period and Day Type – Non-CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

Rate 3													
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.84	0.02	2.9%	0.94	0.02	2.6%	0.87	0.03	3.7%	0.67	0.01	2.0%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.57	0.00	-0.7%	0.66	-0.01	-1.8%	0.57	0.00	0.1%	0.44	0.00	-0.2%
	Day	**All Hours**	**0.62**	**0.00**	**0.4%**	**0.72**	**0.00**	**-0.6%**	**0.63**	**0.01**	**1.2%**	**0.49**	**0.00**	**0.4%**
Average Weekend	Off Peak	All Hours	0.66	0.00	-0.3%	0.77	0.00	-0.5%	0.67	0.00	-0.4%	0.52	0.00	0.1%
	Day	**All Hours**	**0.66**	**0.00**	**-0.3%**	**0.77**	**0.00**	**-0.5%**	**0.67**	**0.00**	**-0.4%**	**0.52**	**0.00**	**0.1%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.91	0.03	3.5%	1.02	0.02	2.0%	0.94	0.05	5.1%	0.73	0.02	2.6%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.60	-0.01	-1.0%	0.70	-0.02	-2.9%	0.60	0.00	0.3%	0.47	0.00	0.2%
	Day	**All Hours**	**0.66**	**0.00**	**0.3%**	**0.77**	**-0.01**	**-1.6%**	**0.67**	**0.01**	**1.7%**	**0.52**	**0.00**	**0.9%**

* A shaded cell indicates estimate is not statistically significant

Table 3.3-10: Rate 3 Load Impacts by Rate Period and Day Type – CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

Rate 3														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.76	0.04	5.0%	0.81	0.06	7.3%	0.77	0.01	1.8%	0.59	0.00	0.8%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.52	0.01	2.7%	0.57	0.03	4.6%	0.51	0.00	0.5%	0.38	-0.01	-2.2%
	Day	**All Hours**	**0.57**	**0.02**	**3.3%**	**0.62**	**0.03**	**5.3%**	**0.57**	**0.01**	**0.9%**	**0.42**	**-0.01**	**-1.4%**
Average Weekend	Off Peak	All Hours	0.60	0.02	2.8%	0.65	0.03	4.4%	0.59	0.01	1.2%	0.44	-0.01	-1.7%
	Day	**All Hours**	**0.60**	**0.02**	**2.8%**	**0.65**	**0.03**	**4.4%**	**0.59**	**0.01**	**1.2%**	**0.44**	**-0.01**	**-1.7%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.84	0.05	6.0%	0.92	0.09	9.3%	0.84	-0.01	-0.9%	0.64	0.02	2.7%
	Off Peak	12 AM to 4 PM, 9 PM to 12 AM	0.56	0.01	1.9%	0.62	0.02	3.8%	0.54	-0.01	-1.9%	0.40	0.00	-0.5%
	Day	**All Hours**	**0.62**	**0.02**	**3.1%**	**0.68**	**0.04**	**5.3%**	**0.60**	**-0.01**	**-1.6%**	**0.45**	**0.00**	**0.4%**

* A shaded cell indicates estimate is not statistically significant

Spring Load Impacts

Figure 3.3-14 shows the average load impacts for the peak period in the spring for Rate 3 for the service territory as a whole and for each climate region. Spring and winter load impacts are very similar for Rate 3, except in the cool climate regions where winter percent impacts were 1.8% and spring percent impacts were equal to 4.6%. Differences between the climate regions were not statistically significant during the spring months. Customers in the hot climate zone provided the greatest peak-period impacts at 4.4% or 0.04 kW.

Figure 3.3-14: Average Load Impacts for Peak Period for PG&E Rate 3[22]
(Positive values represent load reductions)

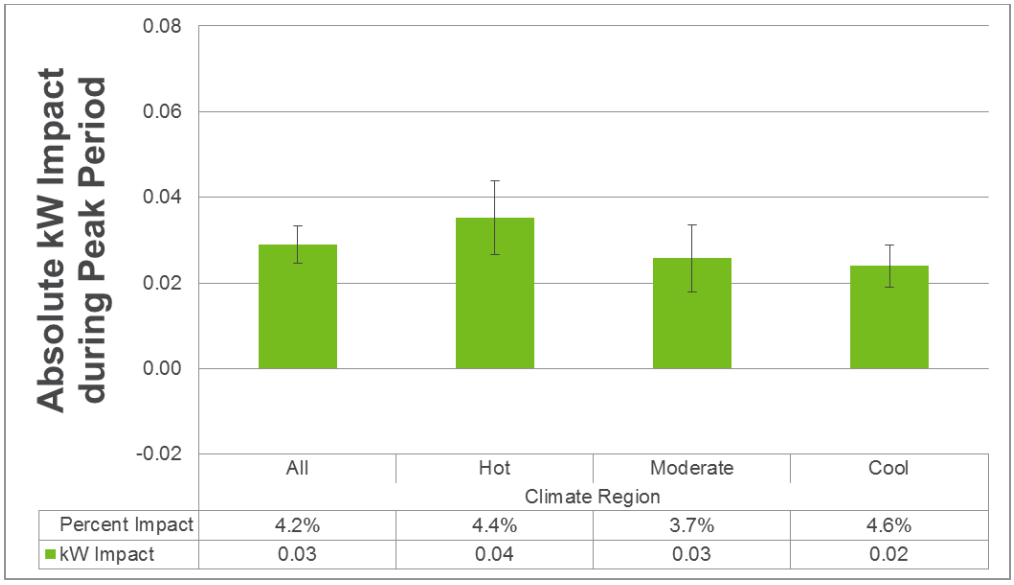


Table 3.3-11 contains estimates of load impacts for all relevant rate periods and day types. On weekdays, the change in usage in the off-peak period is not statistically significant in any climate region, but it is in the territory as a whole. There is an overall conservation effect of 1.2% for the service territory as a whole with a larger, 1.4%, reduction in the hot region. In the moderate climate region, there was no change in daily electricity use on weekdays.

A key feature of Rate 3 is the low price during the hours from 10 AM to 4 PM. These prices are meant to encourage greater electricity use in order to address minimum load issues that can occur in the spring in PG&E's service territory. As seen in Table 3.2-11, in the majority of day types and climate regions, the lower prices did not produce statistically significant increases in loads. An exception is the increase of 2.5% on the average weekday in the moderate climate region. In the hot climate region and in the service territory as a whole, load reductions, not increases, occurred during the super off-peak period on the weekend.

[22] PG&E Rate 3 winter impacts represent March 2017 through May 2017.

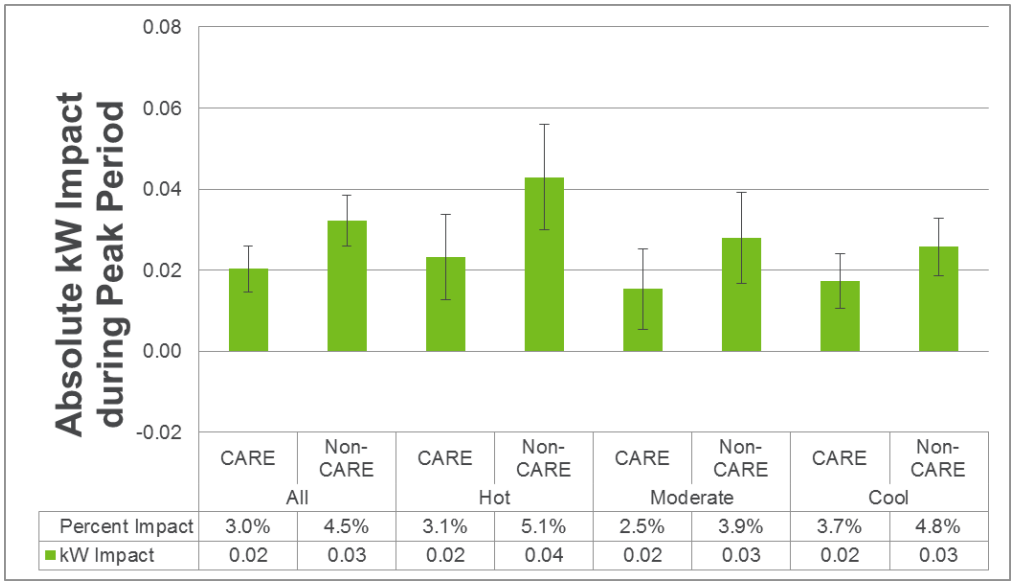
Table 3.3-11: Rate 3 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

Rate 3														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.70	0.03	4.2%	0.81	0.04	4.4%	0.70	0.03	3.7%	0.52	0.02	4.6%
	Off Peak	12 AM to 10 AM, 9 PM to 12 AM	0.48	0.00	0.5%	0.54	0.00	0.5%	0.48	0.00	0.6%	0.38	0.00	0.6%
	Super Off Peak	10 AM to 4 PM	0.53	0.00	-0.7%	0.61	0.00	0.0%	0.54	-0.01	-2.5%	0.39	0.00	1.2%
	Day	**All Hours**	**0.54**	**0.01**	**1.2%**	**0.61**	**0.01**	**1.4%**	**0.54**	**0.00**	**0.6%**	**0.41**	**0.01**	**1.8%**
Average Weekend	Off Peak	12 AM to 10 AM, 4 PM to 12 AM	0.54	0.01	2.3%	0.61	0.02	2.5%	0.54	0.01	2.7%	0.42	0.00	0.9%
	Super Off Peak	10 AM to 4 PM	0.61	0.01	1.5%	0.70	0.02	3.2%	0.63	0.00	-0.1%	0.46	0.00	0.4%
	Day	**All Hours**	**0.56**	**0.01**	**2.0%**	**0.63**	**0.02**	**2.7%**	**0.56**	**0.01**	**1.9%**	**0.43**	**0.00**	**0.8%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.87	0.04	4.5%	1.03	0.06	5.6%	0.89	0.02	1.9%	0.60	0.04	7.0%
	Off Peak	12 AM to 10 AM, 9 PM to 12 AM	0.53	0.01	1.3%	0.61	0.01	1.8%	0.53	0.00	0.9%	0.41	0.00	0.8%
	Super Off Peak	10 AM to 4 PM	0.62	0.00	0.1%	0.74	0.00	0.0%	0.63	0.00	-0.7%	0.43	0.01	1.9%
	Day	**All Hours**	**0.63**	**0.01**	**1.9%**	**0.73**	**0.02**	**2.5%**	**0.63**	**0.00**	**0.8%**	**0.45**	**0.01**	**2.8%**

* A shaded cell indicates estimate is not statistically significant

Figure 3.3-15 shows the peak period load reductions on weekdays for non-CARE/FERA and CARE/FERA customers and Table 4.3-13 and Table 4.3-14 show the load impacts for each rate period and day type for the two segments. As seen in the figures, there are large and statistically significant differences in peak period reductions between CARE/FERA and non-CARE/FERA customers in the service territory as a whole and in the hot region. However, the differences in the moderate and cool regions are much smaller and are not statistically significant.

Figure 3.3-15: Average Load Impacts for Peak Period for PG&E Rate 3 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	3.0%	4.5%	3.1%	5.1%	2.5%	3.9%	3.7%	4.8%
kW Impact	0.02	0.03	0.02	0.04	0.02	0.03	0.02	0.03

As seen in Table 3.3-12 and Table 3.3-13 there are also significant differences in the load impacts between CARE/FERA and non-CARE/FERA customers for other rate periods and day types. For the service territory as a whole, non-CARE/FERA did not change their super off peak energy use. CARE/FERA customers, on the other hand, increased their usage during this period by 1.5% or 0.01 kW. This indicates that CARE/FERA customers may be shifting their usage to the period of time with lower prices.

Table 3.3-12: Rate 3 Load Impacts by Rate Period and Day Type – Non-CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

Rate 3													
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.71	0.03	4.5%	0.84	0.04	5.1%	0.72	0.03	3.9%	0.54	0.03	4.8%
	Off Peak	12 AM to 10 AM, 9 PM to 12 AM	0.49	0.00	0.4%	0.58	0.00	0.0%	0.49	0.00	0.6%	0.39	0.00	0.8%
	Super Off Peak	10 AM to 4 PM	0.54	0.00	-0.4%	0.64	0.01	0.9%	0.55	-0.01	-2.4%	0.40	0.00	1.1%
	Day	**All Hours**	**0.55**	**0.01**	**1.3%**	**0.65**	**0.01**	**1.6%**	**0.55**	**0.00**	**0.8%**	**0.42**	**0.01**	**1.9%**
Average Weekend	Off Peak	12 AM to 10 AM, 4 PM to 12 AM	0.56	0.01	2.6%	0.66	0.02	3.0%	0.55	0.02	3.1%	0.44	0.00	1.0%
	Super Off Peak	10 AM to 4 PM	0.63	0.01	2.0%	0.74	0.03	4.6%	0.64	0.00	0.6%	0.47	0.00	0.0%
	Day	**All Hours**	**0.57**	**0.01**	**2.5%**	**0.68**	**0.02**	**3.5%**	**0.58**	**0.01**	**2.4%**	**0.45**	**0.00**	**0.7%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.89	0.04	4.4%	1.08	0.06	5.5%	0.92	0.02	1.8%	0.62	0.05	7.7%
	Off Peak	12 AM to 10 AM, 9 PM to 12 AM	0.54	0.01	1.0%	0.65	0.01	1.5%	0.54	0.00	0.5%	0.42	0.00	1.1%
	Super Off Peak	10 AM to 4 PM	0.63	-0.01	-0.8%	0.77	-0.01	-1.7%	0.65	-0.01	-1.3%	0.44	0.01	2.1%
	Day	**All Hours**	**0.64**	**0.01**	**1.5%**	**0.77**	**0.01**	**1.9%**	**0.65**	**0.00**	**0.4%**	**0.47**	**0.01**	**3.2%**

* A shaded cell indicates estimate is not statistically significant

Table 3.3-13: Rate 3 Load Impacts by Rate Period and Day Type – CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

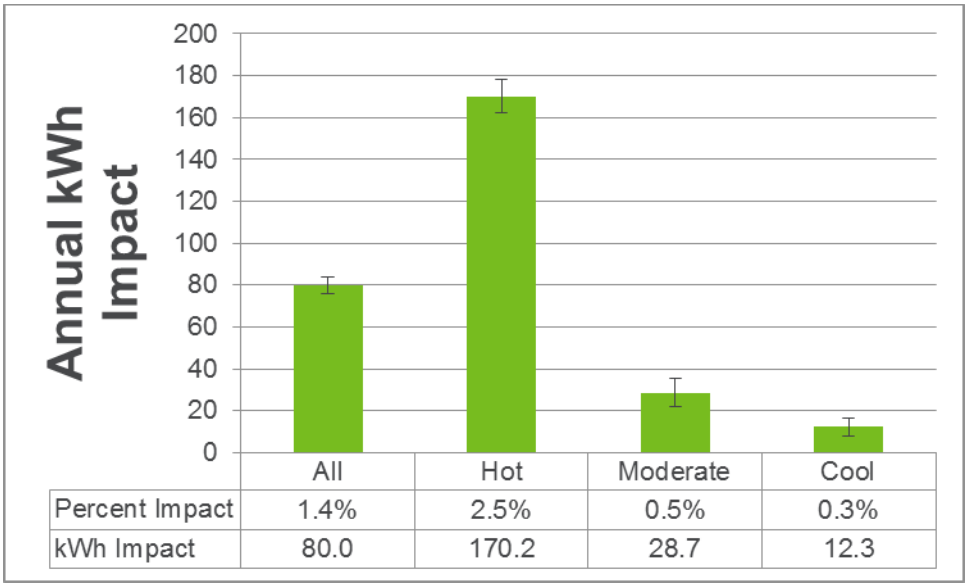
Rate 3														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.67	0.02	3.0%	0.75	0.02	3.1%	0.62	0.02	2.5%	0.47	0.02	3.7%
	Off Peak	12 AM to 10 AM, 9 PM to 12 AM	0.44	0.00	0.9%	0.48	0.01	1.4%	0.42	0.00	0.2%	0.33	0.00	-0.1%
	Super Off Peak	10 AM to 4 PM	0.50	-0.01	-1.5%	0.56	-0.01	-1.7%	0.48	-0.01	-3.1%	0.35	0.01	1.7%
	Day	**All Hours**	**0.50**	**0.00**	**0.9%**	**0.56**	**0.01**	**1.1%**	**0.48**	**0.00**	**0.0%**	**0.37**	**0.00**	**1.3%**
Average Weekend	Off Peak	12 AM to 10 AM, 4 PM to 12 AM	0.49	0.01	1.1%	0.55	0.01	1.6%	0.47	0.00	0.3%	0.37	0.00	0.5%
	Super Off Peak	10 AM to 4 PM	0.57	0.00	-0.1%	0.64	0.01	0.8%	0.55	-0.02	-4.3%	0.41	0.01	2.0%
	Day	**All Hours**	**0.51**	**0.00**	**0.8%**	**0.57**	**0.01**	**1.3%**	**0.49**	**0.00**	**-1.0%**	**0.38**	**0.00**	**0.9%**
Monthly System Peak Day	Peak	4 PM to 9 PM	0.82	0.04	4.9%	0.96	0.06	5.9%	0.74	0.02	2.6%	0.53	0.02	3.6%
	Off Peak	12 AM to 10 AM, 9 PM to 12 AM	0.50	0.01	2.0%	0.56	0.01	2.2%	0.48	0.02	3.1%	0.36	0.00	-0.5%
	Super Off Peak	10 AM to 4 PM	0.60	0.02	2.5%	0.70	0.02	2.9%	0.55	0.01	2.3%	0.39	0.00	1.1%
	Day	**All Hours**	**0.59**	**0.02**	**3.0%**	**0.68**	**0.02**	**3.5%**	**0.55**	**0.02**	**2.8%**	**0.40**	**0.00**	**1.0%**

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 3.3-16 shows the annual conservation effect for each climate region and for the territory as a whole for customers on PG&E's Rate 3. Each climate zone reduced their annual energy consumption by a statistically significant amount. Most notably, customers in the hot climate region had a conservation effect of 2.5%, or 170.2 kWh. Customers in the moderate climate region had usage reductions of about 0.5% or 28.7 kWh and customers in the cool climate region saved 0.3% or 12.3 kWh. These estimates are similar to those for Rate 1.

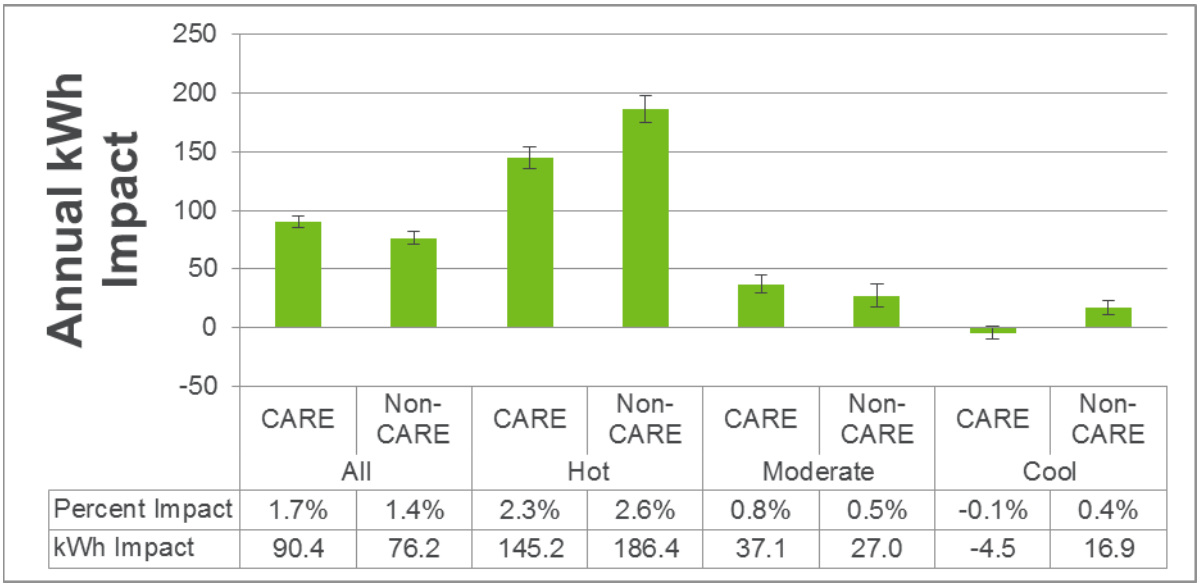
Figure 3.3-16: Average Annual Conservation Effect for PG&E Rate 3 (Positive values represent usage reductions)



	All	Hot	Moderate	Cool
Percent Impact	1.4%	2.5%	0.5%	0.3%
kWh Impact	80.0	170.2	28.7	12.3

Figure 3.3-17 shows the annual conservation effect for CARE/FERA and non-CARE/FERA customers. Unlike Rate 1 and Rate 2, the two groups had similar conservation effects within each climate region. Each group had statistically significant energy savings with the exception of CARE/FERA customers in the cool climate region. Non-CARE/FERA customers in the hot region had the greatest energy savings of 2.6% or 186.4 kWh.

Figure 3.3-17: Average Annual Conservation Effect for PG&E Rate 3 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	1.7%	1.4%	2.3%	2.6%	0.8%	0.5%	-0.1%	0.4%
kWh Impact	90.4	76.2	145.2	186.4	37.1	27.0	-4.5	16.9

3.3.4 Comparison Across Rates

Figure 3.3-18 compares the load impacts for the three rates tested by PG&E for the common set of peak-period hours from 6 to 9 PM for the entire winter. Using a common set of hours reduces differences in impacts across rates that might be due to differences in the number of hours included in the peak period or the timing of those hours. The hours from 6 to 9 PM define the peak period for Rate 2, which is a two period rate in the winter. Rates 1 and 3 are two period rates with the same peak period, from 4 to 9 PM. During the winter period, the peak-to-off-peak ratio[23] is similar for all three rates, so we would expect to see similar impacts during the common peak periods.

As seen in Figure 3.3-18, there are no statistically significant differences in load impacts for the common hours from 6 to 9 PM across the three rates in absolute terms overall or in any climate region. Figure 3.3-19 shows the average daily kWh impact for each rate. The reduction in daily usage differs between Rate 2 and the other two rates for the service territory as a whole as well as in the hot climate region. This could be attributable to the shorter peak period on Rate 2. Daily impacts also vary across rates in the moderate and cool climate regions but the differences are not statistically significant.

[23] The peak-to-off-peak price ratio is equal to the peak price divided by the off-peak price as defined in Figures 3.1-1 through 3.1-3

Figure 3.3-18: Average Impacts from 6 to 9 PM Across Rates

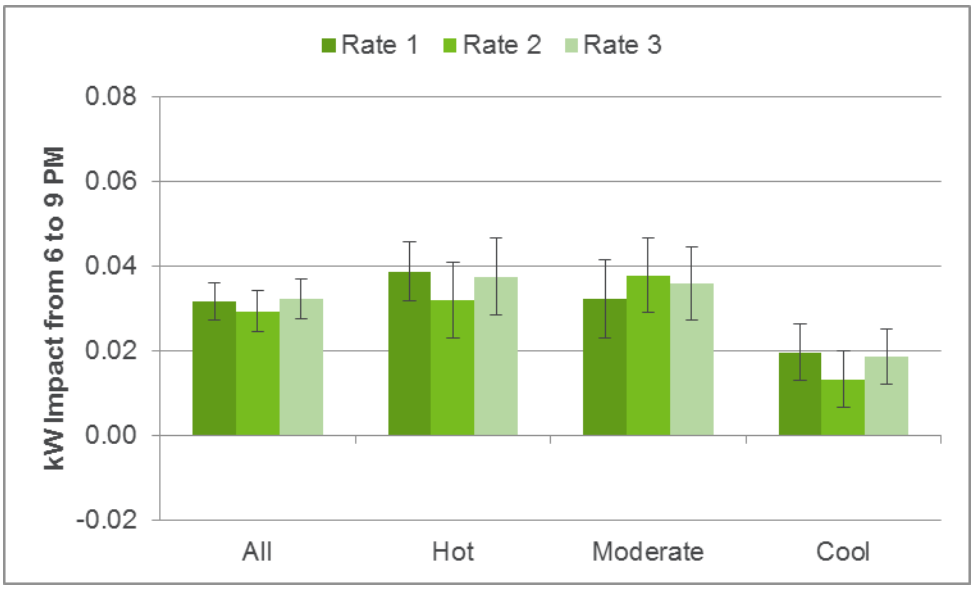
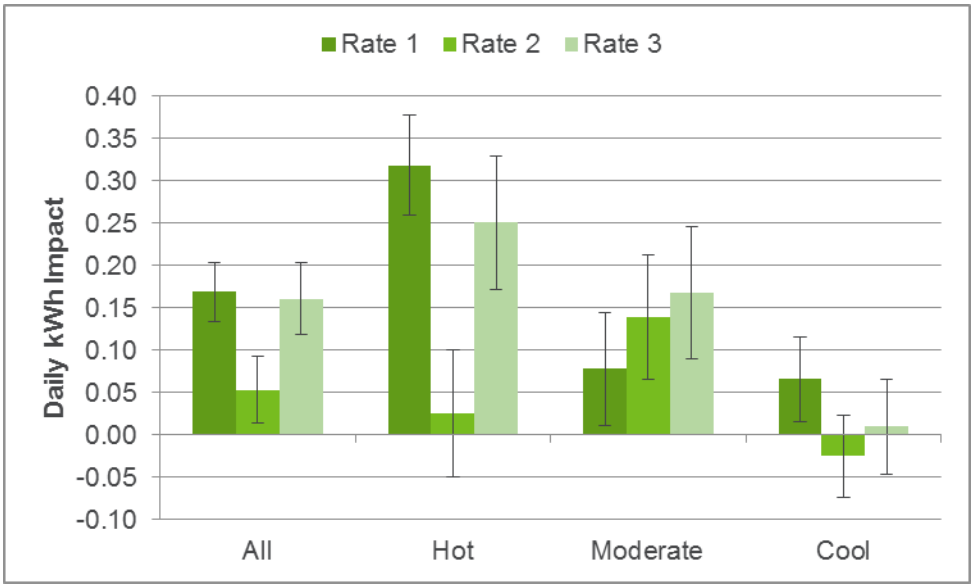


Figure 3.3-19: Average Daily kWh Impacts Across Rates



3.4 Bill Impacts

This section summarizes the bill impact estimates for the three rate treatments tested by PG&E. The CPUC resolution approving PG&E's pilot requires that bill impacts be estimated for the following rates, customer segments, and climate regions:

- **For Rate 1-** Seniors, CARE/FERA customers, non-CARE/FERA customers, households with incomes below 100% of FPG, and households with incomes between 100% and 200% of FPG in PG&E's hot climate region; and
- **For all rates-** For CARE/FERA and non-CARE/FERA customers on each rate across PG&E's service territory as a whole and for each climate region.

In addition to these required segments, Nexant estimated bill impacts for seniors, households with incomes below 100% of FPG, and households with incomes between 100% and 200% of FPG in PG&E's hot climate region for Rate 2 and Rate 3. Bill impacts are reported as the average monthly impact for the winter months of October, November, December, January, February, March, April, and May[24] and for the first full year of the pilot. Three analyses that were conducted for the First Interim Report were conducted again for this report:

- **Structural benefiter/non-benefiter analysis based on pretreatment usage**- Displaying proportions of structural benefiters and non-benefiters for each rate and relevant customer segment based on pretreatment data and on an annual and seasonal (winter and spring) basis;
- **Estimation of the total bill impact due to both the difference in the tariffs and behavior change**[25]- Displaying the bill impact for each rate and relevant customer segment due to structural differences in the rate mitigated by changes in behavior; and
- **Change in the distribution of bill impacts due to behavior change**- Displaying the distribution curves of bill impacts (percentage of customers with bill impacts within $10 incremental bins) with and without behavior change in the same graph to illustrate if the distribution for participants shifted to the left or changed shape compared with the distribution for control customers without behavior change.

A more detailed explanation of each type of analysis and how the analysis was conducted is contained in Section 3.7 of the First Interim Report. The remainder of this section is organized according to the three analysis types summarized above – that is, bill impacts are presented for each rate, relevant customer segment, and climate region for each of the three analyses.

Unlike in the First Interim Report which relied on only one tariff per pilot rate and OAT, the impacts presented in this report are based on two PG&E tariffs. All monthly bills from July 2016 through

[24] The winter period for Rate 3 ends in February. The spring period is March, April, and May.

[25] The structural benefiter/non-benefiter analysis involves straightforward mathematical calculations, and doesn't involve any tests for statistical significance. For example, 5-1=4 does not involve statistical significance. The impacts due to behavioral change require more complex estimation, and do involve tests for statistical significance. The total bill impacts are a combination of the two, and because the structural benefit component doesn't involve statistical significance, the overall outcome of the total bill impact also does not have a metric to help measure statistical significance. Generally speaking, the behavioral component is quite small compared to the structural component.

February 2017 (and their corresponding pretreatment months) are based on the tariffs that were in effect at the start of the pilot. Estimated bills for March 2017 through June 2017 (and their corresponding pretreatment months) are based on the March 2017 tariff. The reason for incorporating a second tariff was a significant change in the structure of PG&E's OAT. At the start of the pilot, the OAT was a three-tiered rate. In March 2017, the rate transitioned to a four-tiered structure. To better reflect the conditions customers actually experienced, Nexant chose to include this new rate in the analysis. Because of this change, the annual structural benefiter analysis was updated for this report.

3.4.1 Structural Benefiter/Non-Benefiter Analysis Based on Pretreatment Usage

The structural benefiter analysis was conducted for the winter, spring[26], and annual time periods using pretreatment usage data for the treatment group for each rate and relevant customer segment. Annual impacts were based on hourly load data from May 2015 through April 2016. Winter impacts were based on October 2015 through May 2015 for Rate 1 and Rate 2 and October 2015 through February 2016 for Rate 3. For Rate 3 only, spring impacts were based on May 2015[27], March 2016, and April 2016. Monthly bills were estimated for each treatment group customer on the OAT and TOU rate using the hourly load data. The difference in bills based on the TOU rate and the OAT determines if a customer is a structural benefiter, a structural non-benefiter, or falls in a neutral range defined as having a structural bill impact between ±$3.

Final results from the structural benefiter / non-benefiter analysis are presented in column graphs and shown as percentages for the individual seasons and on an annual basis. For each rate and relevant segment, the percentage of customers who are non-benefiters, neutral (+/- $3), or benefiters based on their average monthly bills for the time period of interest are shown as individual columns. The three columns within each rate and segment combination total to 100%, thus showing the distribution of structural benefiters and non-benefiters for each rate and segment of interest.

Figure 3.4-1 presents the outcome of the structural benefiter analysis for Rate 1 at the aggregate level across climate regions for all customers as well as for CARE/FERA and non-CARE/FERA. The graph on the left presents the analysis on an annual basis and the graph on the right presents the findings for the winter period. Nearly all customers are structural benefiters in the winter season and most customers are in the neutral category on an annual basis. While the number of benefiters is similar for CARE/FERA and non-CARE/FERA customers on an annual basis, a higher percentage of non-CARE/FERA customers (33%) are non-benefiters than the percentage of CARE/FERA customers (12%).

[26] Spring analysis was conducted for Rate 3 only

[27] Customers were aware of the pilot in May 2016; May 2015 was used instead

Figure 3.4-1: Rate 1 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

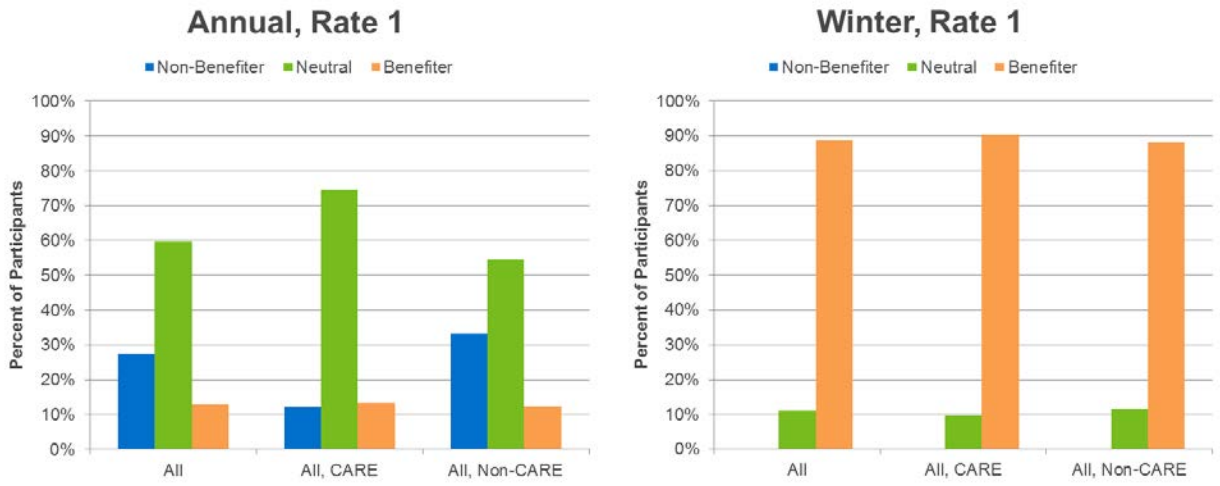


Figure 3.4-2 presents the outcome of the structural benefiter analysis for Rate 1 at the detailed segment level by climate region. The findings at the aggregate level still hold, with nearly all customers being structural benefiters in the winter season. On an annual basis, the hot climate region had a greater proportion of customers in the non-benefiter category than the moderate or cool regions, but most customers in each segment were neither benefiters nor non-benefiters. The one exception was non-CARE/FERA customers in the hot climate region, where 53% of customers were non-benefiters on an annual basis. There was also a substantial share (40%) of senior households in the hot climate region that were non-benefiters.

Figure 3.4-2: Rate 1 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region

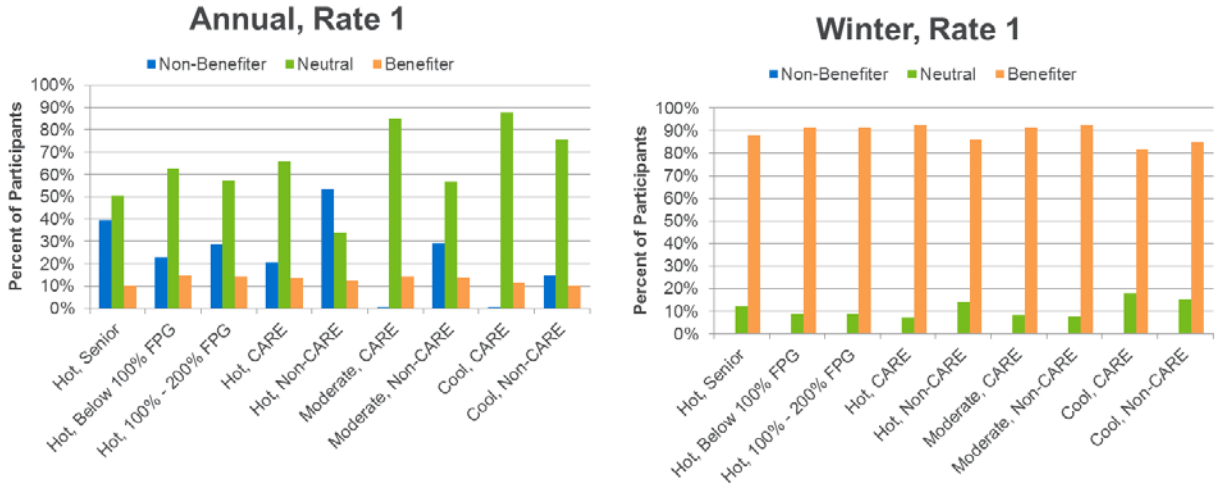


Figure 3.4-3 presents the outcome of the structural benefiter analysis for Rate 2 at the aggregate level across climate regions. Rate 2 differs from Rate 1 in several ways: the peak period is from 6 to 9 PM rather than 4 to 9 PM; it is a three period rate in the summer with a shoulder period from 4 to 6 PM and 9 to 10 PM, but has only two periods in the winter; and prices are the same on weekends and weekdays. Overall, the general pattern of structural benefiters, non-benefiters, and neutrals is similar between Rate 1 and Rate 2. Nearly all customers are structural benefiters in the winter season, and there is a higher proportion of non-benefiter customers among non-CARE/FERA customers than among CARE/FERA customers.

Figure 3.4-3: Rate 2 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

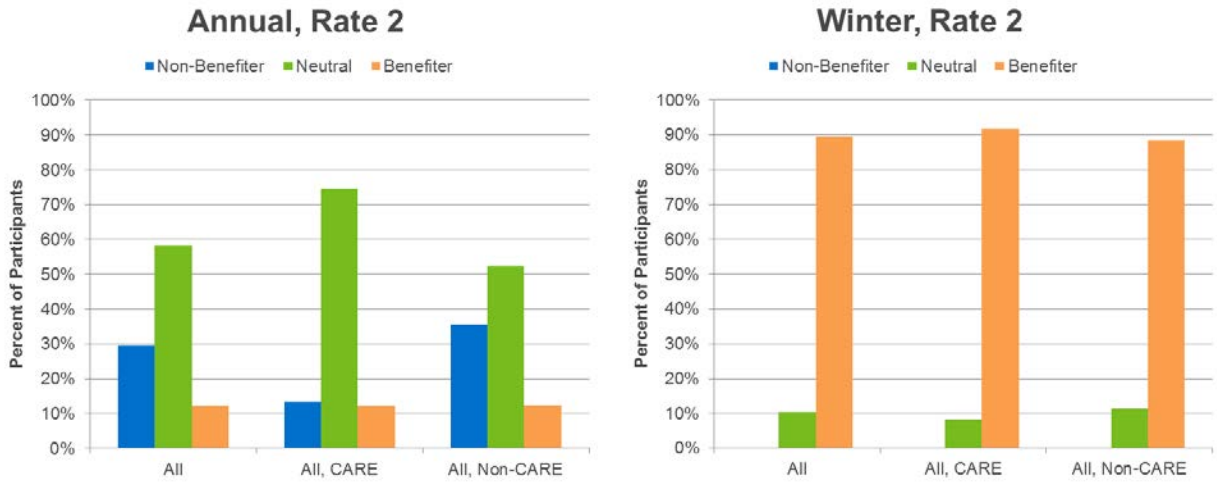


Figure 3.4-4 presents the outcome of the structural benefiter analysis for Rate 2 at the detailed segment level by climate region. The findings at the aggregate level still hold, with nearly all customers being structural benefiters in the winter season. On an annual basis, the hot climate region had a greater proportion of customers in the non-benefiter category than the moderate or cool regions. Overall the findings for Rate 2 at the detailed segment level are also very similar to the distribution of structural benefiters and non-benefiters from Rate 1. Here, too, about 40% of senior households in the hot climate region were non-benefiters on an annual basis.

Figure 3.4-4: Rate 2 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region

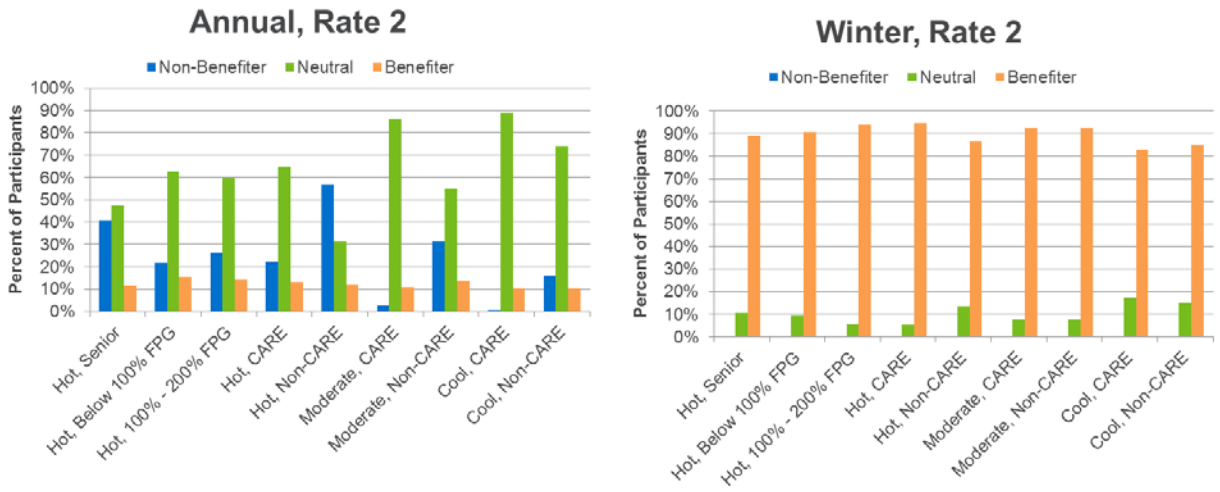
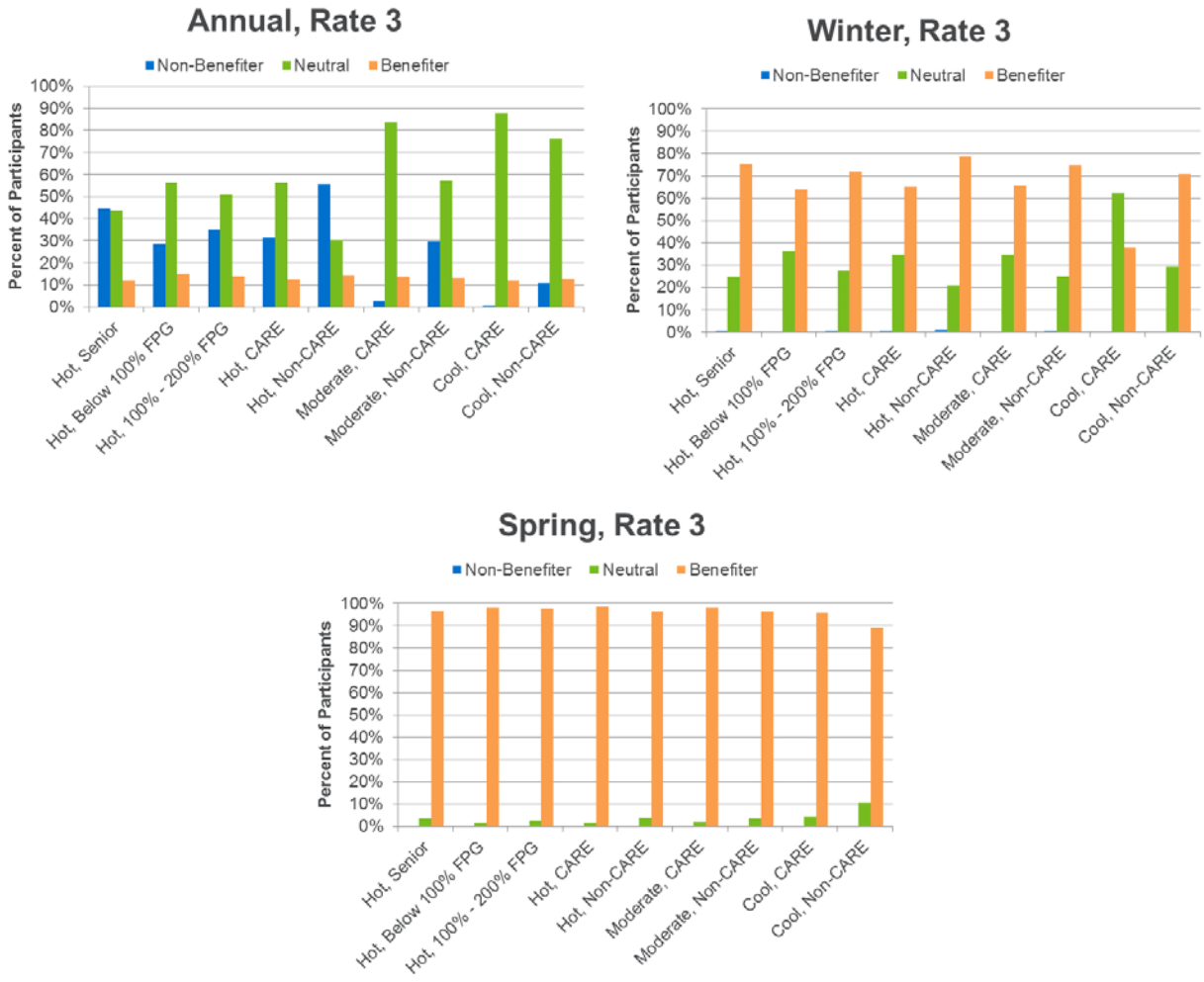


Figure 3.4-5 presents the outcome of the structural benefiter analysis for Rate 3 at the aggregate level across climate regions. PG&E's Rate 3 has the same peak period on weekdays as Rate 1 and a similar peak-to-off-peak price ratio to Rate 1. Like Rate 1, and unlike Rate 2, all weekend hours are priced at the off-peak rate. Additionally, in the spring, Rate 3 has a super off-peak price from 11 AM to 4 PM. As with the other two rates, a majority of customers are structural benefiters in the winter season (and nearly all customers are benefiters in the spring season). Non-CARE/FERA customers have a smaller proportion of neutral customers than CARE/FERA customers.

Figure 3.4-5: Rate 3 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

Figure 3.4-6 presents the outcome of the structural benefiter analysis for Rate 3 at the detailed segment level by climate region. As with the other two rates, the findings at the aggregate level still hold. Once again, about half of non-CARE/FERA customers in the hot climate region are non-benefiters on an annual basis.

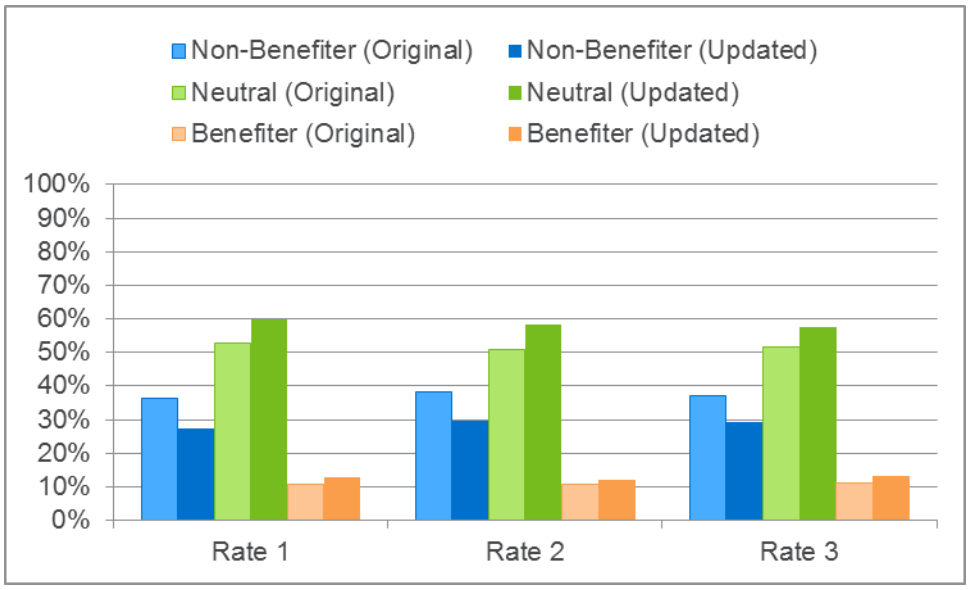
Figure 3.4-6: Rate 3 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region



Overall, a general pattern of structural benefiters and non-benefiters emerged that was consistent across all three rates. Nearly all customers were benefiters in the winter season, regardless of climate region or customer segment. On an annual basis, the hot climate region had a greater proportion of non-benefiters than the moderate or cool regions.

Figure 3.4-7 presents a comparison of the annual structural benefiter analysis using two versions of the pilot tariffs and the OAT. The lighter bars represent the outcome of the analysis based on the June 2016 tariffs, which were in effect at the launch of the pilot. The values here match what was reported in the First Interim Report. The darker bars are based on a combination of the original and March 2017 tariffs. The original tariff was used for the months of June through February, and the new tariffs were used for March through May. Incorporating the updated tariffs increases the number of customers in the neutral category and reduces the number of customers in the non-benefiter category. For a comparison of the two tariffs, see Appendix B.

Figure 3.4-7: Comparison of Structural Benefiter Analysis Between Original and Updated Tariffs



3.4.2 Estimation of the Total Bill Impact Due to Differences in the Tariffs and Behavior Change

Total bill impacts experienced by customers on a TOU rate can be decomposed into two components: the structural impact, and the behavioral impact. As discussed above, the structural impact represents the change in customer bills based solely on the change in the underlying structure of the rate. In this case, it is the change from the OAT to the time-differentiated TOU pilot rates. The behavioral impact represents how customers change their energy usage in response to the new pricing structure of the rate—which includes higher prices in the afternoon and evening and lower prices at other times of day. During the summer period, nearly all customers on the TOU rates experienced a structural increase in their bills. This was not the case in the winter period, where nearly all customers experienced a structural *decrease* in their bills. Customers had the opportunity to save even more money by either shifting their usage away from peak periods or reducing consumption altogether. As noted previously, it is the combination of structural and behavioral bill impacts that produces the total bill impact experienced by the average study participant on each rate.

The results from this analysis represent the average total bill across the first year of the pilot (July 2016 through June 2017) and the average monthly bill for winter and spring. Three different bills were calculated for each customer segment:[28]

- **No Change in Behavior or Tariff [1]:** This represents what the treatment group bills would have been in the post-treatment period if they were on the OAT and had not changed their behavior

[28] See Section 3.2.3 in the First Interim Report for additional details on the methodology.

- **No Change in Behavior, Change in Tariff [2]:** This represents what the treatment group bills would have been in the post-treatment period if they were on the TOU rate and had not changed their behavior
- **Change in Behavior and in Tariff [3]:** This represents what the treatment group bills were in the post-treatment period on the TOU rate with a change in behavior

Based on the components defined above, the following metrics were calculated:

- The difference between **[1]** and **[2]** is the structural bill impact (based on post-treatment usage after adjusting for any pretreatment difference between control and treatment customers);
- The difference between **[1]** and **[3]** is the bill impact due to structural differences in the rates, but mitigated by changes in behavior; and
- The difference between **[2]** and **[3]** is the amount customers were able reduce their bills by changing their behavior.

In the bill impact analysis, a major policy question is to better understand the relationship between structural bill impacts and how customers were able to respond. The outcome of this relationship is presented by the "Total Bill Impact" and "Percent Bill Impact" shown in the data table at the bottom of the figures below. These values represent the final outcome incorporating the structural change, and the customer's behavioral response. Results are organized by rate, climate region, and segment; similarly to the other bill impact analysis sections. For each rate, results are presented for the first year of the pilot, followed by winter (and for Rate 3, spring) estimates.

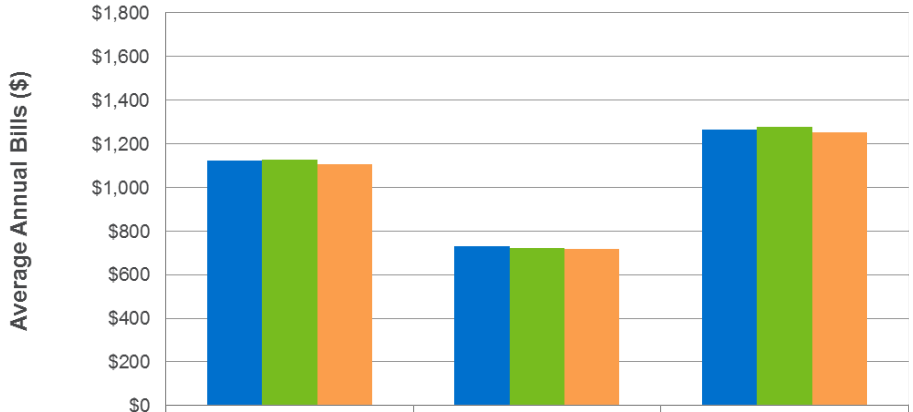
Annual

Figure 3.4-8 presents a set of three average annual bills (the total bill for twelve months, not the average monthly bill) as defined above for the first year of the pilot for all customers, CARE/FERA customers, and non-CARE/FERA customers on Rate 1. The blue bar represents a typical total yearly bill for a customer still on the OAT and not responding to a TOU rate— noted as "No Change in Behavior or Tariff." For the average customer on Rate 1, this dollar amount was $1,121. The green bar represents what a typical annual bill would be for a customer who was billed on a TOU rate, but didn't change their energy use behavior— noted as "No Change in Behavior, Change in Tariff." This dollar amount is $1,127 for the average Rate 1 customer. The difference between the two values, $5.69, is the average increase or decrease a customer would see in their bills by changing from the OAT to Rate 1, and not changing their energy use behavior; this is also referred to as the customer's structural loss or gain, but it is based on post treatment usage for control customers (adjusted for any pretreatment differences between control and treatment customers due to random chance) rather than the structural impact discussed in the prior section, which was based on pretreatment usage. The orange bar represents the average Rate 1 customer's total annual bill after factoring in the change in rate from the OAT to the Pilot Rate 1, and then also taking into account any changes in energy use behavior— noted as "With Change in Behavior and Tariff." This annual cost amount averaged $1,108 for the typical Rate 1 customer. Based on these values, it is possible to estimate the total change in the annual bill including both the change in tariff and in behavior, which, in this instance, is a decrease of $13 over the course of the year (1.1%). This total change is calculated by subtracting the orange ($1,121) from the blue ($1,108).

CARE/FERA customers experienced an average structural gain of $5.74 (1%). Through changes in energy use behavior they were able to offset an additional $4, resulting in a total annual cost decrease of $10

(1.4%) after factoring in both changes in the tariff and behavior. It should be noted that the bill impact due to behavior change for CARE/FERA customers on Rate 1 was statistically significant. Non-CARE/FERA customers experienced a structural loss of $9.89 (1%) over the course of the pilot. However, due to behavior change, they experienced an overall total bill reduction of $14, or about 1.1%.

Figure 3.4-8: Rate 1 Annual Bill Impact Due to Differences in the Tariff and Behavior Change[29]
All | CARE/FERA | Non-CARE/FERA

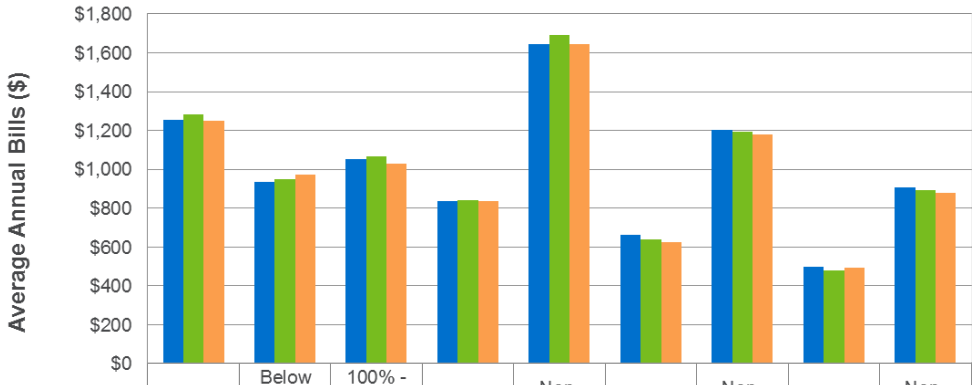


	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$1,121	$729	$1,266
No Change in Behavior, Change in Tariff	$1,127	$723	$1,276
With Change in Behavior and Tariff	$1,108	$719	$1,252
Total Bill Impact	-$13	-$10	-$14
Percent Bill Impact	-1.1%	-1.4%	-1.1%

Figure 3.4-9 presents the three sets of average annual bills as defined above for the detailed segments by climate region on Rate 1. Most customer segments experienced small structural losses over the course of the pilot, but nearly every segment was able to reduce their bills by changing their electricity usage behavior. The exceptions to this general rule are households with incomes below 100% of FPG in the hot climate region, who experienced an annual increase in their bills of $37, CARE/FERA customers in the hot climate region who essentially experienced no change in their bills, and non-CARE/FERA households in the hot climate region, who saw a very small increase of $4 on an average annual bill of $1,643. As seen below in Section 3.4.3, which examines the distribution of bill impacts across customers, very few customers saw large bill increases (or decreases) on Rate 1.

[29] Unlike for load impacts, where negative values mean loads went up relative to the reference load, here a negative value means bills fall relative to what they would under the OAT.

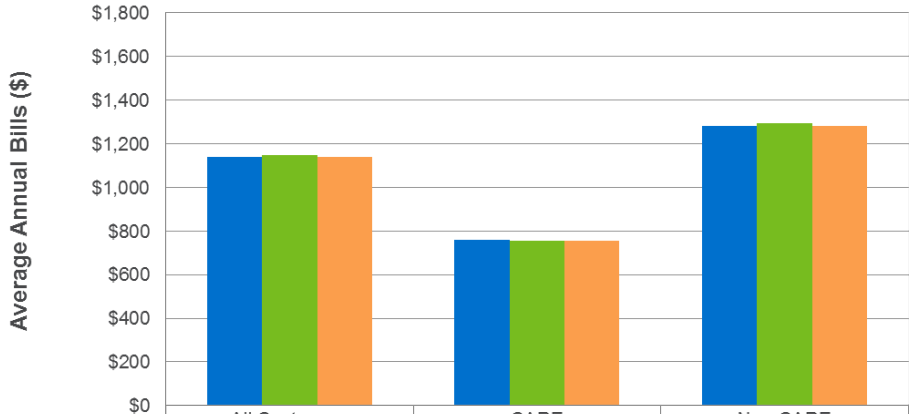
Figure 3.4-9: Rate 1 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$1,256	$937	$1,054	$836	$1,643	$663	$1,201	$500	$905
No Change in Behavior, Change in Tariff	$1,284	$948	$1,067	$842	$1,692	$639	$1,195	$480	$891
With Change in Behavior and Tariff	$1,248	$974	$1,031	$835	$1,647	$627	$1,181	$492	$880
Total Bill Impact	-$8	$37	-$23	$0	$4	-$36	-$20	-$8	-$26
Percent Bill Impact	-0.6%	3.9%	-2.1%	0.0%	0.2%	-5.4%	-1.7%	-1.6%	-2.8%

Figure 3.4-10 presents the three sets of average annual bills for all customers, CARE/FERA customers, and non-CARE/FERA customers on Rate 2. The impacts are similar to those for Rate 1, although the change in the total annual bill for each group is even smaller than for Rate 1. Indeed, for all customers combined, there was no change at all in the annual bill, with the behavioral impact just offsetting the small structural increase in the annual bill. CARE/FERA customers experienced total bill reductions of about $4, or 0.5%, while non-CARE/FERA customers experienced bill increases of about $2, which is equal to 0.1%.

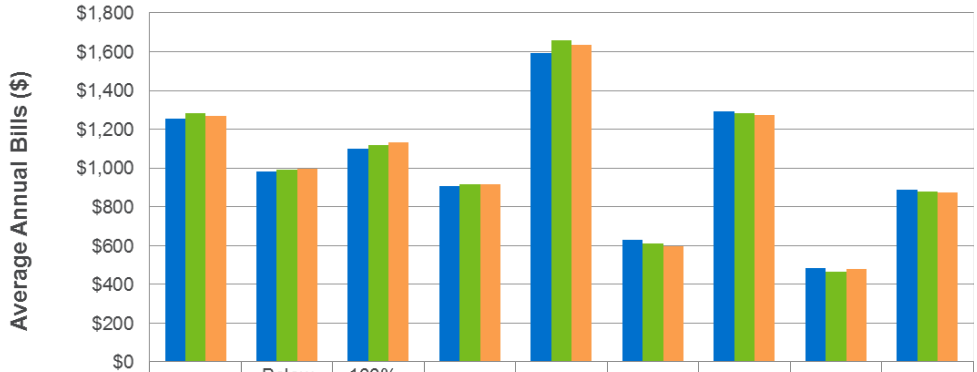
Figure 3.4-10: Rate 2 Annual Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$1,141	$760	$1,281
No Change in Behavior, Change in Tariff	$1,150	$756	$1,295
With Change in Behavior and Tariff	$1,141	$756	$1,283
Total Bill Impact	$0	-$4	$2
Percent Bill Impact	0.0%	-0.5%	0.1%

Figure 3.4-11 presents the three sets of average annual bills for the detailed segments by climate region on Rate 2. While the average customer across the service territory on Rate 2 did not experience a bill increase, all segments in the hot climate regions saw their bills increase. Non-CARE/FERA households in the hot climate region saw the largest absolute bill increase, $40, while households with incomes between 100% and 200% of FPG saw the largest percentage increase, 2.6%. Customer segments in the moderate and cool climate regions saw small, annual bill decreases, ranging from a low of $4 for CARE/FERA households in the cool climate region to a high of $31 for CARE/FERA customers in the moderate climate region, which was a decrease of 5%.

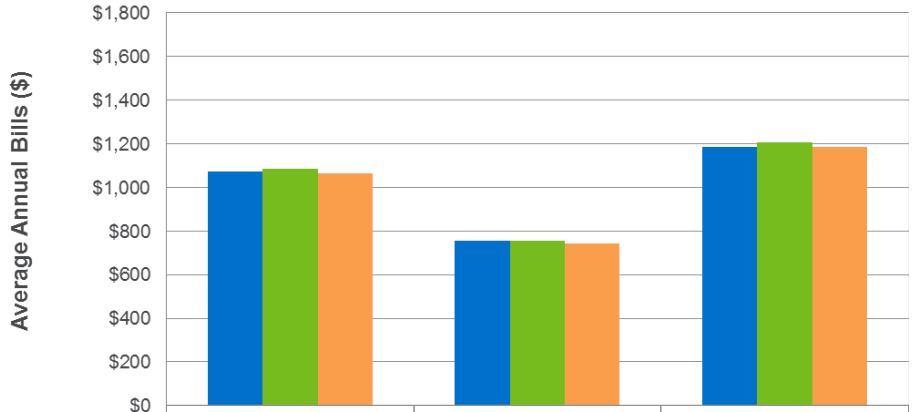
Figure 3.4-11: Rate 2 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$1,252	$984	$1,101	$909	$1,593	$629	$1,291	$484	$888
No Change in Behavior, Change in Tariff	$1,282	$990	$1,118	$916	$1,658	$612	$1,281	$465	$877
With Change in Behavior and Tariff	$1,269	$998	$1,130	$916	$1,633	$597	$1,273	$480	$872
Total Bill Impact	$16	$14	$29	$7	$40	-$31	-$18	-$4	-$16
Percent Bill Impact	1.3%	1.5%	2.6%	0.8%	2.5%	-5.0%	-1.4%	-0.8%	-1.8%

Figure 3.4-12 presents the three sets of average annual bills for all customers, CARE/FERA customers and non-CARE/FERA customers on Rate 3. For the average customer across the service territory, a small structural loss of $14 annually was offset by behavior change, resulting in a small decrease in the annual bill of $6, or roughly 5%. CARE/FERA customers saw essentially no change in their annual bill due to the structural change in the tariff, and saw a total bill decrease of $14, or just under 2%. Non-CARE/FERA customers essentially offset their structural loss of $20 by behavior change, resulting in a very small decrease of $3 in their annual average bill of nearly $1,200.

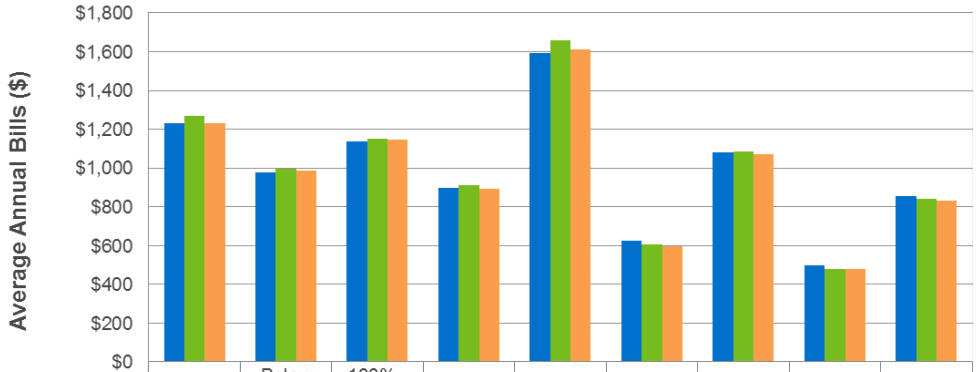
Figure 3.4-12: Rate 3 Annual Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$1,071	$756	$1,187
No Change in Behavior, Change in Tariff	$1,085	$755	$1,207
With Change in Behavior and Tariff	$1,065	$742	$1,184
Total Bill Impact	-$6	-$14	-$3
Percent Bill Impact	-0.5%	-1.8%	-0.2%

Figure 3.4-13 presents the three sets of average annual bills by climate region for the individual customer segments on Rate 3. In the hot climate region, all segments experience structural increases in their bills, but some segments were able to more than offset those losses through behavior change and other segments offset most of the loss by shifting or reducing usage. Non-CARE/FERA customers in the hot climate region saw the largest overall bill increase, equaling $21, or 1.3%. In the moderate and cool climate regions, the average CARE/FERA customers saw a decrease in their total bill of around 4.5%, while non-CARE/FERA customers were experienced bill decreases of 0.8% in the moderate climate region and 2.8% in the cool region.

Figure 3.4-13: Rate 3 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



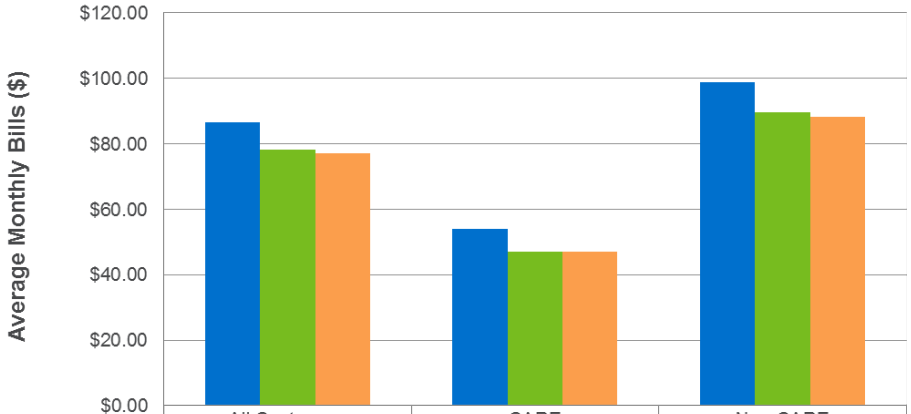
	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$1,231	$979	$1,136	$898	$1,591	$625	$1,082	$500	$857
No Change in Behavior, Change in Tariff	$1,269	$995	$1,153	$912	$1,660	$605	$1,087	$478	$839
With Change in Behavior and Tariff	$1,230	$985	$1,148	$893	$1,612	$597	$1,073	$478	$833
Total Bill Impact	-$1	$6	$12	-$5	$21	-$28	-$8	-$22	-$24
Percent Bill Impact	-0.1%	0.6%	1.0%	-0.5%	1.3%	-4.5%	-0.8%	-4.4%	-2.8%

In summary, for all rates, climate regions and customer segments, annual bill impacts were very small, generally between negative 5% and positive 5%. As seen in the First Interim Report, most customers were structural non-benefiters during the summer period and many saw significant bill increases. The next section shows that customers generally benefitted in the winter months, which offset the summer bill increases and resulted in the very modest annual bill impacts summarized above.

Winter and Spring

Figure 3.4-14 shows the three average monthly bills calculated with no change in behavior or tariff, a change in tariff only, and a change in tariff and behavior for the average winter month for customers on Rate 1. It should be noted that, unlike in the prior section, which presented the total change in the bill for the year, the values in this section represent average monthly bill impacts for winter and spring. As such, the total monthly bill impact of -$9.48 for the average customer, shown in Figure 3.4-14, represents a total savings of roughly $76 over the eight month winter period. Given that the annual bill impact for this same group (as shown previously in Figure 3.4-8) was only -$13, it means that bills across the four month summer period were higher by $63, or roughly $16 per month. Nearly all of the winter savings was due to the structural bill impact. Behavior change had a very minimal impact on the total bill for the average customer across the service territory. This was also true for CARE/FERA and non-CARE/FERA customers.

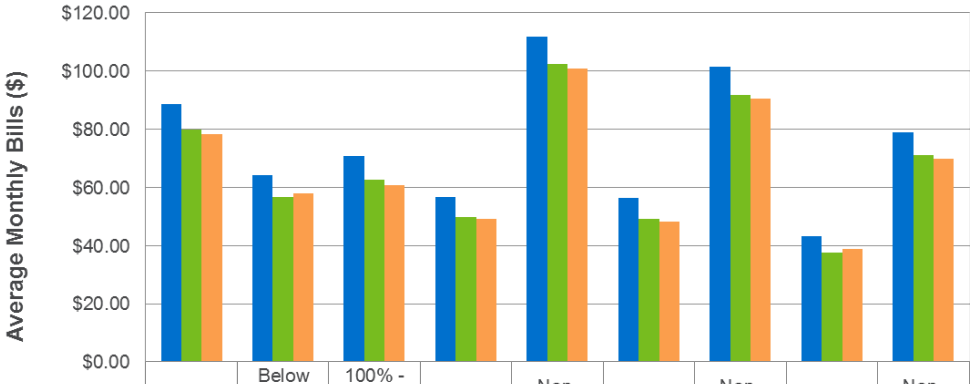
Figure 3.4-14: Rate 1 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$86.68	$53.95	$98.73
No Change in Behavior, Change in Tariff	$78.18	$47.12	$89.62
With Change in Behavior and Tariff	$77.19	$46.97	$88.33
Total Bill Impact	-$9.48	-$6.98	-$10.40
Percent Bill Impact	-10.9%	-12.9%	-10.5%

Figure 3.4-15 presents the three sets of average winter bills for the detailed segments by climate region. All customer segments experienced structural gains in the winter months, but bill impacts due to behavior change were minimal for all segments, typically $1 or less per month. Households with incomes between 100% and 200% of FPG had the greatest overall bill decreases on a percentage basis (14.2% or $10.03), while customers with incomes below 100% FPG had the smallest bill reductions (9.3% or $5.97).

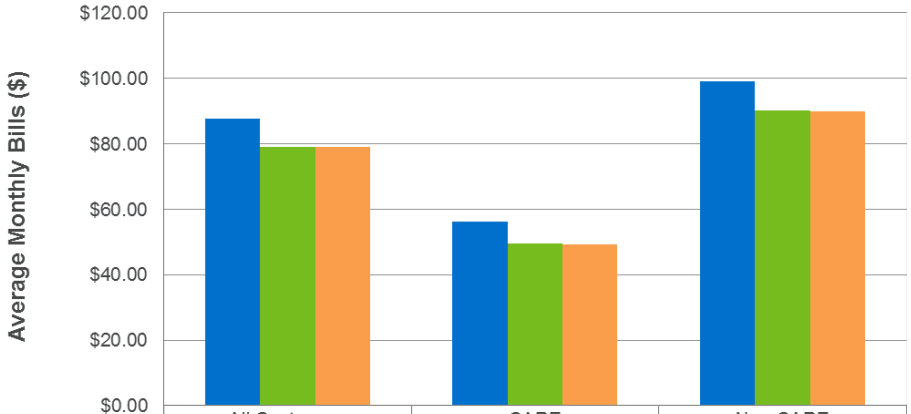
Figure 3.4-15: Rate 1 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$88.54	$64.07	$70.79	$56.78	$111.83	$56.34	$101.34	$43.12	$78.89
No Change in Behavior, Change in Tariff	$79.86	$56.82	$62.72	$49.67	$102.32	$49.16	$91.74	$37.50	$70.99
With Change in Behavior and Tariff	$78.18	$58.10	$60.76	$49.26	$100.79	$48.36	$90.62	$38.82	$69.74
Total Bill Impact	-$10.36	-$5.97	-$10.03	-$7.52	-$11.04	-$7.98	-$10.72	-$4.30	-$9.15
Percent Bill Impact	-11.7%	-9.3%	-14.2%	-13.2%	-9.9%	-14.2%	-10.6%	-10.0%	-11.6%

Figure 3.4-16 presents the three sets of average monthly bills for all customers, CARE/FERA customers and non-CARE/FERA customers on Rate 2. The results are very similar to Rate 1 in that customers are structural benefiters, on average, with structural gains of about 9.8%. However, for the service territory as a whole and for the CARE/FERA and non-CARE/FERA segments, customers did not have statistically significant bill impacts from changes in behavior. This could be due to the fact that customers on Rate 1 had statistically significant usage reductions on the average weekday, while those on Rate 2 did not.

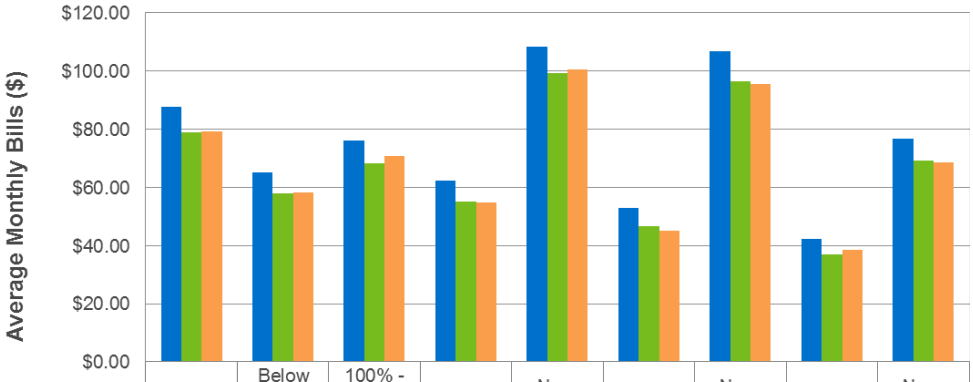
Figure 3.4-16: Rate 2 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$87.62	$56.14	$99.22
No Change in Behavior, Change in Tariff	$79.15	$49.51	$90.07
With Change in Behavior and Tariff	$79.00	$49.33	$89.93
Total Bill Impact	-$8.62	-$6.81	-$9.29
Percent Bill Impact	-9.8%	-12.1%	-9.4%

Figure 3.4-17 presents the three sets of average winter bills for the detailed segments by climate region for customers on Rate 2. Once again, customers were structural winners on average. No customer segments had statistically significant impacts due to behavior change, but overall bill impacts were statistically significant. CARE/FERA customers in the moderate climate region had the greatest bill reductions on a percentage basis, about 15% which is equal to $7.99.

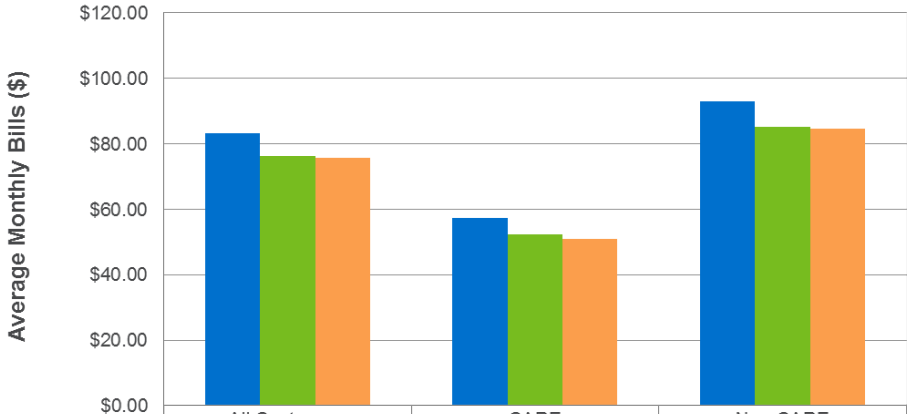
Figure 3.4-17: Rate 2 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$87.72	$65.21	$76.13	$62.23	$108.30	$53.07	$106.86	$42.29	$76.64
No Change in Behavior, Change in Tariff	$79.01	$57.82	$68.23	$55.04	$99.33	$46.76	$96.48	$36.88	$69.16
With Change in Behavior and Tariff	$79.10	$58.30	$70.77	$54.83	$100.43	$45.09	$95.51	$38.48	$68.75
Total Bill Impact	-$8.62	-$6.90	-$5.36	-$7.39	-$7.87	-$7.99	-$11.35	-$3.81	-$7.89
Percent Bill Impact	-9.8%	-10.6%	-7.0%	-11.9%	-7.3%	-15.0%	-10.6%	-9.0%	-10.3%

Figure 3.4-18 presents the three sets of average monthly bills for all customers, CARE/FERA customers and non-CARE/FERA customers on Rate 3. As a reminder, these estimates are based on the winter period for Rate 3, which differs from the winter period for Rate 1 and Rate 2. Only the months of October through February are included. The total bill decreases are slightly smaller than those for the previous two rates, about 9.3% or $7.71 for the service territory as a whole. CARE/FERA customers had statistically significant bill impacts as a result of changes in behavior, but non-CARE/FERA customers did not.

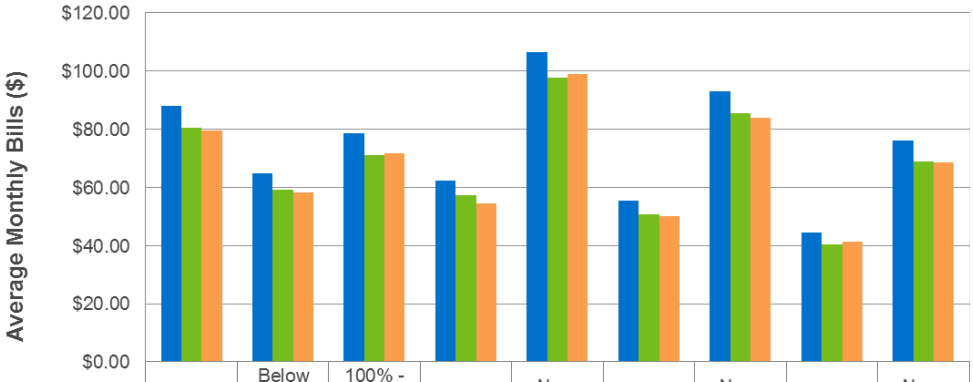
Figure 3.4-18: Rate 3 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$83.34	$57.25	$92.96
No Change in Behavior, Change in Tariff	$76.27	$52.40	$85.07
With Change in Behavior and Tariff	$75.63	$50.89	$84.74
Total Bill Impact	-$7.71	-$6.36	-$8.21
Percent Bill Impact	-9.3%	-11.1%	-8.8%

Figure 3.4-19 presents the three sets of average winter bills for the detailed segments by climate region for customers on Rate 3. All customer segments are structural benefiters, on average. CARE/FERA customers in the hot climate region had statistically significant bill impacts from changes in behavior, and were able to have total bill gains of $7.90 (12.6%). This is not surprising, as customers in this segment had large peak period impacts (7.3% or 0.06 kW) on the average winter weekday.

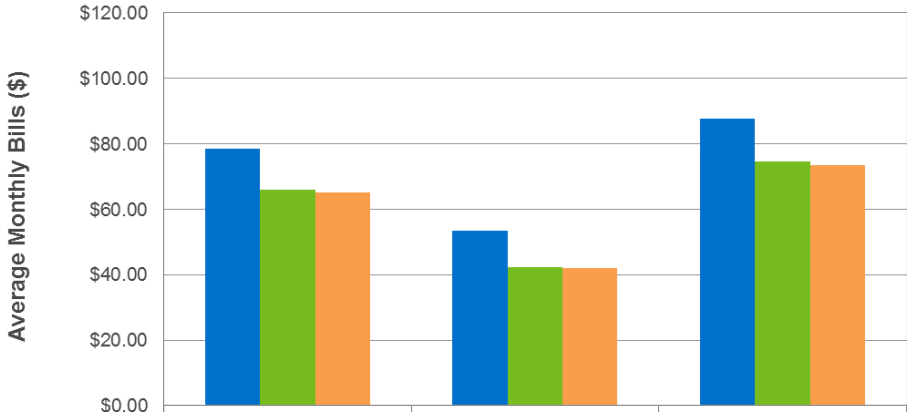
Figure 3.4-19: Rate 3 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$87.90	$64.86	$78.57	$62.47	$106.56	$55.46	$93.17	$44.40	$76.12
No Change in Behavior, Change in Tariff	$80.35	$59.31	$71.05	$57.32	$97.80	$50.64	$85.52	$40.38	$68.92
With Change in Behavior and Tariff	$79.56	$58.12	$71.77	$54.57	$98.85	$50.16	$84.02	$41.22	$68.72
Total Bill Impact	-$8.34	-$6.74	-$6.80	-$7.90	-$7.72	-$5.30	-$9.15	-$3.18	-$7.40
Percent Bill Impact	-9.5%	-10.4%	-8.7%	-12.6%	-7.2%	-9.6%	-9.8%	-7.2%	-9.7%

Figure 3.4-20 presents the three sets of average monthly bills for all customers, CARE/FERA customers and non-CARE/FERA customers on Rate 3 during the spring months of March, April, and May. Like the winter period, customers are structural winners on average, but to a greater extent. On average, customers could expect to save about $12.52 (16%) with a change in tariff and no change in behavior. Customers did not have statistically significant bill impacts as a result of behavior change, but they ultimately saved about $13.37 or 17%. CARE/FERA customers had greater structural gains (21%) than non-CARE/FERA customers (15%).

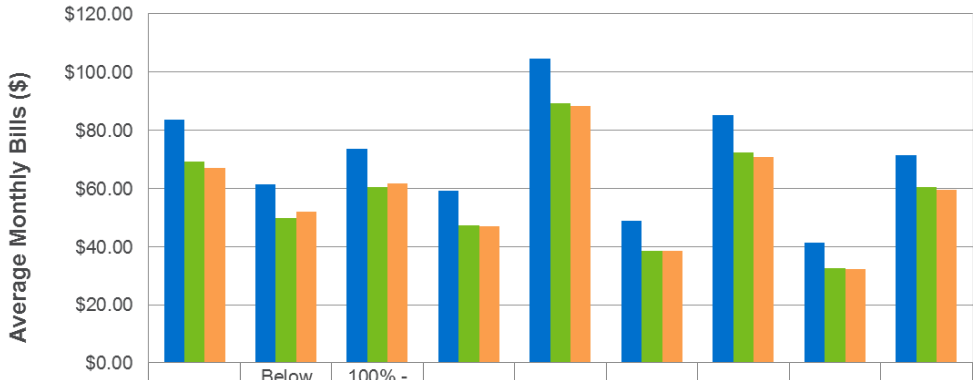
Figure 3.4-20: Rate 3 Spring Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$78.46	$53.32	$87.73
No Change in Behavior, Change in Tariff	$65.94	$42.38	$74.62
With Change in Behavior and Tariff	$65.10	$42.08	$73.58
Total Bill Impact	-$13.37	-$11.24	-$14.15
Percent Bill Impact	-17.0%	-21.1%	-16.1%

Figure 3.4-21 presents the three sets of average spring bills for the detailed segments by climate region for customers on Rate 3. Customers in each segment are structural benefiters, on average, with structural gains between 15% and 22%. Senior households had statistically significant bill impacts due to behavior change, bringing their total average savings to $16.64 or 19.9% during the spring period.

Figure 3.4-21: Rate 3 Spring Bill Impact Due to Differences in the Tariff and Behavior Change
Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$83.61	$61.37	$73.75	$59.29	$104.57	$48.86	$85.05	$41.38	$71.34
No Change in Behavior, Change in Tariff	$69.21	$49.77	$60.35	$47.43	$89.13	$38.45	$72.33	$32.46	$60.46
With Change in Behavior and Tariff	$66.97	$51.94	$61.58	$46.95	$88.49	$38.58	$70.93	$32.18	$59.50
Total Bill Impact	-$16.64	-$9.43	-$12.16	-$12.35	-$16.08	-$10.28	-$14.12	-$9.20	-$11.84
Percent Bill Impact	-19.9%	-15.4%	-16.5%	-20.8%	-15.4%	-21.0%	-16.6%	-22.2%	-16.6%

3.4.3 Change in the Distribution of Bill Impacts Due to Behavior Change

The third analysis presents the distribution of bill impacts[30] for customers with and without behavioral change, and is designed to show how the distribution shifts when customers respond to the rates by changing behavior. Impact distributions are based on the average monthly bills for the first year of the pilot. Bill impacts were estimated for two cases—with and without behavior change. Both are based on the structural bill impact calculations; however, impacts with behavior change show how behavioral impacts are able to affect the structural impact distribution. Customers were segmented into ranges of bill impacts. The percentage of customers in each $10 increment from negative $100 to positive $100 per month was determined with and without behavior change. The underlying calculations used to develop the distributions are based on a difference-in-differences approach that compares the treatment and control customers based on both pre- and post-treatment bill impacts.[31]

The two distributions are presented on a line graph, with the height of the line at any given $10 increment representing the percentage of customers experiencing a bill impact of the corresponding dollar amount. In this case, the bill impact is measured as the difference between the TOU bill and the OAT bill. If the line for the group with changes in behavior is to the left of the line representing the group with no change in behavior, it shows that at least some customers were able to modify their energy usage such that they had lower total bill impacts compared to if they had not changed their behavior.

Annual

Figure 3.4-22 presents the distribution of bill impacts with and without energy use behavior change. The blue line represents the structural bill impacts that result when customers are billed on the TOU rate and do not change their energy use behavior. The green line shows the total bill impacts when customers have responded to the TOU rate and, in some cases, changed their energy use behavior. Bill impacts are calculated as the difference between the TOU bill and the OAT bill. Each point along the line graph represents the percentage of customers within a specific bill impacts bin or range. For example, on Rate 1, approximately 46% of the customers have a structural bill impact between $1 and $10 per month—the blue line. In other words, approximately 46% of the Rate 1 customers would experience an increase of $1 to $10 per month on Rate 1 compared to the OAT without changing their behavior. The green line represents the total bill impacts when customers have had the opportunity to respond to the TOU rate. In this case, the percent of customers experiencing an increase of $1 to $10 per month on Rate 1 compared to the OAT is 44%.

It is important to note that customers could move up or down through the incremental impact bins, and could potentially move more than one bin—meaning that a customer could potentially experience a bill increase due to their behavioral response, or they could jump down several bins and go from a $21 to $30 per month bill impact down to $1 to $10 impact, for example.

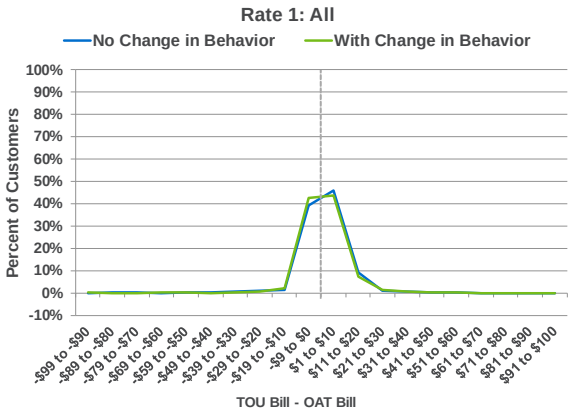
[30] Bill impacts without behavior change represent the structural bill impact distribution; bill impacts with behavior change show how behavioral impacts affect the structural bill impact distribution.

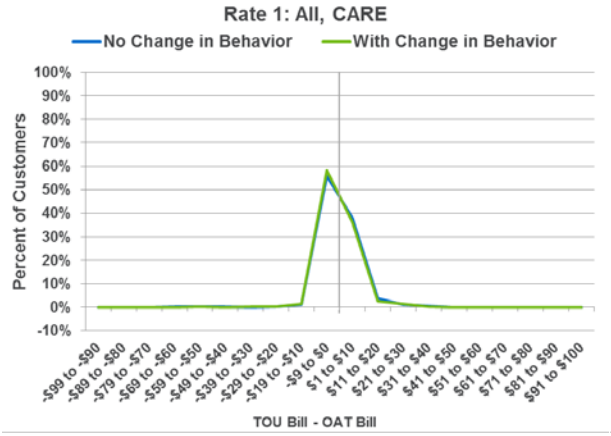
[31] See Section 3.2.4 in the First Interim Report for additional details on the methodology.

About half of the customers on Rate 1 are structural non-benefiters, as illustrated by 57% of customers falling to the right of the dashed line in Figure 3.4-22. Without changes in behavior, about 57% of customers would experience higher bills on Rate 1 versus the OAT. With changes in behavior, this number is reduced to 54%, meaning that some customers moved to the $0 to $9 bin. A large portion of customers, about 39%, face small structural bill savings between $0 and $9, and this percentage increases as customers shift across impact bins.

Figure 3.4-22: Rate 1 Change in Distribution of Bill Impacts Due to Behavior Change All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0%	0%
-$89 to -$80	0%	0%
-$79 to -$70	0%	0%
-$69 to -$60	0%	0%
-$59 to -$50	0%	0%
-$49 to -$40	0%	0%
-$39 to -$30	1%	0%
-$29 to -$20	1%	1%
-$19 to -$10	1%	2%
-$9 to $0	39%	43%
$1 to $10	46%	44%
$11 to $20	9%	7%
$21 to $30	1%	1%
$31 to $40	1%	1%
$41 to $50	0%	0%
$51 to $60	0%	0%
$61 to $70	0%	0%
$71 to $80	0%	0%
$81 to $90	0%	0%
$91 to $100	0%	0%





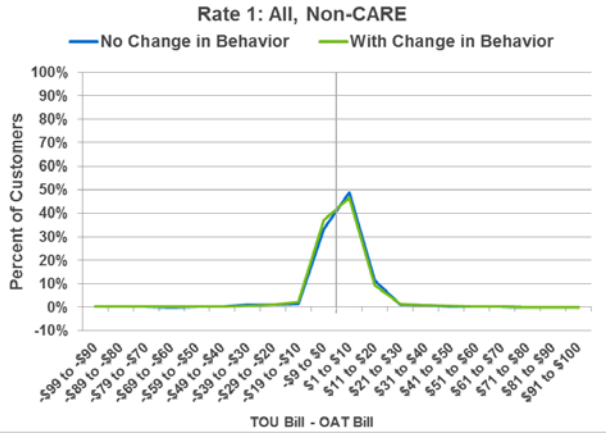
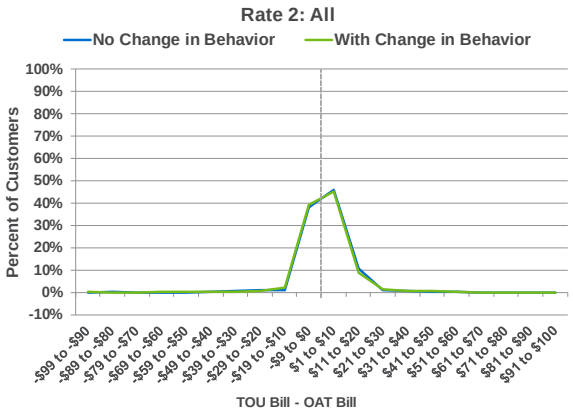
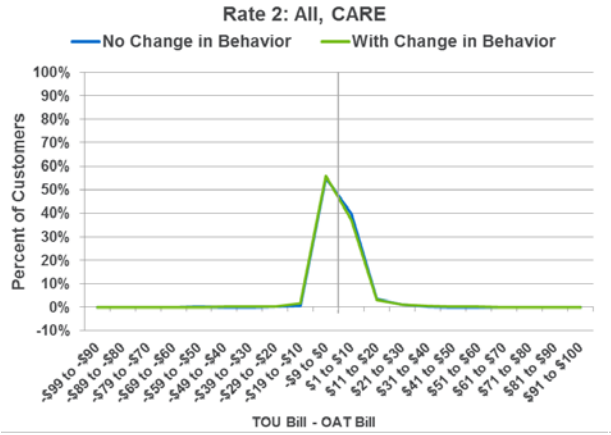


Figure 3.4-23 provides the distribution of bill impacts for all customers and for CARE/FERA and non-CARE/FERA customers on Rate 2. The distributions are nearly identical to that of Rate 1, with about half of customers (46%) experiencing structural losses between $1 and $10. Through behavior change, the distribution shifted toward the $0 to $9 savings bucket. About 55% and 32% of CARE/FERA and non-CARE/FERA customers, respectively, experience structural gains between $0 and $9, and the shift due to behavior change is quite small.

Figure 3.4-23: Rate 2 Change in Distribution of Bill Impacts Due to Behavior Change All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0%	0%
-$89 to -$80	0%	0%
-$79 to -$70	0%	0%
-$69 to -$60	0%	0%
-$59 to -$50	0%	0%
-$49 to -$40	0%	0%
-$39 to -$30	1%	0%
-$29 to -$20	1%	1%
-$19 to -$10	1%	2%
-$9 to $0	38%	39%
$1 to $10	46%	45%
$11 to $20	11%	9%
$21 to $30	1%	2%
$31 to $40	1%	1%
$41 to $50	0%	1%
$51 to $60	0%	0%
$61 to $70	0%	0%
$71 to $80	0%	0%
$81 to $90	0%	0%
$91 to $100	0%	0%





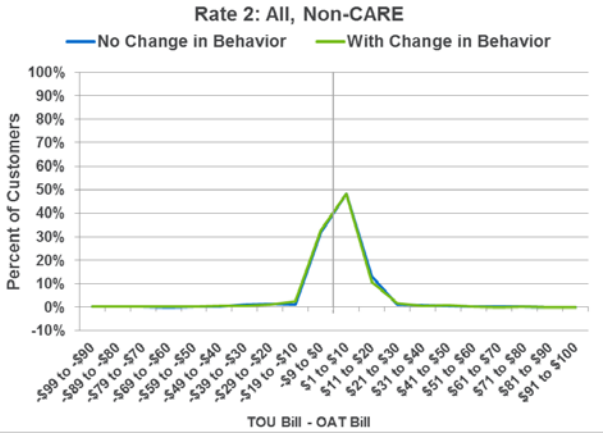
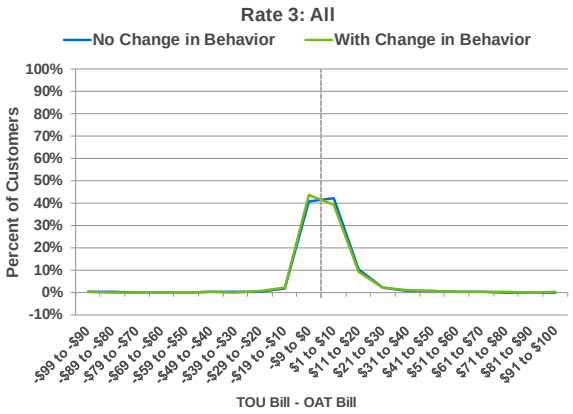
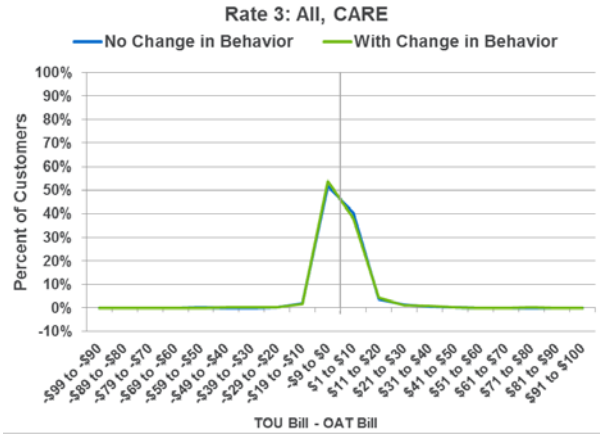


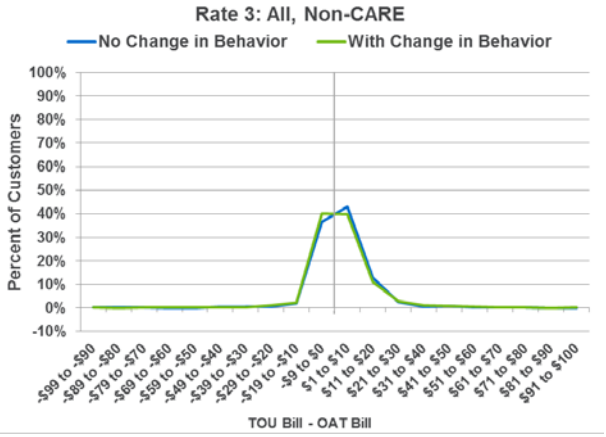
Figure 3.4-24 provides the distributions of bill impacts for all customers and CARE/FERA and non-CARE/FERA customers on Rate 3. Over 40% of customers experienced small structural gains, and another 40% experienced small structural losses. A small portion of customers were able to shift from "benefiter" to "non-benefiter" through changes in behavior, as indicated in the peak of the blue line shifting to the left.

Figure 3.4-24: Rate 3 Change in Distribution of Bill Impacts Due to Behavior Change All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0%	0%
-$89 to -$80	0%	0%
-$79 to -$70	0%	0%
-$69 to -$60	0%	0%
-$59 to -$50	0%	0%
-$49 to -$40	0%	0%
-$39 to -$30	0%	0%
-$29 to -$20	0%	1%
-$19 to -$10	2%	2%
-$9 to $0	41%	44%
$1 to $10	42%	39%
$11 to $20	10%	9%
$21 to $30	2%	2%
$31 to $40	0%	1%
$41 to $50	1%	1%
$51 to $60	0%	0%
$61 to $70	0%	0%
$71 to $80	0%	0%
$81 to $90	0%	0%
$91 to $100	0%	0%







3.5 Synthesis for PG&E Pilot

This section compares input from the load impact analysis, the bill impact analysis and the survey analysis. The objective of these comparisons, at least in part, is to determine if the information and conclusions observed for individual metrics are supported by findings from other metrics or, alternatively, findings for one metric contradict those for another metric. We also look for clues from the survey findings that might help explain why load or bill impacts for one rate differ from those for other rates. For example, if we find that the load impacts are significantly different across rates or across segments on a specific rate, we could turn to the survey questions concerning the level of understanding of rate features to see if there are significant differences in customer understanding of key rate features that might explain the observed differences across rates and/or customer segments.

When reviewing the synthesis tables and discussion below, it is important to keep in mind, as discussed in the RIA Report, that the statistical analysis of survey questions is "over powered" That is, with the very large sample sizes for each treatment and control group, combined with the high survey responses rate, even very small differences in values across segments can be statistically significant. While any decision regarding whether a statistically significant difference is meaningful from a policy perspective is

inherently subjective, it nevertheless is critical. For example, reporting that there is a statistically significant difference in the satisfaction rating of one rate compared to another and concluding or recommending that the rate with the lower satisfaction rating is inferior from a customer engagement perspective would be very misleading if the satisfaction rating for one was 6.2 and the other 6.7 on an 11 point scale.

3.5.1 Synthesis

Table 3.5-1 through Table 3.5-3 summarize some relevant findings from the load impact, bill impact and survey analysis. Before summarizing the results, we provide the following guide to the information in Table 3.5-1 as well as a map to prior tables and figures from which the information was taken for Rate 1, including those contained in the separate RIA Report. This way, readers can easily refer back to those more complete tables and figures.

In each cell in the tables, in addition to the reported values, there is either a colored triangle facing up or down, a (-), N/A, I/S or nothing at all. Cells containing N/A indicate that the specific segment was not included in the analysis, and cells containing I/S indicate the segment was analyzed but didn't have sufficient sample size to warrant reporting the results. If there is a colored triangle in the cell, it means the value in the cell is statistically significantly different relative to the control group. Green triangles symbolize a desirable outcome (e.g., peak period load reductions are good) and red arrows an undesirable outcome (e.g., peak period load increases are not good). If (-) appears, the value is not statistically significant and if there is no symbol at all (as in the column labeled "Understanding TOU Pricing (None Correct)", it means a comparison to the control group is not relevant (in this example, the control group was not on a TOU rate so couldn't respond to questions about rate periods, etc.). N/A indicates that a statistical significance test was not appropriate. The content of each column and the places in the text from which the values were taken is explained below:

- **Summer Peak Period Load Reduction:** The percent reduction in peak period electricity use on average weekdays for the months of July through September 2016. Positive values mean customers reduced use and negative values mean customers increased use during the peak period relative to the control group (e.g., reference load). Reductions are desirable, and therefore indicated by a green triangle, and increases are undesirable, and represented by a red triangle. These values from Rate 1 were carried over from the First Interim Report.
- **Winter Peak Period Load Reduction:** The percent reduction in peak period electricity use on average weekdays for the months of October 2016 through May 2017. Positive values mean customers reduced use and negative values mean customers increased use during the peak period relative to the control group (e.g., reference load). These values for Rate 1 can be found in Table 3.3-1 through Table 3.3-4 in Section 3.3.1.32
- **Net Annual kWh Change %:** The percent reduction in annual electricity use for the year starting July 2016 and ending June 2017. Positive values mean customers reduced use and negative values mean customers increased use. These values are also found in
- Figure 3.3-5 through Figure 3.3-7.

[32] Values for Rates 2 and 3 can be found in similar tables in Sections 3.2.2 and 3.2.3, respectively.

- **Annual Total Bill Impact ($ or %):** This is the change in the average customer's bill on Rate 1 due to the impact of both the structural change in the tariff, holding usage constant, and the change in the bill due to changes in usage. These values may be found at the bottom of the table in Figure 3.4-8.
- **Health Index:** The values in this column represent the mean values of the health index for each customer segment on Rate 1. They are taken from Table 3-7 in the RIA Report. Cells with red triangles indicate that the index mean value for the segment is higher than the mean value for the control group and the difference is statistically significant. Cells with green arrows mean that the treatment group index is actually lower than the control group value and the difference is statistically significant.
- **Bill Higher Than Expected:** The values in this column are taken from Table 3-49 in the RIA Report and equal the percent of customers reporting that their bills since December 2016 had been higher than they expected. The values do not represent the difference in the percentage between treatment and control customers. Many control customers also reported that bills were higher than expected, reflecting the usual seasonal variation in bills that occurs due to seasonal changes in rates, higher air conditioning use in the summer and the tiered structure of the rates. Cells with red triangles represent values that are higher than the percentage reported by control group customers and where the difference is statistically significant.
- **Difficulty Paying Bills:** The values in this column are taken from Table 3-26 in the RIA Report and represent the percent of customers reporting having difficulty paying bills since June 2016. Cells with red or green triangles represent values that are higher or lower than control group values, respectively, and where the differences are statistically significant.
- **Economic Index:** The values in this column represent the mean values of the economic index for each customer segment on Rate 1. They are taken from Table 3-6 in the RIA Report. Cells with red triangles indicate that the index mean value for the segment is higher than the mean value for the control group and the difference is statistically significant.
- **Understanding TOU Pricing:** This variable is based on a survey question asking respondents to identify the hours of the day when prices are the highest. The values in the table come from Table 3-52 in the RIA Report and indicate the percent of customers that failed to correctly identify ANY peak period hours associated with the TOU rate. The higher this percentage, the less likely that a group of customers would make significant reductions during the peak period- this is because fewer customers would know when the peak period was.
- **Satisfaction with Rate:** These values represent the average satisfaction rating for the rate plan on an 11 point scale, from 0 to 10, with higher values indicating higher satisfaction. These values are taken from Table 3-39 in the RIA Report. Values with red triangles represent cells where the average rating for the treatment group on the TOU rate is lower than for the control group on the OAT, and the difference is statistically significant.
- **Satisfaction with Utility:** The same 11-point scale as above was used to assess satisfaction with PG&E. The values in the column are also taken from Table 3-39 in the RIA Report. As above, red triangles represent statistically significant differences between average values for the control and treatment groups.

Looking across the various metrics for each customer segment and rate, we did not observe any internal inconsistencies. In fact, quite the opposite—overall, the load impact, bill impact and survey findings typically align quite well. Below is a summary by customer segment.

Non-CARE/FERA Customers

Non-CARE/FERA customers in the hot climate region have the second highest percent reduction in winter peak period energy use among all segments, averaging 3.9% across the three rates[33], and the highest net annual kWh savings, averaging 2.4% across all rates. While they experienced the greatest annual total bill increases of approximately $20 per year due to a large portion of customers being structural non-benefiters, they were able to offset 67% of their approximately $60 annual structural loss through behavior change. Total annual bill increases for non-CARE/FERA customers in the hot climate region ranged from a low of $4 on Rate 1 to a high of $40 on Rate 2. Average annual bills decreased for non-CARE/FERA customers in the moderate and cool climate regions for all three rates

Across all rates and climate regions, population weighted peak period impacts in the winter were approximately one-half the magnitude of the summer, but all were statistically significant. This is an important finding as it shows customers are continuing to respond to the TOU rates. All non-CARE/FERA customer segments across all rates experienced average total bill decreases in the winter. Non-CARE/FERA customers understood the rates better than nearly any other segment (as indicated by the very low percent that failed to identify at least one peak period hour). In many cases, they had statistically significantly lower instances of customers receiving a higher bill than expected compared to the control group—meaning more control group customers were surprised by higher than expected bills than treatment group customers. The non-CARE/FERA customers also had the lowest satisfaction ratings for the rate plan and for PG&E compared with any other segment. However, there were no cases in which the satisfaction levels were significantly lower relative to the control group. In some cases the satisfaction levels for both the rate and for PG&E were actually higher for the treatment group compared to the control group in the moderate climate region. All of these metrics paint an internally consistent picture of a customer segment that understood the timing of the peak period well, worked hard to reduce usage and bills, and ultimately had satisfaction ratings very similar to those of the control group.

CARE/FERA Customers

Across Rates 1 and 2 in all climate regions, CARE/FERA customers had lower reductions in peak period and daily electricity use than non-CARE/FERA customers. Although, as reported in Sections 3.3.1 through 3.3.3, not all of the differences between CARE/FERA and non-CARE/FERA customers were statistically significant. Rate 3 CARE/FERA customers in the hot climate region exhibited the largest winter peak reduction across all rates and climate regions, and also had among the highest annual kWh savings levels. The specific driver for these large winter impacts is unknown, especially given this group provided some of the smallest impacts over the summer. However, some of the survey findings may provide some insights. This group had the highest percent of customers expressing difficultly paying bills, at 74%. While this metric was not statistically significantly different compared to the control group, they also had the highest economic index score of 4.6, which was significantly higher compared to the control group. In the first survey, 22% of these customers were not able to identify any of the TOU pricing periods correctly. In the second survey, this dropped by nearly one-third, to 14%. This group initially

[33] Average based on peak period for each rate and not the common hours.

faced an annual structural loss of approximately $14, and through behavior change was able to reduce their bills by $19, resulting in a net savings of $5 per year.

Table 3.5-1: Load Impacts, Bill Impacts, and Selected Survey Findings for PG&E Rate 1

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	Non-CARE/FERA	8.7% ▼	5.4% ▼	3.1% ▼	$4 -	0% -	2.20 -	31% ▼	25% -	2.4 -	5%	6.2 -	6.8 -
	CARE/FERA	3.2% ▼	2.6% ▼	0.9% ▼	$0 -	0% -	2.90 -	27% ▼	68% -	4.1 -	14%	6.9 -	7.4 -
	Senior	7.0% ▼	4.8% ▼	2.6% ▼	-$8 ▼	-1% ▼	2.80 -	26% ▼	37% -	3.0 -	12%	6.9 ▲	7.4 -
	HH < 100% FPG	-0.4% -	0.8% -	-0.9% ▲	$37 ▲	4% ▲	2.90 -	31% ▼	70% -	4.3 -	13%	7.0 -	7.5 -
	100% FPG < HH < 200% FPG	N/A	N/A	N/A	-$23 ▼	-2% ▼	2.90 -	28% ▼	60% -	3.9 -	11%	6.7 -	7.2 -
Moderate	Non-CARE/FERA	4.7% ▼	3.5% ▼	0.3% ▼	-$20 ▼	-2% ▼	2.40 -	26% ▼	15% ▼	1.9 ▼	5%	6.6 ▲	6.8 -
	CARE/FERA	3.9% ▼	2.5% ▼	1.7% ▼	-$36 ▼	-5.4% ▼	2.90 -	27% ▼	62% -	4.1 -	14%	7.3 -	7.7 -
Cool	Non-CARE/FERA	4.6% ▼	3.3% ▼	0.8% ▼	-$26 ▼	-2.8% ▼	2.10 -	35% -	15% ▼	1.9 -	3%	6.3 -	6.6 -
	CARE/FERA	1.4% ▼	-0.9% -	-2.2% ▲	-$8 ▼	-1.6% ▼	2.80 -	33% -	57% -	3.6 -	16%	7.1 -	7.4 -

Table 3.5-2: Load Impacts, Bill Impacts, and Selected Survey Findings for PG&E Rate 2

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	Non-CARE/FERA	9.0% ▼	3.7% ▼	1.5% ▼	$40 ▲	2.5% ▲	2.40 -	32% -	28% -	2.4 -	11%	6.0 -	6.5 -
	CARE/FERA	2.8% ▼	3.3% ▼	0.5% ▼	$7 ▲	0.8% ▲	2.90 -	25% ▼	68% -	4.3 -	27%	7.1 -	7.6 ▲
Moderate	Non-CARE/FERA	6.8% ▼	4.3% ▼	-0.1% -	-$18 ▼	-1.4% ▼	2.20 -	36% ▼	17% -	2.0 -	10%	6.3 -	6.9 -
	CARE/FERA	2.8% ▼	5.0% ▼	1.9% ▼	-$31 ▼	-5.0% ▼	3.10 -	30% -	60% -	3.9 -	24%	7.3 -	7.6 -
Cool	Non-CARE/FERA	4.7% ▼	2.5% ▼	0.3% ▼	-$16 ▼	-1.8% ▼	2.20 -	33% -	18% -	2.0 -	11%	6.3 -	6.9 -
	CARE/FERA	0.3% -	0.0% -	-2.4% ▲	-$4 ▼	-0.8% ▼	2.90 -	36% -	53% -	3.7 -	22%	7.2 -	7.5 -

Table 3.5-3: Load Impacts, Bill Impacts, and Selected Survey Findings for PG&E Rate 3

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	Non-CARE/FERA	9.5% ▼	2.6% ▼	2.6% ▼	$21 ▲	1% ▲	2.20 -	28% ▼	25% -	2.5 -	6%	6.2 -	6.7 -
	CARE/FERA	1.9% ▼	7.3% ▼	2.3% ▼	-$5 ▼	-1% ▼	2.70 -	25% ▼	74% -	4.6 ▲	14%	7.3 ▲	7.6 ▲
Moderate	Non-CARE/FERA	4.1% ▼	3.7% ▼	0.5% ▼	-$8 ▼	-1% ▼	2.10 -	32% ▼	15% ▼	2.1 -	3%	6.6 ▲	7.0 ▲
	CARE/FERA	3.2% ▼	1.8% ▼	0.8% ▼	-$28 ▼	-4% ▼	2.90 -	26% ▼	60% -	3.9 -	11%	7.4 -	7.7 -
Cool	Non-CARE/FERA	3.1% ▼	2.0% ▼	0.4% ▼	-$24 ▼	-3% ▼	2.50 -	32% -	20% -	2.1 -	7%	6.4 -	6.8 -
	CARE/FERA	2.3% ▼	0.8% -	-0.1% -	-$22 ▼	-4% ▼	2.70 ▼	31% -	57% -	3.7 -	13%	7.3 -	7.5 -

This group had significant economic challenges, and was successful in adjusting their energy consumption, at least in the winter period, in order to ultimately lower their bills. It should also be noted that these customers had some of the highest satisfaction scores with both the rate and with PG&E, with scores from both satisfaction metrics being significantly higher compared to the control group for customers in the hot climate region on Rate 3, and no worse compared to the control group for any rates across any climate regions.

Turning to other metrics of interest, there was essentially no change in total annual bills in the hot climate region for CARE/FERA customers averaged across the three tariffs. These customers were able to offset 80% of their annual structural bill increase of around $9. While on an annual basis the difference is negligible, customers did experience higher bills in the summer that were ultimately offset by lower bills in the winter. CARE/FERA customers in the moderate and cool climate regions both had structural bill decreases of around $20 (3-4%) on an annual basis. Between 53% and 74% of CARE/FERA customers reported having difficulty paying bills, which was three times higher on average than for non-CARE/FERA customers, but this was also true for control customers. The economic index for CARE/FERA customers was roughly twice as high as for non-CARE/FERA customers in all climate regions and for all rate options, including the control group. In short, CARE/FERA customers had higher economic index scores compared with non-CARE/FERA customers, but the increase in the economic index scores moving from the OAT to TOU rates is not statistically significant except for the Rate 3 hot climate regions customer noted above.

CARE/FERA customers did have higher satisfaction ratings for the TOU rates than non-CARE/FERA customers for all rates and climate regions. This is consistent with findings from many other surveys of this customer class which in general tends to have higher satisfaction ratings overall for all IOU programs. In all climate regions, none of the satisfaction ratings for CARE/FERA customers were statistically significantly lower than the control group ratings—in fact, they were higher for the Rate 3 hot climate regions customers. CARE/FERA customers also had higher ratings for satisfaction with PG&E than non-CARE/FERA customers in all climate regions for all rates.

Senior Households

Senior households in the hot climate region had load reductions in the peak period for the average weekday that were comparable to average reductions for the overall population in the hot region, as reported for Rate 1 in Section 3.3.1. The average peak period load impact of 4.8% is in between the slightly larger load impacts of the non-CARE/FERA group of 5.4% and the smaller impacts from the CARE/FERA group with 2.6%. This reflects the combination of non-CARE/FERA and CARE/FERA customers comprising the Senior household population. The net annual kWh change of 2.6% was also between the values for non-CARE/FERA and CARE/FERA, suggesting the Senior population responds to price signals in a manner consistent with the general population.

Total bill impacts and reductions in bill impacts due to behavior change were also very similar for senior households and the hot general population, reflecting the split between non-CARE/FERA and CARE/FERA customers. On Rate 1, 26% of seniors, along with around a third of the customers from other segments, indicated that their bills were higher than expected. However, this percentage was actually statistically significantly lower for the customers on TOU rates compared to the OAT. There was no statistically

significant difference in the percent of seniors reporting difficulty in paying bills, or in the economic index, compared with the control group.

Senior households appear to have a higher percentage of participants that could not identify any peak period hours compared with the population as a whole in the hot region. Weighted average values for CARE/FERA and non-CARE/FERA customers for this variable for Rate 1 is 8.5% compared to 12% for seniors. Though it should be noted this is an improvement over the first survey where 18% of seniors couldn't identify any of the peak periods.

In addition, about 56% of combined CARE/FERA and non-CARE/FERA customers selected over half of the correct peak hours compared to 50% of seniors (see Table 3-52 in the RIA Report). This was also an improvement, up from 42% in the first survey.

Finally, satisfaction ratings by seniors for the rate plan (6.9) and for PG&E (7.4) were somewhat higher than the ratings for the hot climate zone population as a whole (as calculated by a weighted average for CARE/FERA and non-CARE/FERA households, whose ratings were 6.5 and 7.0 respectively). Seniors on TOU rates also had a statistically different higher average satisfaction ratings for the rate plan compared with the control group, but did not have statistically significantly different ratings for satisfaction with PG&E.

Households with Incomes Below 100% of FPG

Households with incomes below 100% of FPG on Rate 1 in the hot climate region did not have statistically significant peak period load reductions in the winter—nor did they have any in the first summer. This group actually had a statistically significant increase in net annual kWh electricity use equal to almost 1% in the hot climate region. Consistent with these changes, bill impacts due to behavior change actually led to higher bills over and above the structural bill impact for Rate 1. The average annual cost increase for this segment was $37 or 4%.

This segment was tied for the highest percentage on the health index compared to other segments on Rate 1.[34] However, the percentage was not statistically different for the treatment group compared to the control group on this index.

70% of customers with incomes below 100% of FPG reported that they had difficulty paying bills and this segment had the highest economic index score (4.3) of any segment. However, the difference in the economic index for TOU customers compared with the control group was not statistically significant for customers on Rate 1. The percentage of customers reporting difficulty paying bills was also not statistically different from the percent of control customers reporting difficulty. 31% of customers with incomes below 100% of FPG stated they received bills higher than expected. However, this was statistically significantly lower than the control group, and was a general trend across Rate 1 customer segments in the hot and moderate climate regions.

Customers in this segment were among the highest percent of participants who could not identify any peak period hours among all segments on Rate 1. For Rate 1, this segment did not have statistically

[34] This metric is not reported for Rates 2 or 3.

different levels of satisfaction with the rate or with PG&E. Satisfaction was not measured for this segment on Rates 2 or 3.

3.5.2 Key Findings

Key findings pertaining to load impacts from the PG&E pilots include:

1. Customers can and will respond to TOU rates with peak periods that extend well into the evening hours during the winter – peak period load reductions averaged roughly 3.6% for all three pilot rates across the service territory as a whole.
2. The average winter impact of 3.6% is slightly more than half the size of the load impact from the first summer of approximately 6%. However, there was significant variation in the relationship between summer and winter impacts across rates and customer segments.
3. For Rate 2, which has the same prices in effect on weekends as on weekdays, the pattern of load impacts across rate periods was very similar on weekends and weekdays – that is, customers can and will reduce loads on weekends in the winter.
4. There was a statistically significant reduction in net annual electricity use for all three rates – for Rates 1 and 3 the average reduction was 1.4%, while for Rate 2 it was 0.6%. These savings are comparable with those of normative comparison home energy reports.
5. Winter load impacts, in both absolute and percentage terms, were largest in the hot climate region, second largest in the moderate region, and lowest in the cool region for Rates 1 and 3 (although the differences were not always statistically significant). Load impacts were slightly larger in the moderate climate region than the hot region for Rate 2, though the difference is not statistically significant.
6. CARE/FERA customers had significantly lower peak period load reductions compared with non-CARE/FERA customers.
7. Senior households on Rate 1 in the hot climate region had load impacts very similar to the hot climate region population as a whole – in fact, Senior household impacts (4.8%) were slightly higher than the non-CARE/FERA and CARE/FERA population weighted average at 4.2%.
8. Households with incomes below 100% of FPG on Rate 1 in the hot climate region had no statistically significant reduction in peak period, and a small statistically significant increase in net annual electricity use.

Key findings pertaining to bill impacts include:

1. Average monthly winter bills were lower under TOU rates than under the OAT for all customer segments and all climate regions – the average monthly bill decrease ranged from a low of $3.18 for CARE/FERA customers in the cool climate region on Rate 3 to a high of $11.35 for non-CARE/FERA customers on Rate 2 in the moderate climate region. This is driven in part by the fact that the TOU rates are seasonally differentiated (prices are lower in the winter than in the summer), whereas PG&E's standard rate is not.
2. Average annual total bill impacts varied by rate and climate region. The average customer on Rate 1 and Rate 3 experienced slight decreases on an annual basis of $13 and $6, respectively. Average customers on Rate 2 experienced no net change in annual bills. However, the distribution of annual bill impacts varied significantly by climate region. The average customer from the moderate or cool climate regions across all rates experienced net annual total cost

decreases of between $4 and $36. Non-CARE/FERA customers in the hot climate region on all rates experienced annual net cost increases of $4 on Rate 1, $40 on Rate 2, and $21 on Rate 3. Households below 100% of FPG on Rate 1 and CARE/FERA customers on Rate 2 in the hot climate region also experienced net annual cost increases.

Key findings from the survey research include the following:

1. **Economic Hardship:** Rate 3 CARE/FERA customers in the hot region had a higher economic index score, or greater economic hardship, when compared to the Control group. This increase in economic index scores is equivalent to a customer noting difficulty paying one additional bill during the previous six months. In contrast, Rate 1 non-CARE/FERA customers in the moderate region had a lower economic index score, or lower economic hardship, compared to the Control group. Corroborating this finding, non-CARE/FERA customers in the moderate region also reported less difficulty paying their bills than control customers.
2. **Health Hardship:** None of the Rate segment customers had a higher health index score, or greater health hardship, compared to the Control Group. Rate 3 customers participating in or eligible for CARE/FERA in the hot region and Rate 3 CARE/FERA customers in the cool region had a lower health index score, or lower health hardship, compared to the Control groups. Additionally, lower percentages of Rate 1 Below 100% FPG customers in the hot region reported needing medical attention due to excessive heat or cold in their home compared to the Control group.
3. **Satisfaction:** Across most groups, particularly CARE/FERA groups, satisfaction with their rate and PG&E was higher for TOU customers when compared to control group customers, which is a reversal of findings from the first survey. These differences are substantively small. For example, hot region CARE/FERA Rate 3 customers' average rating with their rate plan was 7.3, while control group customers' average rating was 6.8, a difference of 0.5 (Table 4.5.20). On average, satisfaction ratings are slightly higher or the same for Rate group customers, and are slightly lower for Control group customers, compared to results from the first survey.
4. **Bill protection, understanding of rates, and actions taken**:
    - About half of customers reported receiving a letter from PG&E mentioning their bill protection and knowing when their bill protection ends. When customers were asked to select what bill protection means from a list of three possible meanings, 28% to 59% selected the correct meaning and 25% to 51% reported they did not know.
    - Though average levels of agreement for "rate is easy to understand" were somewhat high (generally between 7.0 and 7.5), customer's understanding of their rates indicate a disconnect between customer's rating of understandability and actual understanding (with 3% to 27% of customers unable to identify peak hours). This is especially true for CARE/FERA customers where the percent of customers who could not identify peak hours was much higher than for non-CARE/FERA customers. However, the percentage of customers who selected over 50% of the correct peak hours improved compared to results from the first survey, and about one-third to two-thirds of customers selected the correct answer when asked if their rate is higher, lower, or the same in the summer vs. in the winter.
    - When asked if customers agreed that peak and off-peak times were easy to remember, Rate 1 customers provided slightly higher agreement ratings than rate 2 and 3 customers. Partially corroborating this finding, Rate 2 customers were the most likely to

select “no correct” answers to the rate understanding question, but Rate 1 and 3 customers showed little difference in rate understanding.[35]

- Customers on TOU rates were more likely to take time-specific actions than customers in the control condition. For example, while a similar proportion of customers from control and rate groups indicated that they turned off their lights to conserve energy, a larger proportion of treatment customers indicated they shifted doing laundry, running the dishwasher, and running their pool/spa pump during peak hours, and were more likely to pre-cool their homes. These findings suggest that while fewer treatment customers understood the nuances of their rates, they did know and take actions that helped them shift use.

Overall findings and conclusions include:

- Customers continued to respond to the TOU price signals at the end of a full year. As expected, the load impacts were lower during the winter compared to the first summer. Load impact persistence will be examined in the final report once data from the second summer becomes available.
- The majority of customers across all three rates experienced slight net annual total bill decreases. However, customers in the hot climate regions were more likely to experience net annual bill increases, especially non-CARE/FERA customers.
- Evidence continues to suggest that the more complex, three-period TOU rate (Rate 2) was harder for all customers to fully understand and this was especially true for low income customers. While peak period reductions are roughly the same for all three rates, the reduction in net annual electricity use for Rate 2 was significantly less than for Rates 1 and 3. There is no evidence that Rate 2 has other advantages to offset the disadvantages summarized above although it may be possible with better education and outreach to overcome some of these shortcomings.
- After a year, there is no evidence indicating that senior households as a group in PG&E’s service territory fare better or worse than the general population as a whole. Generally speaking, metrics such as load and bill impacts, and the scores on nearly all survey questions—including those related to hardship—were in between the scores for CARE/FERA and non-CARE/FERA customers in the same climate region, and is reflective of the composition of CARE/FERA and non-CARE/FERA customers within the Senior Segment.
- For households with incomes below 100% of FPG, there was no statistically significant increase in economic or health index scores after a full year on Rate 1 (the only rate where measurements are reported for this segment).
- Evidence from the second survey continues to suggest that the education and outreach to low income customers (CARE/FERA and households with incomes below 100% of FPG) did not generate the same level of understanding of TOU rates as it did for non-low income customers. This could partly result from the fact that more CARE/FERA customers have English as a second language but there may be other reasons. There were improvements in the level of understanding of CARE/FERA households between the first and second survey, but it remains

[35] These survey items were coded much like a test with partial credit; customers would get 50% right if they could identify half of the peak hours for their test rate.

below the general population's level of understanding. This issue should be carefully addressed and studied further in the upcoming default pilots, where there is a much greater emphasis on and opportunity to test ME&O alternatives for all segments.

4 SCE Evaluation

This report section summarizes the attrition, load impacts, and bill impacts for the first year of SCE's pilot, with specific attention to the winter months and annual findings. Load and bill impacts from the first summer season can be found in the First Interim Report.

4.1 Summary of Pilot Treatments

Figure 4.1-1 through Figure 4.1-3 summarize the three tariffs that are being tested in the SCE service territory. All three tariffs have peak periods that include the prime evening hours from 5 to 8 PM. The rates have changed since the launch of the pilot, and the figures represent the tariffs that were in effect in January 2017 and do not reflect the baseline credit of 9.1 ¢/kWh. Appendix B shows the prices that were in effect in each rate period for each tariff, including the OAT. Two sets of prices are shown in the appendix, one covering the period from pilot start through December 2016, and the other beginning on January 1, 2017. While several minor rate changes occurred over the course of the pilot, the rate adjustment that occurred on January 1, 2017 was more significant and, as such, it was factored into the estimation of bill impacts summarized in Section 4.4 below.

Figure 4.1-1: SCE Pilot Rate 1 (January 2017)[36]

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Super Off-Peak (23.2¢)								Off-Peak (27.8¢)						Peak (34.8¢)									
	Winter	Super Off-Peak (22.7¢)								Off-Peak (22.7¢)						Peak (27.3¢)									
Weekend	Summer	Super Off-Peak (23.2¢)								Off Peak (27.8¢)															
	Winter	Super Off-Peak (22.7¢)								Off Peak (22.7¢)															

Figure 4.1-2: SCE Pilot Rate 2 (January 2017)

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Super Off-Peak (17.6¢)								Off-Peak (29.1¢)									Peak (55.2¢)						
	Winter	Super Off-Peak (17.7¢)								Off-Peak (25.5¢)									Peak (27.6¢)						
Weekend	Summer	Super Off-Peak (17.6¢)								Off-Peak (29.1¢)															
	Winter	Super Off-Peak (17.7¢)								Off-Peak (25.5¢)															

Figure 4.1-3: SCE Pilot Rate 3 (January 2017)

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Off Peak (16.3¢)											Peak (22.6¢)					Super On-Peak (37.0¢)							
	Winter	Off Peak (18.3¢)																Mid Peak (21.1¢)							
	Spring	Off Peak (18.3¢)											Super Off Peak (10.0¢)					Peak (25.0¢)							
Weekend	Summer	Off Peak (16.3¢)																Mid Peak (18.7¢)							
	Winter	Off Peak (18.3¢)											Super Off Peak (10.39¢)					Mid Peak (21.1¢)							
	Spring	Off Peak (18.3¢)											Super Off Peak (10.0¢)					Mid Peak (21.1¢)							

[36] See Appendix B for comparison of tariffs.

The prices shown in the above figures for Rates 1 and 2 do not reflect the credit of 9.1¢/kWh for usage below the baseline quantity in each climate zone. This credit significantly reduces average prices, especially for lower usage customers. Rate 3 does not include a baseline credit. Given this difference in baseline credits between Rates 1 and 2 and Rate 3, it is not possible to directly compare prices in each rate period from the above figures.

Rate 1 has three rate periods on summer weekdays and two on winter weekdays. The peak period on Rate 1 is the same all year long and runs from 2 to 8 PM. The peak to super-off-peak price ratio[9] (ignoring the baseline credit) is 1.2 to 1 in winter and 1.5 to 1 in the summer. Customers on SCE's Rate 1 pay off-peak prices on weekends in the winter. In summer, off-peak prices are in effect on weekends from 8 AM to 10 PM, which is the time period covered by the combination of peak and off-peak prices on weekdays.

SCE's Rate 2 has three rate periods on weekdays all year long. Compared with Rate 1, it has a much shorter peak period but a similar peak price in the winter months (27.6 ¢/kWh). The peak period runs from 5 to 8 PM. Rate 2 also features a super off-peak price of roughly 17.7 ¢/kWh between 10 PM and 8 AM on weekdays all year long. The ratio of peak to super-off-peak prices in the summer is roughly 3 to 1. In winter, the peak-to-super off-peak price ratio is roughly 1.6 to 1. On weekends, customers pay the off-peak price between 8 AM and 10 PM and the super off-peak price during the same overnight hours as on weekdays, from 10 PM to 8 AM.

Rate 3 has a peak-period length of five hours, which is in between the peak-period length for Rates 1 and 2. In addition, the peak period starts later in the day compared with Rate 1, and extends further into the evening (until 9 PM) than either of the other pilot rates. The weekday peak-to-super-off-peak price ratio in the winter on Rate 3 is roughly 2.1 to 1. Another difference between Rate 3 and the other rates is the presence of super off-peak pricing between 11 AM and 4 PM in spring, when excess supply conditions may exist in California. On weekends, Rate 3 has two rate periods in summer and three in spring and winter. The peak period on weekends shown in Figure 4.1-3 has a different color compared with weekday peak periods because the prices on weekends don't match any of the prices during peak, partial, off-peak, or super-off-peak periods on weekdays. Finally, as mentioned above, a very important difference is the lack of a baseline credit in Rate 3.

Figure 4.1-4 presents the seasons for each rate. For all three rates, the summer season covers the months of June through September. The winter season is October through May for Rates 1 and 2, and October through February for Rate 3. The spring period for Rate 3 is March through May.

Figure 4.1-4 Seasons by Rate

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rate 1	Winter					Summer				Winter		
Rate 2	Winter					Summer				Winter		
Rate 3	Winter		Spring			Summer				Winter		

In addition to assessing the rate treatments summarized above based on customers recruited from the general, eligible residential population, SCE also recruited customers who were known to have purchased and installed a smart thermostat. The objective of this treatment group was to estimate load

impacts for smart thermostat owners on TOU rates. The pilot plan called for SCE to partner with a smart thermostat vendor (in this case, Nest) to recruit smart thermostat owners into the study using the same "pay-to-play" recruitment strategy as was used for the general population. However, because Nest does not know the names or addresses of Nest thermostat owners, recruitment was done via email only (the same communication channel that Nest uses to send out monthly reports to each online Nest owner summarizing equipment run time and other behavioral information) rather than through the direct mail solicitation that was employed for the rate treatment groups. Target enrollment for the technology treatment was 3,750 customers and participants were to be randomly assigned to Rates 1 and 3 or to the control condition. In reality, enrollment fell well short of this target and those who enrolled were randomly assigned only to Rate 1 and to the control group.

SCE also varied the education and outreach provided to participants who were on the three TOU rates. The majority of customers (75%) on each of the three TOU rates received what SCE describes as enhanced education and outreach while the remainder received fewer contacts during the post enrollment phase.

The next section, Section 4.2, is a discussion of customer attrition over the first year of the pilot. Section 4.3 presents the load impact estimates for the winter period for each rate and Section 4.4 summarizes the bill impacts for the winter months and on an annual basis.

4.2 Customer Attrition

Figure 4.2-1 through Figure 4.2-3 show the cumulative opt-out rates over time for each test cell and climate region. The cumulative number of opt-outs is highest in the hot region, second highest in the moderate region and lowest in the cool region. The number of control customers dropping out is very low in all climate regions. The cumulative opt-out rate in the moderate region is below 6% and the cumulative opt-out rate in the cool regions is below 4% for all rates and for both CARE/FERA and non-CARE/FERA customers. The opt-out rates in the hot climate zones increase between July and August for Rates 1 and 2, and a bit later for Rate 3. This is likely due to the fact that enrollment in Rate 3 occurred later than it did for the other two rates. CARE/FERA customers in the hot climate region on Rate 3 had the greatest opt-out rate, reaching over 12% by the end of the first year of the pilot (June 2017). This is more than twice the opt-out rate for hot-CARE/FERA customers on Rate 2 and roughly four times larger than for Rate 1. The opt-out rates generally level off after the summer season, except for Rate 3 where the cumulative opt outs steadily increase over time.

Figure 4.2-1: Cumulative SCE Opt Outs by Month – Hot Climate Region

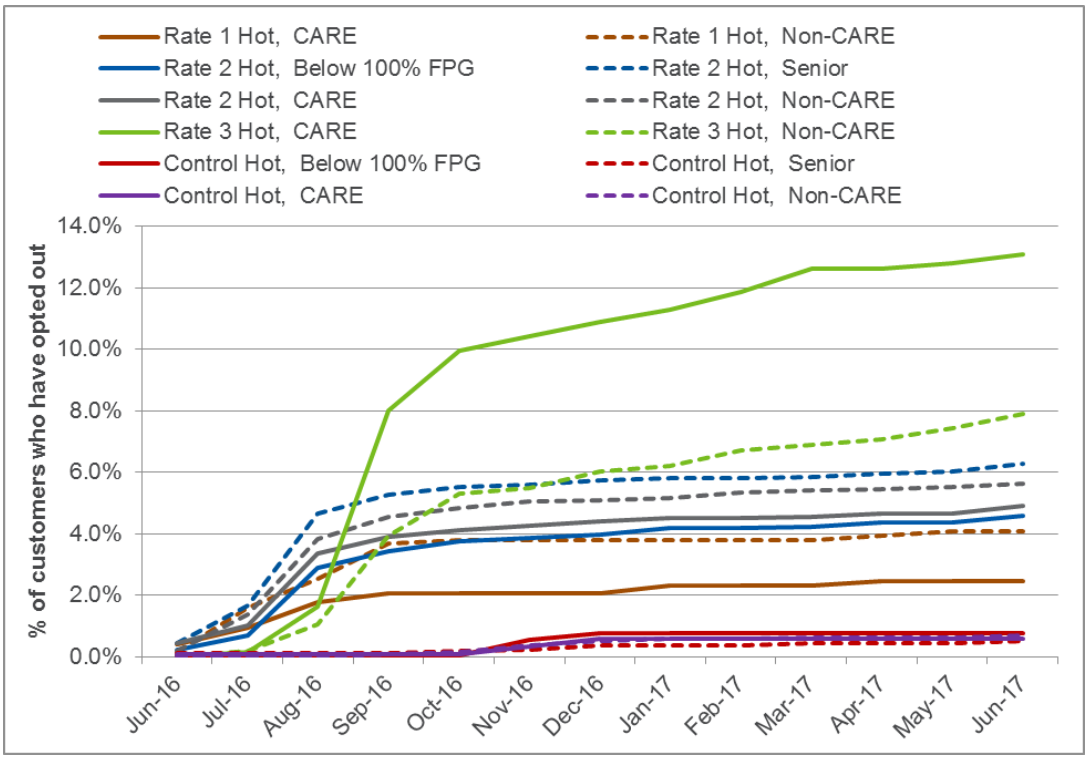


Figure 4.2-2: Cumulative SCE Opt Outs by Month – Moderate Climate Region

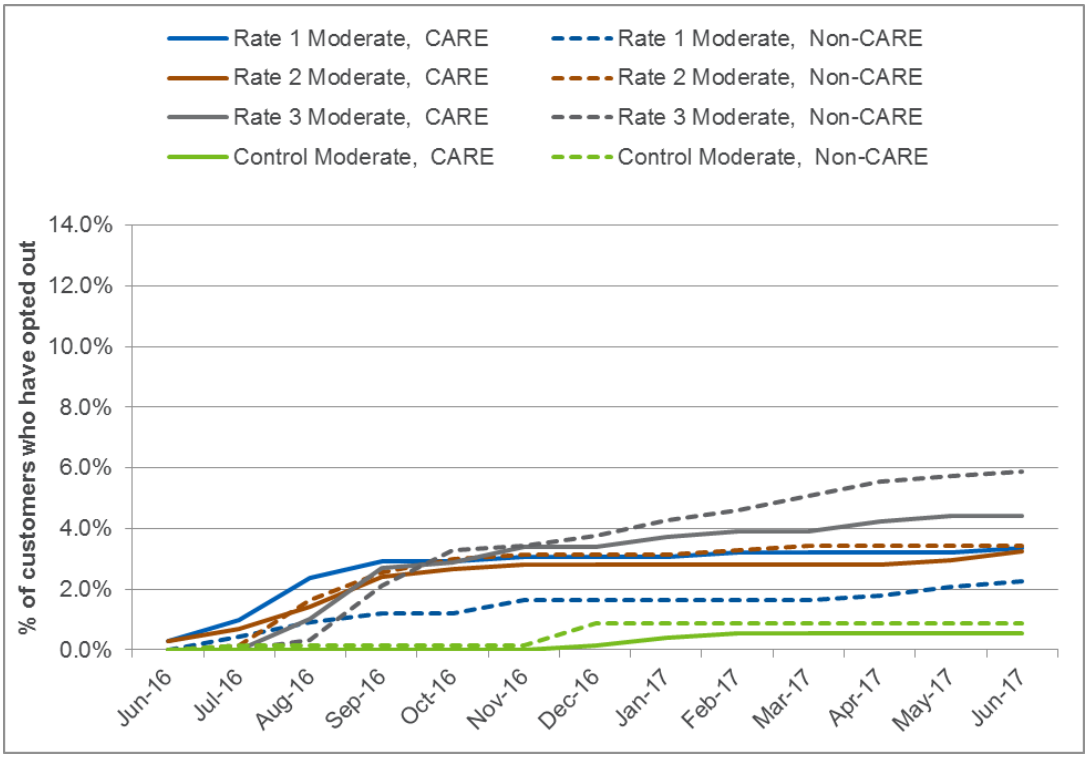


Figure 4.2-3: Cumulative SCE Opt Outs by Month – Cool Climate Region

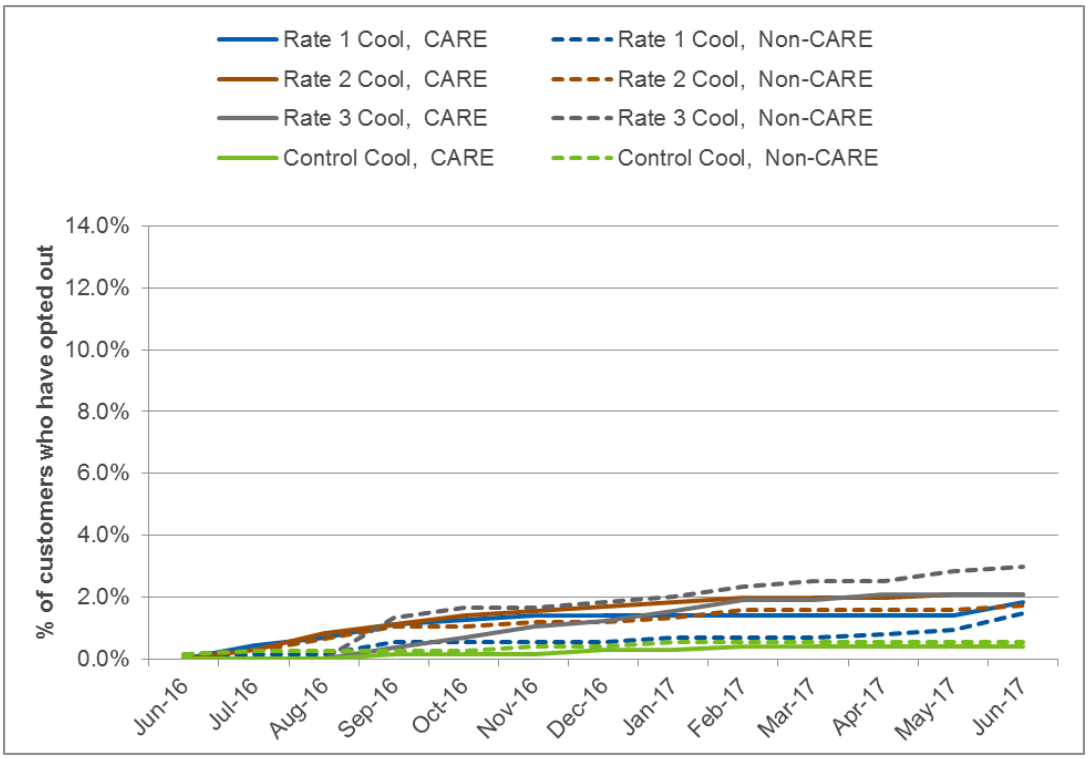


Figure 4.2-4 shows the cumulative percent of customers that opted out of each tariff for the CARE/FERA, non-CARE/FERA segments and for the total population across SCE's service territory as a whole. As seen, the cumulative percent of customers opting out was quite low for all rates and segments. The lowest cumulative percent opt out was for non-CARE/FERA customers on Rate 1 and the highest was for CARE/FERA customers on Rate 3. The opt-out percentage was highest for Rate 3 for both CARE/FERA and non-CARE/FERA customers and for the population as a whole. Recall that this is the rate with no baseline credit. The cumulative opt-out rate for each group showed a very rapid increase once bills began to be issued and the opt-out rates leveled off for Rate 1 and Rate 2. For all three rates, the cumulative opt out percentage over the entire period was only roughly 4.5%.

Figure 4.2-4: Cumulative Opt Outs by Rate and Customer Segment for the SCE Service Territory

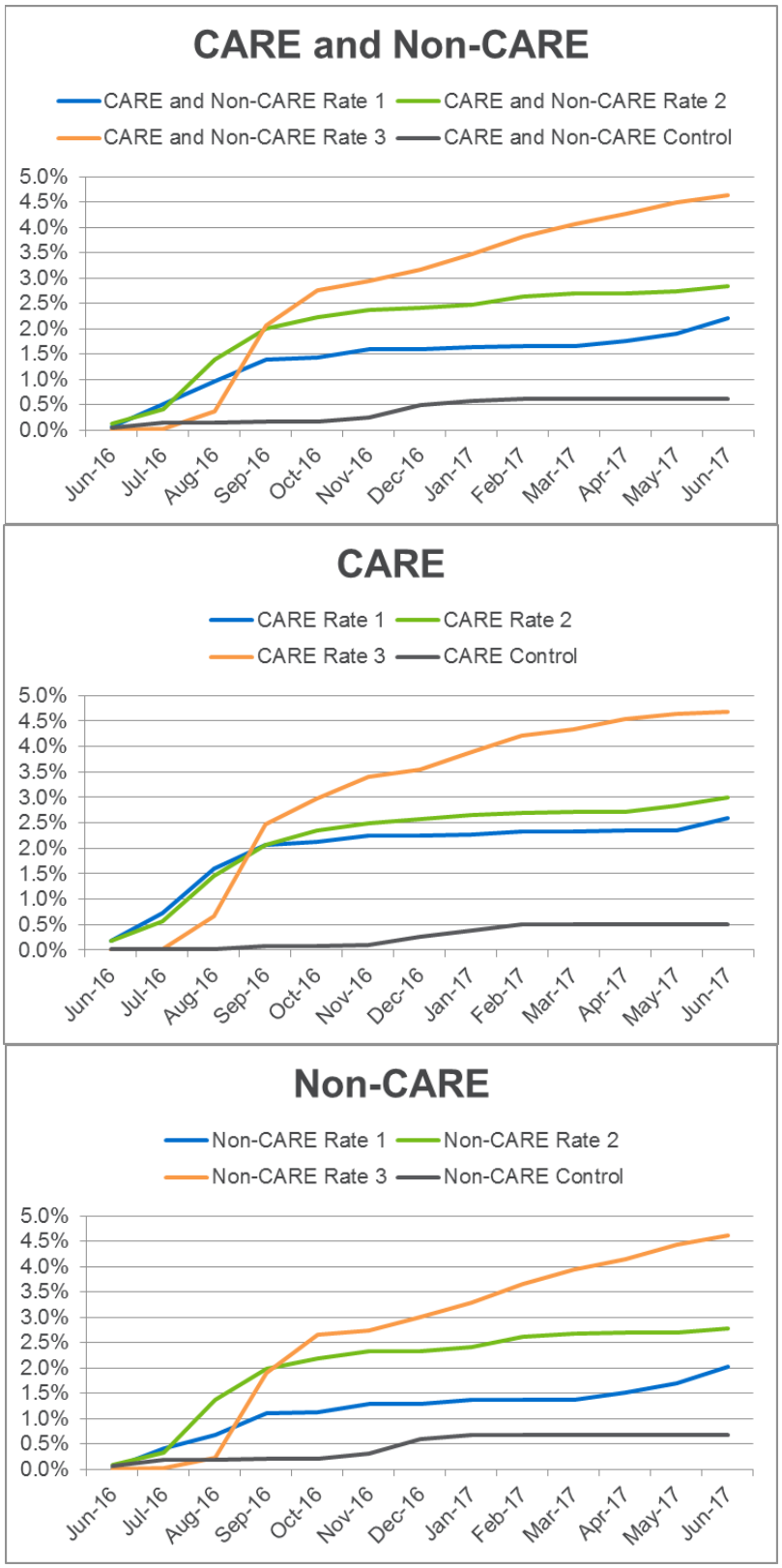


Figure 4.2-5 through Figure 4.2-7 show the overall attrition rate over time for each climate region, customer segment, and TOU rate. As seen in the figures, the cumulative attrition rate is quite constant over time in the moderate and cool climate regions, but not in the hot climate region. Much of the attrition among CARE/FERA Rate 3 customers in the hot climate region is attributable to opt-outs, and overall attrition rates for this group reached nearly 35% by the end of the first year of the pilot. Customers in the hot climate zone had a slight increase in attrition between March and April 2017 due to customers joining CCAs. Overall attrition rates are below 25% for the moderate climate region and below 20% for the cool climate region.

Figure 4.2-5: Cumulative SCE Attrition by Month – Hot Climate Region

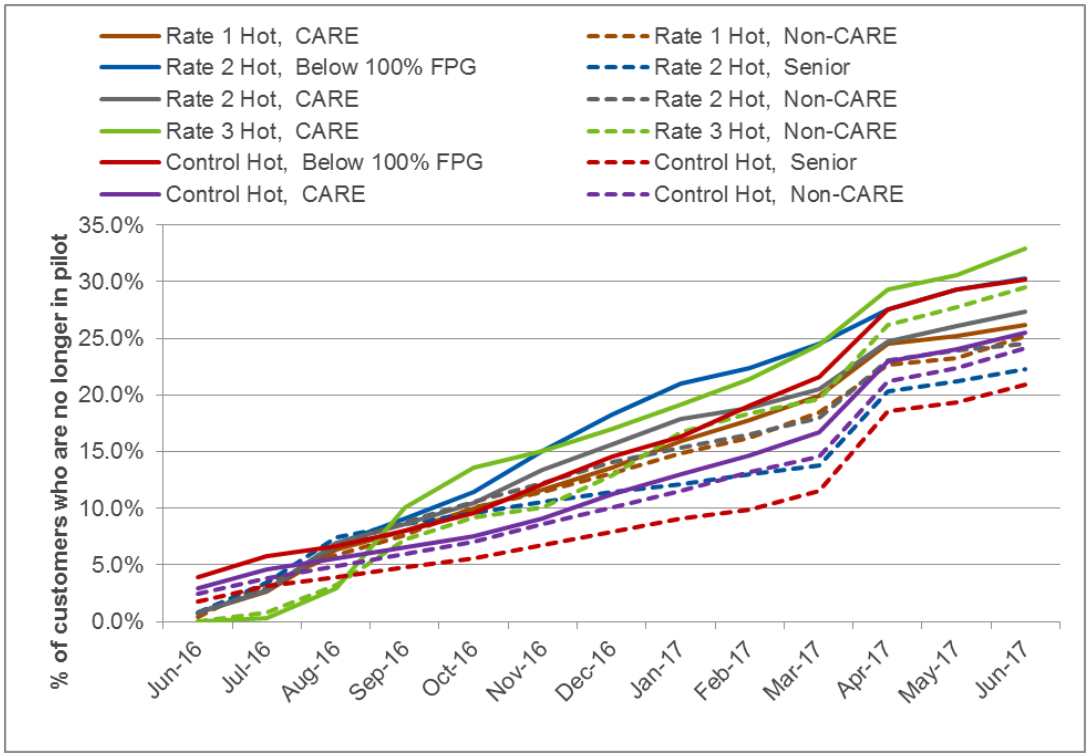


Figure 4.2-6: Cumulative SCE Attrition by Month – Moderate Climate Region

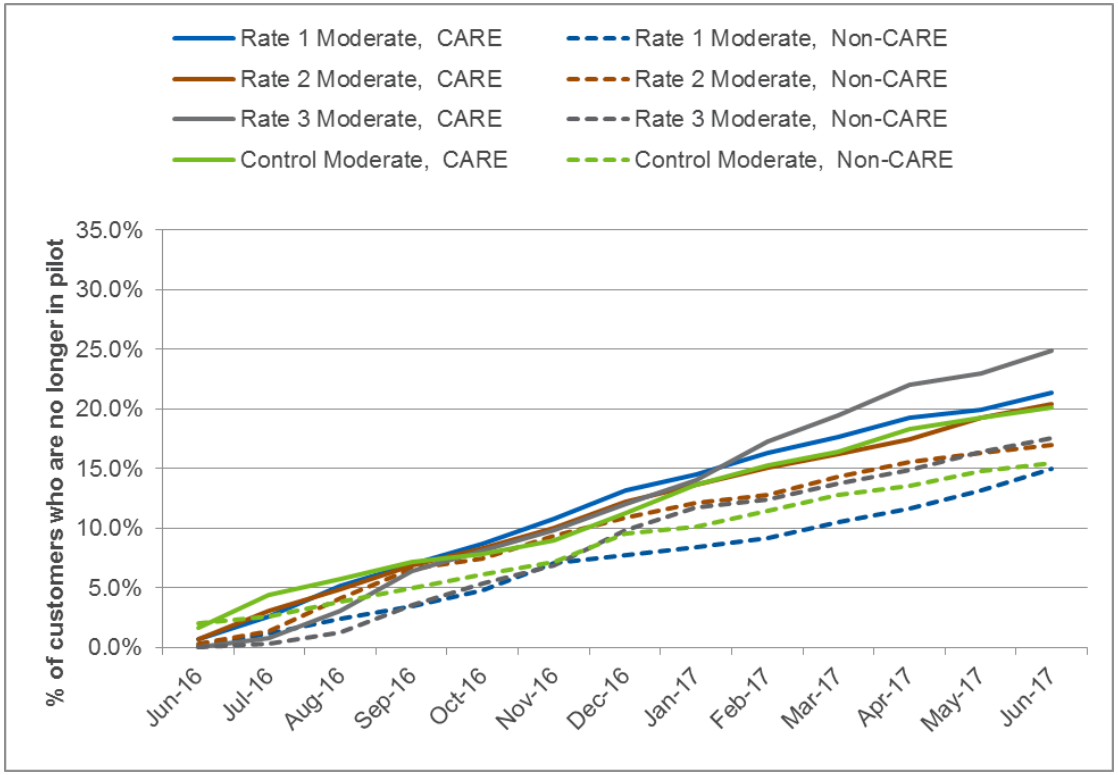
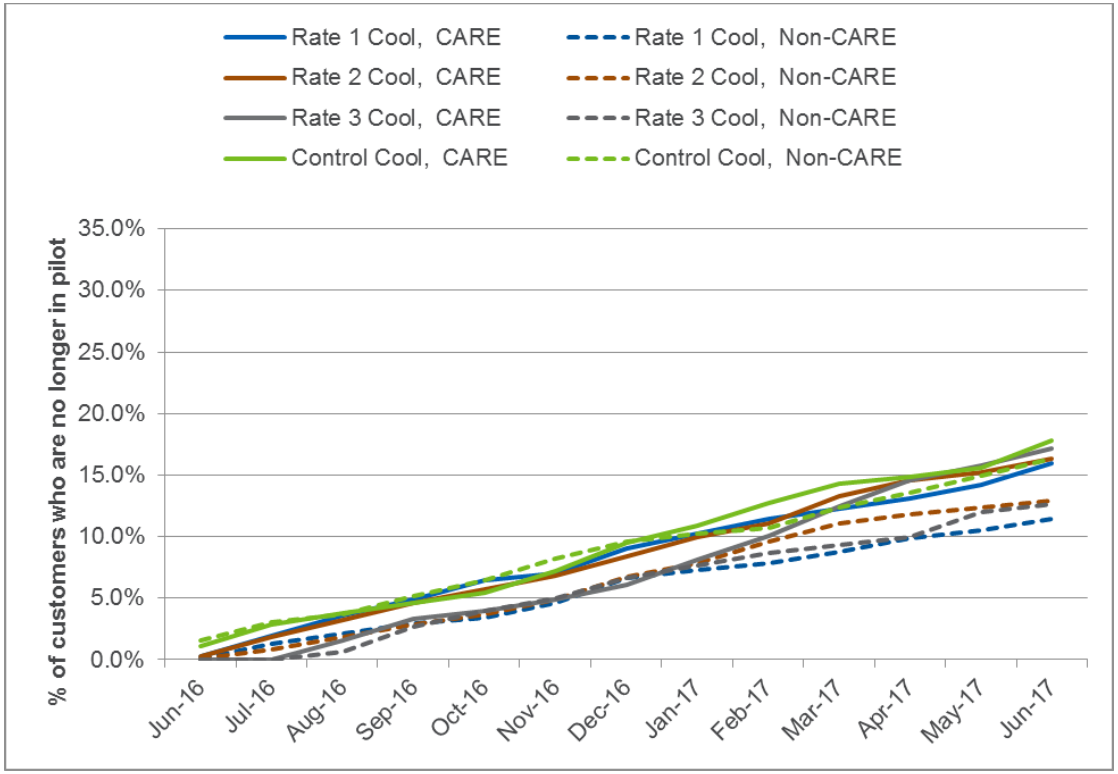


Figure 4.2-7: Cumulative SCE Attrition by Month – Cool Climate Region



4.3 Load Impacts

This section summarizes the load impact estimates for the three rate treatments tested by SCE. The CPUC resolution approving SCE's pilot requires that load impacts be estimated for the peak and off-peak periods and for daily energy use for the following rates, customer segments, and climate regions:

- Seniors, CARE/FERA customers, non-CARE/FERA customers and households with incomes below 100% of FPG in SCE's hot climate region for Rate 2;
- For all three rates for all customers in SCE's service territory as a whole and for all customers in SCE's hot and moderate climate regions; and
- For CARE/FERA and non-CARE/FERA customers on each rate across SCE's service territory as a whole.

In addition to these required segments, Nexant estimated load impacts for CARE/FERA and non-CARE/FERA customers for each rate for each climate region. Load impacts are reported here for each rate period for the average weekday, average weekend and for the average monthly peak day for the winter months of October through May for Rate 1 and Rate 2 and October through February for Rate 3 and for the spring months of March through May for Rate 3. Impacts are reported for each rate, climate zone and customer segment summarized above. Underlying the values presented in the report are electronic tables that contain estimates for each hour of the day for each day type, segment and climate zone and for each month separately. These values are contained in Excel spreadsheets that are available upon request through the CPUC.

Figure 4.3-1 shows an example of the content of these tables for SCE Rate 1 for all eligible customers in the service territory. Pull down menus in the upper left hand cover allow users to select different customer segments, climate regions, day types (e.g., weekdays, weekends, monthly peak day) and time period (individual months or the average of October through May).

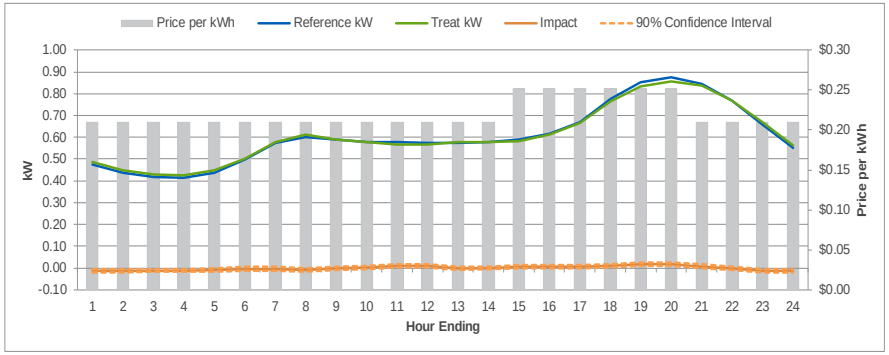
The remainder of this section is organized by rate treatment—load impacts are presented for each relevant customer segment and climate region for each of the three rates. Following the summary for each rate, load impacts are compared across rates. This comparison is made only for the hours within each peak period that are common across all three rates (5 to 8 PM) and during the overlapping winter period (October through February). Because the rates differ with respect to the length and timing of peak and off-peak periods, differences in load impacts across rates for any particular rate period may be due not only to differences in prices within the rate period but also due to differences in the length or timing of the rate periods.

As discussed in Section 5 in the First Interim Report, in addition to the three rate treatments, SCE also recruited customers who were known to have purchased and installed a smart thermostat. The objective of this treatment group was to estimate load impacts for smart thermostat owners on TOU rates. Those who enrolled were randomly assigned only to Rate 1 and to the control group. Load impacts for these customers are presented in Section 4.3.1.

Figure 4.3-1: Example of Content of Electronic Tables Underlying Load Impacts Summarized in this Report (SCE Rate 1, Average Winter Weekday, All Customers)

Segment	All
Rate	Rate 1
Month	Winter 2016 2017 - Rate 1 or 2
Day Type	Average Weekday
Treated Customers	3,997

Period	Reference kW	Treat kW	Impact	Percent Impact	90% Confidence Interval	
Super On Peak	N/A	N/A	N/A	N/A	N/A	N/A
Peak	0.73	0.72	0.01	1.4%	0.01	0.01
Mid Peak	N/A	N/A	N/A	N/A	N/A	N/A
Off Peak	0.64	0.63	0.00	0.4%	0.00	0.01
Super Off Peak	0.51	0.52	-0.01	-2.0%	-0.01	-0.01
Daily kWh	14.53	14.54	-0.02	-0.1%	-0.05	0.02



Hour Ending	Reference kW	Treat kW	Impact	Percent Impact	90% Confidence Interval		Price	Period
1	0.48	0.49	-0.01	-2.6%	-0.02	0.00	$0.21	Super Off Peak
2	0.44	0.45	-0.01	-2.6%	-0.02	0.00	$0.21	Super Off Peak
3	0.42	0.43	-0.01	-2.7%	-0.02	0.00	$0.21	Super Off Peak
4	0.42	0.43	-0.01	-2.7%	-0.02	0.00	$0.21	Super Off Peak
5	0.44	0.45	-0.01	-2.4%	-0.02	0.00	$0.21	Super Off Peak
6	0.50	0.50	0.00	-0.7%	-0.01	0.00	$0.21	Super Off Peak
7	0.57	0.58	0.00	-0.6%	-0.01	0.00	$0.21	Super Off Peak
8	0.60	0.61	-0.01	-1.7%	-0.02	0.00	$0.21	Super Off Peak
9	0.59	0.59	0.00	-0.3%	-0.01	0.01	$0.21	Off Peak
10	0.58	0.58	0.00	0.1%	-0.01	0.01	$0.21	Off Peak
11	0.58	0.57	0.01	1.6%	0.00	0.02	$0.21	Off Peak
12	0.57	0.57	0.01	1.5%	0.00	0.02	$0.21	Off Peak
13	0.58	0.58	0.00	-0.4%	-0.01	0.01	$0.21	Off Peak
14	0.58	0.58	0.00	0.0%	-0.01	0.01	$0.21	Off Peak
15	0.59	0.58	0.01	1.1%	0.00	0.01	$0.25	Peak
16	0.62	0.61	0.01	0.9%	0.00	0.01	$0.25	Peak
17	0.67	0.67	0.01	0.9%	0.00	0.01	$0.25	Peak
18	0.78	0.77	0.01	1.4%	0.00	0.02	$0.25	Peak
19	0.85	0.83	0.02	2.0%	0.01	0.03	$0.25	Peak
20	0.87	0.86	0.02	1.9%	0.01	0.02	$0.25	Peak
21	0.84	0.84	0.01	0.9%	0.00	0.02	$0.21	Off Peak
22	0.77	0.77	0.00	-0.2%	-0.01	0.01	$0.21	Off Peak
23	0.66	0.67	-0.01	-2.0%	-0.02	0.00	$0.21	Super Off Peak
24	0.55	0.56	-0.01	-2.4%	-0.02	0.00	$0.21	Super Off Peak
Daily kWh	**14.53**	**14.54**	**-0.02**	**-0.1%**	**-0.05**	**0.02**	**N/A**	**N/A**

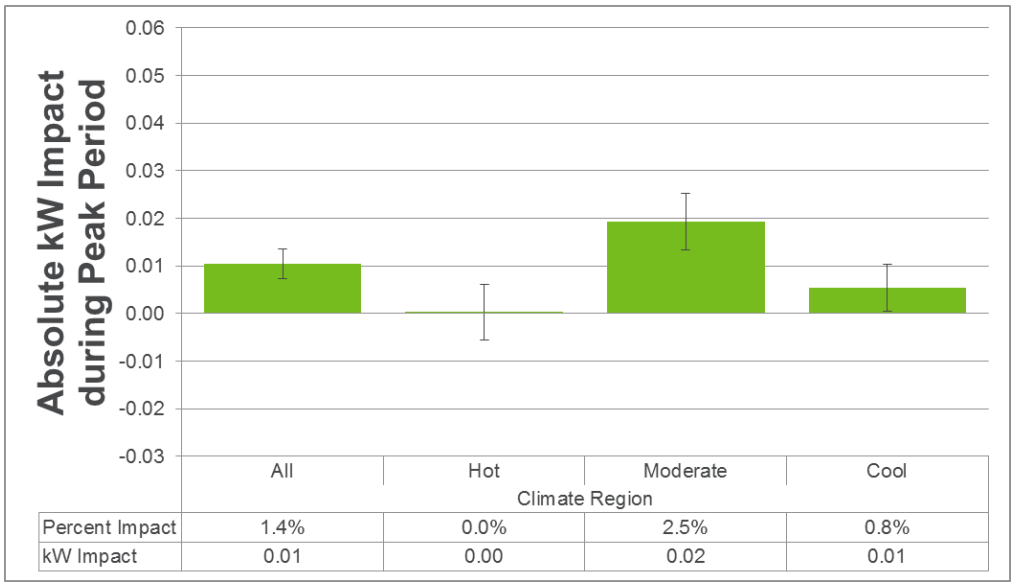
4.3.1 Rate 1

SCE's Rate 1 is a three-period rate on weekdays with a peak-period from 2 to 8 PM, an off-peak period from 9 AM to 2 PM and 8 PM to 10 PM and the remaining hours designated as super off peak. In winter, for electricity usage above the baseline quantity, prices equal roughly 27.5 ¢/kWh[37] in the peak period and 22.9 ¢/kWh in the off-peak period. Usage on the weekends is priced at the off-peak price all day. For usage below the baseline quantify, a credit of 9.9 ¢/kWh is applied.

Winter Load Impacts

Figure 4.3-2 shows the average peak period load reduction in absolute terms for Rate 1 for SCE's service territory as a whole and for each climate region. The lines bisecting the top of each bar in the figures show the 90% confidence band for each estimate. If the confidence band includes 0, it means that the estimated load impacts are not statistically different from 0 at the 90% level of confidence. If the confidence bands for two bars do not overlap, it means that the observed difference in the load impacts is statistically significant. If they do overlap, it does not necessarily mean that the difference is not statistically significant.[38] In these cases, t-tests were calculated to determine whether the difference is statistically significant.[39]

Figure 4.3-2: Average Load Impacts for Peak Period for SCE Rate 1[40]
(Positive values represent load reductions)



[37] Prices reflect tariffs in effect at the launch of the pilot through the end of December 2016. As indicated above and shown in Appendix B, rates changed on January 1, 2017.

[38] For further discussion of this topic, see https://www.cscu.cornell.edu/news/statnews/stnews73.pdf.

[39] The test was applied at the 90% confidence level which means that a t-value exceeding 1.65 indicates statistical significance.

[40] SCE Rate 1 winter impacts represent October 2016 through May 2017.

As seen in the figure, the average peak-period load impacts for the service territory as a whole and for the cool and moderate climate regions are statistically significant at the 90% level of confidence. On average, pilot participants across SCE's service territory on Rate 1 reduced peak-period electricity use by 1.4%, or 0.01 kW, across the six-hour peak period from 2 to 8 PM. The average peak-period load reduction ranges from a high of 2.5% and 0.02 kW in the moderate climate region to a low of 0.0% and 0.00 kW in the hot climate region. In other words, customers in the hot climate region did not make significant changes in their energy use during the peak period. In the cool climate region, the load reduction equals 0.8% or 0.01 kW.

There is a very significant difference in the pattern of load reductions across climate regions in SCE's service territory compared with PG&E's service territory. This was also true in the summer period as reported in the First Interim Report. As discussed in Section 3.3, both the percentage and absolute impacts are significantly greater for customers in PG&E's hot climate region than in the moderate and cool regions for Rate 1 and Rate 3. SCE's peak period load reductions in the hot region are not significant, while PG&E's reduction equals 4.4% for Rate 1. The difference in absolute impacts between the moderate and cool regions is also large and statistically significant. In many cases, SCE's hottest climate regions in the summer are also the coldest in the winter.

Table 4.3-1 shows the average percent and absolute load impacts for each rate period for weekdays and weekends and for the average monthly system peak day for the SCE service territory as a whole and for the participant population in each climate region. The percent reduction equals the load impact in absolute terms (kW) divided by the reference load. Shaded cells in the table contain load impact estimates that are not statistically significant at the 90% confidence level. The percentage and absolute values in the first row of Table 4.3-1, which represent the load impacts in the peak period on the average weekday, equal the values shown in Figure 4.3-2, discussed above.

The reference loads shown in Table 4.3-1 represent estimates of what customers on the TOU rate would have used if they had not responded to the price signals contained in the TOU tariff. As seen in the table, average hourly usage during the peak period is roughly 0.73 kW for the service territory as a whole, and around 0.61 kW over the 24 hour average weekday. In the hot climate region, average usage in the peak period is slightly larger at 0.85 kW. Average usage in the moderate climate region is 0.77 kW and in the cool region it is 0.67 kW.

As discussed in Section 3.3.1, when examining the change in usage across rate periods, it is important to keep in mind that a change in any period could be the result of an overall decrease or increase in end-use consumption or due to shifting usage from one rate period to another (or both). As seen in Table 4.3-1, on the average weekday, there were small but statistically significant load increases in the super off-peak period in the service territory as a whole and in the individual climate regions. The moderate climate region saw statistically significant demand reductions in the off-peak period during all three day types.

A reduction in daily electricity use (depicted by positive values in the row labeled Day in the table) means that the combination of changes in use across all rate periods resulted in less electricity use for the day as a whole. As seen in Table 4.3-1, for the service territory as a whole, there was an insignificant increase in daily electricity use on the average weekday. In the moderate climate region, the

conservation effect was 0.7% on the average weekday. However, loads increased overall in the hot and cool climate regions.

The monthly system peak day estimates represent the average across the eight weekdays, one in each winter month, when SCE's system peaked in 2016 and 2017. Peak period reference loads are higher on these days than on the average weekday, although differences in daily reference loads across average weekdays and system peak days are small. For the service territory as a whole, the percent reduction in peak period loads, 2.1%, is greater than that on the average weekday (1.4%) and the absolute load reduction, 0.02, kW is greater than on the average weekday (0.01 kW). Customers had small but statistically significant daily usage increases on the average weekend, most of which was concentrated in the super off-peak period. During this period, customers increased their usage by 2.1% or 0.01 kWh.

Table 4.3-1: Rate 1 Load Impacts by Period and Day Type *
(Positive values represent load reductions, negative values represent load increases)

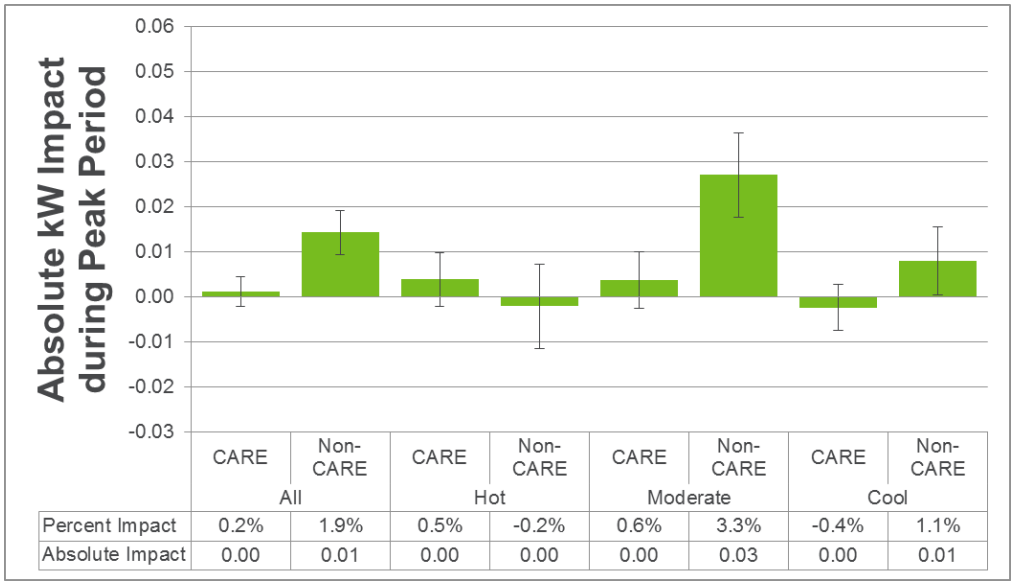
Rate 1														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	2 PM to 8 PM	0.73	0.01	1.4%	0.85	0.00	0.0%	0.77	0.02	2.5%	0.67	0.01	0.8%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.64	0.00	0.4%	0.72	-0.01	-1.6%	0.66	0.01	1.1%	0.59	0.00	0.3%
	Super Off Peak	10 PM to 8 AM	0.51	-0.01	-2.0%	0.57	-0.02	-3.3%	0.54	-0.01	-1.2%	0.46	-0.01	-2.3%
	Day	All Hours	0.61	0.00	-0.1%	0.69	-0.01	-1.7%	0.64	0.00	0.7%	0.56	0.00	-0.5%
Average Weekend	Off Peak	8 AM to 10 PM	0.74	0.00	0.5%	0.83	-0.01	-1.2%	0.77	0.01	1.4%	0.68	0.00	0.1%
	Super Off Peak	10 PM to 8 AM	0.50	-0.01	-2.1%	0.57	-0.02	-3.2%	0.54	-0.01	-1.8%	0.46	-0.01	-2.0%
	Day	All Hours	0.64	0.00	-0.3%	0.72	-0.01	-1.9%	0.68	0.00	0.4%	0.59	0.00	-0.6%
Monthly System Peak Day	Peak	2 PM to 8 PM	0.88	0.02	2.1%	0.97	-0.01	-1.1%	0.98	0.03	3.1%	0.77	0.02	2.0%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.70	0.01	1.2%	0.78	-0.01	-1.8%	0.75	0.01	1.7%	0.64	0.01	1.6%
	Super Off Peak	10 PM to 8 AM	0.52	-0.01	-1.6%	0.58	-0.02	-3.6%	0.56	0.00	-0.3%	0.47	-0.01	-2.3%
	Day	All Hours	0.67	0.00	0.6%	0.74	-0.02	-2.2%	0.72	0.01	1.6%	0.60	0.00	0.4%

* A shaded cell indicates estimate is not statistically significant

Figure 4.3-3 shows the absolute peak period load impacts for Rate 1 for CARE/FERA and non-CARE/FERA customers for the service territory as a whole and for each climate region. In the moderate and cool climate regions, and the service territory as a whole, both the percent and absolute load impacts in the peak period are greater for non-CARE/FERA customers than for CARE/FERA customers. For example, in the cool climate region, the average weekday peak period reduction is 1.1% and 0.01 kW for non-CARE/FERA customers whereas for CARE/FERA customers, there is no statistically significant change in peak period electricity use. Load reductions in the hot climate region do not follow the same pattern and are not statistically significant for either segment. Once again, this finding is quite different from what was seen in PG&E's service territory, where the contrast in load reductions between CARE/FERA and non-CARE/FERA customers was greatest in the hot and cool climate regions.

Figure 4.3-3: Average Load Impacts for Peak Period for SCE Rate 1 for CARE/FERA and non-CARE/FERA Customers

(Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	All		Hot		Moderate		Cool	
Percent Impact	0.2%	1.9%	0.5%	-0.2%	0.6%	3.3%	-0.4%	1.1%
Absolute Impact	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01

Table 4.3-2 shows the estimated load impacts for each rate period and day type by climate zone and for the service territory as a whole for non-CARE/FERA customers and Table 4.3-3 shows the estimated values for CARE/FERA customers. For the service territory as a whole, non-CARE/FERA customers have average peak period loads that are larger than CARE/FERA customers (0.78 kW for non-CARE/FERA and 0.62 kW for CARE/FERA). This pattern is consistent across all three climate regions and for daily electricity usage on average summer weekdays.

For the service territory as a whole, CARE/FERA customers increased average daily usage on weekdays by 1.3% or 0.01 kW, whereas non-CARE/FERA customers showed no statistically significant change. On the monthly system peak days, non-CARE/FERA customers reduced electricity use by 1.1%, but CARE/FERA increased their overall usage by 1.0%. CARE/FERA customers in the cool climate region increased their daily demand on all three day types.

Table 4.3-2: Rate 1 Load Impacts by Rate Period and Day Type – Non-CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases

Rate 1														
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	2 PM to 8 PM	0.78	0.01	1.9%	0.91	0.00	-0.2%	0.83	0.03	3.3%	0.71	0.01	1.1%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.68	0.01	0.9%	0.79	-0.02	-2.0%	0.73	0.01	2.0%	0.63	0.00	0.7%
	Super Off Peak	10 PM to 8 AM	0.54	-0.01	-1.7%	0.61	-0.03	-4.4%	0.58	0.00	-0.3%	0.49	-0.01	-2.2%
	Day	All Hours	0.65	0.00	0.3%	0.74	-0.02	-2.3%	0.69	0.01	1.6%	0.59	0.00	-0.2%
Average Weekend	Off Peak	8 AM to 10 PM	0.80	0.01	0.7%	0.91	-0.02	-1.7%	0.85	0.02	1.9%	0.73	0.00	0.4%
	Super Off Peak	10 PM to 8 AM	0.53	-0.01	-1.8%	0.61	-0.03	-4.5%	0.58	-0.01	-1.3%	0.48	-0.01	-1.5%
	Day	All Hours	0.69	0.00	-0.1%	0.78	-0.02	-2.6%	0.73	0.01	0.8%	0.63	0.00	-0.2%
Monthly System Peak Day	Peak	2 PM to 8 PM	0.93	0.02	2.2%	1.04	-0.02	-1.7%	1.06	0.03	3.3%	0.82	0.02	2.1%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.75	0.01	1.9%	0.85	-0.02	-2.0%	0.81	0.02	2.8%	0.68	0.01	2.1%
	Super Off Peak	10 PM to 8 AM	0.55	0.00	-0.8%	0.62	-0.03	-4.9%	0.60	0.01	1.4%	0.50	-0.01	-1.9%
	Day	All Hours	0.71	0.01	1.1%	0.80	-0.02	-2.8%	0.79	0.02	2.5%	0.64	0.01	0.8%

* A shaded cell indicates estimate is not statistically significant

Table 4.3-3: Rate 1 Load Impacts by Rate Period and Day Type – CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 1														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	2 PM to 8 PM	0.62	0.00	0.2%	0.74	0.00	0.5%	0.65	0.00	0.6%	0.55	0.00	-0.4%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.53	-0.01	-1.1%	0.62	0.00	-0.6%	0.54	-0.01	-1.2%	0.48	-0.01	-1.1%
	Super Off Peak	10 PM to 8 AM	0.44	-0.01	-2.8%	0.51	-0.01	-1.4%	0.45	-0.02	-3.5%	0.39	-0.01	-2.7%
	Day	All Hours	0.51	-0.01	-1.3%	0.60	0.00	-0.5%	0.53	-0.01	-1.5%	0.46	-0.01	-1.5%
Average Weekend	Off Peak	8 AM to 10 PM	0.61	0.00	-0.2%	0.71	0.00	-0.2%	0.63	0.00	0.3%	0.54	0.00	-0.8%
	Super Off Peak	10 PM to 8 AM	0.44	-0.01	-2.9%	0.51	0.00	-0.6%	0.46	-0.01	-3.1%	0.39	-0.01	-3.7%
	Day	All Hours	0.54	-0.01	-1.1%	0.63	0.00	-0.3%	0.56	0.00	-0.9%	0.48	-0.01	-1.8%
Monthly System Peak Day	Peak	2 PM to 8 PM	0.74	0.01	1.9%	0.85	0.00	0.0%	0.82	0.02	2.8%	0.63	0.01	1.6%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.58	-0.01	-0.9%	0.67	-0.01	-1.4%	0.61	-0.01	-1.0%	0.51	0.00	-0.4%
	Super Off Peak	10 PM to 8 AM	0.44	-0.02	-4.0%	0.52	-0.01	-1.3%	0.46	-0.02	-4.9%	0.40	-0.02	-4.0%
	Day	All Hours	0.56	-0.01	-1.0%	0.65	-0.01	-0.9%	0.60	-0.01	-1.0%	0.49	0.00	-1.0%

* A shaded cell indicates estimate is not statistically significant

Table 4.3-4 shows the estimated load impacts for smart thermostat customers who were enrolled on Rate 1. As a reminder, these load reductions represent the total reduction for customers who had previously purchased smart thermostats and are on Rate 1 relative to a control group of smart thermostat owners who are on the OAT. The impacts are not the incremental load impact of a smart thermostat for customers on a TOU rate relative to customers on a TOU rate who do not have a smart thermostat. These customers are distributed throughout the service territory and the vast majority are non-CARE/FERA customers. The average weekday peak-period reference load for these households (1.03 kW) is more than 40% higher than the average for households in the service territory as a whole (0.73 kW). The average load reduction for smart thermostat households during the peak period, 4.7% or 0.05 kW, was much larger than the average for all households in the service territory (1.4% or 0.01 kW). This result is in contrast to what was found in the first summer, as reported in the First Interim Report, where smart thermostat households had reductions similar to those of the general population. Smart thermostat households reduced average daily use by 2.7%, or 0.02 kW, and had comparable reductions in daily usage on weekends. Peak period load reductions on the monthly system peak day were less than half the size of the impacts on weekends and weekdays and were not statistically significant.

Table 4.3-4: Rate 1 Load Impacts by Rate Period and Day Type – Technology Customers* (Positive values represent load reductions, negative values represent load increases)

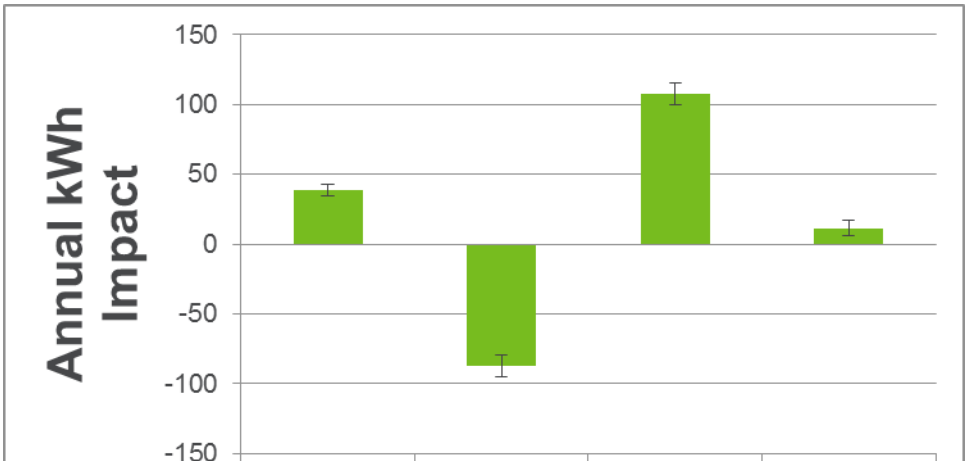
Day Type	Period	Hours	Technology		
			Ref. kW	Impact kW	% Impact
Average Weekday	Peak	2 PM to 8 PM	1.03	0.05	4.7%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.87	0.02	2.5%
	Super Off Peak	10 PM to 8 AM	0.69	0.01	1.0%
	Day	All Hours	0.84	0.02	2.7%
Average Weekend	Off Peak	8 AM to 10 PM	1.03	0.04	3.7%
	Super Off Peak	10 PM to 8 AM	0.69	0.01	1.6%
	Day	All Hours	0.89	0.03	3.0%
Monthly System Peak Day	Peak	2 PM to 8 PM	1.30	0.02	1.5%
	Off Peak	8 AM to 2 PM, 8 PM to 10 PM	0.97	0.03	3.0%
	Super Off Peak	10 PM to 8 AM	0.71	0.00	0.0%
	Day	All Hours	0.95	0.01	1.5%

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 4.3-4 shows the annual conservation effect for customers on SCE's Rate 1. The impacts here are quite different from those for PG&E. Most notably, customers in PG&E's hot climate region saved the most energy during the first year of the pilot. In contrast, customers in SCE's hot climate region had a statistically significant increase in daily electricity use of 1.1%. This group had the largest energy usage increase in SCE's service territory. Customers in the moderate climate region saw the greatest conservation effect of 107.6 kWh, or about 1.6%. Overall, customers in SCE's service territory saved about 0.6% or 38.7 kWh per customer over the course of the year.

Figure 4.3-4: Average Annual Conservation Effect for SCE Rate 1
(Positive values represent usage reductions)

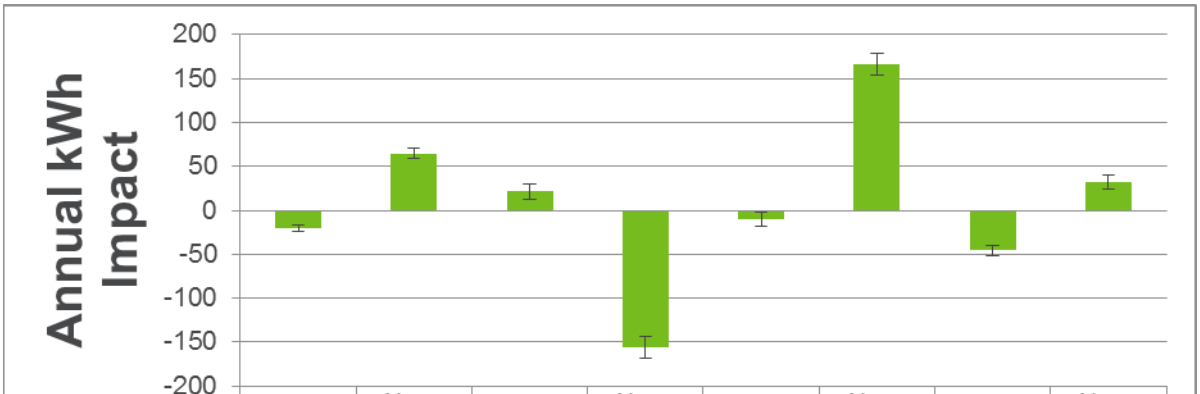


	All	Hot	Moderate	Cool
Percent Impact	0.6%	-1.1%	1.6%	0.2%
kWh Impact	38.7	-87.5	107.6	11.6

Figure 4.3-5 shows the annual conservation effect for CARE/FERA and non-CARE/FERA customers. The difference between customer segments is not consistent across climate regions. Non-CARE/FERA customers in the moderate climate region saved the most energy, about 2.2% or 166.4 kWh during the first year of the pilot. This is not surprising, as this group had the greatest winter peak period impacts and was the only segment to save energy on the average winter weekday. CARE/FERA customers in the moderate and cool climate regions and non-CARE/FERA customers in the hot climate region increased their electricity use over the course of the year.

Figure 4.3-5: Average Annual Conservation Effect for SCE Rate 1 for CARE/FERA and Non-CARE/FERA Customers

(Positive values represent usage reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	All		Hot		Moderate		Cool	
Percent Impact	-0.4%	1.0%	0.3%	-1.8%	-0.2%	2.2%	-1.1%	0.6%
kWh Impact	-20.4	64.8	21.7	-155.9	-10.1	166.4	-45.8	32.4

4.3.2 Rate 2

SCE's Rate 2 like Rate 1, is a three-period rate in the winter on weekdays. The primary difference between Rate 1 and Rate 2 is that Rate 2 has a much shorter peak period, from 5 to 8 PM (and corresponding longer shoulder period) compared with six hour peak period for Rate 1. The Rate 2 peak period price is 27.9 ¢/kWh, which is similar to Rate 1 peak price of 27.5 ¢/kWh.[41] The super off-peak period, which is in effect on weekends and weekdays, has a price of 17.4 ¢/kWh and covers the hours from 10 PM to 8 AM. For usage below the baseline quantify, a credit of 9.9 ¢/kWh is applied in both cases.

Winter Load Impacts

Figure 4.3-6 shows the percent and absolute load impacts for the weekday peak period for Rate 2 for SCE's service territory as a whole and for each climate region. Percent and absolute impacts for the service territory as a whole, 2.0% and 0.02 kW, are greater than those for Rate 1 (1.4% and 0.01 kW). The average weekday peak-period load reduction for customers in the hot climate region on Rate 2, 1.4% and 0.01 kW, are very different from the impacts for Rate 1, which were not statistically significant. Customers in the moderate and cool climate regions reduced their electricity usage by about the same amount as their counterparts on Rate 1.

[41] Prices reflect tariffs in effect at the launch of the pilot through the end of December 2016. As indicated above and shown in Appendix B, rates changed on January 1, 2017.

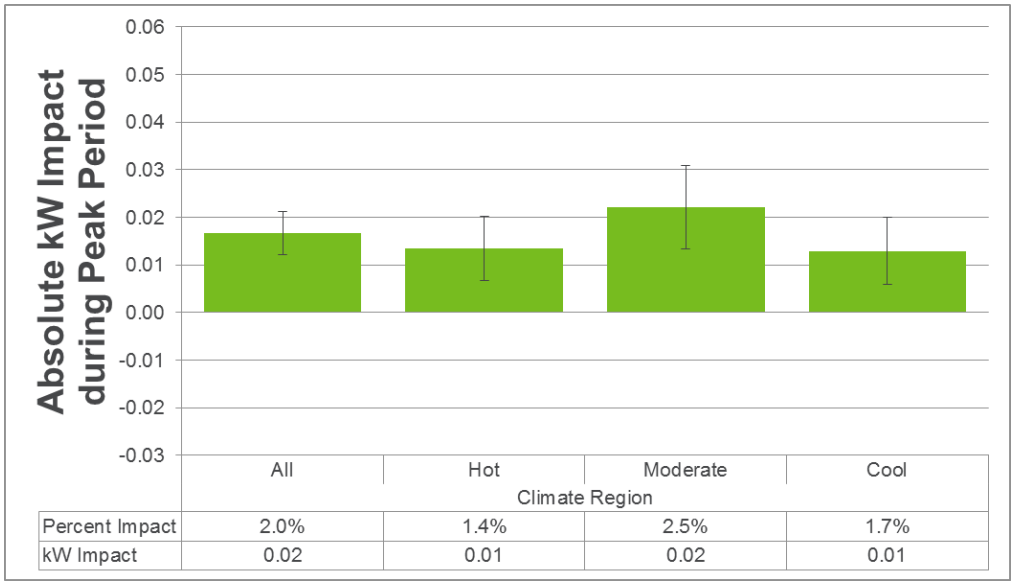
Looking at the pattern of load impacts across climate regions for customers on Rate 2, the difference in impacts between the hot and moderate regions is not statistically significant. None of the other pairwise comparisons are statistically different either.

Table 4.3-5 contains load impact estimates for each rate period and day type for Rate 2. For the service territory as a whole, daily electricity usage was similar on average winter weekdays and weekends, 0.61 kW and 0.64 kW. Reductions in daily electricity use were also quite similar on weekdays and weekends, although quite small in both percentage and absolute terms. Electricity use and impacts were the largest on monthly system peak days, with load reductions of about 3.3% or 0.03 kW.

When the daily reduction in electricity use for Rate 2 is spread over 24 hours each day, the average reduction in electricity use on weekdays equals roughly 0.06 kWh. Over eight months, this adds up to about 15 kWh per customer. This is slightly less than the PG&E estimate of roughly 17 kWh per household for the winter season for its Rate 1. If this average conservation effect was provided under default conditions and, say, 90% of the eligible population of roughly 3.3 million customers in SCE's service territory remained on the rate, the total reduction in electricity use over the eight month period would equal more than 48 GWh.

Customers in every climate region provided statistically significant peak and off-peak demand reductions for Rate 2 during all three day types. Customers in each climate region increased their electricity use during the super off-peak period on weekdays and weekends, which could indicate load shifting or increased consumption of selected end uses during the lower priced period.

Figure 4.3-6: Average Load Impacts for Peak Period for SCE Rate 2[42]
(Positive values represent load reductions)



	All	Hot	Moderate	Cool
Percent Impact	2.0%	1.4%	2.5%	1.7%
kW Impact	0.02	0.01	0.02	0.01

[42] SCE Rate 2 winter impacts represent October 2016 through May 2017.

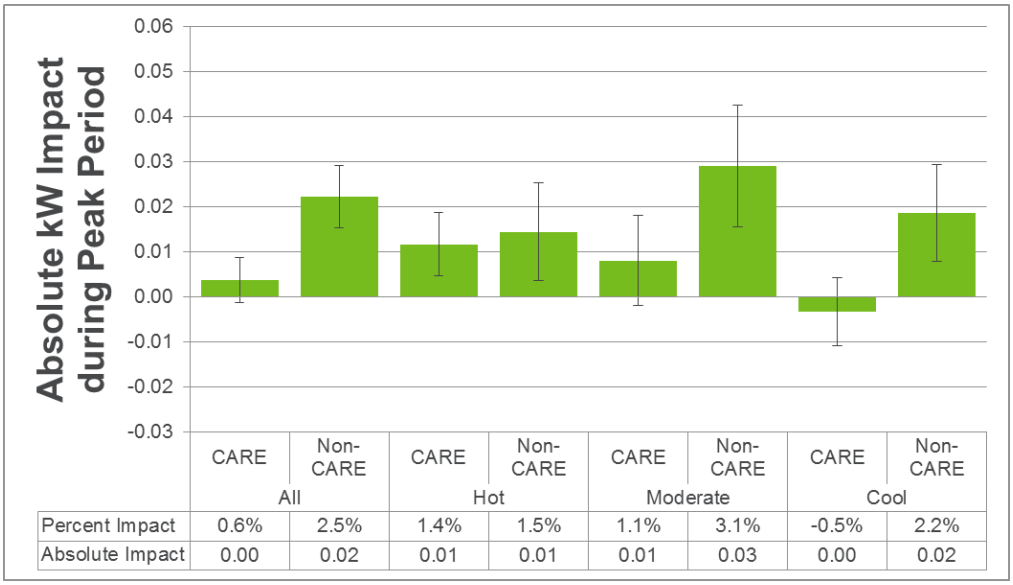
Table 4.3-5: Rate 2 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

Rate 2														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	0.83	0.02	2.0%	0.93	0.01	1.4%	0.87	0.02	2.5%	0.78	0.01	1.7%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.63	0.01	1.5%	0.73	0.01	1.7%	0.67	0.01	2.2%	0.58	0.00	0.7%
	Super Off Peak	10 PM to 8 AM	0.51	-0.01	-1.8%	0.57	-0.01	-1.7%	0.54	-0.01	-2.4%	0.46	-0.01	-1.2%
	Day	All Hours	0.61	0.00	0.4%	0.69	0.00	0.5%	0.64	0.00	0.6%	0.56	0.00	0.2%
Average Weekend	Off Peak	8 AM to 10 PM	0.74	0.01	1.6%	0.83	0.01	1.6%	0.77	0.02	2.2%	0.68	0.01	1.1%
	Super Off Peak	10 PM to 8 AM	0.50	-0.01	-2.0%	0.57	-0.01	-1.8%	0.54	-0.01	-2.4%	0.46	-0.01	-1.7%
	Day	All Hours	0.64	0.00	0.4%	0.72	0.00	0.5%	0.68	0.00	0.6%	0.59	0.00	0.2%
Monthly System Peak Day	Peak	5 PM to 8 PM	0.97	0.03	3.3%	1.04	0.02	1.7%	1.06	0.03	3.2%	0.87	0.03	4.0%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.72	0.02	2.3%	0.81	0.01	0.9%	0.79	0.02	2.8%	0.64	0.01	2.1%
	Super Off Peak	10 PM to 8 AM	0.52	-0.01	-1.1%	0.58	-0.01	-2.1%	0.56	-0.01	-1.6%	0.47	0.00	-0.3%
	Day	All Hours	0.67	0.01	1.4%	0.74	0.00	0.1%	0.72	0.01	1.5%	0.60	0.01	1.7%

* A shaded cell indicates estimate is not statistically significant

Figure 4.3-7 shows the estimated peak period load impacts for Rate 2 for CARE/FERA and non-CARE/FERA households for the service territory as a whole and for each climate region. Except in the hot climate region, there were significant differences in load reductions between CARE/FERA and non-CARE/FERA customers. In the moderate climate region, non-CARE/FERA customers had the greatest reduction in peak-period energy use at 3.1% and 0.03 kW.

Figure 4.3-7: Average Load Impacts for Peak Period for SCE Rate 2 for CARE/FERA and non-CARE/FERA Customers
(Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	All		Hot		Moderate		Cool	
Percent Impact	0.6%	2.5%	1.4%	1.5%	1.1%	3.1%	-0.5%	2.2%
Absolute Impact	0.00	0.02	0.01	0.01	0.01	0.03	0.00	0.02

Table 4.3-6 and Table 4.3-7show the load impacts for non-CARE/FERA and CARE/FERA customers, respectively, for each rate period and day-type. Once again, the values in the first row of each table are the same as those found in Figure 4.3-7. For the service territory as a whole, non-CARE/FERA customers have higher peak period usage, 0.89 kW, than CARE/FERA customers, 0.70 kW. Daily consumption is also greater for non-CARE/FERA customers than for CARE/FERA customers on Rate 2. Only the non-CARE/FERA group was able to reduce their average daily energy use by about 0.7% or more on weekends and weekdays. At the service territory level, both groups increased usage during the super off-peak period.

Table 4.3-6: Rate 2 Load Impacts by Rate Period and Day Type – Non-CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 2														
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	0.89	0.02	2.5%	1.00	0.01	1.5%	0.95	0.03	3.1%	0.83	0.02	2.2%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.68	0.01	2.0%	0.80	0.02	2.1%	0.72	0.02	2.6%	0.62	0.01	1.5%
	Super Off Peak	10 PM to 8 AM	0.54	-0.01	-1.8%	0.61	-0.02	-2.5%	0.58	-0.02	-3.0%	0.49	0.00	-0.5%
	Day	All Hours	0.65	0.01	0.8%	0.74	0.00	0.4%	0.69	0.00	0.7%	0.59	0.01	1.0%
Average Weekend	Off Peak	8 AM to 10 PM	0.80	0.02	2.0%	0.91	0.02	1.8%	0.85	0.02	2.4%	0.73	0.01	1.8%
	Super Off Peak	10 PM to 8 AM	0.53	-0.01	-2.0%	0.61	-0.02	-2.6%	0.58	-0.02	-3.2%	0.48	0.00	-0.8%
	Day	All Hours	0.69	0.00	0.7%	0.78	0.00	0.4%	0.73	0.00	0.5%	0.63	0.01	0.9%
Monthly System Peak Day	Peak	5 PM to 8 PM	1.04	0.04	3.6%	1.11	0.02	2.1%	1.16	0.04	3.1%	0.93	0.04	4.5%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.77	0.02	2.9%	0.88	0.01	1.0%	0.85	0.02	2.9%	0.69	0.02	3.3%
	Super Off Peak	10 PM to 8 AM	0.55	0.00	-0.5%	0.62	-0.02	-3.6%	0.60	-0.01	-1.1%	0.50	0.00	0.8%
	Day	All Hours	0.71	0.01	1.9%	0.80	0.00	-0.3%	0.79	0.01	1.7%	0.64	0.02	2.7%

* A shaded cell indicates estimate is not statistically significant

Table 4.3-7: Rate 2 Load Impacts by Rate Period and Day Type – CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 2														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	0.70	0.00	0.6%	0.82	0.01	1.4%	0.72	0.01	1.1%	0.63	0.00	-0.5%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.53	0.00	-0.1%	0.63	0.01	1.0%	0.55	0.01	1.3%	0.47	-0.01	-2.3%
	Super Off Peak	10 PM to 8 AM	0.44	-0.01	-1.9%	0.51	0.00	-0.2%	0.45	0.00	-0.9%	0.39	-0.01	-3.8%
	Day	All Hours	0.51	0.00	-0.6%	0.60	0.00	0.6%	0.53	0.00	0.5%	0.46	-0.01	-2.5%
Average Weekend	Off Peak	8 AM to 10 PM	0.61	0.00	0.4%	0.71	0.01	1.3%	0.63	0.01	1.7%	0.54	-0.01	-1.5%
	Super Off Peak	10 PM to 8 AM	0.44	-0.01	-2.0%	0.51	0.00	-0.3%	0.46	0.00	-0.5%	0.39	-0.02	-4.7%
	Day	All Hours	0.54	0.00	-0.4%	0.63	0.00	0.8%	0.56	0.01	0.9%	0.48	-0.01	-2.5%
Monthly System Peak Day	Peak	5 PM to 8 PM	0.81	0.02	2.5%	0.91	0.01	0.7%	0.87	0.03	3.3%	0.70	0.02	2.2%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.61	0.00	0.6%	0.70	0.01	0.8%	0.65	0.02	2.6%	0.52	-0.01	-2.0%
	Super Off Peak	10 PM to 8 AM	0.44	-0.01	-2.7%	0.52	0.00	0.6%	0.46	-0.01	-2.8%	0.40	-0.02	-4.1%
	Day	All Hours	0.56	0.00	-0.2%	0.65	0.00	0.7%	0.60	0.01	1.0%	0.49	-0.01	-2.0%

* A shaded cell indicates estimate is not statistically significant

Figure 4.3-8 shows the load impacts in absolute terms for senior households and households with incomes below 100% of FPG. Table 4.3-8 shows the estimated values for other rate periods and day types for each segment.

The reduction in peak-period electricity use was greater for customers with incomes below 100% FPG (2.7% or 0.02 kW) than they were for senior households (1.1% or 0.01 kW), although the difference was not statistically significant. Load impacts for senior households were similar to those for the hot climate region population as a whole, 1.4% or 0.01 kW. It is worth noting in Table 4.3-8 that senior households had average peak period usage of 0.91 kW, which is nearly identical to the average usage for the population as a whole in the hot climate region (0.93 kW as seen in Table 4.3-5). Households with incomes below 100% FPG had peak period average usage of 0.81 kW.

Senior households have average daily demand (0.68 kW) on weekdays compared to customers with incomes below 100% of FPG (0.61 kW). Households with incomes below 100% of FPG were able to reduce daily weekday energy consumption by over 2%. Load reductions were also significant in the off-peak periods on average weekdays for both groups. On the average weekend, senior households did not significantly reduce their daily energy consumption due to their increased demand in the super off-peak period.

Figure 4.3-8: Average Load Impacts for Peak Period for SCE Rate 2 for Senior Households and Households with Incomes Below 100% of FPG in the Hot Climate Region (Positive values represent load reductions)

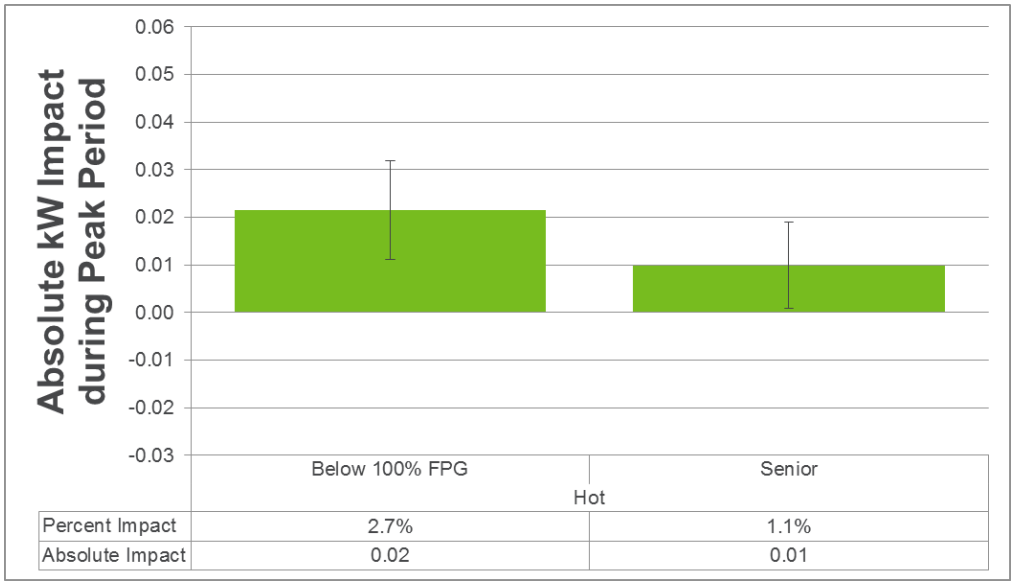


Table 4.3-8: Rate 2 Load Impacts by Rate Period and Day Type for Senior Households and Households with Incomes Below 100% of FPG in the Hot Climate Region*

(Positive values represent load reductions, negative values represent load increases)

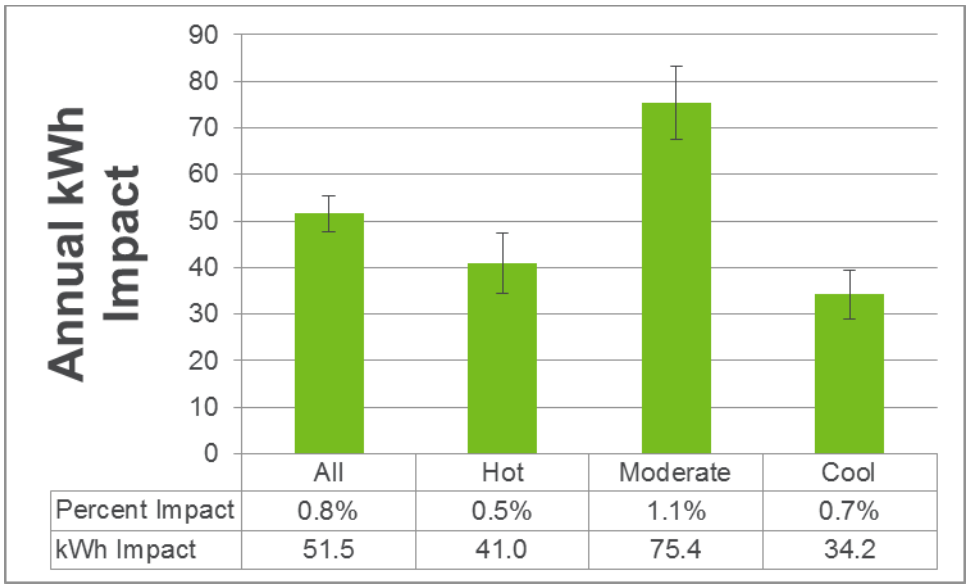
Rate 2								
Day Type	Period	Hours	Hot, Below 100% FPG			Hot, Senior		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	0.81	0.02	2.7%	0.91	0.01	1.1%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.64	0.02	3.1%	0.74	0.01	0.9%
	Super Off Peak	10 PM to 8 AM	0.52	0.00	0.4%	0.54	-0.02	-2.8%
	Day	All Hours	0.61	0.01	2.1%	0.68	0.00	-0.3%
Average Weekend	Off Peak	8 AM to 10 PM	0.71	0.02	2.9%	0.81	0.01	1.1%
	Super Off Peak	10 PM to 8 AM	0.52	0.00	0.7%	0.54	-0.02	-3.0%
	Day	All Hours	0.63	0.01	2.1%	0.70	0.00	-0.2%
Monthly System Peak Day	Peak	5 PM to 8 PM	0.91	0.04	4.8%	1.02	0.01	1.3%
	Off Peak	8 AM to 5 PM, 8 PM to 10 PM	0.71	0.03	3.8%	0.83	0.00	-0.2%
	Super Off Peak	10 PM to 8 AM	0.53	0.01	2.0%	0.55	-0.01	-2.7%
	Day	All Hours	0.66	0.02	3.4%	0.74	-0.01	-0.7%

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 4.3-9 shows the annual conservation effect for SCE's service territory as a whole and for each climate region. The impacts for customers on Rate 2 are quite different compared to those on Rate 1, especially in the hot and cool climate regions. Customers in the hot climate region on Rate 1 increased their energy consumption during the first year of the pilot, while those on Rate 2 reduced their consumption by 0.5% or 41.0 kWh. Similar to Rate 1, customers in the moderate climate region provided the greatest reductions of 1.1% or 75.4 kWh. Customers in the cool climate regions had the smallest conservation effect of 0.7% or 34.2 kWh.

Figure 4.3-9: Average Annual Conservation Effect for SCE Rate 2
(Positive values represent usage reductions)

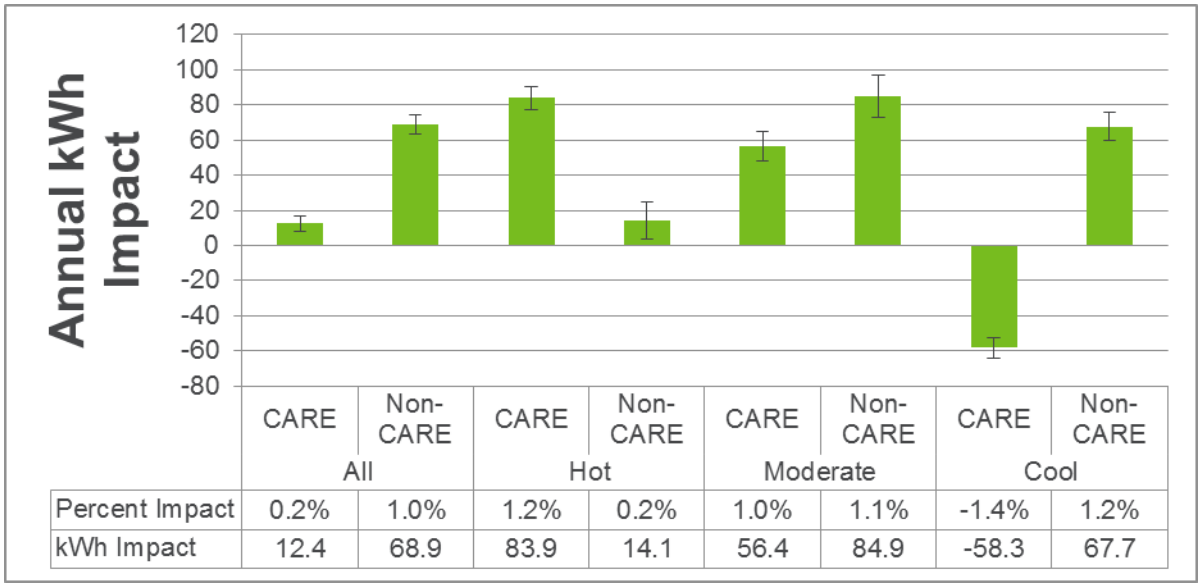


	All	Hot	Moderate	Cool
Percent Impact	0.8%	0.5%	1.1%	0.7%
kWh Impact	51.5	41.0	75.4	34.2

Figure 4.3-10 shows the energy savings during the first year of the pilot for CARE/FERA and non-CARE/FERA customers. Each group reduced their energy consumption with the exception of CARE/FERA customers in the cool climate region. This is not surprising, as this group did not reduce their demand during the peak period. For the service territory as a whole, non-CARE/FERA customers saved more energy than their CARE/FERA counterparts, with savings of 1.0% and 0.2%, respectively.

Figure 4.3-10: Average Annual Conservation Effect for SCE Rate 2 for CARE/FERA and Non-CARE/FERA Customers

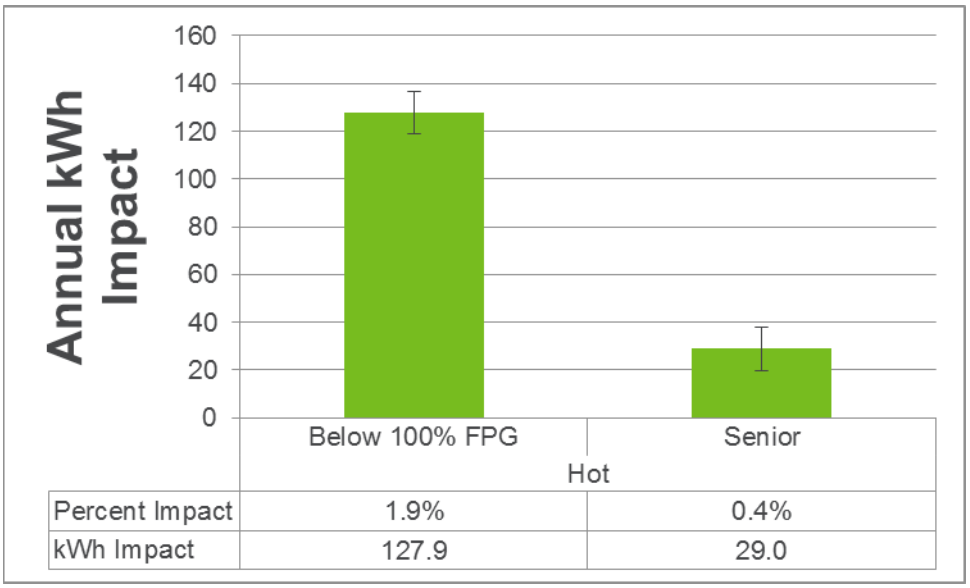
(Positive values represent usage reductions)



	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	0.2%	1.0%	1.2%	0.2%	1.0%	1.1%	-1.4%	1.2%
kWh Impact	12.4	68.9	83.9	14.1	56.4	84.9	-58.3	67.7

Figure 4.3-11 shows the annual conservation effect for senior households and households with incomes below 100% FPG in SCE's hot climate region. Customers with incomes below 100% FPG reduced their energy use by 1.9% or 127.9 kWh, which is quite different from similar customers on PG&E's Rate 1. Senior households saved energy as well, but only about 0.4% or 29.0 kWh over the course of the year.

Figure 4.3-11: Average Annual Conservation Effect for SCE Rate 2 for Senior Households and Households with Incomes Below 100% FPG
(Positive values represent usage reductions)



4.3.3 Rate 3

SCE's Rate 3 has two rate periods on winter weekdays, a mid-peak period (21.0 ¢/kWh from 4 to 9 PM) and an off peak-period (18.2 ¢/kWh for all other hours).[43] On weekends, a super off-peak period is in effect from 11 AM to 4 PM and the price is 10.4 ¢/kWh. During the spring months, Rate 3 is a three-period rate on weekends and weekdays, with a weekday peak period price of 24.9 ¢/kWh, a super-off peak price of 9.9 ¢/kWh, and an off peak price of 18.2 ¢/kWh. Rate 3 differs from Rates 1 and 2 in that it does not offer customers a baseline credit.

Winter Load Impacts

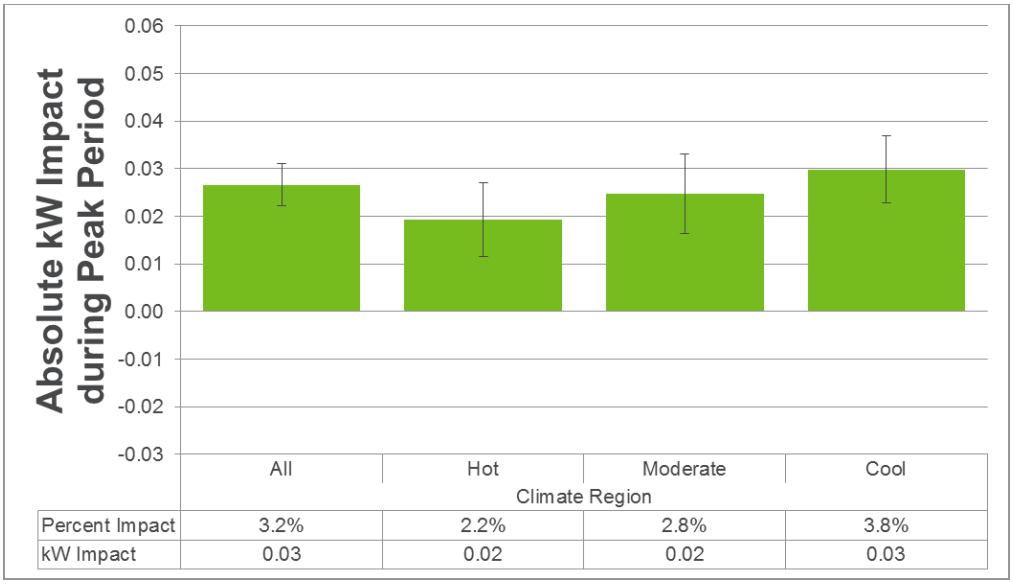
Figure 4.3-12 shows the mid peak period load reductions on average weekdays for Rate 3. The load reductions for the SCE territory as a whole, 3.2% or 0.03 kW, are greater than they were for Rate 1 or Rate 2 even though average demand during the peak period was similar across the three rates (between 0.73 and 0.83 kW). Load impacts for customers in the hot and moderate climate regions were identical in absolute terms (0.02 kW), but reductions in the moderate region were larger than they were in the hot region in percentage terms (2.8% versus 2.2%). Load reductions were greatest among customers in the cool climate region, with impacts of 3.8% or 0.03 kW. The differences in the absolute load impacts in the mid peak period between the climate regions were not statistically significant.

[43] Prices reflect tariffs in effect at the launch of the pilot through the end of December 2016. As indicated above and shown in Appendix B, rates changed on January 1, 2017.

Table 4.3-9 contains estimates of load impacts for all relevant rate periods and day types. Mid peak demand was the smallest among customers in the cool climate region at 0.79 kW, but percent impacts were the greatest. On the average weekend, customers in the moderate climate region had the greatest percent impacts at 2.9% (0.03 kW). Customers did not increase electricity use during the super off peak period which only occurred on weekends.

On weekdays, the average reduction in daily electricity use was statistically significant overall and in the hot and cool climate regions, ranging from a low of 1.0% in the hot climate region to a high of 1.5% in the cool region.

Figure 4.3-12: Average Load Impacts for Mid Peak Period for SCE Rate 3[44]
(Positive values represent load reductions)



	All	Hot	Moderate	Cool
Percent Impact	3.2%	2.2%	2.8%	3.8%
kW Impact	0.03	0.02	0.02	0.03

[44] SCE Rate 3 winter impacts represent October 2016 through February 2017.

Table 4.3-9: Rate 3 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

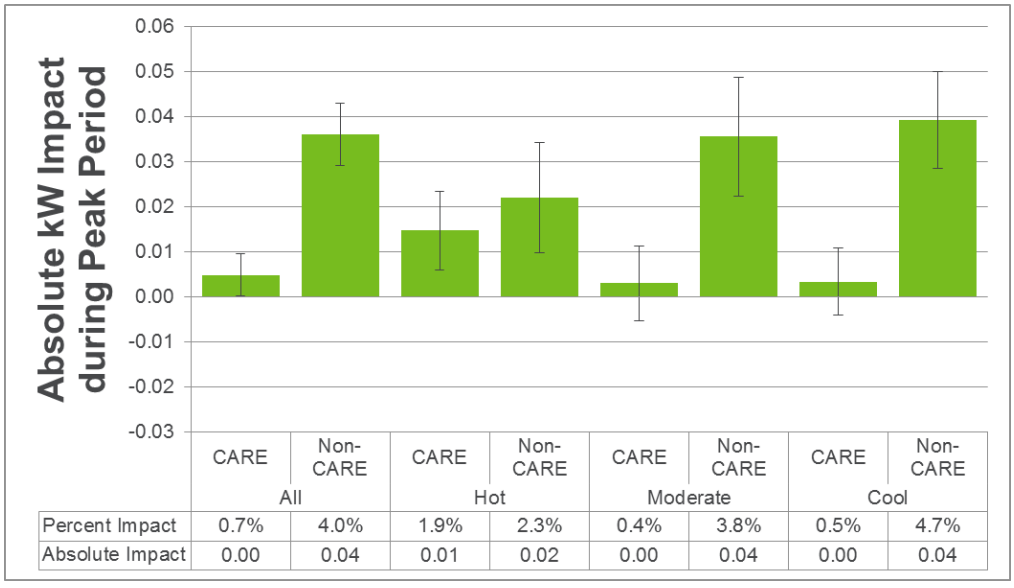
Rate 3														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Mid Peak	4 PM to 9 PM	0.84	0.03	3.2%	0.89	0.02	2.2%	0.88	0.02	2.8%	0.79	0.03	3.8%
	Off Peak	9 PM to 4 PM	0.58	0.00	0.1%	0.64	0.00	0.6%	0.61	0.00	-0.6%	0.53	0.00	0.7%
	Day	All Hours	0.63	0.01	1.0%	0.69	0.01	1.0%	0.66	0.00	0.3%	0.59	0.01	1.5%
Average Weekend	Mid Peak	4 PM to 9 PM	0.87	0.02	2.7%	0.92	0.02	2.7%	0.91	0.03	2.9%	0.81	0.02	2.5%
	Off Peak	9 PM to 11 PM	0.59	0.00	-0.6%	0.65	0.00	0.7%	0.62	-0.01	-1.0%	0.54	0.00	-0.5%
	Super Off Peak	11 PM to 4 PM	0.70	0.00	0.3%	0.78	0.01	0.7%	0.74	0.01	1.2%	0.65	0.00	-0.6%
	Day	All Hours	0.67	0.00	0.5%	0.74	0.01	1.2%	0.71	0.00	0.5%	0.62	0.00	0.3%
Monthly System Peak Day	Mid Peak	4 PM to 9 PM	0.95	0.05	4.7%	0.93	0.02	2.0%	1.02	0.04	3.8%	0.90	0.06	6.3%
	Off Peak	11 AM to 4 PM, 9 PM to 11 PM	0.61	0.01	1.3%	0.66	0.00	0.5%	0.65	0.00	0.2%	0.57	0.02	2.7%
	Day	All Hours	0.68	0.02	2.3%	0.71	0.01	0.9%	0.73	0.01	1.2%	0.64	0.02	3.8%

* A shaded cell indicates estimate is not statistically significant

Figure 4.3-13 shows the mid peak period load reductions on weekdays for non-CARE/FERA and CARE/FERA customers, and Table 4.3-10 and Table 4.3-11 show the load impacts for each rate period and day type for the two segments. Load reductions were statistically significant for all customer segments and climate regions except for CARE/FERA customers in the moderate and cool climate regions. The differences in absolute impacts between CARE/FERA and non-CARE/FERA customers were statistically significant for the service territory as a whole as well as in the moderate and cool climate regions.

As seen in Table 4.3-10 and Table 4.3-11, there are significant average weekday load reductions for non-CARE/FERA customers in the SCE territory as a whole. Load reductions were also significant, and over 1%, for non-CARE/FERA customers on average weekends and monthly system peak days.

Figure 4.3-13: Average Load Impacts for Mid Peak Period for SCE Rate 3 for CARE/FERA and Non-CARE/FERA Customers
(Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	All		Hot		Moderate		Cool	
Percent Impact	0.7%	4.0%	1.9%	2.3%	0.4%	3.8%	0.5%	4.7%
Absolute Impact	0.00	0.04	0.01	0.02	0.00	0.04	0.00	0.04

Table 4.3-10: Rate 3 Load Impacts by Rate Period and Day Type – Non-CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 3														
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Mid Peak	4 PM to 9 PM	0.90	0.04	4.0%	0.95	0.02	2.3%	0.95	0.04	3.8%	0.84	0.04	4.7%
	Off Peak	9 PM to 4 PM	0.61	0.00	0.2%	0.69	0.00	0.6%	0.66	-0.01	-1.1%	0.56	0.01	1.1%
	Day	All Hours	0.67	0.01	1.2%	0.74	0.01	1.0%	0.72	0.00	0.3%	0.62	0.01	2.1%
Average Weekend	Mid Peak	4 PM to 9 PM	0.93	0.03	3.0%	0.99	0.03	2.8%	0.99	0.03	3.2%	0.87	0.03	3.0%
	Off Peak	9 PM to 11 PM	0.62	0.00	-0.6%	0.70	0.01	0.8%	0.67	-0.01	-1.7%	0.57	0.00	-0.1%
	Super Off Peak	11 PM to 4 PM	0.76	0.00	0.4%	0.85	0.00	0.1%	0.81	0.01	1.0%	0.70	0.00	0.1%
	Day	All Hours	0.72	0.00	0.6%	0.79	0.01	1.2%	0.77	0.00	0.2%	0.66	0.01	0.8%
Monthly System Peak Day	Mid Peak	4 PM to 9 PM	1.02	0.06	5.8%	0.99	0.03	3.1%	1.10	0.06	5.4%	0.96	0.06	6.8%
	Off Peak	11 AM to 4 PM, 9 PM to 11 PM	0.65	0.01	1.9%	0.70	0.01	1.1%	0.71	0.00	0.2%	0.60	0.02	3.6%
	Day	All Hours	0.73	0.02	3.0%	0.76	0.01	1.6%	0.79	0.01	1.7%	0.68	0.03	4.5%

* A shaded cell indicates estimate is not statistically significant

Table 4.3-11: Rate 3 Load Impacts by Rate Period and Day Type –CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 3														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Mid Peak	4 PM to 9 PM	0.70	0.00	0.7%	0.80	0.01	1.9%	0.73	0.00	0.4%	0.64	0.00	0.5%
	Off Peak	9 PM to 4 PM	0.49	0.00	-0.1%	0.57	0.00	0.6%	0.51	0.00	0.4%	0.45	0.00	-1.0%
	Day	All Hours	0.54	0.00	0.1%	0.62	0.01	1.0%	0.55	0.00	0.4%	0.49	0.00	-0.6%
Average Weekend	Mid Peak	4 PM to 9 PM	0.71	0.01	1.5%	0.81	0.02	2.3%	0.74	0.01	2.0%	0.65	0.00	0.7%
	Off Peak	9 PM to 11 PM	0.50	0.00	-0.3%	0.58	0.00	0.5%	0.52	0.00	0.5%	0.46	-0.01	-1.7%
	Super Off Peak	11 PM to 4 PM	0.58	0.00	0.0%	0.67	0.01	2.1%	0.61	0.01	1.7%	0.52	-0.02	-3.0%
	Day	All Hours	0.56	0.00	0.2%	0.65	0.01	1.3%	0.59	0.01	1.2%	0.51	-0.01	-1.4%
Monthly System Peak Day	Mid Peak	4 PM to 9 PM	0.80	0.01	1.6%	0.84	0.00	-0.1%	0.85	0.00	-0.2%	0.73	0.03	4.5%
	Off Peak	11 AM to 4 PM, 9 PM to 11 PM	0.52	0.00	-0.3%	0.58	0.00	-0.8%	0.55	0.00	0.0%	0.48	0.00	-0.4%
	Day	All Hours	0.58	0.00	0.3%	0.63	0.00	-0.6%	0.61	0.00	0.0%	0.53	0.01	1.0%

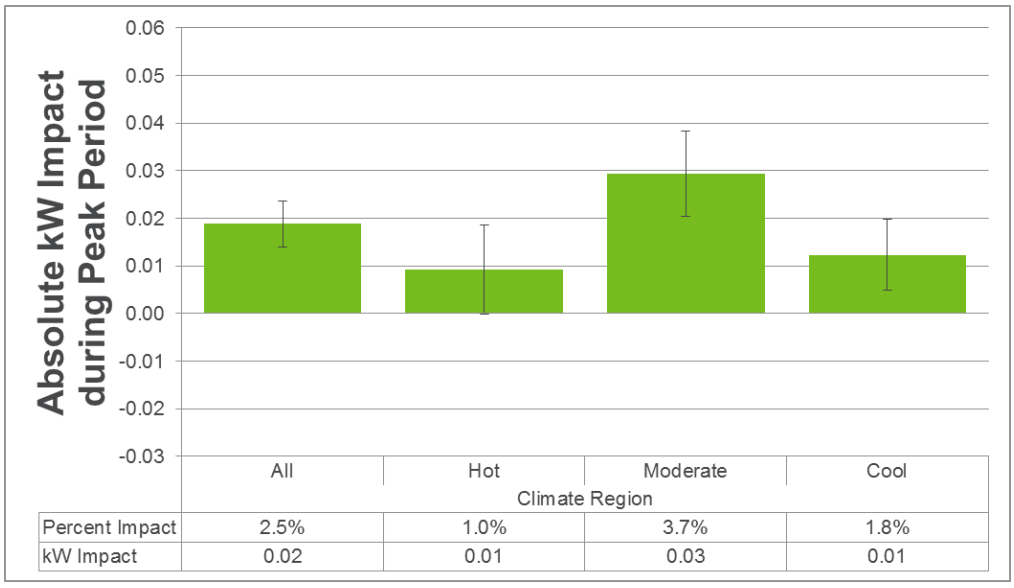
* A shaded cell indicates estimate is not statistically significant

Spring Load Impacts

Figure 4.3-14 shows peak period load reductions on average weekdays during the spring period, which includes March, April, and May. Load reductions are significant in the moderate and cool climate zones, with percent impacts of 3.7% and 1.8%, respectively. For the service territory as a whole, customers reduced their peak period energy use by 2.5% or 0.02 kW. Spring impacts for each climate region in SCE's territory were smaller than those for PG&E's Rate 1, except in the moderate climate region where they were nearly identical (3.7% and 0.03 kW).

Table 4.3-12 contains estimates of load impacts for all relevant rate periods and day types. Peak demand was the greatest among customers in the hot climate region at 0.90 kW, but impacts were not statistically significant. On the average weekend, customers in SCE's territory had percent impacts equal to 1.4% or 0.01 kW during the mid peak period. Customers increased electricity use during the super off peak period on weekends but not weekdays. On weekdays, the average reduction in daily electricity use was statistically significant in only the hot climate regions.

Figure 4.3-14: Average Load Impacts for Peak Period for SCE Rate 3[45]
(Positive values represent load reductions)



	All	Hot	Moderate	Cool
Percent Impact	2.5%	1.0%	3.7%	1.8%
kW Impact	0.02	0.01	0.03	0.01

[45] SCE Rate 3 spring impacts represent March 2017 through May 2017.

Table 4.3-12: Rate 3 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

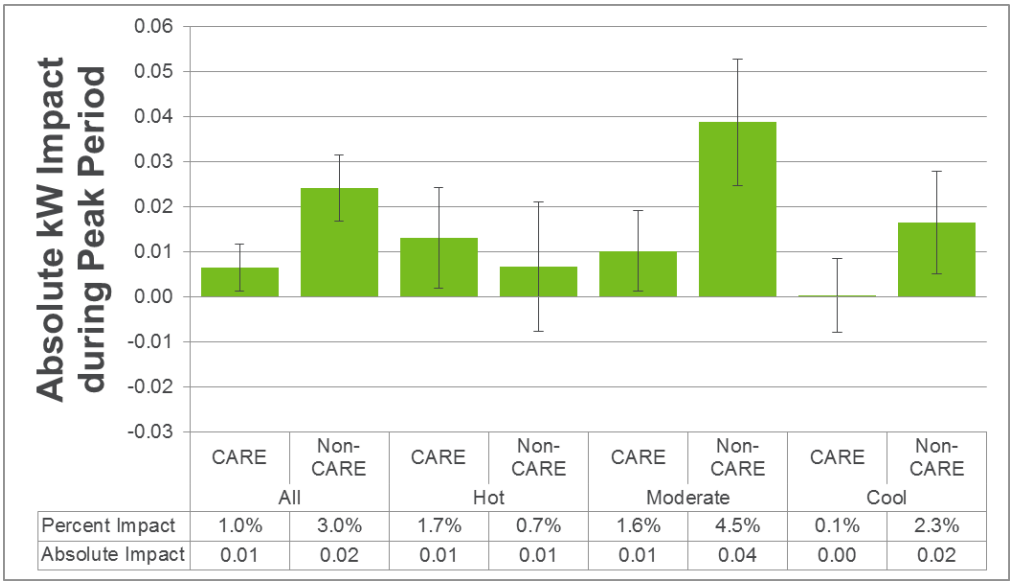
Rate 3														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.75	0.02	2.5%	0.90	0.01	1.0%	0.79	0.03	3.7%	0.67	0.01	1.8%
	Off Peak	9 PM to 11 AM	0.49	-0.01	-1.0%	0.57	0.00	0.6%	0.52	-0.01	-2.7%	0.45	0.00	0.0%
	Super Off Peak	11 AM to 4 PM	0.58	0.00	0.3%	0.77	0.01	0.9%	0.61	0.00	0.0%	0.50	0.00	0.5%
	Day	All Hours	0.56	0.00	0.2%	0.68	0.01	0.8%	0.59	0.00	-0.3%	0.51	0.00	0.6%
Average Weekend	Mid Peak	4 PM to 9 PM	0.76	0.01	1.4%	0.91	0.01	0.8%	0.81	0.02	2.8%	0.69	0.00	0.3%
	Off Peak	9 PM to 11 PM	0.50	-0.01	-1.1%	0.58	0.00	0.5%	0.52	-0.01	-1.9%	0.46	0.00	-0.7%
	Super Off Peak	11 PM to 4 PM	0.66	-0.01	-2.0%	0.84	-0.01	-1.2%	0.71	-0.01	-1.6%	0.58	-0.02	-2.7%
	Day	All Hours	0.59	0.00	-0.6%	0.70	0.00	0.1%	0.62	0.00	-0.6%	0.53	0.00	-0.9%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.91	0.03	3.4%	1.15	-0.01	-0.8%	1.06	0.04	3.8%	0.73	0.03	4.7%
	Off Peak	9 PM to 11 AM	0.51	0.00	0.1%	0.61	0.01	1.7%	0.55	-0.01	-1.8%	0.45	0.01	1.5%
	Super Off Peak	11 AM to 4 PM	0.71	0.01	1.8%	0.98	-0.02	-1.8%	0.82	0.02	2.6%	0.56	0.01	2.5%
	Day	All Hours	0.64	0.01	1.5%	0.80	0.00	0.1%	0.71	0.01	1.0%	0.53	0.01	2.6%

* A shaded cell indicates estimate is not statistically significant

Figure 4.3-15 shows the peak period load reductions on weekdays for non-CARE/FERA and CARE/FERA customers in the spring period. Table 4.3-13 and Table 4.3-14 show the load impacts for each rate period and day type for the two segments. Load reductions were not statistically significant for non-CARE/FERA customers in the hot climate region and CARE/FERA customers in the cool climate region. There was a statistically significant difference in absolute impacts between CARE/FERA and non-CARE/FERA customers in the moderate and cool climate regions and in the territory as a whole.

As seen in Table 4.3-13 and Table 4.3-14, there are significant average weekday load reductions for CARE/FERA customers in the SCE territory as a whole and in the hot and moderate climate regions.

Figure 4.3-15: Average Load Impacts for Peak Period for SCE Rate 3 for CARE/FERA and Non-CARE/FERA Customers (Positive values represent load reductions)



	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	1.0%	3.0%	1.7%	0.7%	1.6%	4.5%	0.1%	2.3%
Absolute Impact	0.01	0.02	0.01	0.01	0.01	0.04	0.00	0.02

Table 4.3-13: Rate 3 Load Impacts by Rate Period and Day Type – Non-CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

Rate 3														
Day Type	Period	Hours	All, Non-CARE			Hot, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.80	0.02	3.0%	0.98	0.01	0.7%	0.86	0.04	4.5%	0.72	0.02	2.3%
	Off Peak	9 PM to 11 AM	0.53	-0.01	-1.4%	0.62	0.00	0.5%	0.56	-0.02	-3.9%	0.49	0.00	0.2%
	Super Off Peak	11 AM to 4 PM	0.61	0.00	0.0%	0.84	0.00	0.4%	0.66	-0.01	-1.0%	0.53	0.00	0.9%
	Day	All Hours	0.60	0.00	0.1%	0.74	0.00	0.5%	0.64	-0.01	-1.0%	0.54	0.01	1.0%
Average Weekend	Mid Peak	4 PM to 9 PM	0.82	0.01	1.3%	1.00	0.00	-0.2%	0.89	0.03	3.0%	0.74	0.00	0.2%
	Off Peak	9 PM to 11 PM	0.54	-0.01	-1.4%	0.63	0.00	0.6%	0.57	-0.02	-2.9%	0.49	0.00	-0.6%
	Super Off Peak	11 PM to 4 PM	0.71	-0.02	-2.8%	0.93	-0.01	-1.1%	0.77	-0.02	-2.6%	0.63	-0.02	-3.5%
	Day	All Hours	0.63	-0.01	-1.0%	0.77	0.00	0.0%	0.68	-0.01	-1.3%	0.57	-0.01	-1.0%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.98	0.04	4.1%	1.25	0.00	-0.1%	1.16	0.05	4.2%	0.79	0.04	5.5%
	Off Peak	9 PM to 11 AM	0.55	0.00	0.2%	0.67	0.01	2.1%	0.60	-0.02	-2.7%	0.49	0.01	2.3%
	Super Off Peak	11 AM to 4 PM	0.76	0.01	1.6%	1.07	-0.03	-2.4%	0.89	0.01	1.4%	0.59	0.02	3.4%
	Day	All Hours	0.68	0.01	1.7%	0.87	0.00	0.3%	0.78	0.00	0.4%	0.57	0.02	3.5%

* A shaded cell indicates estimate is not statistically significant

Table 4.3-14: Rate 3 Load Impacts by Rate Period and Day Type –CARE/FERA Customers*
(Positive values represent load reductions, negative values represent load increases)

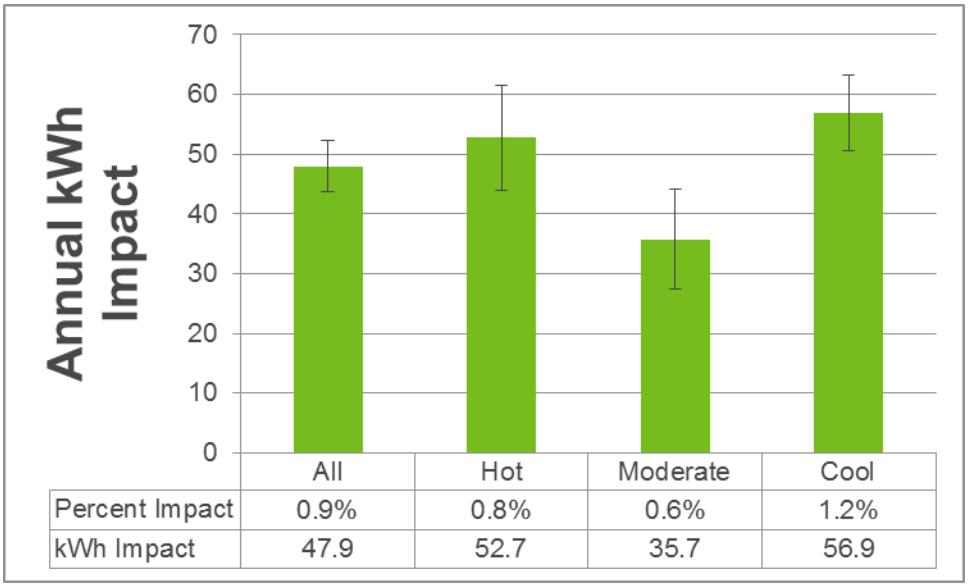
Rate 3														
Day Type	Period	Hours	All, CARE			Hot, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.63	0.01	1.0%	0.78	0.01	1.7%	0.65	0.01	1.6%	0.55	0.00	0.1%
	Off Peak	9 PM to 11 AM	0.41	0.00	0.2%	0.49	0.00	0.7%	0.42	0.00	0.7%	0.36	0.00	-0.7%
	Super Off Peak	11 AM to 4 PM	0.49	0.01	1.1%	0.65	0.01	1.9%	0.52	0.01	2.5%	0.41	0.00	-1.2%
	Day	All Hours	0.47	0.00	0.6%	0.59	0.01	1.3%	0.49	0.01	1.3%	0.41	0.00	-0.6%
Average Weekend	Mid Peak	4 PM to 9 PM	0.63	0.01	1.8%	0.77	0.02	2.7%	0.66	0.01	2.3%	0.55	0.00	0.8%
	Off Peak	9 PM to 11 PM	0.41	0.00	-0.1%	0.50	0.00	0.2%	0.43	0.00	0.7%	0.37	0.00	-1.1%
	Super Off Peak	11 PM to 4 PM	0.55	0.00	0.4%	0.69	-0.01	-1.4%	0.58	0.01	1.1%	0.47	0.00	0.5%
	Day	All Hours	0.49	0.00	0.6%	0.60	0.00	0.5%	0.51	0.01	1.2%	0.43	0.00	-0.2%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.77	0.01	1.4%	0.99	-0.02	-2.3%	0.87	0.02	2.6%	0.59	0.01	1.8%
	Off Peak	9 PM to 11 AM	0.42	0.00	-0.1%	0.53	0.01	1.0%	0.45	0.00	0.5%	0.36	0.00	-1.4%
	Super Off Peak	11 AM to 4 PM	0.61	0.01	2.4%	0.84	0.00	-0.5%	0.69	0.04	5.7%	0.45	0.00	-1.1%
	Day	All Hours	0.54	0.01	1.0%	0.69	0.00	-0.4%	0.59	0.01	2.4%	0.43	0.00	-0.4%

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 4.3-16 shows the annual conservation effect of customers on SCE's Rate 3. Because of Rate 3's late start, the estimates shown below do not include savings for the month of July. Energy savings were similar between climate regions, but customers in the cool climate region saved the most (1.2% or 56.9 kWh). In the service territory as a whole, customers reduced their consumption by 0.9% or 47.9 kWh.

Figure 4.3-16: Average Annual Conservation Effect for SCE Rate 3
(Positive values represent usage reductions)

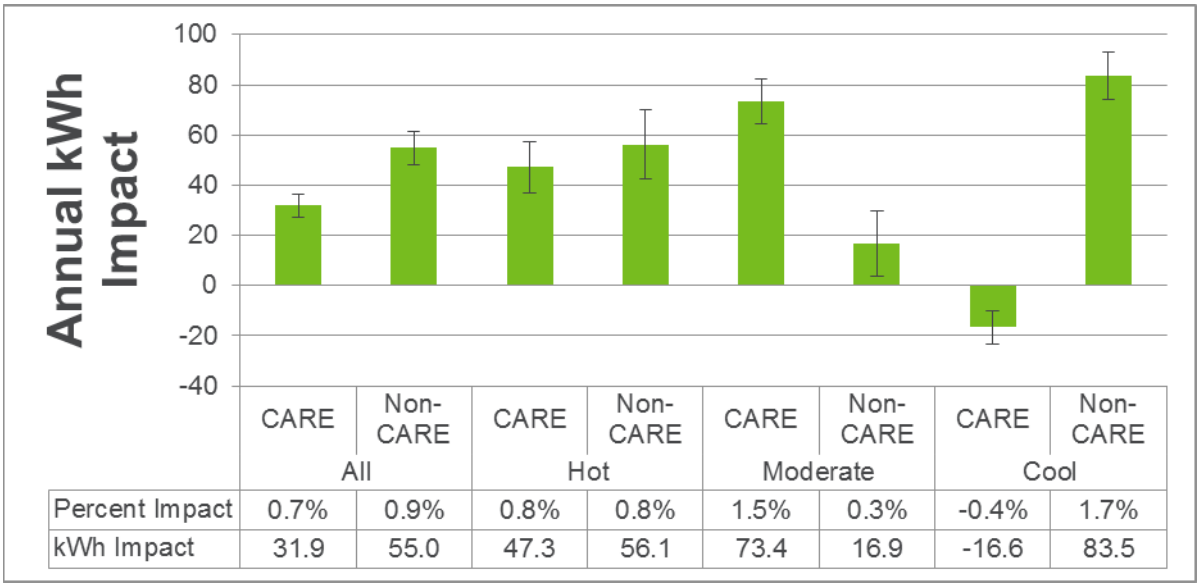


	All	Hot	Moderate	Cool
Percent Impact	0.9%	0.8%	0.6%	1.2%
kWh Impact	47.9	52.7	35.7	56.9

Figure 4.3-17 presents the annual conservation effect for CARE/FERA customers and non-CARE/FERA customers. These estimates are similar to those for Rate 2 in that all customer segments saved energy with the exception of CARE/FERA customers in the cool climate region. Their non-CARE/FERA counterparts saved the most, however, with a conservation effect of 1.7% or 83.5 kWh. CARE/FERA customers and non-CARE/FERA customers in the hot climate region both reduced their energy use by 0.8%.

Figure 4.3-17: Average Annual Conservation Effect for SCE Rate 3 for CARE/FERA and Non-CARE/FERA Customers

(Positive values represent usage reductions)



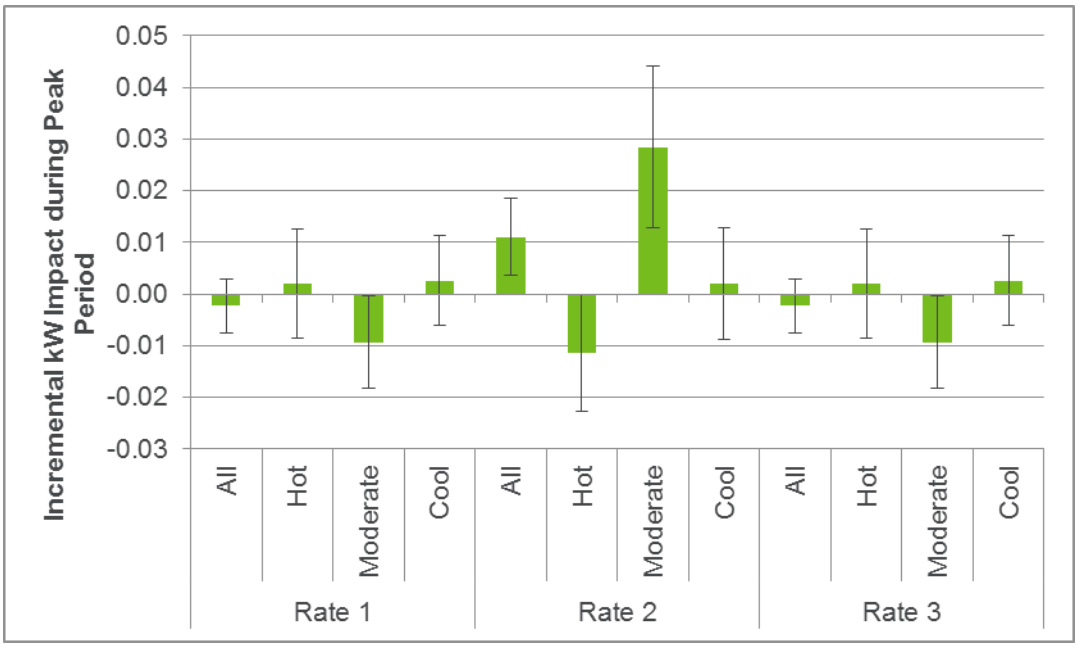
	All		Hot		Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
Percent Impact	0.7%	0.9%	0.8%	0.8%	1.5%	0.3%	-0.4%	1.7%
kWh Impact	31.9	55.0	47.3	56.1	73.4	16.9	-16.6	83.5

4.3.4 Advanced ME&O

SCE varied the education and outreach provided to participants who were on the three TOU rates. The majority of customers (75%) on each of the three TOU rates received what SCE describes as enhanced education and outreach while the remainder received fewer contacts during the post enrollment phase. The customers chosen at random to receive the enhanced education treatment for each rate received a postcard at the end of August containing tips and reminders about their rate. Starting in Late September, the roughly 19% of participants in the enhanced education group who indicated at the time of enrollment that they were willing to receive information via text messages were sent additional reminders and tips via text message.

Figure 4.3-18 shows the average incremental impact attributable to the enhanced education and outreach for each climate region and rate, as well as for the territory as a whole. In general, customers receiving the enhanced treatment did not have statistically significantly greater impacts than those who did not. The one exception was customers in the moderate climate region on Rate 2.

Figure 4.3-18: Incremental Impacts among Customers Receiving Advanced ME&O



4.3.5 Comparison Across Rates

Figure 4.3-19 compares the load impacts for the three rates tested by SCE for the common set of peak-period hours from 5 to 8 PM for the entire winter. Using a common set of hours reduces differences in impacts across rates that might be due to differences in the number of hours included in the peak period or the timing of those hours. The hours from 5 to 8 PM define the peak period for Rate 2, which is a two period rate in the winter. Rates 1 and 3 are two period rates with the same peak period, from 2 to 8 PM. During the winter period, the peak-to-off-peak ratio[46] is similar for all three rates, so we would expect to see similar impacts during the common peak periods. Generally, impacts were not statistically significantly different between rates, with the exception of the hot climate region. Customers on SCE's Rate 1 in the hot climate region increased their demand between 5 and 8 PM during the winter period, while customers on the other two rates had statistically significant load reductions.

Figure 4.3-20 presents the average daily kWh impacts for each rate during the winter period. Daily impacts vary across rates and climate regions with no clear pattern.

[46] The peak-to-off-peak price ratio is equal to the peak price divided by the off-peak price as defined in Figures 4.1-1 through 4.1-3

Figure 4.3-19: Average Impacts from 5 to 8 PM Across Rates

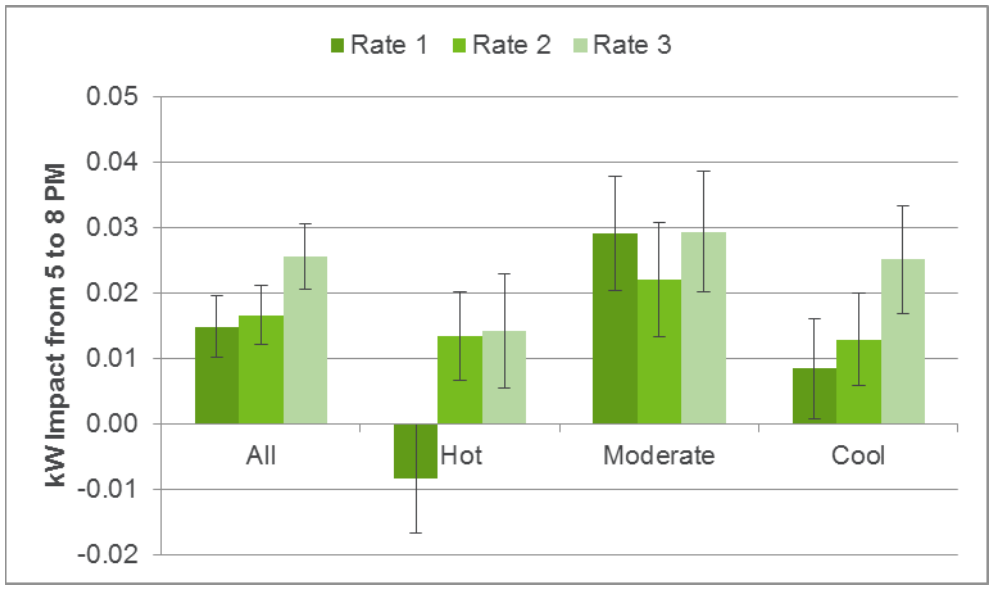
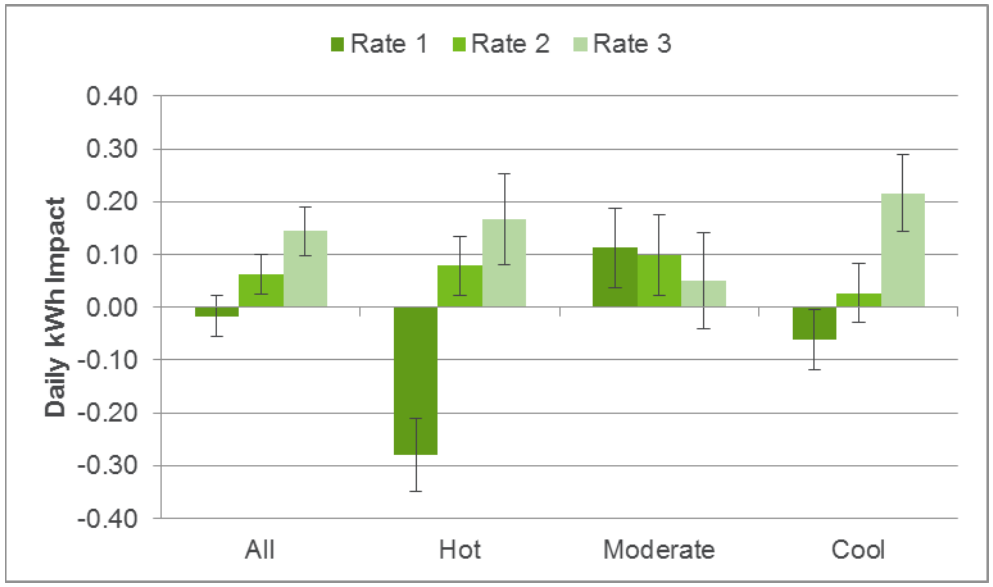


Figure 4.3-20: Average Daily kWh Impacts Across Rates



4.4 Bill Impacts

This section summarizes the bill impact estimates for the three rate treatments tested by SCE. The CPUC resolution approving SCE's pilot requires that bill impacts be estimated for the following rates, customer segments, and climate regions:

- **For Rate 2-** Seniors, CARE/FERA customers, non-CARE/FERA customers, households with incomes below 100% of FPG, and households with incomes between 100% and 200% of FPG in SCE's hot climate region; and
- **For all rates-** For CARE/FERA and non-CARE/FERA customers on each rate across SCE's service territory as a whole and for each climate region.

In addition to these required segments, Nexant estimated bill impacts for seniors, households with incomes below 100% of FPG, and households with incomes between 100% and 200% of FPG in SCE's hot climate region for Rate 1 and Rate 3. Bill impacts are reported as the average monthly impact for the winter months of October, November, December, January, February, March, April, and May[47] and for the first full year of the pilot. Three analyses that were conducted for the First Interim Report were conducted again for this report:

- **Structural benefiter/non-benefiter analysis based on pretreatment usage-** Displaying the proportions of structural benefiters and non-benefiters for each rate and relevant customer segment based on pretreatment data on an annual and seasonal (winter and spring) season basis;
- **Estimation of the total bill impact due to both the difference in the tariffs and behavior change**[25]- Displaying the bill impact for each rate and relevant customer segment due to structural differences in the rate mitigated by changes in behavior; and
- **Change in the distribution of bill impacts due to behavior change-** Displaying the distribution curves of bill impacts (percentage of customers with bill impacts within $10 incremental bins) with and without behavior change in the same graph to illustrate if the distribution for participants shifted to the left or changed shape compared with the distribution for control customers without behavior change.

A more detailed explanation of each type of analysis and how the analysis was conducted is contained in Section 3.7 of the First Interim Report. The remainder of this section is organized according to the three analysis types summarized above—that is, bill impacts are presented for each rate, relevant customer segment, and climate region for each of the three analyses.

Unlike the First Interim Report which relied on only one tariff per pilot rate and OAT, the impacts presented in this report are based on two SCE tariffs. All monthly bills from July 2016 through December 2016 (and their corresponding pretreatment months) are based on the tariffs that were in effect at the start of the pilot. Estimated bills for January 2017 through June 2017 (and their corresponding pretreatment months) are based on the January 2017 tariff. The reason for incorporating a second tariff was a significant change in the structure of SCE's OAT. At the start of the pilot, the OAT was a three-tiered rate. In January 2017, the rate transitioned to a two-tiered structure (with a surcharge for high

[47] The winter period for Rate 3 ends in February. The spring period is March, April, and May. July 2016 is not included in the analysis for Rate 3 due to the late start in enrollment.

usage). To better reflect the conditions customers actually experienced, Nexant chose to include this new rate in the analysis. Because of this change, the annual structural benefiter analysis was updated for this report.

4.4.1 Structural Benefiter/Non-Benefiter Analysis Based on Pretreatment Usage

As with PG&E, the structural benefiter analysis was conducted for the winter, spring, and annual time periods using pretreatment usage data for the treatment group for each rate and relevant customer segment. Annual impacts were based on hourly load data from May 2015 through April 2016[48]. Winter impacts were based on May 2015 and October 2015 through April 2016 for Rate 1 and Rate 2 and October 2015 through February 2016 for Rate 3. For Rate 3 only, spring impacts were based on May 2015[49], March 2016, and April 2016. Monthly bills were estimated for each treatment group customer on the OAT and TOU rate using the hourly load data. The difference in bills based on the TOU rate and the OAT determines if a customer is a structural benefiter, a structural non-benefiter, or falls in a neutral range defined as having a structural bill impact between ±$3.

Final results from the structural benefiter / non-benefiter analysis are presented in column graphs, and shown as percentages for the winter season and on an annual basis. For each rate and relevant segment, the percentage of customers who are non-benefiters, neutral (+/- $3), or benefiters based on their average monthly bills for the time period of interest are shown as individual columns. The three columns within each rate and segment combination total to 100%, thus showing the distribution of structural benefiters and non-benefiters for each rate and segment of interest.

Figure 4.4-1 presents the outcome of the structural benefiter analysis for Rate 1 at the aggregate level across climate regions for all customers as well as for CARE/FERA and non-CARE/FERA. The graph on the left presents the analysis on an annual basis, and the graph on the right presents the findings for the winter period. Nearly all non-CARE/FERA customers are structural benefiters in the winter season. However, nearly half of CARE/FERA customers are in the neutral category in the winter months. Even though most of these customers have a structural gain on the winter rates, their structural gains are smaller than $3 – putting them in the neutral category.

[48] Customers were aware of the pilot in May 2016; May 2015 was used instead.

[49] Customers were aware of the pilot in May 2016; May 2015 was used instead.

Figure 4.4-1: Rate 1 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

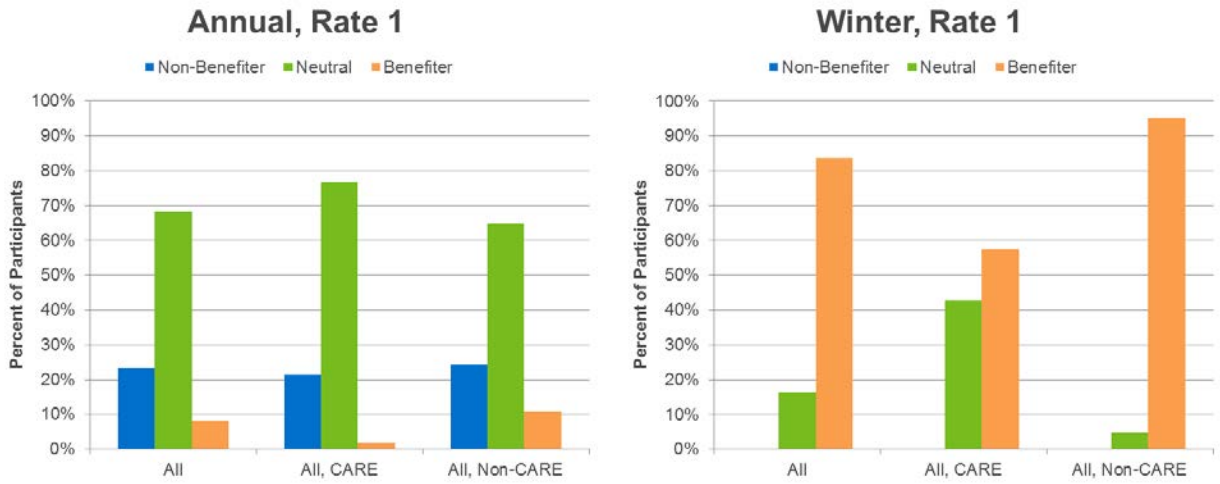


Figure 4.4-2 presents the outcome of the structural benefiter analysis for Rate 1 at the detailed segment level by climate region. The findings at the aggregate level still hold, with a majority of customers being structural benefiters in the winter season. The non-CARE/FERA segments in all three climate regions have a greater proportion of benefiters than the CARE/FERA segments on an annual basis. About half of non-CARE/FERA and CARE/FERA customers in the hot climate regions are structural non-benefiters on an annual basis.

Figure 4.4-2: Rate 1 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region

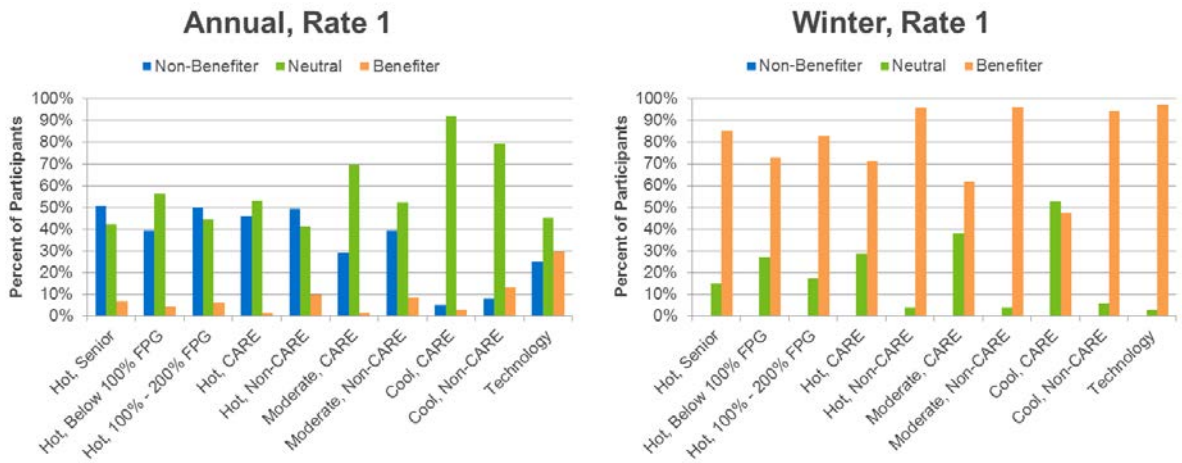


Figure 4.4-3 presents the outcome of the structural benefiter analysis for Rate 2 at the aggregate level across climate regions. SCE's Rate 2 differs from Rate 1 in several important ways. Both rates have three rate periods on winter weekdays; however the Rate 2 peak period is only three hours, from 5 to 8 PM,

compared to six hours on Rate 1. Overall, the general pattern of structural benefiters, non-benefiters, and neutrals is similar between Rate 1 and Rate 2, however Rate 2 has a smaller proportion of customers in the neutral category and a greater proportion of customers are benefiters.

Figure 4.4-3: Rate 2 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

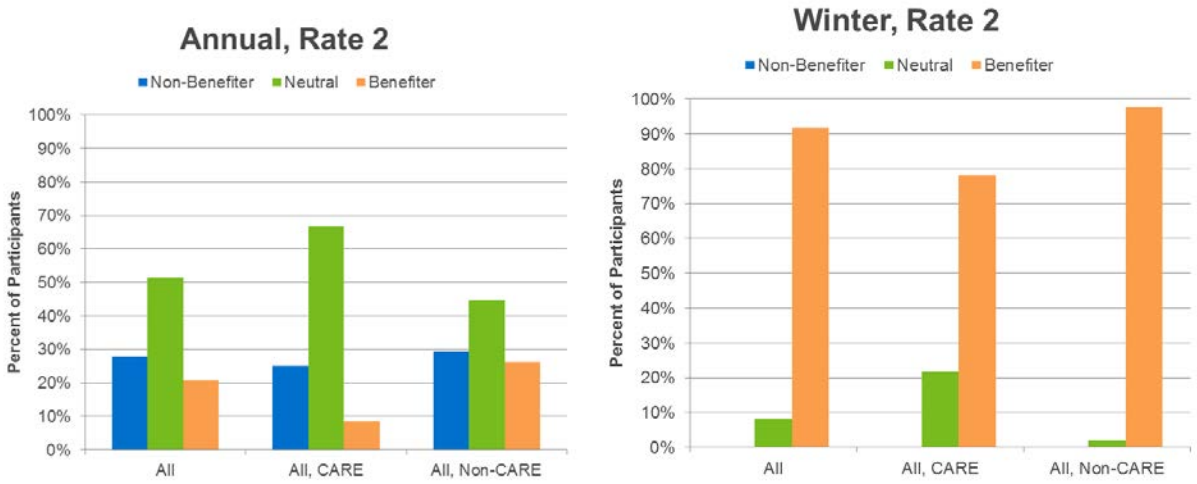


Figure 4.4-4 presents the outcome of the structural benefiter analysis for Rate 2 at the detailed segment level by climate region. On an annual and winter basis, more customers are benefiters when compared to Rate 1. This is especially noticeable in the winter months among CARE/FERA customers in the cool climate region where 97% of customers are benefiters on Rate 2 but only 47% are benefiters on Rate 1.

Figure 4.4-4: Rate 2 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region

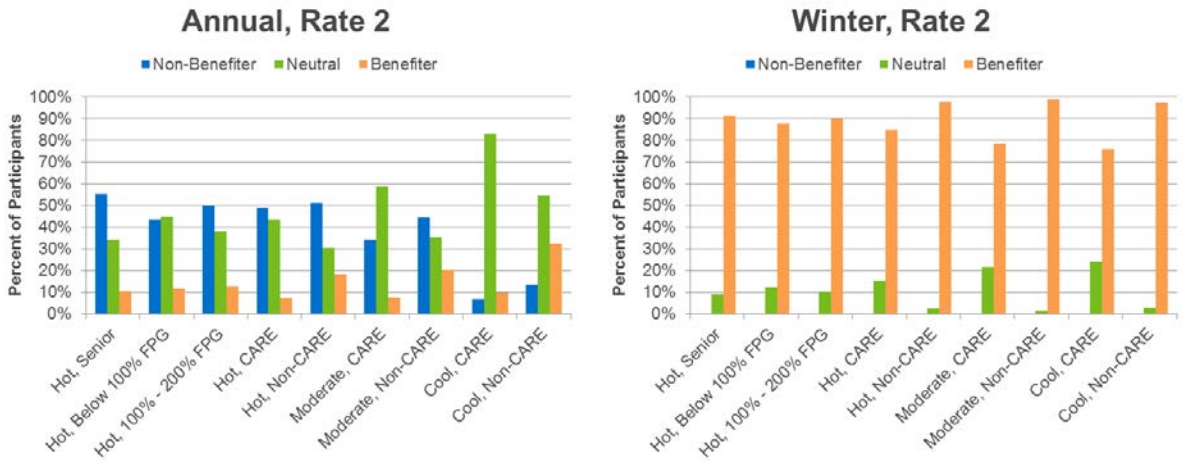


Figure 4.4-5 presents the distribution of structural benefiters, non-benefiters, and neutral customers for Rate 3 at the aggregate level across climate regions on an annual, winter, and spring basis. During the

winter months, the distribution of customers is very different from those for the previous two rates. While most customers are structural benefiters in the winter months on Rate 1 and Rate 2, nearly half of customers are non-benefiters on Rate 3. While a majority of customers may experience structural losses, there is a small number of customers who face very large structural gains, which will be discussed in more detail in the following two sections of this report.

In the spring period (March through April), about one third of customers fall into each category for the service territory as a whole. CARE/FERA customers are more likely to be in the neutral category than non-CARE/FERA customers.

Figure 4.4-5: Rate 3 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

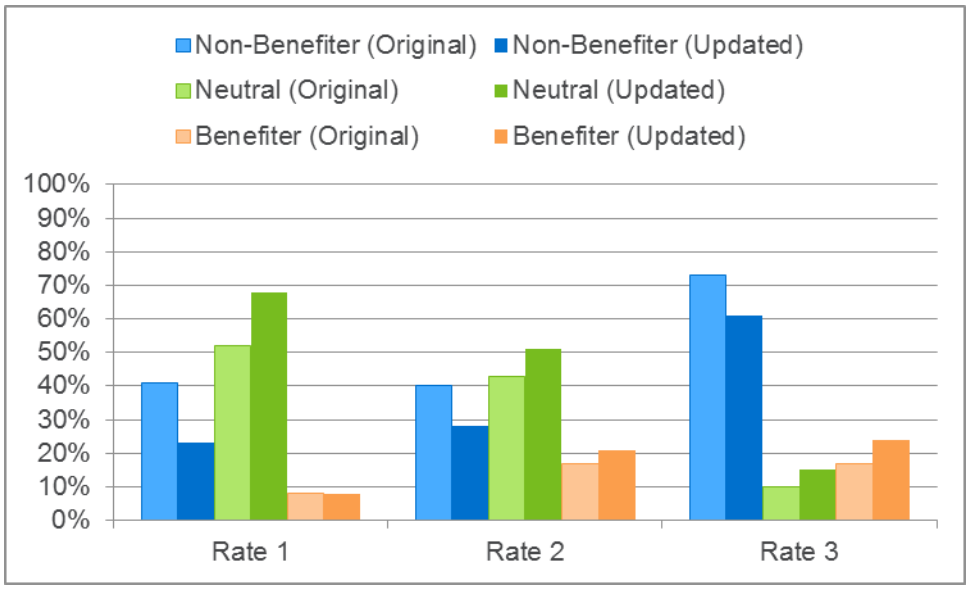
Figure 4.4-6 presents the outcome of the structural benefiter analysis for Rate 3 at the detailed segment level by climate region. In the winter period, the customers who are most likely to be structural benefiters are seniors in the hot climate region, and non-CARE/FERA customers in the hot, moderate, and cool regions. Again, this pattern is quite different from those for Rates 1 and 2. In the spring, nearly

half of non-CARE/FERA customers in the hot climate region are structural benefiters, while their CARE/FERA counterparts fall mostly in the neutral category.

Figure 4.4-6: Rate 3 Structural Benefiter / Non-Benefiter Analysis Detailed Segments by Climate Region

Figure 4.4-7 presents a comparison of the annual structural benefiter analysis using two versions of the pilot tariffs and the OAT. The lighter bars represent the outcome of the analysis based on the June 2016 tariffs, which were in effect at the launch of the pilot. The values here match what was reported in the First Interim Report. The darker bars are based on a combination of the original and January 2017 tariffs. The original tariff was used for the months of June through December, and the new tariffs were used for January through May. Incorporating the updated tariffs increases the number of customers in the neutral category and reduces the number of customers in the non-benefiter category. For a comparison of the two tariffs, see Appendix B.

Figure 4.4-7: Comparison of Structural Benefiter Analysis between Original and Updated Tariffs



4.4.2 Estimation of the Total Bill Impact Due to Differences in the Tariffs and Behavior Change

Total bill impacts experienced by customers on a TOU rate can be decomposed into two components: the structural impact, and the behavioral impact. As described above, the structural impact represents the change in customer bills based solely on the change in the underlying structure of the rate. In this case, it is the change from the OAT to the time-differentiated TOU pilot rates. The behavioral impact represents how customers change their energy usage in response to the new pricing structure of the rate—which includes higher prices in the afternoon and evening and lower prices at other times of day. During the winter period, nearly all customers on Rate 1 and Rate 2 experienced a decrease in their bills due to the change in tariff alone. Customers also had an opportunity to increase that reduction by changing their energy use behavior in response to the new price signals. As noted above, it is the combination of structural and behavioral bill impacts that produces the total bill impact experienced by the average study participant on each rate.

The results from this analysis represent the total annual cost and average monthly bill across the winter and spring. Three different bills were calculated for each customer segment:[50]

- **No Change in Behavior or Tariff [1]:** This represents what the treatment group bills would have been in the post-treatment period if they were on the OAT and had not changed their behavior
- **No Change in Behavior, Change in Tariff [2]:** This represents what the treatment group bills would have been in the post-treatment period if they were on the TOU rate and had not changed their behavior

[50] See section 3.2.3 in the First Interim Report for additional details on the methodology.

- **Change in Behavior and in Tariff [3]:** This represents what the treatment group bills were in the post-treatment period on the TOU rate with a change in behavior

Based on the components defined above, the following metrics were calculated:

- The difference between **[1]** and **[2]** is the structural bill impact (based on post-treatment usage after adjusting for any pretreatment difference between control and treatment customers);
- The difference between **[1]** and **[3]** is the bill impact due to structural differences in the rates, but mitigated by changes in behavior; and
- The difference between **[2]** and **[3]** is the amount customers were able reduce their bills by changing their behavior.

In the bill impact analysis, a major policy question was to better understand the relationship between the structural bill impacts, and how customers were able to respond. The outcome of this relationship is presented by the "Total Bill Impact" and "Percent Bill Impact" shown in the data table at the bottom of the figures below. These values represent the final outcome incorporating both the structural change, and the customer's behavioral response. Results are organized by rate, climate region, and segment; similarly to the other bill impact analysis sections. For each rate, results are presented for the first year of the pilot, followed by winter (and for Rate 3, spring) estimates.

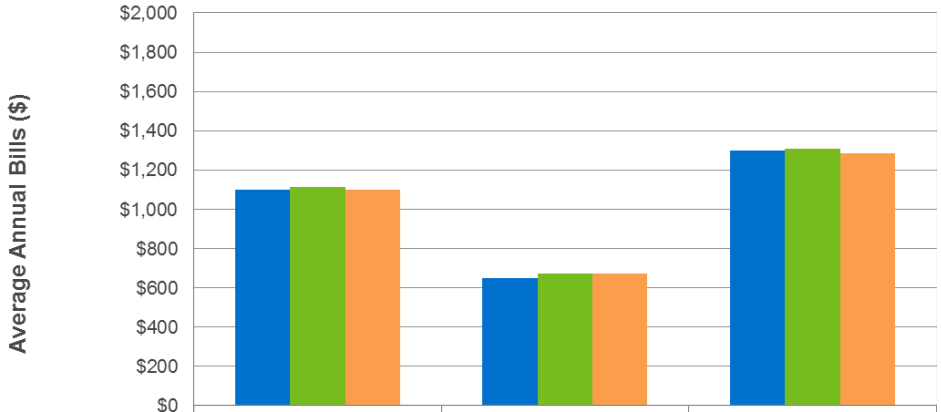
Annual

Figure 4.4-8 presents a set of three average annual bills (the total bill for twelve months, not the average monthly bills) as defined above for the first year of the pilot for all customers, CARE/FERA customers, and non-CARE/FERA customers on Rate 1. The blue bar represents a typical total yearly bill for a customer still on the OAT and not responding to a TOU rate— noted as "No Change in Behavior or Tariff." For the average customer on Rate 1, this dollar amount was $1,101 per month. The green bar represents what a typical total yearly bill would be for a customer who was billed on a TOU rate, but didn't change their energy use behavior— noted as "No Change in Behavior, Change in Tariff." This dollar amount is $1,112 for the average Rate 1 customer. The difference between the two values, $11, is the average increase a customer would see in their bills by changing from the OAT to Rate 1, and not changing their energy use behavior; this is also referred to as the customer's structural loss. The orange bar represents the average Rate 1 customer's total annual bill after factoring in the change in rate from the OAT to the Pilot Rate 1, and then also taking into account any changes in energy use behavior— noted as "With Change in Behavior and Tariff." This bill amount averaged $1,098 for the typical Rate 1 customer. Based on these values, it is possible to estimate the total change in the annual bill including both the change in tariff and in behavior, which, in this instance is a bill reduction of $3 per year (0.3%). This total change is calculated by subtracting the orange ($1,101) from the blue ($1,098).

Non-CARE/FERA customers experienced an average structural loss of $6 (0.4%). Through changes in energy use behavior they were able to offset all of it, resulting in a total annual reduction of $14 (1.1%) after factoring in both changes in the tariff and behavior. It should be noted that the bill impact from behavior change for non-CARE/FERA customers on Rate 1 was statistically significant.

Conversely, CARE/FERA customers were not able to mitigate their structural loss resulting in an annual bill increase of $21 or 3.3%.

Figure 4.4-8: Rate 1 Annual Bill Impact Due to Differences in the Tariff and Behavior Change[51]
All | CARE/FERA | Non-CARE/FERA

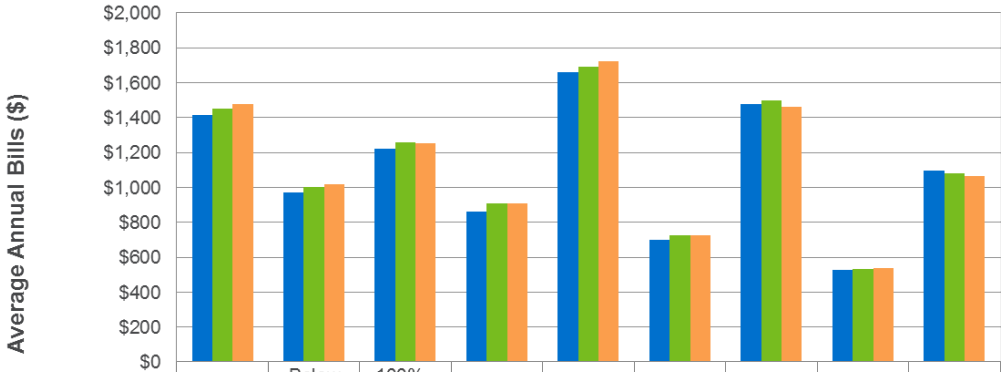


	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$1,101	$651	$1,301
No Change in Behavior, Change in Tariff	$1,112	$671	$1,306
With Change in Behavior and Tariff	$1,098	$673	$1,286
Total Bill Impact	-$3	$21	-$14
Percent Bill Impact	-0.3%	3.3%	-1.1%

Figure 4.4-9 presents the three sets of average annual bills as defined above for the detailed segments by climate region on Rate 1. Non-CARE/FERA customers in the moderate and cool climate regions offset their structural bill increase and ultimately experienced lower total costs by 1.1% and 2.6%, respectively. All other customer segments faced higher costs over the course of the first year, with increases between 1.8% and 5.4%.

[51] Unlike for load impacts, where negative values mean loads went up relative to the reference load, here a negative value means bills fall relative to what they would under the OAT.

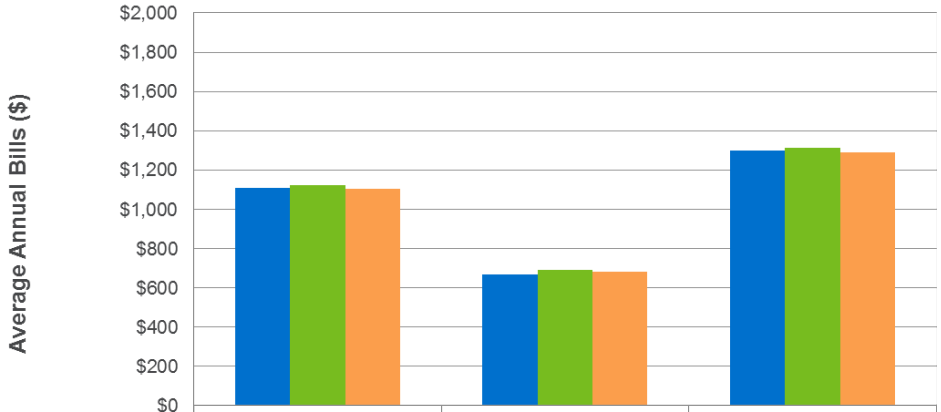
Figure 4.4-9: Rate 1 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$1,415	$971	$1,220	$861	$1,661	$701	$1,477	$526	$1,095
No Change in Behavior, Change in Tariff	$1,453	$1,004	$1,258	$906	$1,693	$726	$1,500	$532	$1,082
With Change in Behavior and Tariff	$1,477	$1,017	$1,252	$908	$1,725	$725	$1,461	$536	$1,067
Total Bill Impact	$62	$46	$32	$47	$64	$24	-$16	$10	-$28
Percent Bill Impact	4.4%	4.7%	2.6%	5.4%	3.8%	3.4%	-1.1%	1.8%	-2.6%

Figure 4.4-10 presents the three sets of average annual bill for all customers, CARE/FERA customers, and non-CARE/FERA customers on Rate 2, which were similar to Rate 1. On average, customers faced structural losses of about $14, or 1.3%. Through changes in behavior, customers were able to mitigate this loss and ultimately did not face meaningful bill impacts. CARE/FERA customers faced total bill increases of about 2.2%, while non-CARE/FERA customers faced bill reductions equal to less than 1%.

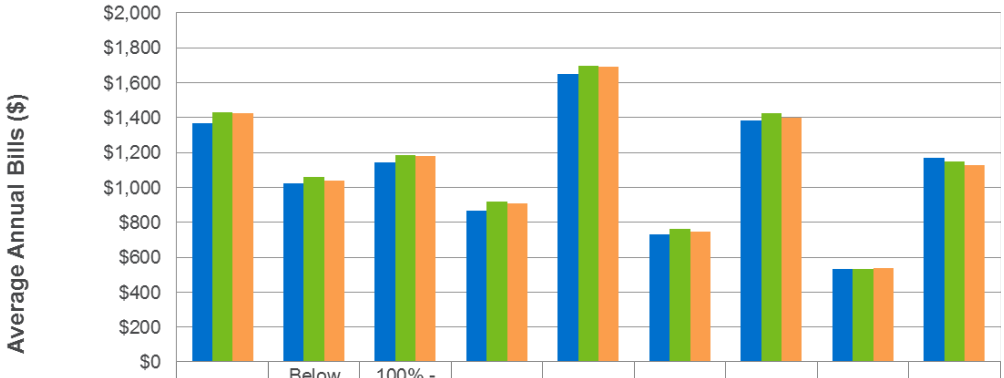
Figure 4.4-10: Rate 2 Annual Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$1,106	$669	$1,300
No Change in Behavior, Change in Tariff	$1,120	$690	$1,311
With Change in Behavior and Tariff	$1,104	$683	$1,290
Total Bill Impact	-$2	$15	-$10
Percent Bill Impact	-0.2%	2.2%	-0.8%

Figure 4.4-11 presents the three sets of average annual bills for the detailed segments by climate region on Rate 2. No customer segment was able to mitigate their small structural losses through changes in behavior, with the exception of non-CARE/FERA customers in the cool climate region. These customers experienced structural gains equal to about $20 or 1.7%. Through changes in behavior, they saved an additional $12, bringing their total annual bill reduction to $42 or 3.6%.

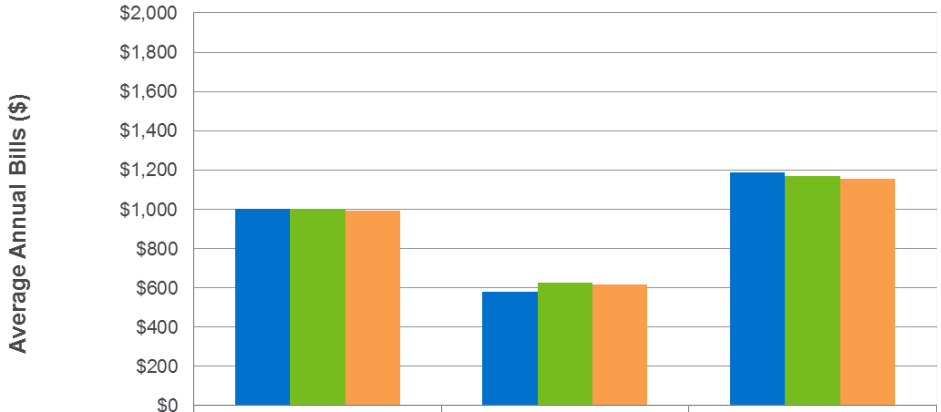
Figure 4.4-11: Rate 2 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$1,370	$1,021	$1,141	$868	$1,649	$731	$1,382	$535	$1,168
No Change in Behavior, Change in Tariff	$1,432	$1,060	$1,186	$919	$1,698	$763	$1,424	$534	$1,148
With Change in Behavior and Tariff	$1,426	$1,040	$1,179	$908	$1,691	$747	$1,401	$539	$1,126
Total Bill Impact	$57	$19	$38	$40	$42	$16	$19	$4	-$42
Percent Bill Impact	4.1%	1.9%	3.4%	4.6%	2.6%	2.2%	1.3%	0.8%	-3.6%

Figure 4.4-12 presents the three sets of total annual bills for the average customer and for CARE/FERA and non-CARE/FERA customers on Rate 3. On average, customers did not face significant structural bill impacts – only about $2 over the course of a year. This is similar to what was seen for Rate 1 and Rate 2. On average, CARE/FERA customers experienced structural losses of $45 or 7.8% and non-CARE/FERA customers faced structural gains equal to about $17 or 1.4%. After the first year of the pilot, CARE/FERA customers faced total bill increases of 6.9%, or about $40, while non-CARE/FERA customers faced bill reductions of 2.7% or $32.

Figure 4.4-12: Rate 3 Annual Bill Impact Due to Differences in the Tariff and Behavior Change[52]
All | CARE/FERA | Non-CARE/FERA

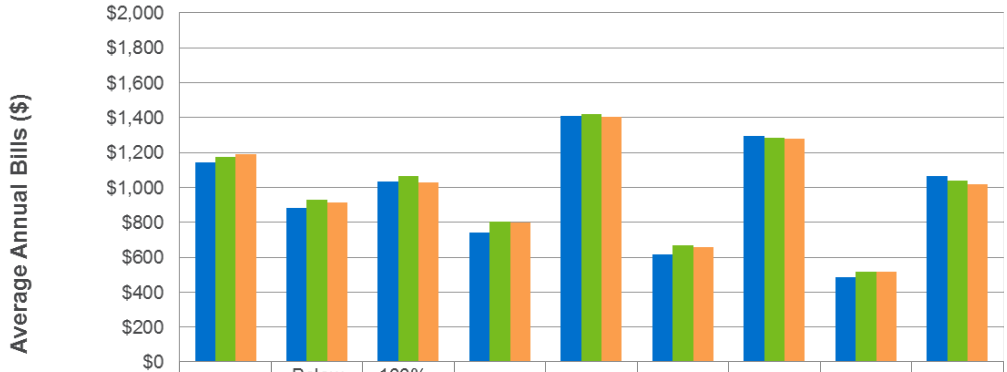


	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$1,001	$579	$1,188
No Change in Behavior, Change in Tariff	$1,003	$624	$1,171
With Change in Behavior and Tariff	$992	$619	$1,157
Total Bill Impact	-$10	$40	-$32
Percent Bill Impact	-1.0%	6.9%	-2.7%

Figure 4.4-13 presents the three sets of annual bills for the average customer on Rate 3 by the detailed segments. Generally, structural bill impacts were greater than those experienced by customers on the other two rates. For example, CARE/FERA customers in the hot climate region had average annual structural losses of $60 or 8%. The same customers on Rate 1 faced structural losses of $45 or 5.2%. These customers were not able to mitigate all of their structural losses through behavior change and ultimately faced average annual increases of $56 or 7.6%.

[52] Estimates for Rate 3 do not include July 2016 due to a late start in enrollment.

Figure 4.4-13: Rate 3 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



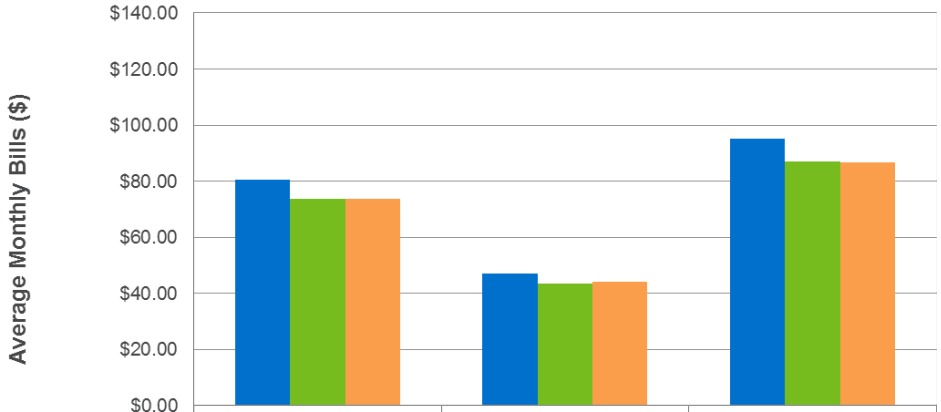
	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$1,144	$882	$1,032	$742	$1,408	$616	$1,295	$483	$1,064
No Change in Behavior, Change in Tariff	$1,176	$929	$1,066	$802	$1,418	$666	$1,282	$518	$1,038
With Change in Behavior and Tariff	$1,190	$914	$1,030	$799	$1,404	$655	$1,276	$519	$1,017
Total Bill Impact	$46	$32	-$2	$56	-$4	$39	-$18	$35	-$47
Percent Bill Impact	4.0%	3.6%	-0.2%	7.6%	-0.3%	6.4%	-1.4%	7.3%	-4.4%

Winter and Spring

Figure 4.4-13 presents the three sets of average monthly bills for all customers and CARE/FERA and non-CARE/FERA customers on Rate 1. It should be noted that, unlike in the prior section, which presented the total change in the bill for the year, the values in this section represent average monthly bill impacts for winter and spring. As such, the total monthly bill impact of negative $6.64 for the average customer shown in Figure 4.4-14 represents a total savings of roughly $53 over the eight month winter period. On average, customers experienced structural gains equal to about $6.65 or 8.3% per month, on average. These customers did not have additional reductions in bills as a result of shifting energy use or reducing energy use overall.

Bill impacts due to behavior change were not statistically significant, so generally speaking total bill impacts were very similar to structural bill impacts for both CARE/FERA and non-CARE/FERA customers.

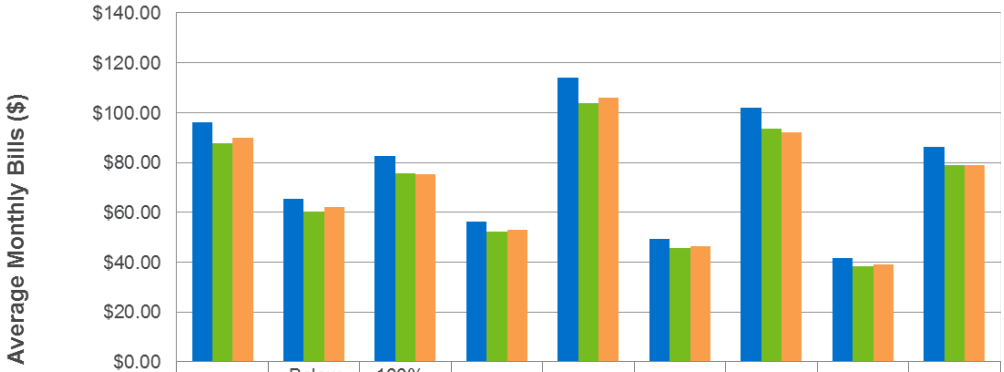
Figure 4.4-14: Rate 1 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$80.38	$47.12	$95.07
No Change in Behavior, Change in Tariff	$73.72	$43.61	$87.03
With Change in Behavior and Tariff	$73.73	$44.27	$86.75
Total Bill Impact	-$6.64	-$2.85	-$8.32
Percent Bill Impact	-8.3%	-6.1%	-8.7%

Figure 4.4-15 presents the three sets of average winter monthly bills for the detailed segments by climate region for customers on Rate 1. Customers in each segment experienced total bill reductions during the winter months, with impacts falling between negative 5% and negative 9.5%. Bill impacts due to behavior change were not statistically significant, so generally speaking total bill impacts were very similar to structural bill impacts for each group of customers.

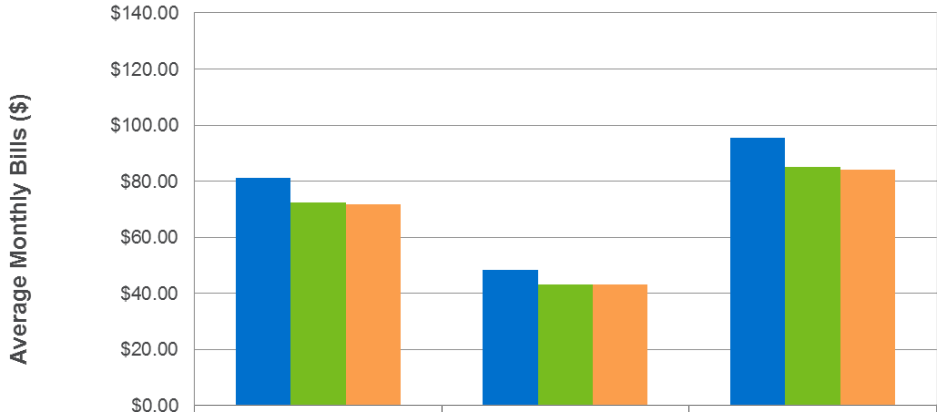
Figure 4.4-15: Rate 1 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$96.14	$65.53	$82.52	$56.23	$114.10	$49.49	$101.84	$41.50	$86.16
No Change in Behavior, Change in Tariff	$87.57	$60.32	$75.58	$52.25	$103.90	$45.76	$93.42	$38.38	$78.84
With Change in Behavior and Tariff	$89.91	$62.22	$75.36	$52.88	$106.09	$46.37	$92.16	$39.10	$78.81
Total Bill Impact	-$6.22	-$3.31	-$7.16	-$3.35	-$8.02	-$3.12	-$9.67	-$2.40	-$7.35
Percent Bill Impact	-6.5%	-5.0%	-8.7%	-6.0%	-7.0%	-6.3%	-9.5%	-5.8%	-8.5%

Figure 4.4-16 presents the three sets of average winter monthly bills for customers on Rate 2, which are similar to those on Rate 1. In general, customers experience structural gains equal to about $8.77 (10.8%) in the winter months. Total bill reductions were equal to 9.44 or 11.6%, but the additional bill impacts as a result of behavior change were not statistically significant. Non-CARE/FERA customers experienced bill reductions that were slightly larger than those for CARE/FERA customers (11.9% versus 10.5%).

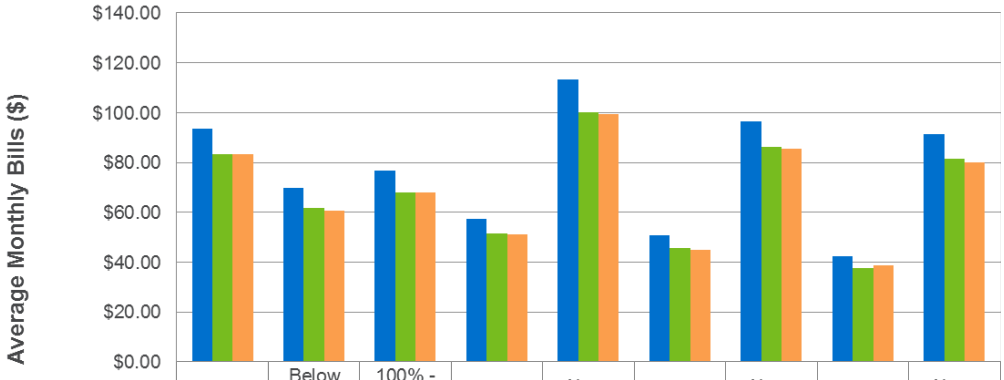
Figure 4.4-16: Rate 2 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$81.05	$48.22	$95.56
No Change in Behavior, Change in Tariff	$72.28	$43.03	$85.20
With Change in Behavior and Tariff	$71.61	$43.13	$84.20
Total Bill Impact	-$9.44	-$5.08	-$11.37
Percent Bill Impact	-11.6%	-10.5%	-11.9%

Figure 4.4-17 presents the three sets of average winter bills for the detailed segments by climate region. On average, customers experience structural gains in each segment. Non-CARE/FERA customers in the hot climate region faced the greatest structural gains on a percentage basis (11.6%) and the greatest total gains of 12.4% during the winter months.

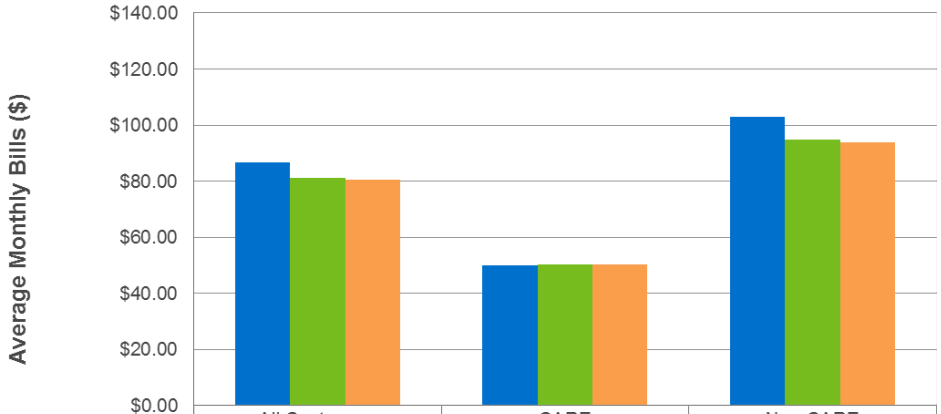
Figure 4.4-17: Rate 2 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$93.40	$69.85	$76.70	$57.42	$113.38	$50.89	$96.33	$42.24	$91.42
No Change in Behavior, Change in Tariff	$83.33	$61.85	$67.87	$51.38	$100.23	$45.51	$86.31	$37.56	$81.36
With Change in Behavior and Tariff	$83.48	$60.68	$68.09	$51.02	$99.36	$44.84	$85.62	$38.62	$80.09
Total Bill Impact	-$9.92	-$9.17	-$8.62	-$6.39	-$14.02	-$6.04	-$10.71	-$3.63	-$11.34
Percent Bill Impact	-10.6%	-13.1%	-11.2%	-11.1%	-12.4%	-11.9%	-11.1%	-8.6%	-12.4%

Figure 4.4-18 presents the three sets of average winter monthly bills for customers on Rate 3. Recall that in Section 4.4.1, nearly half of the customers on Rate 3 are structural non-benefiters, but below the average customer faced a structural gain. This is because, while most customers would experience bill increases, those that face bill reductions experience large savings. This brings the average winter structural bill impact down to negative $5.45 or 6.3%. The total bill impact after changes in behavior is equal to a reduction of $6.13 or 7.1%. CARE/FERA customers experienced structural losses that they were not able to mitigate through changes in behavior; this behavioral impact was very small and not statistically significant.

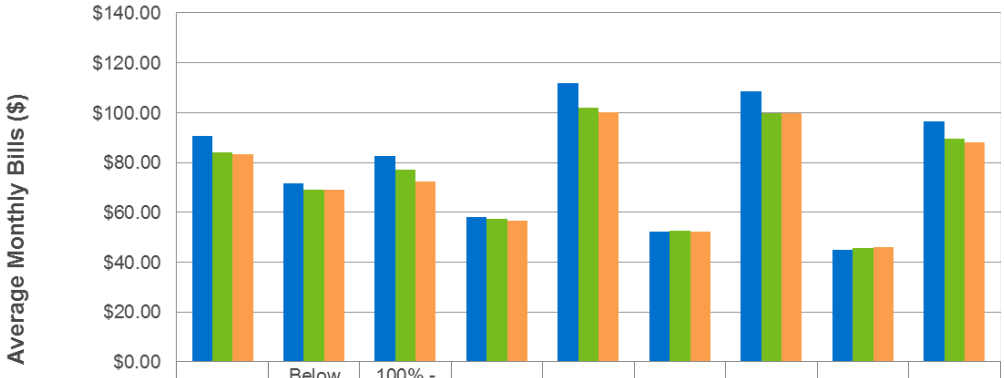
Figure 4.4-18: Rate 3 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$86.63	$50.07	$102.79
No Change in Behavior, Change in Tariff	$81.19	$50.38	$94.80
With Change in Behavior and Tariff	$80.51	$50.26	$93.87
Total Bill Impact	-$6.13	$0.19	-$8.92
Percent Bill Impact	-7.1%	0.4%	-8.7%

Figure 4.4-19 presents the three sets of average winter monthly bills for the detailed segments by climate region for Rate 3. As with the territory as a whole, the average customer in each segment faced a small structural gain, even though most customers fall into the non-benefiter category in the pretreatment period. The exceptions are CARE/FERA customers in the moderate and cool climate regions, who face trivial structural loses.

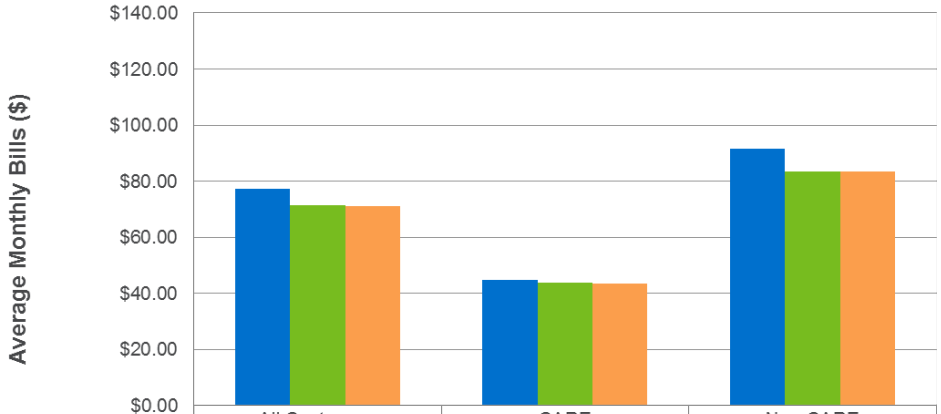
Figure 4.4-19: Rate 3 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$90.74	$71.76	$82.63	$58.15	$111.77	$52.20	$108.59	$45.03	$96.63
No Change in Behavior, Change in Tariff	$83.97	$69.11	$77.08	$57.27	$101.80	$52.52	$99.78	$45.76	$89.65
With Change in Behavior and Tariff	$83.49	$69.06	$72.45	$56.78	$100.13	$52.13	$99.82	$46.05	$88.14
Total Bill Impact	-$7.25	-$2.69	-$10.18	-$1.37	-$11.64	-$0.07	-$8.77	$1.02	-$8.49
Percent Bill Impact	-8.0%	-3.8%	-12.3%	-2.4%	-10.4%	-0.1%	-8.1%	2.3%	-8.8%

Figure 4.4-20 presents the three sets of average spring monthly bills for customers on Rate 3, for all customers and for CARE/FERA and non-CARE/FERA customers separately. Non-CARE/FERA customers experienced structural gains of over $8 per month, on average, which is equal to about 8.9%. Though the bill impacts due to changes in behavior were not statistically significant, their total bill reductions were equal to $8.37 or 9.1%, on average. The total bill reductions for CARE/FERA customers were much smaller but still statistically significant, about 2.7% or $1.19 per month.

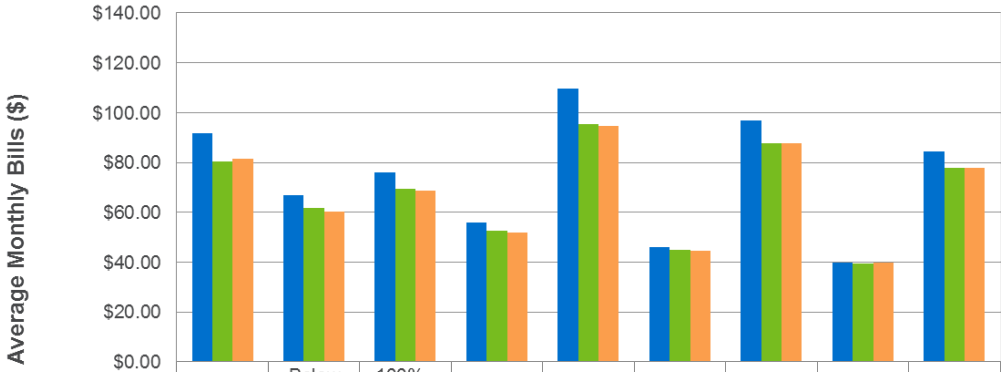
Figure 4.4-20: Rate 3 Spring Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE All	Non-CARE
No Change in Behavior or Tariff	$77.32	$44.82	$91.68
No Change in Behavior, Change in Tariff	$71.36	$43.85	$83.51
With Change in Behavior and Tariff	$71.15	$43.63	$83.31
Total Bill Impact	-$6.17	-$1.19	-$8.37
Percent Bill Impact	-8.0%	-2.7%	-9.1%

Figure 4.4-21 presents the three sets of average spring monthly bills for the detailed segments by climate region. Each customer segment experienced statistically significant bill reductions, with the exception of CARE/FERA customers in the cool climate region. Non-CARE/FERA customers in the hot climate region had the greatest bill reductions on a percentage and absolute basis, about 13.6% or $14.92.

Figure 4.4-21: Rate 3 Spring Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Senior	Below 100% FPG	100% - 200% FPG	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Hot					Moderate		Cool	
No Change in Behavior or Tariff	$91.66	$67.05	$76.02	$55.92	$109.47	$45.92	$96.71	$39.82	$84.32
No Change in Behavior, Change in Tariff	$80.21	$61.82	$69.29	$52.60	$95.55	$45.11	$87.68	$39.51	$77.97
With Change in Behavior and Tariff	$81.61	$60.44	$68.66	$51.75	$94.55	$44.63	$87.80	$39.76	$77.67
Total Bill Impact	-$10.05	-$6.61	-$7.35	-$4.17	-$14.92	-$1.29	-$8.92	-$0.06	-$6.65
Percent Bill Impact	-11.0%	-9.9%	-9.7%	-7.5%	-13.6%	-2.8%	-9.2%	-0.1%	-7.9%

4.4.3 Change in the Distribution of Bill Impacts Due to Behavior Change

The third analysis presents the distribution of bill impacts[53] for customers with and without behavioral change on an annual basis, and is designed to show how the distribution shifts when customers respond to the rates by changing behavior. Similar to the other analyses, impact distributions are based on the first year of the pilot.[54] Customers were segmented into ranges of bill impacts. The percentage of customers in each $10 increment from negative $100 to positive $100 per month was determined with and without behavior change. The underlying calculations used to develop the distributions are based on of a difference-in-differences approach that compares the treatment and control customers based on both pre- and post-treatment bill impacts.[55]

The two distributions are presented on a line graph, with the height of the line at any given $10 increment representing the percentage of customers experiencing a bill impact of the corresponding dollar amount. In this case, the bill impact is measured as the difference between the TOU bill and the OAT bill. If the line for the group with changes in behavior is to the left of the line representing the group with no change in behavior, it shows that at least some customers were able to modify their energy usage such that they had lower total bill impacts compared to if they had not changed their behavior.

[53] Bill impacts without behavior change represent the structural bill impact distribution; bill impacts with behavior change show how behavioral impacts affect the structural bill impact distribution.

[54] Rate 3 estimates do not include July 2016.

[55] See Section 3.2.4 in the First Interim Report for additional details on the methodology.

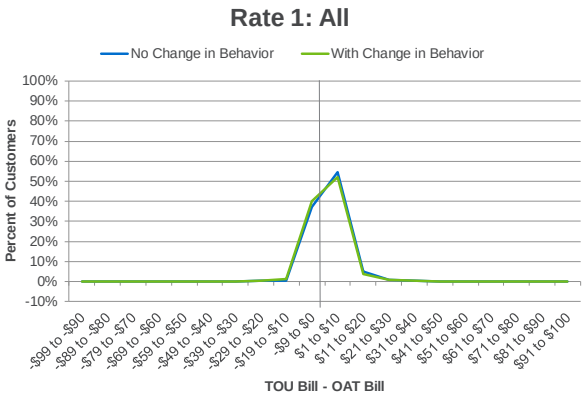
Figure 4.4-22 presents the distribution of annual bill impacts with and without energy use behavior change. The blue line represents the structural bill impacts that result when customers are billed on the TOU rate and do not change their energy use behavior. The green line shows the total bill impacts when customers have responded to the TOU rate and, in some cases, changed their energy use behavior. Bill impacts are calculated as the difference between the TOU bill and the OAT bill. Each point along the line graph represents the percentage of customers within a specific bill impacts bin or range. For example, on Rate 1, approximately 5% of the customers have a structural bill impact between $11 and $20 per month—the blue line. In other words, approximately 5% of the Rate 1 customers would experience an increase of $11 to $20 per month on Rate 1 compared to the OAT without changing their behavior. The green line represents the bill impacts when customers have had the opportunity to respond to the TOU rate. In this case, the percent of customers experiencing an increase of $11 to $20 per month on Rate 1 compared to the OAT is 4%, showing a slight decrease.

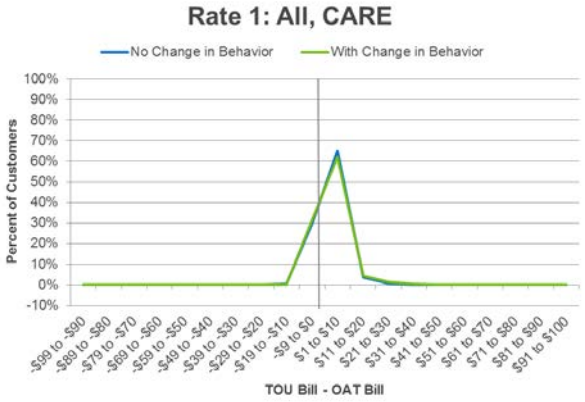
It is important to note that customers could move up or down through the incremental impact bins, and could potentially move more than one bin—meaning that a customer could potentially experience a bill increase due to their behavioral response, or they could jump down several bins and go from a $31 to $40 per month bill impact down to $11 to $20 impact, for example.

As noted in the previous two sections, annual bill impacts were small, and most customers experienced trivial structural losses over the course of the year. Without changes in behavior, about 55% of customers would expect bill impacts of $1 to $10. Through changes in behavior, 52% of customers fall in this category. With the increase in the percent of customers with bill reductions of $0 to $9, it appears that customers were able to mitigate some of their structural losses.

Figure 4.4-22: Rate 1 Change in the Distribution of Bill Impacts Due to Behavior Change
All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0%	0%
-$89 to -$80	0%	0%
-$79 to -$70	0%	0%
-$69 to -$60	0%	0%
-$59 to -$50	0%	0%
-$49 to -$40	0%	0%
-$39 to -$30	0%	0%
-$29 to -$20	1%	0%
-$19 to -$10	1%	1%
-$9 to $0	37%	40%
$1 to $10	55%	52%
$11 to $20	5%	4%
$21 to $30	1%	1%
$31 to $40	0%	1%
$41 to $50	0%	0%
$51 to $60	0%	0%
$61 to $70	0%	0%
$71 to $80	0%	0%
$81 to $90	0%	0%
$91 to $100	0%	0%





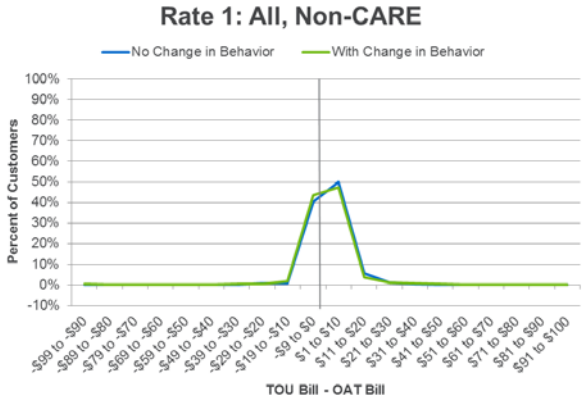
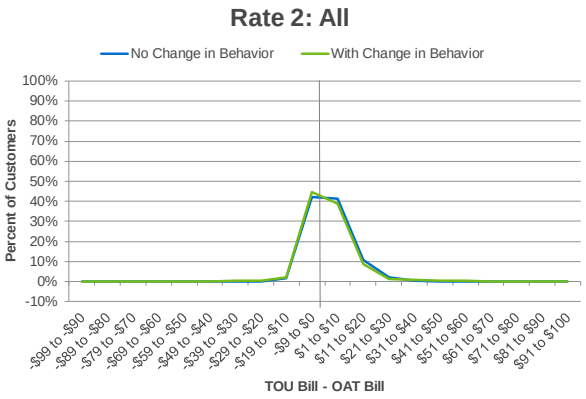
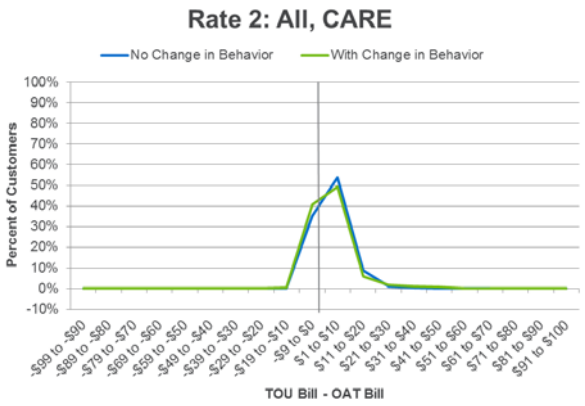


Figure 4.4-23 presents the distributions of bill impacts for customers on Rate 2, which are similar to those for Rate 1. Without changes in behavior, 41% of customers would experience bill impacts between $1 and $10 per month, on an annual basis. With changes in behavior, this is reduced to 39%. The distributions for CARE/FERA and non-CARE/FERA customers are similar in that just over half of customers face small bill increases, both with and without changes in behavior.

Figure 4.4-23: Rate 2 Change in the Distribution of Bill Impacts Due to Behavior Change
All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0%	0%
-$89 to -$80	0%	0%
-$79 to -$70	0%	0%
-$69 to -$60	0%	0%
-$59 to -$50	0%	0%
-$49 to -$40	0%	0%
-$39 to -$30	0%	0%
-$29 to -$20	0%	0%
-$19 to -$10	2%	2%
-$9 to $0	42%	45%
$1 to $10	41%	39%
$11 to $20	11%	9%
$21 to $30	2%	2%
$31 to $40	1%	1%
$41 to $50	0%	1%
$51 to $60	0%	0%
$61 to $70	0%	0%
$71 to $80	0%	0%
$81 to $90	0%	0%
$91 to $100	0%	0%





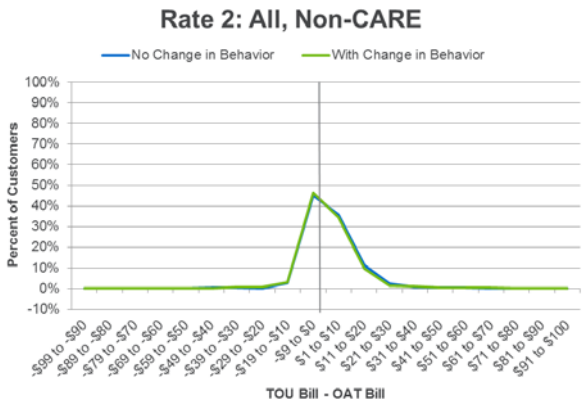
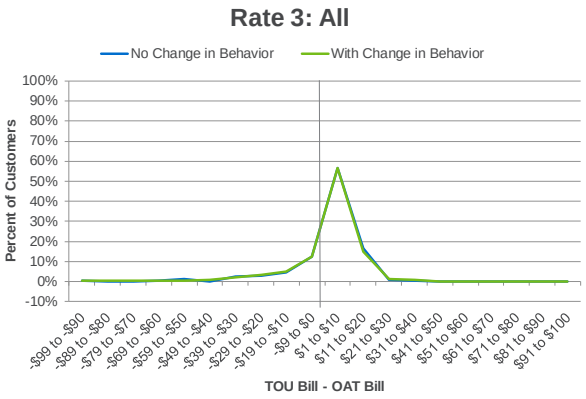
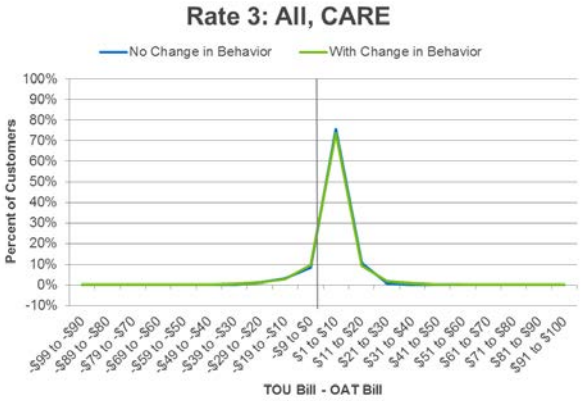


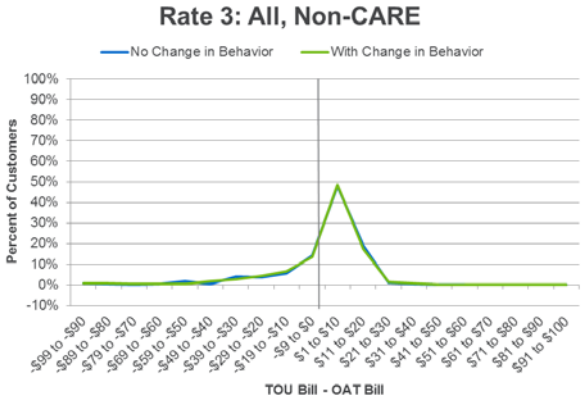
Figure 4.4-24 presents the distributions of bill impacts with and without behavior change for customers on Rate 3. The distributions are very different from those for the other two rates in that more customers face structural losses (about 75%) but there are more customers in the higher bill savings bins. For example, 1% of customers could experience monthly bill reductions of $50 to $59 on Rate without changes in their behavior. The shift in the distribution is small when customers change their behavior.

Figure 4.4-24: Rate 3 Change in the Distribution of Bill Impacts Due to Behavior Change
All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0%	0%
-$89 to -$80	0%	0%
-$79 to -$70	0%	0%
-$69 to -$60	0%	0%
-$59 to -$50	1%	0%
-$49 to -$40	0%	1%
-$39 to -$30	3%	2%
-$29 to -$20	3%	3%
-$19 to -$10	5%	5%
-$9 to $0	12%	12%
$1 to $10	56%	57%
$11 to $20	17%	15%
$21 to $30	1%	1%
$31 to $40	0%	1%
$41 to $50	0%	0%
$51 to $60	0%	0%
$61 to $70	0%	0%
$71 to $80	0%	0%
$81 to $90	0%	0%
$91 to $100	0%	0%







4.5 Synthesis for SCE Pilot

This section compares input from the load impact analysis, the bill impact analysis and the survey analysis. The objective of these comparisons, at least in part, is to determine if the information and conclusions observed for individual metrics are supported by findings from other metrics or, alternatively, findings for one metric contradict those for another metric. We also look for clues from the survey findings that might help explain why load or bill impacts for one rate differ from those for other rates.

Readers are referred to the beginning of Section 3.5 for an important caution when interpreting these results—namely that given the large samples underlying the survey analysis, statistically significant differences may not reflect meaningful differences from a policy perspective.

4.4.1 Synthesis

Table 4.5-1 through Table 4.5-3 summarize some of the relevant findings from the load impact, bill impact and survey analysis. Readers are directed to Section 3.5.1 for an explanation of the variables and symbols contained in the tables. As a reminder, unlike with PG&E where two pilot rates had two pricing

periods and one had three, SCE's pilot Rates 1 and 2 had three pricing periods on weekdays and two on weekends. Rate 3 had two pricing periods on winter weekdays, and three pricing periods on spring weekdays and weekends in the winter and spring. The shoulder periods for all three period rates were long, beginning at 8 AM for two of the rates and at 11 AM for the third. Also, Rate 3 has no baseline credit whereas Rates 1 and 2 do.

Non-CARE/FERA Customers

Non-CARE/FERA customers in the hot climate region tended to have smaller peak period reductions compared to customers in the moderate and cool climate regions in the winter. This pattern of smaller impacts in the hot climate region is consistent with results from the first summer as well. It should be noted that in the winter, the hot climate region is in many cases the coldest climate region. With the inclusion of the high desert, the hot climate region experiences some of the most extreme temperature swings between seasons and by time of day. Average peak period impacts for non-CARE/FERA customers ranged from not statistically significant in the hot climate region on rate 1 to 4.7% in the cool climate region on rate 3. When comparing against summer impacts, the hot climate region produced winter impacts that were approximately half the size of the summer impact. The moderate and cool regions produced winter impacts that were approximately 80% of the summer impacts, in percentage terms.

On average, non-CARE/FERA Rate 1 customers tended to produce smaller winter impacts compared to Rate 2 or 3 customers. However, some of this may be driven specifically by the lack of impacts from the hot climate region on Rate 1. In the winter, Rate 1 has the longest peak period, the highest peak to off peak price ratio, and a peak period price similar to Rate 2—which would presumably result in larger impacts.

When comparing customers in the hot climate region on Rate 1 with those on Rate 3, it is important to remember that Rate 3 had a lower peak period price than Rates 1 and 2, and also had a relatively flat peak to off peak price ratio. However, Rate 3 didn't have the baseline credit of approximately $0.10 per kWh, which effectively lowered the prices for all pricing periods on Rates 1 and 2 until the customer reached 100% of the baseline usage allocation. This results in a situation where Rate 3 has the highest price across all pricing periods, and a minimal price differential, meaning that customers may be more inclined to reduce usage across the entire day rather than focusing only in the peak periods, similarly to Rate 2. In the hot climate region, this resulted in Rate 3 customers having the largest peak period reductions of 2.3% and the greatest net annual kWh reduction of 0.8%.

Total annual bill impacts for non-CARE/FERA customers in the hot climate region ranged from a reduction of $4 on Rate 3 to an increase of $64 on Rate 1. Customers on Rates 1 and 2 were ineffective at making behavioral changes that offset the structural loss. Rate 3 customers started out with the smallest structural loss, but ultimately made the largest behavioral changes. Average annual bills decreased for non-CARE/FERA customers in the moderate and cool climate regions on Rates 1 and 3, and in the cool climate region on Rate 2.

Across all rates and climate regions, non-CARE/FERA population weighted peak period impacts in the winter were approximately two-thirds the magnitude of the summer, but all were statistically significant except for the Rate 1 hot climate region. This is an important finding as it shows customers are

continuing to respond to the TOU rates. Non-CARE/FERA customers understood the rates better than nearly any other segment (as indicated by the very low percent that failed to identify at least one peak period hour on Rates 1 and 3). However, it is worth noting that on average, Rate 1 and 2 customers performed worse on being able to identify the highest price hours on the second survey compared to the first. Additionally, Rate 2 customers generally had much lower performance across all customer segments regarding identifying the highest price hours compared to Rates 1 and 3.

The non-CARE/FERA customers had a low percentage of customers having difficulty paying their bills compared to other segments, and also had the lowest satisfaction ratings for the rate plan and for SCE compared with any other segment. However, there were no cases in which the satisfaction levels were significantly lower relative to the control group. In some cases the satisfaction levels for both the rate and for SCE were actually higher for the treatment group compared to the control group in the moderate climate region.

CARE/FERA Customers

Across all rates in all climate regions (with the exception of the hot climate zone for Rate 1), CARE/FERA customers had lower reductions in winter peak period electricity use than non-CARE/FERA customers. Although, as reported in Sections 4.3.1 through 4.3.3, not all of the differences between CARE/FERA and non-CARE/FERA customers were statistically significant. Peak period impacts for CARE customers ranged from not statistically significant across all rates in the cool climate region to 1.9% in the hot climate region on rate 3. The hot climate region produced winter impacts that were approximately 70% of the summer impact, in percentage terms. The moderate region produced winter impacts were approximately 22% of the summer impacts. The cool climate region produced 3% impacts in the summer, and -0.1% impacts in the winter. It should be noted that performance varied quite significantly when calculated by rate rather than by climate region, with 0.2% peak savings on Rate 1, 0.6% savings on Rate 2, and 0.7% on Rate 3 for CARE customers. The difference between results by climate region and by rate are driven by the proportion of customers in each climate region, with significantly more customers residing in the moderate and cool climate regions where the impacts are smaller. When comparing summer to winter impacts by rate, the winter impacts range between 6% of the summer impacts on Rate 1 to 23% of the summer impacts on Rate 3.

The average CARE/FERA customer was an annual structural non-benefiter across all rates and climate regions, ultimately resulting in all CARE/FERA customers experiencing higher total annual electricity costs ranging from a low of a $4 increase for Rate 2 CARE/FERA customers in the cool climate regions to a high of $56 for Rate 3 customers in the hot climate region.

Table 4.5-1: Load Impacts, Bill Impacts, and Selected Survey Findings for SCE Rate 1

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	Non-CARE/FERA	1.1% ▼	-0.2% -	-1.8% ▲	$64 ▲	3.8% ▲	1.9 ▼	23% -	22% -	2.2 -	11%	6.5 -	7.1 -
	CARE/FERA	1.8% ▼	0.5% -	0.3% ▼	$47 ▲	5.4% ▲	2.5 -	23% -	60% -	3.9 -	20%	7.3 -	7.9 -
Moderate	Non-CARE/FERA	5.5% ▼	3.3% ▼	2.2% ▼	-$16 ▼	-1.1% ▼	2.0 -	19% ▼	24% -	2.2 -	14%	6.9 ▲	7.2 -
	CARE/FERA	3.3% ▼	0.6% -	-0.2% ▲	$24 ▲	3.4% ▲	2.5 -	24% -	57% -	3.7 -	23%	7.6 -	7.9 -
Cool	Non-CARE/FERA	5.8% ▼	1.1% ▼	0.6% ▼	-$28 ▼	-2.6% ▼	2.2 -	22% -	20% -	2.1 -	12%	6.9 -	7.4 -
	CARE/FERA	2.4% ▼	-0.4% -	-1.1% ▲	$10 ▲	1.8% ▲	2.2 ▼	18% -	60% -	3.7 -	18%	8.0 -	8.3 -

Table 4.5-2: Load Impacts, Bill Impacts, and Selected Survey Findings for SCE Rate 2

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	Non-CARE/FERA	2.9% ▼	1.5% ▼	0.2% ▼	$42 ▲	2.6% ▲	2.1 -	24% -	24% -	2.3 -	27%	6.5 -	7.0 -
	CARE/FERA	3.5% ▼	1.4% ▼	1.2% ▼	$40 ▲	4.6% ▲	2.7 -	24% -	67% -	4.1 -	37%	7.2 -	7.8 -
	Senior	4.1% ▼	1.1% ▼	0.4% ▼	$57 ▲	4.1% ▲	2.6 -	23% -	36% -	2.9 -	34%	7.0 -	7.5 -
	HH < 100% FPG	3.1% ▼	2.7% ▼	1.9% ▼	$19 ▲	1.9% ▲	2.8 -	27% -	59% -	3.9 -	35%	7.3 -	7.8 -
	100% FPG < HH < 200% FPG	N/A	N/A	N/A	$38 ▲	3.4% ▲	2.7 -	24% -	58% -	3.5 -	33%	6.7 -	7.4 -
Moderate	Non-CARE/FERA	5.6% ▼	3.1% ▼	1.1% ▼	$19 ▲	1.3% ▲	2.0 -	20% -	23% -	2.2 -	26%	6.9 ▲	7.4 ▲
	CARE/FERA	1.7% ▼	1.1% -	1.0% ▼	$16 ▲	2.2% ▲	2.5 -	22% -	58% -	3.6 ▼	44%	7.8 -	8.0 -
Cool	Non-CARE/FERA	4.2% ▼	2.2% ▼	1.2% ▼	-$42 ▼	-3.6% ▼	2.0 -	20% -	19% -	2.0 -	28%	7.0 -	7.4 -
	CARE/FERA	4.6% ▼	-0.5% -	1.4% ▲	$4 ▲	0.8% ▲	2.5 -	20% -	61% -	3.7 -	40%	8.0 -	8.4 -

Table 4.5-3: Load Impacts, Bill Impacts, and Selected Survey Findings for SCE Rate 3

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	Non-CARE/FERA	3.0% ▼	2.3% ▼	0.8% ▼	-$4 -	-0.3% -	2.3 -	30% -	23% -	2.3 -	7%	6.4 -	7.0 -
	CARE/FERA	-0.1% ▼	1.9% ▼	0.8% ▼	$56 ▲	7.6% ▲	2.5 -	29% -	70% ▲	4.2 -	19%	7.4 -	7.9 -
Moderate	Non-CARE/FERA	1.4% -	3.8% ▼	0.3% ▼	-$18 ▼	-1.4% ▼	1.8 ▼	29% -	22% -	2.2 -	10%	6.5 -	7.1 -
	CARE/FERA	4.8% ▼	0.4% -	1.5% ▼	$39 ▲	6.4% ▲	2.9 -	25% -	60% -	3.9 -	20%	7.4 -	7.9 -
Cool	Non-CARE/FERA	4.3% ▼	4.7% ▼	1.7% ▼	-$47 ▼	-4.4% ▼	2.1 -	30% ▲	18% -	2.0 -	6%	6.8 -	7.3 -
	CARE/FERA	2.0% ▼	0.5% -	-0.4% ▲	$35 ▲	7.3% ▲	2.5 -	24% -	62% -	3.7 -	18%	7.8 -	8.3 -

The Rate 3 hot climate region CARE/FERA customers were the only segment to have a statistically significantly higher percentage of TOU customers having difficulty paying their bill compared to control group customers. In all other segments and rates, a comparable percentage of treatment and control group customers expressed difficulty in paying bills. Generally speaking, CARE/FERA customers were not able to offset a significant portion of the structural bill increases, with the largest offset of 50% ($16) from Rate 2 customers in the moderate climate region.

The economic index for CARE/FERA customers was roughly twice as high as for non-CARE/FERA customers in all climate regions and for all rate options, including the control group. In short, CARE/FERA customers had higher economic index scores compared with non-CARE/FERA customers, but the increase in the economic index scores moving from the OAT to TOU rates is not statistically significant for any rate in any climate region.

Importantly, in spite of the above, CARE/FERA customers had higher satisfaction ratings for the TOU rates than non-CARE/FERA customers for all rates and climate regions. In all climate regions, none of the satisfaction ratings for CARE/FERA customers were statistically significantly lower than the control group ratings. CARE/FERA customers also had higher ratings for satisfaction with SCE than non-CARE/FERA customers in all climate regions for all rates.

Senior Households

Senior households in the hot climate region had load reductions in the peak period for the average weekday that were slightly lower compared to average reductions for the overall population in the hot region, as reported for Rate 2 in Section 4.3.2. The average peak period load impact of 1.1% is slightly smaller than the load impacts of the non-CARE/FERA group of 1.5% and the impacts from the CARE/FERA group with 1.4%. The net annual kWh change of 0.4% was between the values for non-CARE/FERA and CARE/FERA, suggesting the population of senior households responds to price signals in a manner consistent with the general population.

Total annual bill impacts are similar between senior households and the hot general population in percentage terms, reflecting the split between non-CARE/FERA and CARE/FERA customers. On Rate 2, 23% of senior households, along with around a quarter of the customers from other segments, indicated that their bills were higher than expected. However, this percentage was not statistically significantly different for the customers on TOU rates compared to the OAT. There was no statistically significant difference in the percent of seniors reporting difficulty in paying bills, or in the economic index, compared with the control group.

Senior households had a higher percentage of participants that could not identify any peak period hours (34%) compared with non-CARE/FERA customers (27%) in the hot region. However, they performed slightly better than the CARE/FERA customers (37%). Performance on the second survey declined from the first survey where 30% of senior households couldn't identify any of the peak periods. The percentage of customers not identifying any correct peak period hours tended to be higher in general for Rate 2 compared to the other rates.

Finally, satisfaction ratings by senior households for the rate plan (7.0) and for SCE (7.5) were somewhat higher than the ratings for the hot climate zone population as a whole (as calculated by a weighted average for CARE/FERA and non-CARE/FERA households, whose ratings were 6.7 and 7.3 respectively).

Seniors on TOU rates did not have statistically different satisfaction ratings for the rate plan or SCE compared with the control group.

Households with Incomes Below 100% of FPG

Households with incomes below 100% of FPG on Rate 2 in the hot climate region had the largest peak period load reductions in the winter for the hot climate region. The 2.7% winter impact was 87% of the summer percentage impact. This group also had the largest decrease in net annual kWh electricity use in the hot climate region, equal to almost 2%. Annual structural bill impacts averaged $39, and these customers were able to offset around half of the increase, or around $20, resulting in an average annual cost increase for this segment of $19 or 1.9%.

This segment had the highest score on the health index compared to other segments on Rate 2.[56] However, the score was not statistically different for the treatment group compared to the control group on this index.

59% of households with incomes below 100% of FPG reported that they had difficulty paying bills and this segment had the second highest economic index score (3.9) of any segment on Rate 2. However, the difference in the economic index for TOU customers compared with the control group was not statistically significant for customers on Rate 2. The percentage of treatment customers reporting difficulty paying bills was also not statistically different from the percent of control customers reporting difficulty. 27% of households with incomes below 100% of FPG stated they received bills higher than expected. However, this was not statistically significantly different from the control group.

Customers in this segment were among the highest percent of participants who could not identify any peak period hours among all segments on Rate 2. For Rate 2, this segment did not have statistically different levels of satisfaction with the rate or with SCE. Satisfaction was not measured for this segment on Rates 2 or 3.

4.4.2 Key Findings

Key findings pertaining to load impacts from the SCE pilots include:

1. Customers can and will respond to TOU rates with peak periods that extend well into the evening hours during the winter – peak period load reductions averaged roughly 1.4% for Rate 1, 2.0% for Rate 2, and 3.2% for Rate 3 across the service territory as a whole.
2. The average winter impact of 2.2% is slightly more than half the size of the load impact from the first summer of approximately 3.8%. However, there was significant variation in the relationship between summer and winter impacts across rates and customer segments.
3. For Rate 3, which has the same peak period prices in effect on weekends as on weekdays, the peak period load reductions are similar on the two day types– that is, customers can and will reduce loads on weekends in the winter.
4. There was a statistically significant reduction in net annual electricity use for all three rates - 0.6% for Rate 1, 0.8% for Rate 2, and 0.9% for Rate 3.

[56] This metric is not reported for Rates 1 or 3.

5. The pattern of winter load reductions across climate regions in both percentage and absolute terms was not consistent across rates and was quite different from the pattern seen in PG&E's service territory, which showed a significant decline in load reductions in both percentage and absolute terms moving from the hot to the cool climate regions. For SCE, peak period load reductions for customers on Rate 1 were largest in the moderate and cool regions and not significant in the hot region. For Rates 2 and 3, differences across climate regions were not always statistically significant.
6. Households who had previously purchased smart thermostats reduced winter peak period usage by approximately 4.7%, which was significantly higher compared to non-CARE/FERA population weighted load reductions of 1.8%. Nest offered its "Time of Savings" support service for the second summer, which could affect second summer impacts in the final report.
7. Unlike for PG&E's customers, where CARE/FERA customers generally had significantly lower peak period load reductions compared with non-CARE/FERA customers, the load impacts for CARE/FERA and non-CARE/FERA customers in SCE's service territory were not statistically significantly different in the hot climate regions.
8. Senior households on Rate 2 in the hot climate region had load impacts (1.1%) slightly lower compared to the hot climate region population as a whole (1.4%).
9. Households with incomes below 100% of FPG on Rate 2 in the hot climate region had a statistically significant reduction in the peak period of 2.7%, and a statistically significant decrease in net annual electricity use of 1.9%.

Key findings pertaining to bill impacts include:

1. Average monthly winter bills were lower under TOU rates than under the OAT for all customer segments and all climate regions (except for CARE/FERA customers in the cool climate region on Rate 3) – the average monthly bill decrease ranged from a low of $0.07 for CARE/FERA customers in the moderate climate region on Rate 3 to a high of $14.02 for non-CARE/FERA customers on Rate 2 in the hot climate region. This is driven in part by the fact that the TOU rates are seasonally differentiated (prices are lower in the winter than in the summer), whereas SCE's standard rate is not.
2. Average annual total bill impacts varied by rate and climate region. The average customer on Rate 1 and Rate 2 experienced slight decreases on an annual basis of $3 and $2, respectively. Average customers on Rate 3 experienced a slightly larger net decrease in annual bills of $10. However, the distribution of annual bill impacts varied significantly by climate region. The average customer from the moderate or cool climate regions across all rates experienced net annual total cost changes ranging from a decrease of $47 for non-CARE/FERA customers in the cool climate region on Rate 3 to an increase of $39 for CARE/FERA customers on Rate 3 in the moderate climate region. Non-CARE/FERA customers in the hot climate region on Rates 1 and 2 experienced annual net cost increases of $64 on Rate 1, and $42 on Rate 2. Rate 3 households saw bill decreases of $4. CARE/FERA customers in the hot climate region all experienced annual total bill increases between $0 and $56. Households below 100% of FPG and seniors on Rate 1 in the hot climate region also experienced net annual cost increases of $19 and $57, respectively.
3. Average bill increases due to the change in the tariff are reduced modestly by changes in usage behavior, but most segments were unable to come close to offsetting the structural change by changing usage behavior.

Key findings from the survey research include the following:

1. **Economic Hardship:** No SCE customer segment in any climate region had significantly higher average economic index scores when compared to the Control group. Rate 2 CARE/FERA customers and those eligible for CARE/FERA in the moderate region had lower economic index scores compared to the Control groups. Corroborating this finding, CARE/FERA customers in the moderate region also reported less difficulty paying their bills than control customers.
2. **Health Hardship:** No customer segment in any climate region had significantly higher average health index scores when compared to the Control group. Rate 1 non-CARE/FERA customers in the hot region and CARE/FERA customers in the cool region, and Rate 3 non-CARE/FERA customers in the moderate region reported lower health index scores compared to the Control groups. In addition, about 6% more Rate 1 CARE/FERA customers and Rate 1 and 2 customers on or eligible for CARE/FERA in the hot climate region sought medical attention due to excessive cold when compared to their Control groups.57 In contrast, about 10% fewer Rate 1 CARE/FERA and Rate 2 non-CARE/FERA customers in the moderate region, and Rate 2 customers on or eligible for CARE/FERA in the cool region sought medical attention due to excessive heat compared to the Control groups.58
3. **Satisfaction:** Across non-CARE/FERA and senior customer segments, satisfaction with their rate and with SCE was the same or higher for TOU customers when compared to Control group customers, which is a reversal of trends from the first survey. Most CARE/FERA customer segments, however, reported slightly lower levels of satisfaction compared to the Control groups, but none were statistically significant. These differences are small and not necessarily meaningful. For example, non-CARE/FERA customers on Rate 1 in the moderate region gave an average rating of 7.4, while control group customers' average rating is 7.0. This 0.4 increase is statistically significant but is not necessarily meaningful. On average, satisfaction ratings are slightly higher or the same for Rate group customers, and are slightly lower for Control group customers, compared to results from the first survey.
4. **Bill protection, understanding of rates, and actions taken:**
    - About half of customers reported receiving a letter from SCE mentioning their bill protection and about two-thirds reported knowing when their bill protection ends. When customers were asked if they understand bill protection, 87% or more reported they did.
    - Though agreement ratings for "rate is easy to understand" were high (generally between 6.8 and 7.6), customer's understanding of their rates indicate a disconnect between customer's rating of understandability and actual understanding (with 7% to 40% of customers unable to identify peak hours). The percent of customers who could not identify any peak period hours was much higher for CARE/FERA customers than for non-CARE/FERA customers. In addition, the percentage of Rate 3 customers who selected over 50% of the correct peak hours improved while the percentage of Rate 1 and 2 customers declined compared to results from the first survey. Also, more than

[57] These customers all had electric heating.

[58] These customers all had air-conditioning and a household member with a disability that requires cooling.

two-thirds of customers selected the correct answer when asked if their rate is higher, lower, or the same in the summer vs. in the winter.

- When asked if customers agreed that peak and off-peak times were easy to remember, Rate 1 customers provided lower agreement ratings than Rate 2 and 3 customers. However, Rate 3 customers were most likely to select over half of the correct peak hours compared to Rate 1 and 2 customers.[59]
- Customers on TOU rates were more likely to take time-specific actions than customers in the control condition. For example, while a similar proportion of customers from control and rate groups indicated they turned off their lights to conserve energy, a larger proportion of treatment customers indicated they shifted doing laundry and running the dishwasher during peak hours. This trend suggests that while fewer rate customers understood the nuances of their rates, they did know and take actions that helped them shift use. This trend is particularly striking for non-CARE/FERA customers in the hot region, but less prominent for CARE/FERA and less than 100% FPG customers in the hot region.

Overall findings and conclusions include:

- Customers continued to respond to the TOU price signals at the end of a full year. As expected, the load impacts were lower during the winter compared to the first summer. Load impact persistence will be examined in the final report once data from the second summer becomes available.
- The majority of customers across all three rates experienced slight net annual total bill decreases. However, customers in the hot climate regions and CARE/FERA customers were more likely to experience net annual bill increases.
- For seniors and households with incomes below 100% of FPG, there was no statistically significant increase in economic or health index scores after a full year on Rate 2 (the only rate where measurements are reported for this segment).
- Evidence from the second survey still suggests that the education and outreach to low income customers (CARE/FERA and households with incomes below 100% of FPG) did not generate the same level of understanding of TOU rates as it did for non-low income customers. This could partly result from the fact that more CARE/FERA customers have English as a second language but there may be other reasons. In some cases the level of understanding between the first and second survey went down, such as with Rate 2. The level of understanding went up for Rate 3, and was mixed for Rate 1. Nexant continues to recommend that this issue be carefully addressed and studied further in the upcoming default pilots where there is a much greater emphasis on and opportunity to test ME&O alternatives for all segments.

[59] These survey items were coded much like a test with partial credit; customers would get 50% right if they could identify half of the peak hours for their test rate.

5 SDG&E Evaluation

This report section summarizes the attrition, load impacts, and bill impacts for the first year of SDG&E's pilot, with specific attention to the winter months and annual savings. Load and bill impacts from the first summer season can be found in the First Interim Report.

5.1 Summary of Pilot Treatments

Figure 5.1-1 and Figure 5.1-2 summarize the two tariffs that are being tested in the SDG&E service territory. Both tariffs have peak periods that include the evening hours from 4 to 9 PM. The rates have changed since the launch of the pilot, and the figures represent the tariffs that were in effect in March 2017 and do not reflect the baseline credit of 22 ¢/kWh in the summer and 20 ¢/kWh in the winter. Appendix B shows the prices that were in effect in each rate period for each tariff, including the OAT. Two sets of prices are shown in the appendix, one covering the period from pilot start through February 2017, and the other beginning on March 1, 2017. While several minor rate changes occurred over the course of the pilot, the rate adjustment that occurred on March 1, 2017 was more significant and, as such, it was factored into the estimation of bill impacts summarized in Section 5.4 below.

Figure 5.1-1: SDG&E Pilot Rate 1 (March 2017)[60]

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Super Off-Peak (32¢)						Off-Peak (38¢)										Peak (62¢)							
	Winter	Super Off-Peak (39¢)						Off-Peak (40¢)										Peak (41¢)							
Weekend	Summer	Super Off-Peak (32¢)														Off-Peak (38¢)		Peak (62¢)							
	Winter	Super Off-Peak (39¢)														Off-Peak (40¢)		Peak (41¢)							

Figure 5.1-2: SDG&E Pilot Rate 2 (March 2017)

Tariff	Season	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
Weekday	Summer	Off-Peak (36¢)																Peak (62¢)							
	Winter	Off-Peak (39¢)																Peak (41¢)							
Weekend	Summer	Off-Peak (36¢)																Peak (62¢)							
	Winter	Off-Peak (39¢)																Peak (41¢)							

Rate 1 has three rate periods in all seasons and all days of the week. The peak period, from 4 to 9 PM, is constant across all days of the week and seasons. The timing and length of the off-peak and super-off-peak periods are also constant across seasons but differ on weekdays and weekends. The peak to super-off-peak price ratio[9] (without the baseline credit) is roughly 1.9 to 1 in summer and a very modest 1.06 to 1 in winter. The summer peak to off-peak price ratio is roughly 1.6 to 1.

The primary difference between SDG&E's Rate 2 and Rate 1 is that Rate 2 has only two rate periods whereas Rate 1 has three. Rate 2 has the same peak period, from 4 to 9 PM, as Rate 1 and the peak period prices are also the same as Rate 1. The peak period and peak period prices, are the same all year. In winter, the peak-to-off-peak price ratio for Rate 2 is roughly 1.05 to 1, making the rate relatively flat.

[60] See Appendix B for comparison of tariffs.

Figure 5.1-3 presents the seasons for each rate. For both rates, the summer season covers the months of May through October. The winter season is November through April.

Figure 5.1-3 Seasons by Rate

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rate 1	Winter				Summer						Winter	
Rate 2	Winter				Summer						Winter	

In addition to the above rate options, SDG&E's pilot is testing the impact of weekly usage alerts, known as Weekly Alert Emails (WAE), on demand response under TOU rates. The WAE used in summer 2016 provided weekly emails to participants that report the prior week's electricity usage by rate period. A new WAE was launched in mid-October. This version includes a bill-to date forecast, an updated usage chart displaying usage by peak period, and a doughnut chart illustrating the total amount of usage by peak period for the billing period. A random sample of 2,500 Rate 2 customers was chosen to receive the WAEs on a default basis. SDG&E had email addresses on just over 70% of this sample, so WAE's actually were delivered to roughly 1,775 customers out of the target group of 2,500.

The next section, Section 5.2, is a discussion of customer attrition over the first year of the pilot. Section 5.3 presents the load impact estimates for the winter period for each rate and Section 5.4 summarizes the bill impacts for the winter months and on an annual basis.

5.2 Customer Attrition

Figure 5.2-1 through Figure 5.2-3 show the cumulative opt-out rates over time for each test cell and climate region. The cumulative number of opt-outs is similar in the hot and moderate climate regions, between 1.5% and 3.5%. The control group in the hot climate region is made up of customers who were turned away from the pilot, therefore they cannot opt out. The opt-out rate in the cool climate region is very low for all customer segments, only reaching about 2% by the end of the first year of the pilot. In the moderate and cool climate regions, non-CARE/FERA customers had slightly higher opt-out rates than CARE/FERA customers. Opt-out rates appear to level off near the beginning of November, when customers were transitioned to the winter rate period and they remain generally level through June 2017.

Figure 5.2-1: Cumulative SDG&E Opt Outs by Month – Hot Climate Region

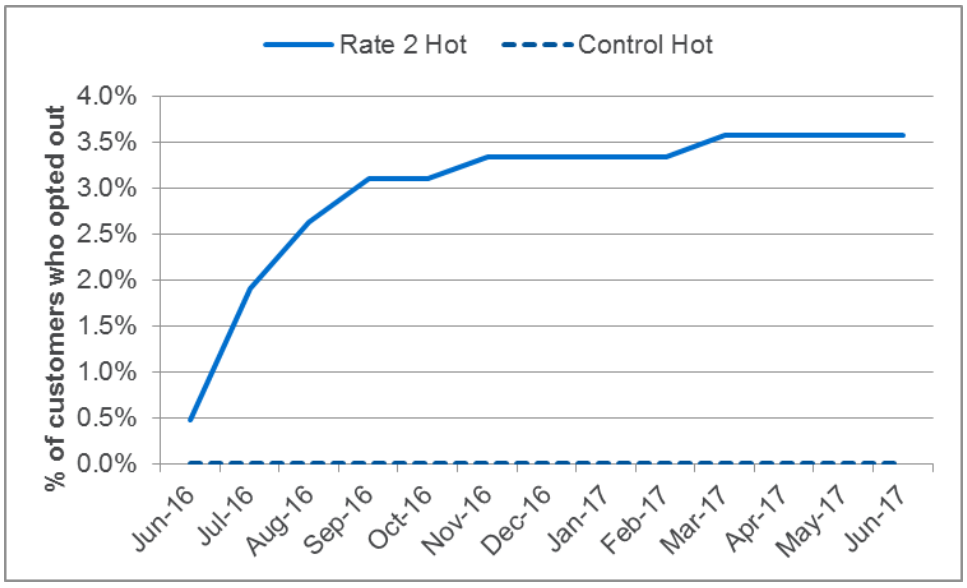


Figure 5.2-2: Cumulative SDG&E Opt Outs by Month – Moderate Climate Region

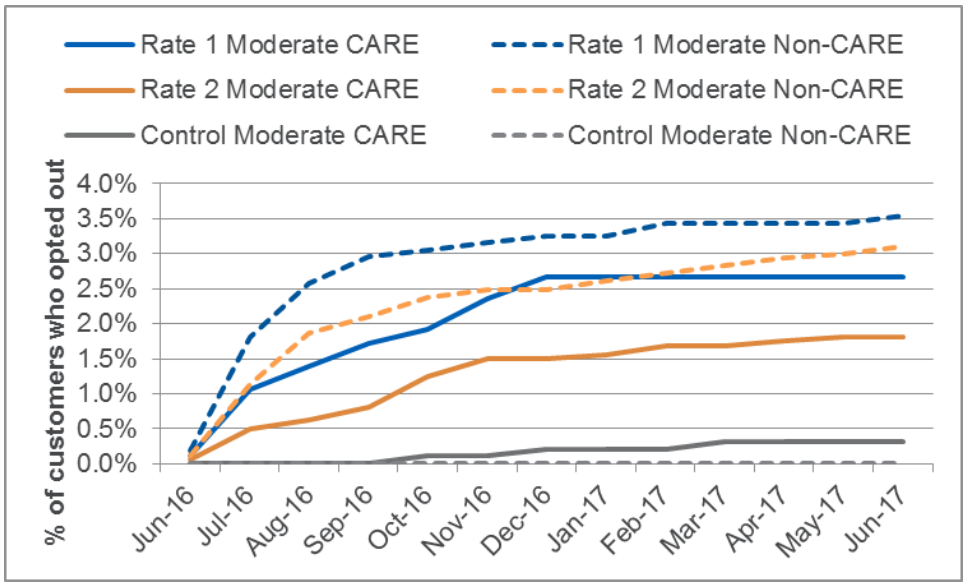


Figure 5.2-3: Cumulative SDG&E Opt Outs by Month – Cool Climate Region

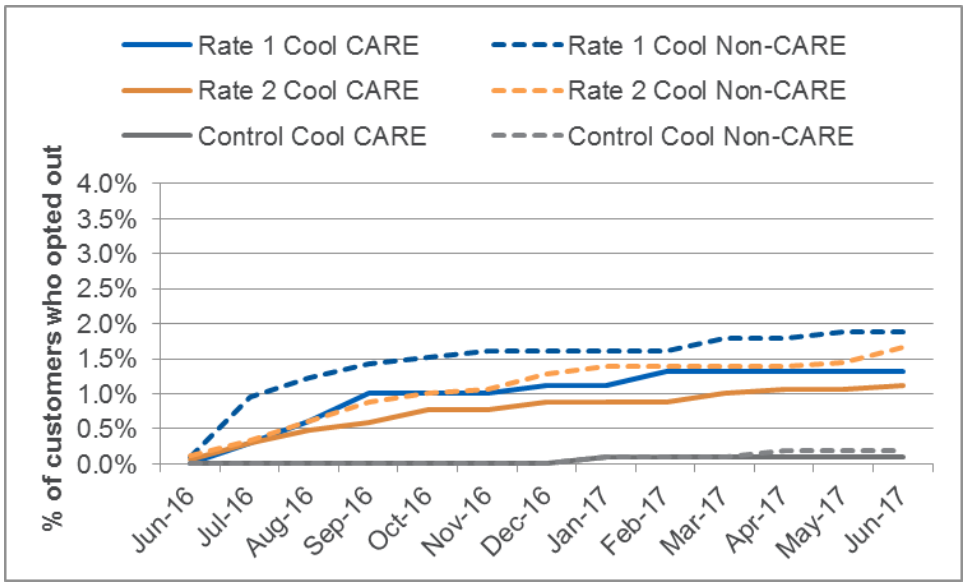


Figure 5.2-4 through Figure 5.2-6 show the overall attrition rate over time for each climate region, customer segment, and TOU rate. Generally attrition rates are fairly steady in the time period between June 2016 and June 2017. Among treated customers, those in the moderate and cool climate region have similar attrition rates. Attrition rates are lowest in the hot climate region.

Figure 5.2-4: Cumulative SDG&E Attrition by Month – Hot Climate Region

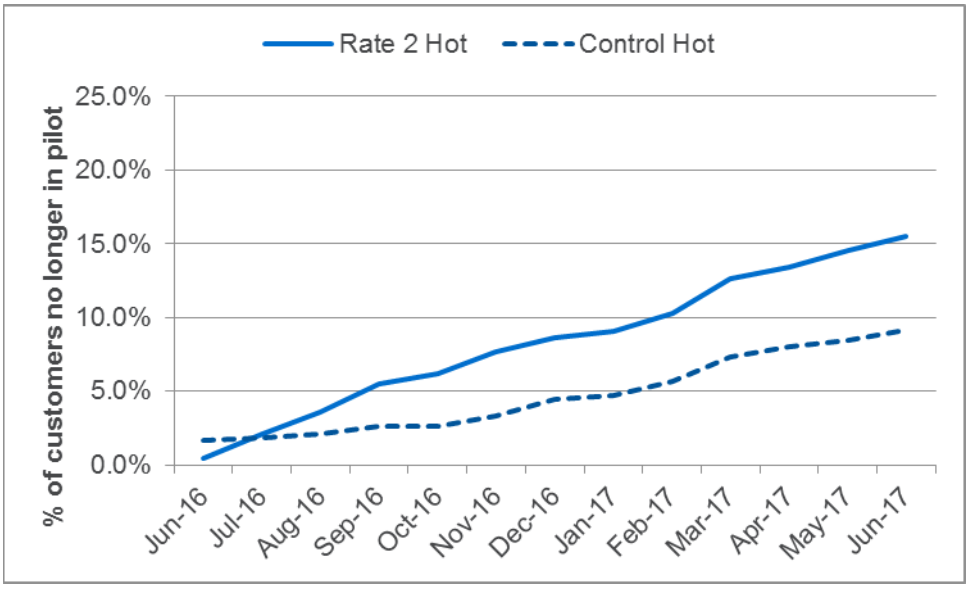


Figure 5.2-5: Cumulative SDG&E Attrition by Month – Moderate Climate Region

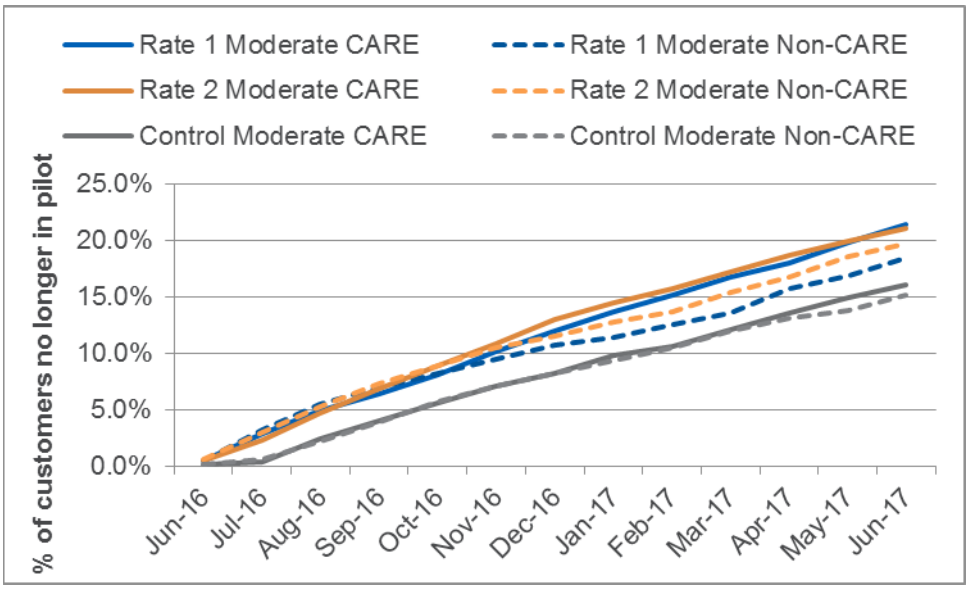
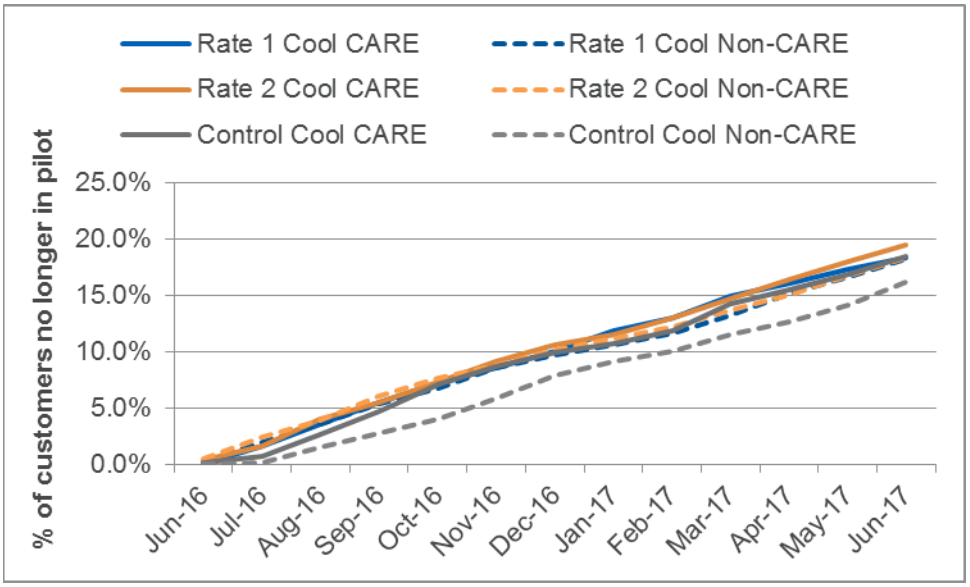


Figure 5.2-6: Cumulative SDG&E Attrition by Month – Cool Climate Region



5.3 Load Impacts

This section summarizes the load impact estimates for the two rate treatments tested by SDG&E. Load impacts are reported for each rate period for the average weekday, average weekend, and for the average monthly peak day for the winter months of November through April for CARE/FERA and non-CARE/FERA customers in SDG&E's moderate and cool climate regions. As discussed previously, SDG&E's hot climate region is quite small and the sample of customers recruited into the pilot is not large enough to support estimation of load impacts separately for CARE/FERA and non-CARE/FERA customers nor to

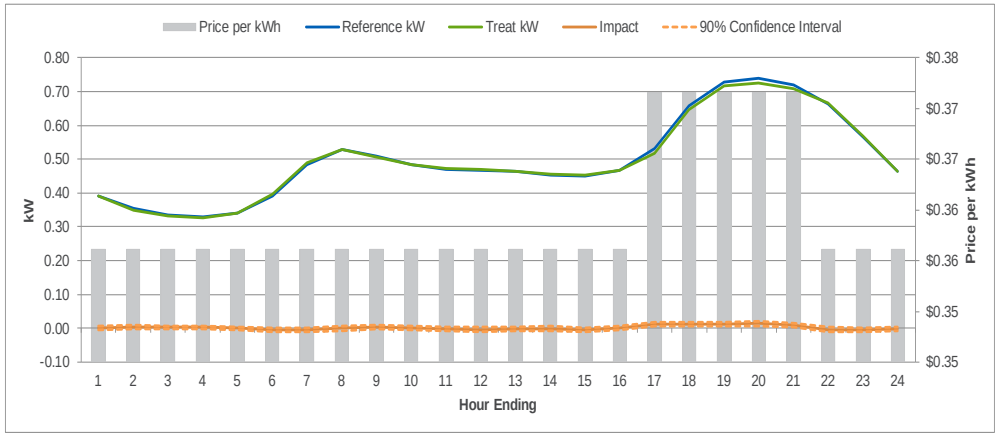
support segmentation of the sample into seniors or various income groups as was done in the hot regions for PG&E and SCE. All customers in the hot region were placed on Rate 2 or were in the control group.

As with PG&E and SCE, electronic tables that contain estimates for each hour of the day for each day type and climate zone and for each month separately are also available upon request through the CPUC. Figure 5.3-1 shows an example of the content of these tables for SDG&E Rate 2 for all eligible customers in the service territory. Pull down menus in the upper left hand corner allow users to select different climate regions, day types (e.g., weekdays, weekends, monthly peak day) and time period (individual months or the average of the winter period).

Figure 5.3-1: Example of Content of Electronic Tables Underlying Load Impacts Summarized in this Report (SDG&E Rate 2, Average Winter Weekday, All Customers)

Segment	All
Rate	Rate 2
Month	Winter 2016 2017
Day Type	Average Weekday
Treated Customers	6,662

Period	Reference kW	Treat kW	Impact	Percent Impact	90% Confidence Interval	
Peak	0.67	0.66	0.012	1.7%	0.01	0.01
Partial Peak	N/A	N/A	N/A	N/A	N/A	N/A
Off-Peak	0.45	0.45	0.00	-0.2%	0.00	0.00
Super Off-Peak	N/A	N/A	N/A	N/A	N/A	N/A
Daily kWh	11.98	11.93	0.04	0.4%	0.02	0.07



Hour Ending	Reference kW	Treat kW	Impact	Percent Impact	90% Confidence Interval		Price	Period
1	0.39	0.39	0.00	0.2%	0.00	0.01	$0.36	Off-Peak
2	0.35	0.35	0.00	0.9%	0.00	0.01	$0.36	Off-Peak
3	0.33	0.33	0.00	1.0%	0.00	0.01	$0.36	Off-Peak
4	0.33	0.33	0.00	1.0%	0.00	0.01	$0.36	Off-Peak
5	0.34	0.34	0.00	0.1%	0.00	0.01	$0.36	Off-Peak
6	0.39	0.40	0.00	-1.2%	-0.01	0.00	$0.36	Off-Peak
7	0.48	0.49	0.00	-1.0%	-0.01	0.00	$0.36	Off-Peak
8	0.53	0.53	0.00	0.0%	-0.01	0.01	$0.36	Off-Peak
9	0.51	0.51	0.00	0.7%	0.00	0.01	$0.36	Off-Peak
10	0.48	0.48	0.00	0.2%	-0.01	0.01	$0.36	Off-Peak
11	0.47	0.47	0.00	-0.4%	-0.01	0.00	$0.36	Off-Peak
12	0.47	0.47	0.00	-0.7%	-0.01	0.00	$0.36	Off-Peak
13	0.46	0.47	0.00	-0.4%	-0.01	0.00	$0.36	Off-Peak
14	0.45	0.45	0.00	-0.1%	-0.01	0.01	$0.36	Off-Peak
15	0.45	0.45	0.00	-1.0%	-0.01	0.00	$0.36	Off-Peak
16	0.47	0.47	0.00	0.0%	-0.01	0.01	$0.36	Off-Peak
17	0.53	0.52	0.01	2.2%	0.01	0.02	$0.37	Peak
18	0.66	0.65	0.01	1.8%	0.01	0.02	$0.37	Peak
19	0.73	0.72	0.01	1.6%	0.01	0.02	$0.37	Peak
20	0.74	0.73	0.01	1.9%	0.01	0.02	$0.37	Peak
21	0.72	0.71	0.01	1.3%	0.00	0.02	$0.37	Peak
22	0.66	0.67	0.00	-0.5%	-0.01	0.00	$0.36	Off-Peak
23	0.56	0.57	0.00	-0.7%	-0.01	0.00	$0.36	Off-Peak
24	0.46	0.46	0.00	-0.3%	-0.01	0.00	$0.36	Off-Peak
Daily kWh	**11.98**	**11.93**	**0.04**	**0.4%**	**0.02**	**0.07**	**N/A**	**N/A**

The remainder of this section is organized by rate treatment—that is, load impacts are presented for each relevant climate region and each customer segment for each of the two rates. Following the summary for each rate, load impacts are compared across rates.

As discussed in Section 6 of the First Interim Report, in addition to the two rate treatments, SDG&E tested the incremental impact of Weekly Alert Emails (WAEs) sent to customers on a default basis. Results of this analysis are presented in Section 5.3.3.

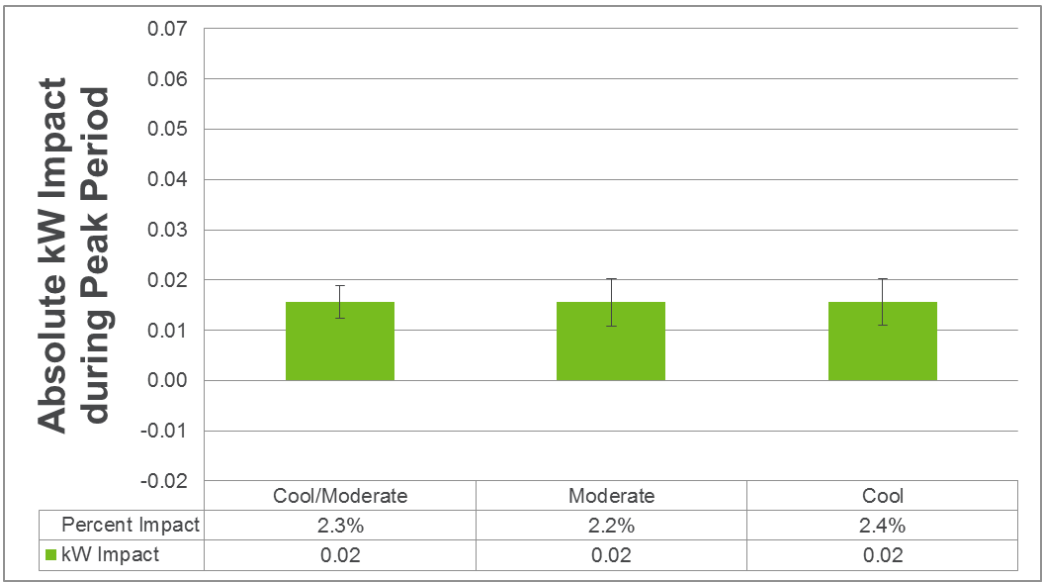
5.3.1 Rate 1

SDG&E's Rate 1 is a three-period rate with a peak period from 4 to 9 PM on weekdays and weekends. On weekdays, the off-peak (or shoulder) period runs from 6 AM to 4 PM and 9 PM to midnight. On weekends, this period is much shorter, running from 2 to 4 PM and 9 PM to midnight. In winter, for electricity usage above 130% of the baseline quantity, prices equal roughly 37.3 ¢/kWh[61] in the peak period, 36.2 ¢/kWh in the off-peak (or shoulder) period and 35.1 ¢/kWh in the super off-peak period. For usage below 130% the baseline quantity, a credit of 18.6 ¢/kWh is applied.

Winter Load Impacts

Figure 5.3-2 below shows the average peak-period load reduction in absolute terms for Rate 1 for customers in the moderate and cool climate regions, separately and combined. As with the other IOUs, the lines bisecting the top of each bar in the figures show the 90% confidence band for each estimate.

Figure 5.3-2: Average Load Impacts For Peak Period for SDG&E Rate 1 (Positive values represent load reductions)



[61] Prices reflect tariffs in effect at the launch of the pilot through the end of February 2017. As indicated above and shown in Appendix B, rates changed on March 1, 2017.

As seen in the figures, the average peak load impacts for the cool and moderate climate regions, separately and combined, are statistically significant at the 90% level of confidence in both percentage and absolute terms. On average, pilot participants in both climate regions combined reduced electricity use by 2.3% or 0.02 kW across the five hour peak period from 4 to 9 PM. Customers in the moderate climate region reduced their usage by 2.2% or 0.02 kW, which is an absolute impact nearly identical to the cool climate region.

Table 5.3-1 shows the average percent and absolute load impacts for Rate 1 for each rate period for weekdays and weekends and for the average monthly system peak day for the cool and moderate climate regions. The percent reduction equals the load impact in absolute terms (kW) divided by the reference load. Shaded cells in the table contain load impact estimates that are not statistically significant at the 90% confidence level. The percentage and absolute values in the first row of Table 5.3-1, which represent the load impacts in the peak period on the average weekday, equal the values shown in Figure 5.3-2, discussed above.

The reference loads shown in Table 5.3-1 represent estimates of what customers on the TOU rate would have used if they had not responded to the price signals contained in the TOU tariff. As seen in the table, average hourly usage during the peak period is roughly 0.67 kW for the moderate and cool climate regions combined and around 0.50 kW for the 24 hour average weekday. In the moderate climate region, average usage in the peak period is larger at 0.71 kW than in the cool climate region (0.64 kW).

As seen in Table 5.3-1, on the average weekday, there were statistically significant reductions in usage during the peak and off-peak periods and for the day for both climate regions, and statistically significant increases in usage in the super-off-peak period from midnight to 6 AM on weekdays and the monthly system peak day. On weekends, there was also an increase in super off-peak usage in the moderate climate region. For the cool climate region, the change in usage in the super off-peak period was not statistically significant, as highlighted in gray. Load impacts were greatest for customers in the moderate climate region during the peak period on monthly system peak days, at 2.7% or 0.02 kW.

For the moderate and cool climate regions combined, there was a 1.0% reduction in daily electricity use on the average weekday. In the moderate climate region it is 0.6% and in the cool climate region it is 1.3%. While the daily reduction in energy use for Rate 1 is small in percentage and absolute terms, this average is spread over 24 hours each day, so the average reduction in electricity use on weekdays equals roughly 0.11 kWh. Over six months, this adds up to about 21 kWh per customer.

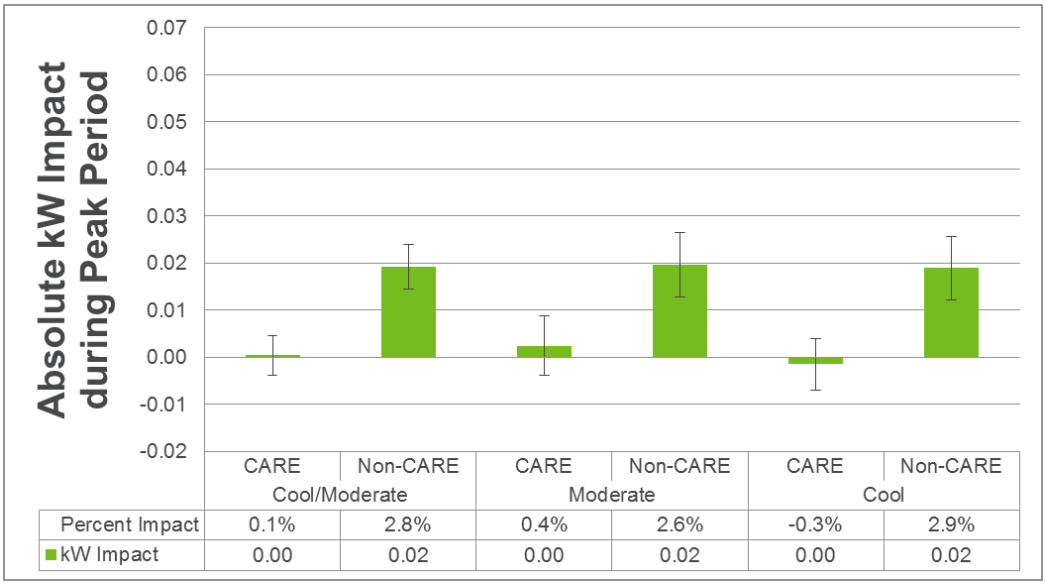
Table 5.3-1: Rate 1 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

Rate 1											
Day Type	Period	Hours	Cool/Moderate			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.67	0.02	2.3%	0.71	0.02	2.2%	0.64	0.02	2.4%
	Off-Peak	6 AM to 4 PM, 9 PM to 12 AM	0.49	0.01	1.3%	0.53	0.01	1.1%	0.47	0.01	1.5%
	Super Off-Peak	12 AM to 6 AM	0.35	-0.01	-2.1%	0.38	-0.01	-3.5%	0.34	0.00	-1.1%
	Day	**All Hours**	0.50	0.00	1.0%	0.53	0.00	0.6%	0.47	0.01	1.3%
Average Weekend	Peak	4 PM to 9 PM	0.68	0.01	2.0%	0.73	0.01	1.5%	0.65	0.02	2.4%
	Off-Peak	2 PM to 4 PM, 9 PM to 12 AM	0.55	0.01	1.1%	0.59	0.00	0.2%	0.52	0.01	1.7%
	Super Off-Peak	12 AM to 2 PM	0.45	0.00	-0.7%	0.49	-0.01	-1.3%	0.42	0.00	-0.3%
	Day	**All Hours**	0.52	0.00	0.4%	0.56	0.00	-0.2%	0.49	0.00	0.9%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.75	0.01	1.9%	0.80	0.02	2.7%	0.71	0.01	1.3%
	Off-Peak	6 AM to 4 PM, 9 PM to 12 AM	0.54	0.00	0.8%	0.58	0.01	1.1%	0.51	0.00	0.5%
	Super Off-Peak	12 AM to 6 AM	0.37	-0.01	-2.4%	0.40	-0.02	-4.5%	0.35	0.00	-0.7%
	Day	**All Hours**	0.54	0.00	0.6%	0.58	0.00	0.6%	0.51	0.00	0.5%

* A shaded cell indicates estimate is not statistically significant

Figure 5.3-3 shows the absolute peak period load impacts for Rate 1 for CARE/FERA and non-CARE/FERA customers for the moderate and cool climate regions combined and separately. In the combined region, both the percent and absolute load impacts were greater for non-CARE/FERA customers than for CARE/FERA customers and the differences are statistically significant. Generally, CARE/FERA customers in the cool and moderate climate regions did not reduce their energy use during the peak periods. The greatest load reductions came from non-CARE/FERA customers in the cool climate region, at 2.9% and 0.02 kW. However, the impacts were very similar for the same segment in the moderate climate region.

Figure 5.3-3: Average Load Impacts for Peak Period for SDG&E Rate 1 for CARE/FERA and non-CARE/FERA Customers
(Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Cool/Moderate		Moderate		Cool	
Percent Impact	0.1%	2.8%	0.4%	2.6%	-0.3%	2.9%
kW Impact	0.00	0.02	0.00	0.02	0.00	0.02

Table 5.3-2 shows the estimated load impacts for each rate period and day type for the moderate and cool climate zones separately and combined for non-CARE/FERA customers. Table 5.3-3 shows the same but for CARE/FERA customers. For both climate regions, non-CARE/FERA customers have greater peak period demand than CARE/FERA customers. For example, on the average weekday in the two climate zones combined, peak period demand is equal to 0.69 kW for non-CARE/FERA customers and 0.59 kW for CARE/FERA customers. Average overall weekday consumption is similar between the two groups, 0.51 kW and 0.45 kW for non-CARE/FERA and CARE/FERA customers, respectively. This indicates that non-CARE/FERA customers have a higher concentration of electricity use in the peak period, which may have made it easier to reduce their consumption during that time.

Customers in the non-CARE/FERA segments had load impacts of 1.7% during the off-peak period on average weekdays, and 1.5% on the average weekend. Only non-CARE/FERA customers were able to reduce their overall daily consumption on all three day types. CARE/FERA customers increased their daily consumption on all day types.

Table 5.3-2: Rate 1 Load Impacts by Rate Period and Day Type – Non-CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

Rate 1											
Day Type	Period	Hours	Cool/Moderate, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.69	0.02	2.8%	0.74	0.02	2.6%	0.66	0.02	2.9%
	Off-Peak	6 AM to 4 PM, 9 PM to 12 AM	0.51	0.01	1.7%	0.55	0.01	1.6%	0.48	0.01	1.8%
	Super Off-Peak	12 AM to 6 AM	0.36	-0.01	-1.8%	0.39	-0.01	-3.7%	0.34	0.00	-0.5%
	Day	**All Hours**	0.51	0.01	1.4%	0.55	0.01	0.9%	0.48	0.01	1.7%
Average Weekend	Peak	4 PM to 9 PM	0.70	0.02	2.5%	0.76	0.02	2.0%	0.67	0.02	2.8%
	Off-Peak	2 PM to 4 PM, 9 PM to 12 AM	0.56	0.01	1.5%	0.61	0.00	0.6%	0.53	0.01	2.2%
	Super Off-Peak	12 AM to 2 PM	0.46	0.00	-0.6%	0.51	-0.01	-1.3%	0.43	0.00	0.0%
	Day	**All Hours**	0.53	0.00	0.7%	0.58	0.00	0.0%	0.50	0.01	1.3%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.77	0.02	2.3%	0.83	0.03	3.1%	0.73	0.01	1.9%
	Off-Peak	6 AM to 4 PM, 9 PM to 12 AM	0.55	0.01	1.4%	0.60	0.01	1.9%	0.52	0.01	1.0%
	Super Off-Peak	12 AM to 6 AM	0.37	-0.01	-1.6%	0.40	-0.02	-4.8%	0.35	0.00	0.7%
	Day	**All Hours**	0.55	0.01	1.2%	0.60	0.01	1.1%	0.52	0.01	1.2%

* A shaded cell indicates estimate is not statistically significant

Table 5.3-3: Rate 1 Load Impacts by Rate Period and Day Type – CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

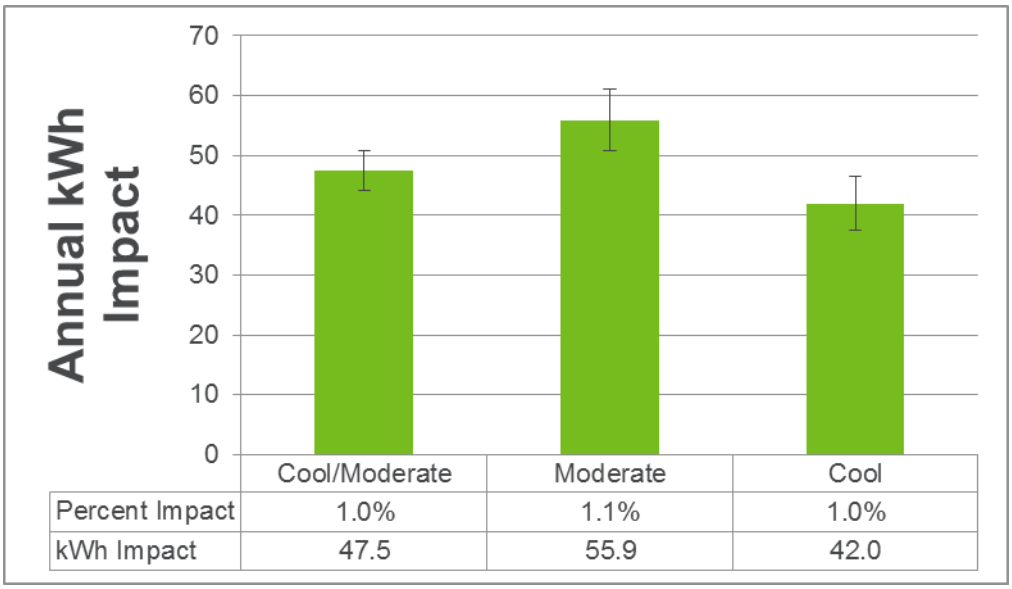
Rate 1											
Day Type	Period	Hours	Cool/Moderate, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.59	0.00	0.1%	0.62	0.00	0.4%	0.56	0.00	-0.3%
	Off-Peak	6 AM to 4 PM, 9 PM to 12 AM	0.45	0.00	-0.6%	0.48	0.00	-0.7%	0.42	0.00	-0.5%
	Super Off-Peak	12 AM to 6 AM	0.33	-0.01	-3.6%	0.36	-0.01	-2.9%	0.31	-0.01	-4.4%
	Day	**All Hours**	0.45	0.00	-1.0%	0.48	0.00	-0.8%	0.42	0.00	-1.1%
Average Weekend	Peak	4 PM to 9 PM	0.59	0.00	-0.2%	0.62	0.00	-0.4%	0.55	0.00	-0.1%
	Off-Peak	2 PM to 4 PM, 9 PM to 12 AM	0.50	0.00	-1.0%	0.54	-0.01	-1.1%	0.46	0.00	-0.9%
	Super Off-Peak	12 AM to 2 PM	0.41	-0.01	-1.5%	0.44	-0.01	-1.2%	0.38	-0.01	-1.9%
	Day	**All Hours**	0.47	0.00	-1.1%	0.50	0.00	-0.9%	0.43	-0.01	-1.2%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.66	0.00	-0.3%	0.71	0.01	1.3%	0.62	-0.01	-2.1%
	Off-Peak	6 AM to 4 PM, 9 PM to 12 AM	0.49	-0.01	-1.9%	0.53	-0.01	-1.6%	0.46	-0.01	-2.1%
	Super Off-Peak	12 AM to 6 AM	0.35	-0.02	-5.9%	0.38	-0.01	-3.5%	0.32	-0.03	-8.7%
	Day	**All Hours**	0.49	-0.01	-2.1%	0.53	-0.01	-1.1%	0.46	-0.01	-3.3%

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 5.3-4 shows the average customer's annual conservation effect for customers on SDG&E's Rate 1. Energy savings were similar between the moderate and cool climate regions, about 1%. Overall, customers in the two zones saved approximately 47.5 kWh during the first year of the pilot. This is comparable to the conservation effects seen for the other two utilities.

Figure 5.3-4: Average Annual Conservation Effect for SDG&E Rate 1
(Positive values represent usage reductions)

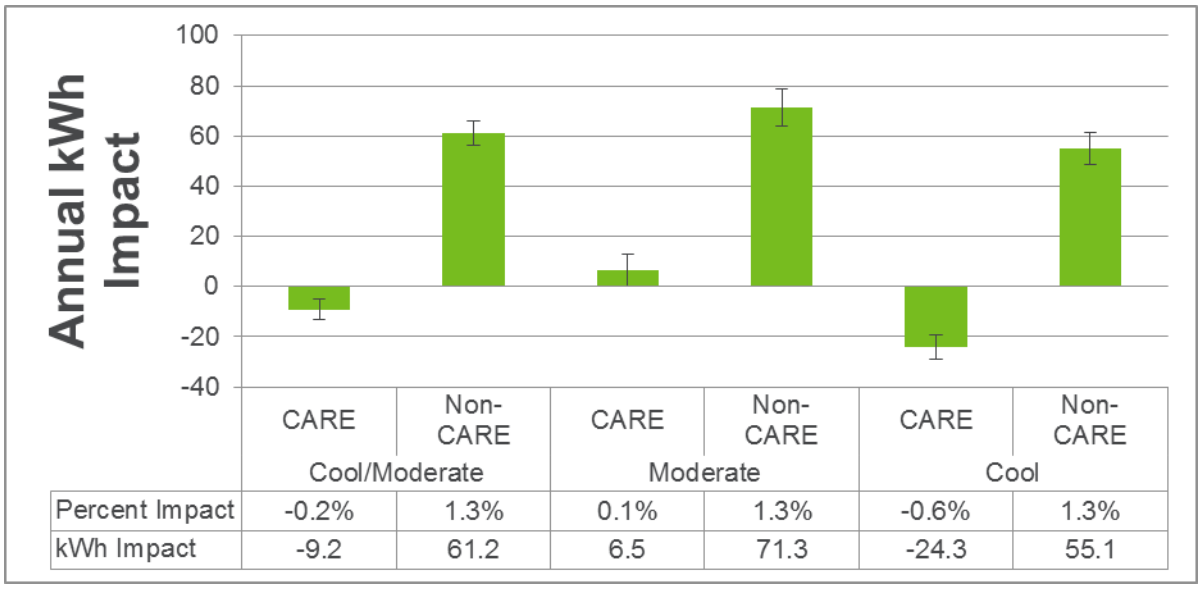


	Cool/Moderate	Moderate	Cool
Percent Impact	1.0%	1.1%	1.0%
kWh Impact	47.5	55.9	42.0

Figure 5.3-5 shows the total energy savings for CARE/FERA and non-CARE/FERA customers in the cool and moderate climate regions separately and combined. Non-CARE/FERA customers attributed to most of the energy savings, while CARE/FERA customers had either small energy savings or small energy usage increases.

Figure 5.3-5: Average Annual Conservation Effect for SDG&E Rate 1 for CARE/FERA and Non-CARE/FERA Customers

(Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Cool/Moderate		Moderate		Cool	
Percent Impact	-0.2%	1.3%	0.1%	1.3%	-0.6%	1.3%
kWh Impact	-9.2	61.2	6.5	71.3	-24.3	55.1

5.3.2 Rate 2

SDG&E's Rate 2 differs from Rate 1 in that it is a two-period rate, rather than a three-period rate. Like Rate 1, the peak period is from 4 to 9 PM on weekdays and weekends. In winter, for electricity usage above 130% of the baseline quantity, prices equal roughly 37.3 ¢/kWh in the peak period and 35.8 ¢/kWh in the off-peak period. Like Rate 1, a credit of 18.6 ¢/kWh is applied to usage below 130% the baseline quantity[62].

Winter Load Impacts

Figure 5.3-6 shows the absolute load impacts for the weekday peak period for Rate 2 for SDG&E's service territory as a whole and for each climate region. For the service territory as a whole, load impacts were equal to 1.7% or 0.01 kW. Like Rate 1, customers in the moderate and cool climate regions had similar load impacts of 1.6% and 1.7% respectively. Customers in the hot climate zone had the greatest peak period impacts at 3.9% or 0.04 kW. Impacts in the hot climate zone are statistically significantly greater than those in the cool and moderate climate regions.

[62] Prices reflect tariffs in effect at the launch of the pilot through the end of February 2017. As indicated above and shown in Appendix B, rates changed on March 1, 2017.

Figure 5.3-6: Average Load Impacts For Peak Period for SDG&E Rate 2 (Positive values represent load reductions)

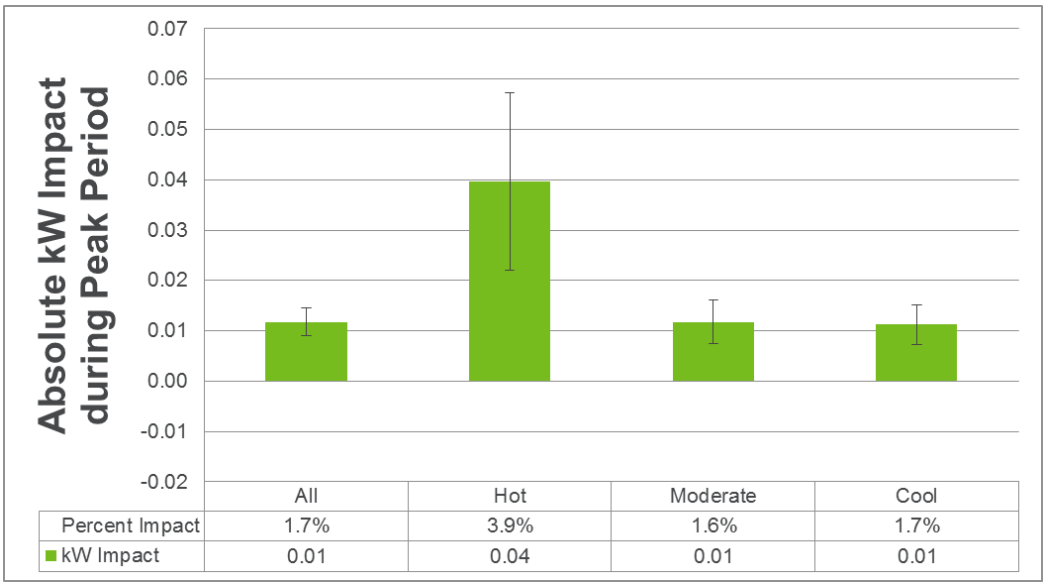


Table 5.3-4contains estimates of load impacts for all relevant rate periods and day types. Reference loads and load impacts in each rate period and over the course of the day were similar between weekends and weekdays for the service territory as a whole and also for each climate region. The overall conservation effect (e.g., the reduction in daily usage) did not have a consistent pattern. Customers in the hot climate region increased their daily consumption on weekdays, while customers in the cool climate region reduced their loads.

Table 5.3-4: Rate 2 Load Impacts by Rate Period and Day Type*
(Positive values represent load reductions, negative values represent load increases)

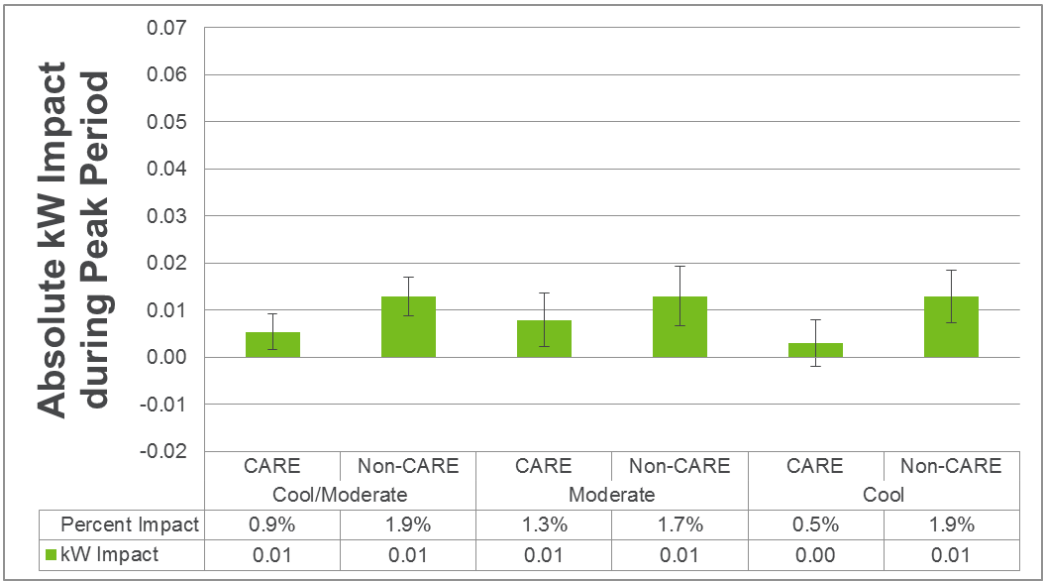
Rate 2														
Day Type	Period	Hours	All			Hot			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.67	0.01	1.7%	1.02	0.04	3.9%	0.71	0.01	1.6%	0.64	0.01	1.7%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.45	0.00	-0.2%	0.73	-0.03	-4.7%	0.48	0.00	-0.9%	0.43	0.00	0.5%
	Day	**All Hours**	0.50	0.00	0.4%	0.79	-0.02	-2.4%	0.53	0.00	-0.2%	0.47	0.00	0.9%
Average Weekend	Peak	4 PM to 9 PM	0.68	0.01	1.4%	1.05	0.02	1.6%	0.73	0.01	1.3%	0.65	0.01	1.5%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.48	0.00	-0.5%	0.78	-0.04	-4.7%	0.52	-0.01	-1.1%	0.45	0.00	0.1%
	Day	**All Hours**	0.52	0.00	0.0%	0.84	-0.03	-3.1%	0.56	0.00	-0.5%	0.49	0.00	0.5%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.75	0.01	1.7%	1.10	0.05	4.2%	0.80	0.01	0.9%	0.71	0.02	2.3%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.49	0.00	0.0%	0.77	-0.02	-3.0%	0.52	0.00	-0.8%	0.46	0.00	0.6%
	Day	**All Hours**	0.54	0.00	0.5%	0.84	-0.01	-1.0%	0.58	0.00	-0.3%	0.51	0.01	1.1%

* A shaded cell indicates estimate is not statistically significant

Figure 5.3-7 shows the peak period load reductions on weekdays for non-CARE/FERA and CARE/FERA customers and Table 5.3-5 and Table 5.3-6 show the load impacts for each rate period and day type for the two segments. There are not enough customers in the hot climate region to segment between CARE/FERA and non-CARE/FERA, so these tables only include customers in the moderate and cool climate regions, separately and combined.

Like Rate 1, non-CARE/FERA customers in the cool climate region had greater percent impacts (1.9% and 0.01 kW) than their CARE/FERA counterparts (0.9% and 0.01 kW) and these differences are statistically significant in both absolute and percentage terms. This is not the case in the moderate climate region, where load impacts for CARE/FERA and non-CARE/FERA customers were more similar.

Figure 5.3-7: Average Load Impacts for Peak Period for SDG&E Rate 2 for CARE/FERA and non-CARE/FERA Customers
(Positive values represent load reductions)



	CARE	Non-CARE	CARE	Non-CARE	CARE	Non-CARE
	Cool/Moderate		Moderate		Cool	
Percent Impact	0.9%	1.9%	1.3%	1.7%	0.5%	1.9%
kW Impact	0.01	0.01	0.01	0.01	0.00	0.01

As seen in Table 5.3-5 and Table 5.3-6, non-CARE/FERA customers had greater on-peak and average weekday demand than CARE/FERA customers. Only non-CARE/FERA customers reduced their overall consumption. For example, non-CARE/FERA customers in the moderate and cool climate regions combined reduced their average weekday electricity demand by 0.5% or less than 0.01 kW. CARE/FERA and non-CARE/FERA segments were not available in the hot climate region due to the small population of customers, resulting in insufficient sample size to allow for segmentation.

Table 5.3-5: Rate 2 Load Impacts by Rate Period and Day Type – Non-CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

Rate 2											
Day Type	Period	Hours	Cool/Moderate, Non-CARE			Moderate, Non-CARE			Cool, Non-CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.69	0.01	1.9%	0.74	0.01	1.7%	0.66	0.01	1.9%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.46	0.00	0.0%	0.50	-0.01	-1.1%	0.44	0.00	0.7%
	Day	**All Hours**	0.51	0.00	0.5%	0.55	0.00	-0.3%	0.48	0.01	1.1%
Average Weekend	Peak	4 PM to 9 PM	0.70	0.01	1.5%	0.76	0.01	1.4%	0.67	0.01	1.6%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.49	0.00	-0.5%	0.53	-0.01	-1.5%	0.46	0.00	0.2%
	Day	**All Hours**	0.53	0.00	0.1%	0.58	0.00	-0.7%	0.50	0.00	0.6%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.77	0.01	1.8%	0.83	0.00	0.4%	0.73	0.02	2.8%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.49	0.00	0.4%	0.53	0.00	-0.9%	0.47	0.01	1.2%
	Day	**All Hours**	0.55	0.00	0.8%	0.60	0.00	-0.5%	0.52	0.01	1.7%

* A shaded cell indicates estimate is not statistically significant

Table 5.3-6: Rate 2 Load Impacts by Rate Period and Day Type –CARE/FERA*
(Positive values represent load reductions, negative values represent load increases)

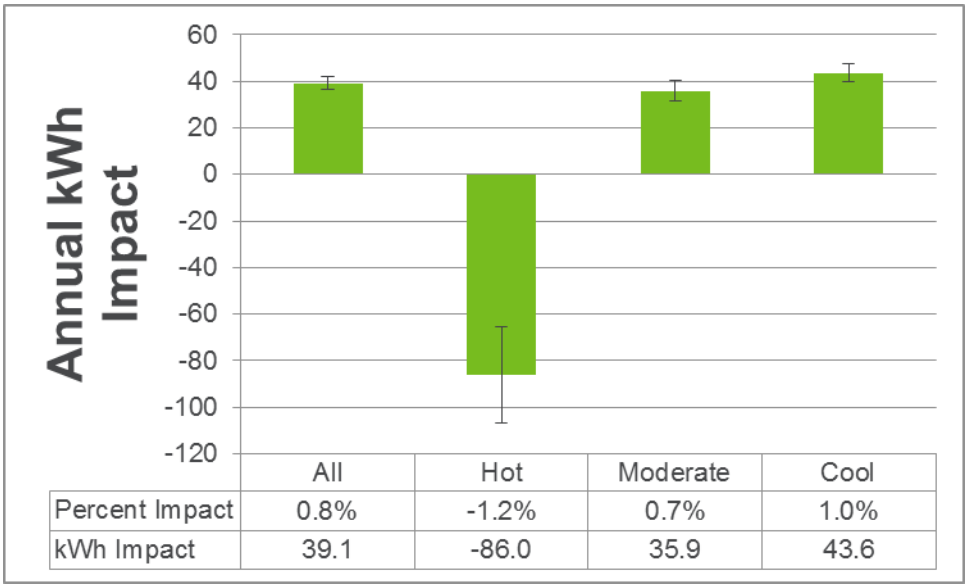
Rate 2											
Day Type	Period	Hours	Cool/Moderate, CARE			Moderate, CARE			Cool, CARE		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.59	0.01	0.9%	0.62	0.01	1.3%	0.56	0.00	0.5%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.41	0.00	-0.4%	0.44	0.00	-0.1%	0.39	0.00	-0.8%
	Day	**All Hours**	0.45	0.00	-0.1%	0.48	0.00	0.3%	0.42	0.00	-0.5%
Average Weekend	Peak	4 PM to 9 PM	0.59	0.00	0.7%	0.62	0.01	1.1%	0.55	0.00	0.3%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.43	0.00	-0.1%	0.47	0.00	0.1%	0.40	0.00	-0.3%
	Day	**All Hours**	0.47	0.00	0.1%	0.50	0.00	0.4%	0.43	0.00	-0.1%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.66	0.01	1.2%	0.71	0.02	2.6%	0.62	0.00	-0.5%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.45	-0.01	-1.6%	0.48	0.00	-0.3%	0.41	-0.01	-3.0%
	Day	**All Hours**	0.49	0.00	-0.8%	0.53	0.00	0.5%	0.46	-0.01	-2.3%

* A shaded cell indicates estimate is not statistically significant

Annual Conservation Effect

Figure 5.3-8 shows the conservation effect over the first year of the pilot for customers on SDG&E's Rate 2. Overall, customers reduced their energy consumption by about 0.8% or 39.1 kWh over the course of the year. These savings are attributable to the moderate and cool climate regions, as customers in the hot region actually increased their energy consumption by 1.2%. All conservation effects were statistically significant at the 90% confidence level.

Figure 5.3-8: Average Annual Conservation Effect for SDG&E Rate 2
(Positive values represent usage reductions)

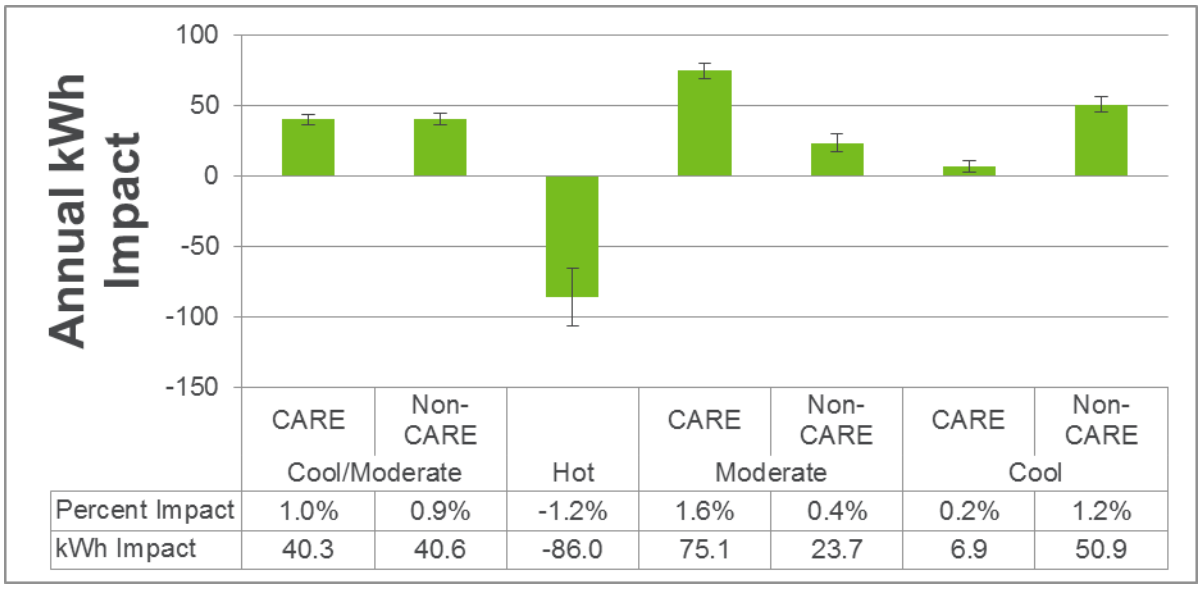


	All	Hot	Moderate	Cool
Percent Impact	0.8%	-1.2%	0.7%	1.0%
kWh Impact	39.1	-86.0	35.9	43.6

Figure 5.3-9 presents the annual conservation effect for CARE/FERA and non-CARE/FERA customers. There were not enough customers in the hot climate region to estimate savings for individual segments. Unlike Rate 1, there is not a clear pattern in the difference in conservation effects between CARE/FERA and non-CARE/FERA customers. In the cool and moderate climate regions combined, each group reduced their energy consumption by over 40 kWh during the course of the year.

Figure 5.3-9: Average Annual Conservation Effect for SDG&E Rate 2 for CARE/FERA and Non-CARE/FERA Customers

(Positive values represent load reductions)



	CARE	Non-CARE		CARE	Non-CARE	CARE	Non-CARE
	Cool/Moderate		Hot	Moderate		Cool	
Percent Impact	1.0%	0.9%	-1.2%	1.6%	0.4%	0.2%	1.2%
kWh Impact	40.3	40.6	-86.0	75.1	23.7	6.9	50.9

5.3.3 Weekly Alert Emails

Winter Load Impacts

Table 5.3-7shows peak period impacts for customers who are not receiving alerts (“controls”) and those who are (“recipients”) and Table 5.3-8 contains estimated impacts for all rate periods and day types. As seen, the incremental impacts during the peak period were very small and, as shown by the fact that the 90% confidence interval includes 0, incremental impacts for the territory as a whole were not statistically significant. It is worth noting that the incremental impact for the combined moderate climate region is statistically significant at the 90% confidence level. It should also be noted that, although the % increase in the impact is large in percentage terms, this is a bit misleading since the estimated values are based on a very small impact to begin with. That is, the denominator in the calculation is quite small so that even very small incremental effects represent a reasonably large percent of the impact.

As seen in Table 5.3-8, there are small but statistically significant increases in electricity use during the off-peak period in the cool/moderate regions combined on both weekdays and weekends and also in the cool region.

In October, SDG&E modified the WAE content and formatting. This new format may have been more effective in impacting customer behavior in the moderate climate region.

Table 5.3-7: Incremental Impacts of SDG&E Weekly Alert Emails

Climate Zone	Number of Customers		kW Impact during Peak Period					% Increase in Impact
	Controls	Recipients	Controls	Recipients	Incremental	90% Confidence Interval		
Cool	1,632	916	0.019	0.006	-0.012	-0.018	-0.007	-65%
Moderate	1,493	832	0.005	0.018	0.013	0.006	0.020	289%
Cool/Moderate	3,124	1,748	0.013	0.011	-0.002	-0.006	0.002	-15%

Table 5.3-8: Incremental Impacts of SDG&E Weekly Alert Emails by Rate Period and Day Type*

Rate 2											
Day Type	Period	Hours	WAE - Cool/Moderate			WAE - Moderate			WAE - Cool		
			Non-WAE Impact	Inc. Impact	% Inc. Impact	Non-WAE Impact	Inc. Impact	% Inc. Impact	Non-WAE Impact	Inc. Impact	% Inc. Impact
Average Weekday	Peak	4 PM to 9 PM	0.013	-0.002	-15.0%	0.005	0.013	289.3%	0.019	-0.012	-65.2%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.001	-0.003	-211.9%	-0.004	0.000	3.2%	0.005	-0.004	-86.9%
	Day	**All Hours**	0.004	-0.003	-68.7%	-0.003	0.003	-103.7%	0.008	-0.006	-76.3%
Average Weekend	Peak	4 PM to 9 PM	0.011	-0.003	-25.4%	0.002	0.015	593.0%	0.017	-0.014	-84.5%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	-0.001	-0.003	210.8%	-0.008	0.000	0.4%	0.003	-0.004	-136.2%
	Day	**All Hours**	0.001	-0.003	-183.7%	-0.005	0.003	-55.1%	0.006	-0.006	-105.4%
Monthly System Peak Day	Peak	4 PM to 9 PM	0.014	-0.003	-19.0%	-0.002	0.015	-775.9%	0.025	-0.015	-59.9%
	Off-Peak	12 AM to 4 PM, 9 PM to 12 AM	0.000	-0.005	-2364.0%	-0.007	0.000	6.2%	0.005	-0.007	-141.4%
	Day	**All Hours**	0.003	-0.004	-135.7%	-0.006	0.003	-46.6%	0.009	-0.009	-96.0%

* A shaded cell indicates estimate is not statistically significant

5.3.4 Comparison Across Rates

Figure 5.3-10 shows the average peak period impact for Rate 1 and Rate 2 in the winter months. The peak period covers the same hours for each rate (4 to 9 PM). The differences in impacts between the two rates are not statistically significant. Recall that there are no customers in SDG&E's hot climate region on Rate 1, meaning that the "All" category is not an apples to apples comparison.

Figure 5.3-11 shows the average daily kWh impact during the winter period for Rate 1 and Rate 2. Impacts are fairly similar in the cool climate region, but not in the moderate climate region.

Figure 5.3-10: Average Peak Period Impacts Across Rates

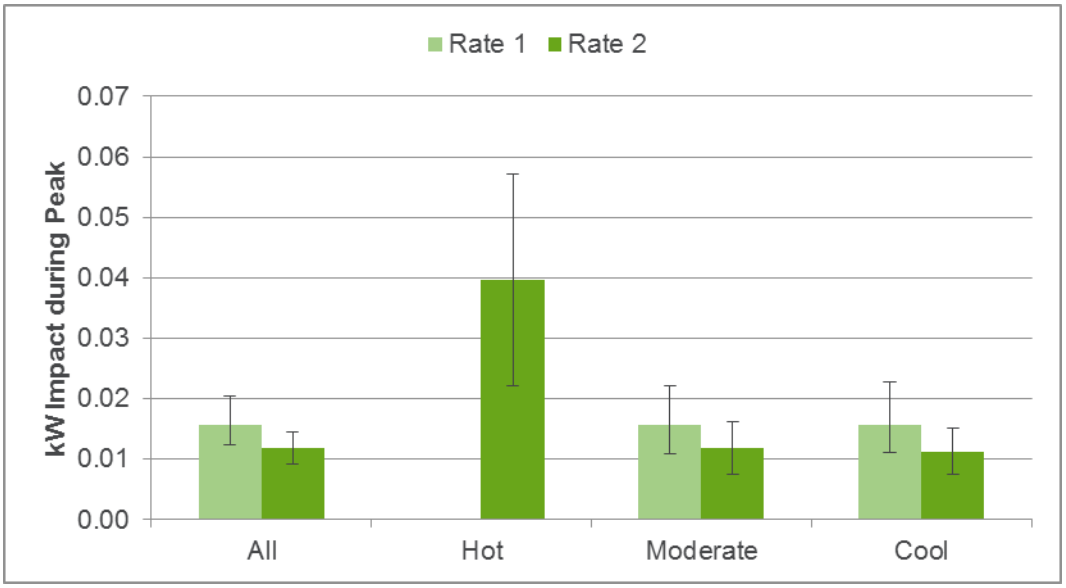
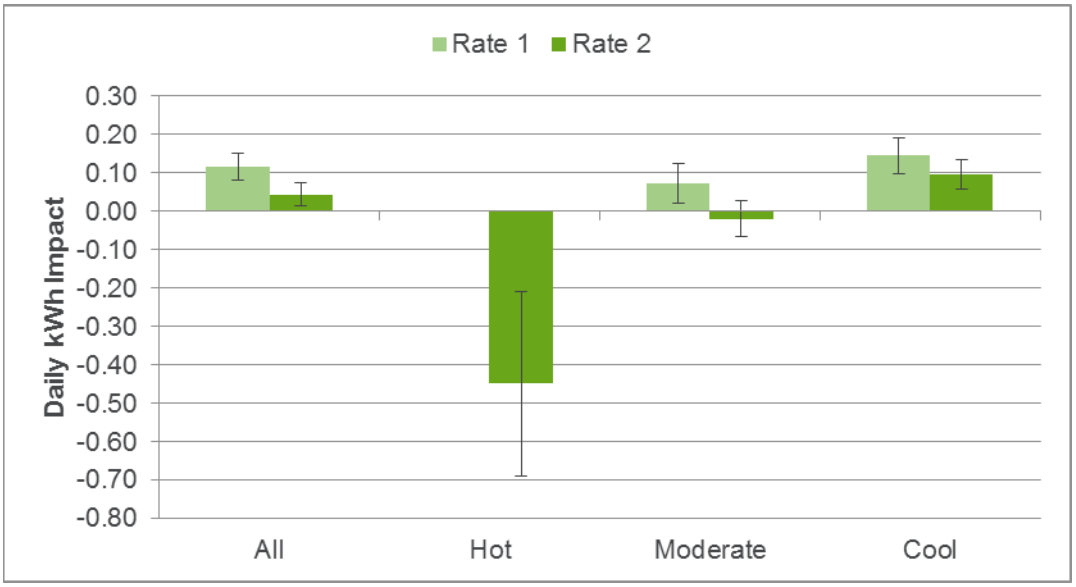


Figure 5.3-11: Average Daily kWh Impacts Across Rates



5.4 Bill Impacts

This section summarizes the bill impact estimates for the two rate treatments tested by SDG&E. Bill impacts are reported for each climate region separately and combined, and for CARE/FERA and non-CARE/FERA customers in the moderate and cool climate regions. As discussed previously, SDG&E's hot climate region is quite small and the sample of customers recruited into the pilot is not large enough to support estimation of load impacts separately for CARE/FERA and non-CARE/FERA customers nor to support segmentation of the sample into seniors or various income groups as was done in the hot regions for PG&E and SCE. All customers in the hot region were placed on Rate 2 or were in the control group.

Bill impacts are reported as the average total impact for the first year of the pilot and as the average monthly impact for the winter months of November through April for each rate, climate zone, and customer segment summarized above. As described in Section 3.2 of the First Interim Report, the following three analyses were conducted:

- **Structural benefiter/non-benefiter analysis based on pretreatment usage-** Displaying the proportions of structural benefiters and non-benefiters for each rate and relevant customer segment based on pretreatment data on an annual and summer season basis;
- **Estimation of the total bill impact due to both the difference in the tariffs and behavior change[25]-** Displaying the bill impact for each rate and relevant customer segment due to structural differences in the rate mitigated by changes in behavior; and
- **Change in the distribution of bill impacts due to behavior change-** Displaying the distribution curves of bill impacts (percentage of customers with bill impacts within $10 incremental bins) with and without behavior change in the same graph to illustrate if the distribution for participants shifted to the left or changed shape compared with the distribution for control customers without behavior change.

A more detailed explanation of each type of analysis and how the analysis was conducted is contained in Section 3.2 of the First Interim Report. The remainder of this section is organized according to the three analysis types summarized above—that is, bill impacts are presented for each rate, relevant customer segment, and climate region for each of the three analyses.

Unlike in the First Interim Report which relied on only one tariff per pilot rate and OAT, the impacts presented in this report are based on two SDG&E tariffs. All monthly bills form July 2016 through February 2017 (and their corresponding pretreatment months) are based on the tariffs that were in effect at the start of the pilot. Estimated bills for March 2017 through June 2017 (and their corresponding pretreatment months) are based on the March 2017 tariff. The reason for incorporating a second tariff was a significant change in both the pilot rates and OAT. Because of this change, which is documented in Appendix B, the annual structural benefiter analysis was updated for this report.

5.4.1 Structural Benefiter/Non-Benefiter Analysis Based on Pretreatment Usage

As with PG&E and SCE, the structural benefiter analysis was conducted for the winter and annual time periods using pretreatment usage data for the treatment group for each rate and relevant customer segment. Annual impacts were based on hourly load data from May 2015 through April 2016. Winter impacts were based on November 2015 through April 2016. Monthly bills were estimated for each treatment group customer on the OAT and TOU rate using the hourly load data. The difference in bills based on the TOU rate and the OAT determines if a customer is a structural benefiter, a structural non-benefiter, or falls in a neutral range defined as having a structural bill impact between ±$3.[63]

Final results from the structural benefiter / non-benefiter analysis are presented in column graphs and shown as percentages for the summer season and on an annual basis. For each rate and relevant segment, the percentage of customers who are non-benefiters, neutral (+/- $3), or benefiters based on their average monthly bills for the time period of interest are shown as individual columns. The three columns within each rate and segment combination total to 100%, thus showing the distribution of structural benefiters and non-benefiters for each rate and segment of interest.

Figure 5.4-1 presents the outcome of the structural benefiter analysis for Rate 1 for the cool and moderate climate regions combined for all customers as well as for CARE/FERA and non-CARE/FERA customers. The graph on the left presents the analysis on an annual basis, and the graph on the right presents the findings for the winter period. In the two climate regions combined, a large proportion of customers are in the neutral category and very few are benefiters on an annual basis. Over 90% of CARE/FERA customers in the cool and moderate climate regions have bill impacts in the neutral range. On a winter basis, essentially all customers are structurally neutral. The price differential between periods is very small (less than one cent), making the rate relatively flat. This combined with the baseline credit means that pilot bills are very similar to bills estimated with the OAT.

[63] See Section 3.2.1 in the First Interim Report for additional details on the methodology.

Figure 5.4-1: Rate 1 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

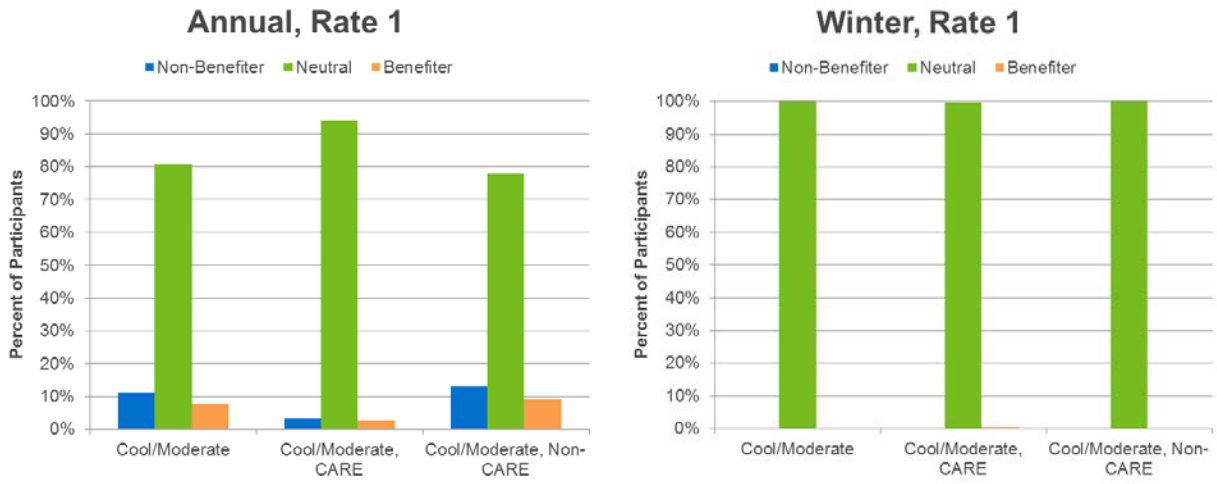


Figure 5.4-2 presents the outcome of the structural benefiter analysis for Rate 1 at the detailed segment level for the cool and moderate climate regions, separately. The findings at the aggregate level still hold, with most customers in the neutral category, and a small percentage of non-CARE/FERA customers in the benefiter category on an annual basis. Nearly all customers in each segment are neutral in the winter months, for the reasons explained above.

Figure 5.4-2: Rate 1 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region

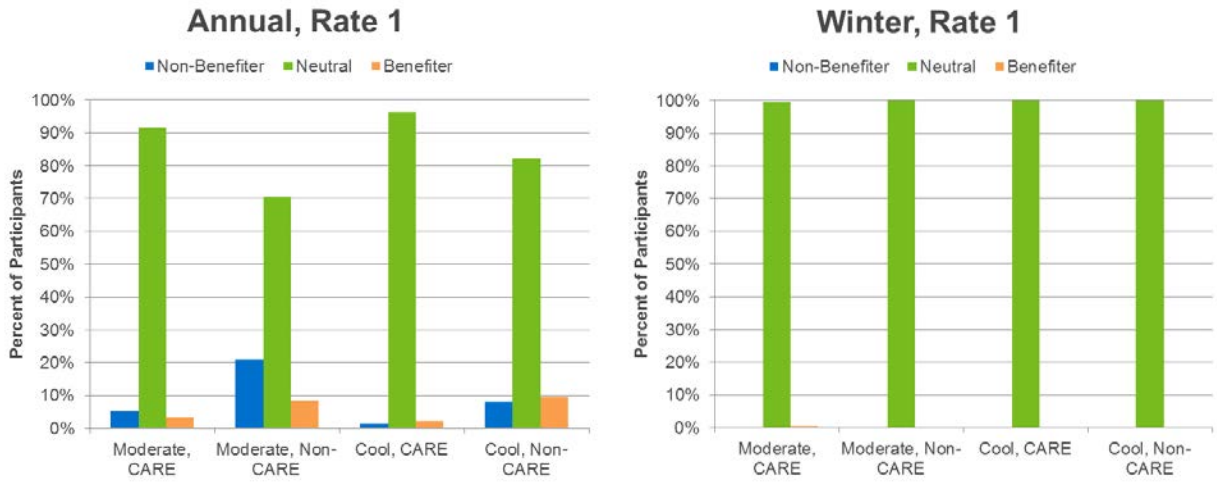


Figure 5.4-3 presents the outcome of the structural benefiter analysis for Rate 2 at the aggregate level across climate regions, and by CARE/FERA and non-CARE/FERA for the cool and moderate climate regions combined. The results are nearly identical to those for Rate 1. Once again, most CARE/FERA customers in the cool and moderate climate regions are in the neutral category on an annual basis and essentially all customers are in the neutral category in the winter months. Like Rate 1, the price differential between off-peak and peak periods is very small, resulting in a nearly flat rate. In other words, bills estimated using the OAT and Rate 2 are nearly identical.

Figure 5.4-3: Rate 2 Structural Benefiter / Non-Benefiter Analysis
All | CARE/FERA | Non-CARE/FERA

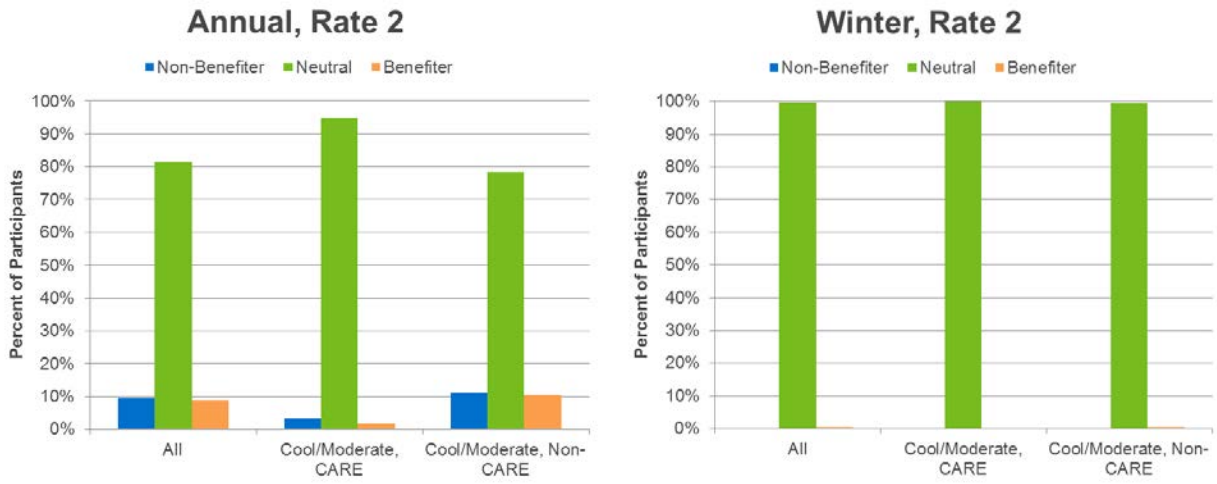
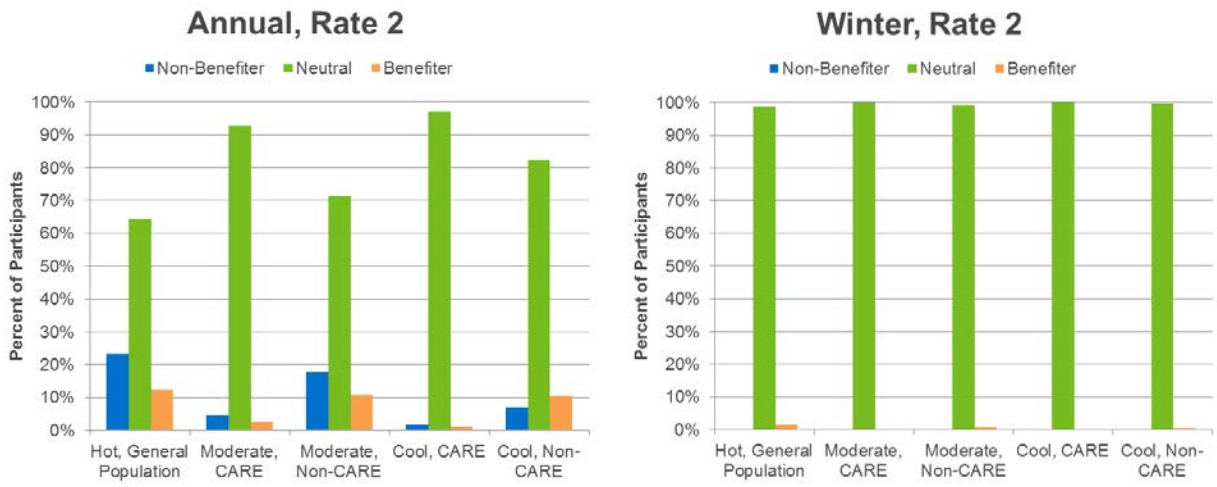


Figure 5.4-4 presents the outcome of the structural benefiter analysis for Rate 2 at the detailed segment level by climate region. As mentioned previously, the hot climate region is too small to segment by CARE/FERA status. Just over 20% of customers in the hot climate region are non-benefiters on an annual time frame, but almost all customers in that region are in the neutral category in the winter months. As with Rate 1, most CARE/FERA customers in the cool and moderate climate regions fall into the neutral category on an annual and winter basis.

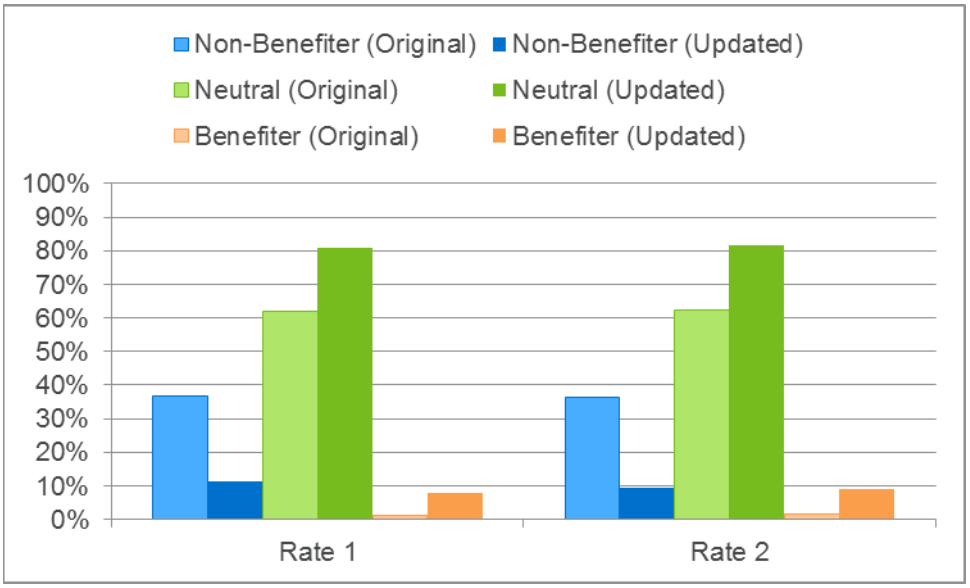
Figure 5.4-4: Rate 2 Structural Benefiter / Non-Benefiter Analysis
Detailed Segments by Climate Region



Overall, a general pattern of structural benefiters and non-benefiters emerged that was constant across rates. Generally, CARE/FERA customers tend to have very small bill impacts compared to non-CARE/FERA customers, as shown by their larger share of customers in the neutral category on an annual basis. These results stand in contrast to those from PG&E and SCE who had very large proportions of benefiters in nearly all customer segments during the winter period.

Figure 5.4-5 presents a comparison of the annual structural benefiter analysis using two versions of the pilot tariffs and the OAT. The lighter bars represent the outcome of the analysis based on the June 2016 tariffs, which were in effect at the launch of the pilot. The values here match what was reported in the First Interim Report. The darker bars are based on a combination of the original and March 2017 tariffs. The original tariff was used for the months of June through February, and the new tariffs were used for March through May. Incorporating the updated tariffs increases the number of customers in the neutral category and reduces the number of customers in the non-benefiter category. For a comparison of the two tariffs, see Appendix B.

Figure 5.4-5: Comparison of Structural Benefiter Analysis between Original and Updated Tariffs



The next section presents the full picture of how customer's bills changed with a change in their tariff and changes in behavior.

5.4.2 Estimation of the Total Bill Impact Due to Differences in the Tariffs and Behavior Change

Total bill impacts experienced by customers on a TOU rate can be decomposed into two components: the structural impact, and the behavioral impact. The structural impact represents the change in customer bills based solely on the change in the underlying structure of the rate. In this case, it is the change from the OAT to the time-differentiated TOU pilot rates. The behavioral impact represents how the customer changed their energy usage in response to the new pricing structure of the rate—which includes higher prices in the afternoon and evening and lower prices at other times of the day. As noted above, it is the combination of structural and behavioral bill impacts that produces the total bill impact experienced by the average study participant on each rate.

The results from this analysis represent the total cost to the customer over the first year of the pilot and the average monthly bill across the winter months of November 2016 through April 2017. Three different bills were calculated for each customer segment:[64]

- **No Change in Behavior or Tariff [1]:** This represents what the treatment group bills would have been in the post-treatment period if they were on the OAT and had not changed their behavior
- **No Change in Behavior, Change in Tariff [2]:** This represents what the treatment group bills would have been in the post-treatment period if they were on the TOU rate and had not changed their behavior
- **Change in Behavior and in Tariff [3]:** This represents what the treatment group bills were in the post-treatment period on the TOU rate with a change in behavior

Based off of components defined above, the following metrics were calculated:

- The difference between **[1]** and **[2]** is the structural bill impact (based on post-treatment usage after adjusting for any pretreatment difference between control and treatment customers);
- The difference between **[1]** and **[3]** is the bill impact due to structural differences in the rates, but mitigated by changes in behavior; and
- The difference between **[2]** and **[3]** is the amount customers were able reduce their bills by changing their behavior.

In the bill impact analysis, a major policy question was to better understand the relationship between the structural bill impacts, and how customers were able to respond. This outcome is represented by the "total bill impact" shown in the data table at the bottom of the figures below. Put differently, this percentage represents how much of the structural bill increase from the TOU rate the average customer was able to offset. Results are organized by rate, climate region, and segment; similarly to the other bill impact analysis sections.

Annual

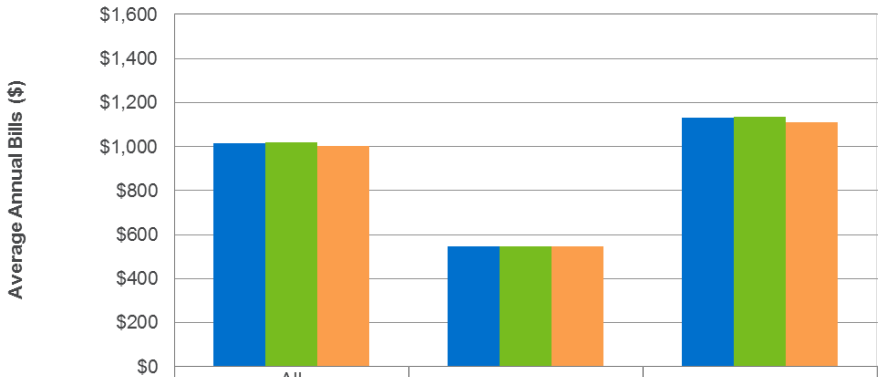
Figure 5.4-6 presents a set of three average annual bills (the total cost across twelve monthly bills) as defined above for all customers, CARE/FERA customers, and non-CARE/FERA customers on Rate 1 in the cool and moderate climate regions combined. The blue bar represents a typical total yearly cost for a customer still on the OAT and not responding to a TOU rate— noted as "No Change in Behavior or Tariff." For the average customer on Rate 1, this dollar amount was $1,017. The green bar represents what a typical total cost would be for a customer who was billed on a TOU rate, but didn't change their energy use behavior— noted as "No Change in Behavior, Change in Tariff." This dollar amount is $1,019 for the average Rate 1 customer. The difference between the two values, $2, is the average increase a customer would see in their bills by changing from the OAT to Rate 1, and not changing their energy use behavior; this is also referred to as the customer's structural loss. The orange bar represents the average Rate 1 customer's bill after factoring in the change in rate from the OAT to the Pilot Rate 1, and then also taking into account any changes in energy use behavior— noted as "With Change in Behavior and

[64] See Section 3.2.3 of the First Interim Report for additional details on the methodology.

Tariff." This bill amount averaged $1,000 for the typical Rate 1 customer. Based off these values, it is possible to estimate the total change in bills including both the change in tariff and in behavior, which was a bill reduction of about $16 per month (less than 2%). The total change in bill is calculated by subtracting the orange ($1,000) from the blue ($1,017)[65].

Non-CARE/FERA customers were able to avoid all of their structural loss, which was equal to about $3.

Figure 5.4-6: Rate 1 Annual Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA

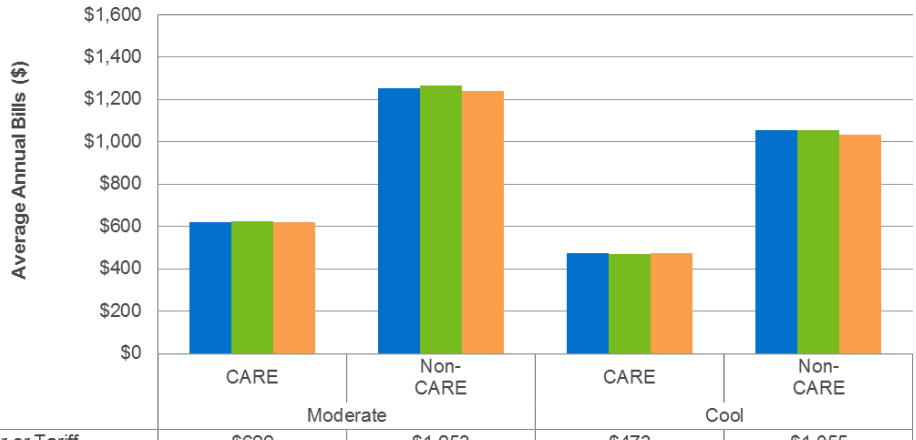


	All Customers	CARE	Non-CARE
No Change in Behavior or Tariff	$1,017	$546	$1,130
No Change in Behavior, Change in Tariff	$1,019	$546	$1,133
With Change in Behavior and Tariff	$1,000	$547	$1,110
Total Bill Impact	-$16	$1	-$21
Percent Bill Impact	-1.6%	0.1%	-1.8%

Figure 5.4-7 presents the three sets of total yearly costs as defined above for the detailed segments for the cool and moderate climate regions on Rate 1. Generally, customers had very small structural bill impacts, with the exception of non-CARE/FERA customers in the moderate climate region who faced cost increases of about 12% without changes in their behavior. Fortunately, these customers were able to ultimately reduce their overall costs by about $14 or 1.1% by shifting or reducing their energy use. CARE/FERA customers in both climate regions did not have meaningful bill impacts over the course of the year in either direction.

[65] There is some rounding error.

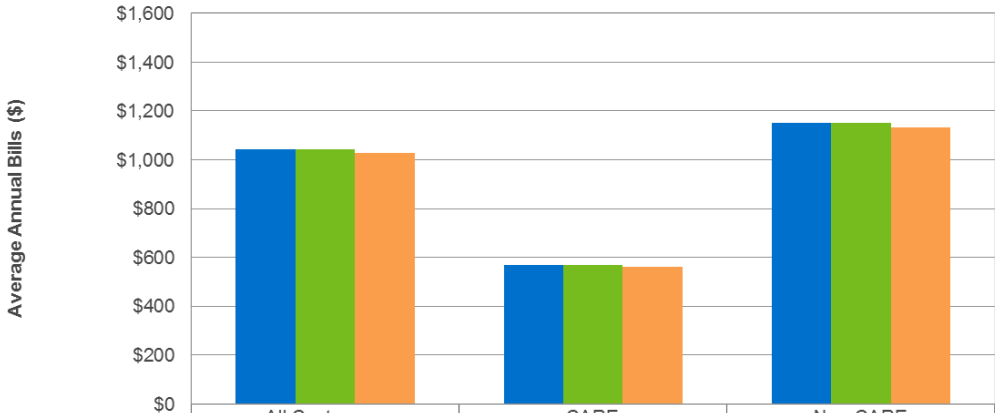
Figure 5.4-7: Rate 1 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE
No Change in Behavior or Tariff	$622	$1,253	$473	$1,055
No Change in Behavior, Change in Tariff	$624	$1,265	$470	$1,053
With Change in Behavior and Tariff	$621	$1,239	$475	$1,031
Total Bill Impact	-$1	-$14	$2	-$24
Percent Bill Impact	-0.1%	-1.1%	0.4%	-2.3%

Figure 5.4-8 presents the three sets of bills for customers on Rate 2 for customers in the service territory as a whole and for CARE/FERA and non-CARE/FERA customers in the cool and moderate climate regions combined. Like Rate 1, differences in total annual costs are very small (less than 2%) when compared across the three bill calculations. Overall, customers faced essentially no structural losses, and were able to reduce their total costs by about $15 or 1.5%. CARE/FERA customers faced structural losses of only $1 over the course of the year, but in the end they reduced their costs by $8 or 1.4% through changes in behavior.

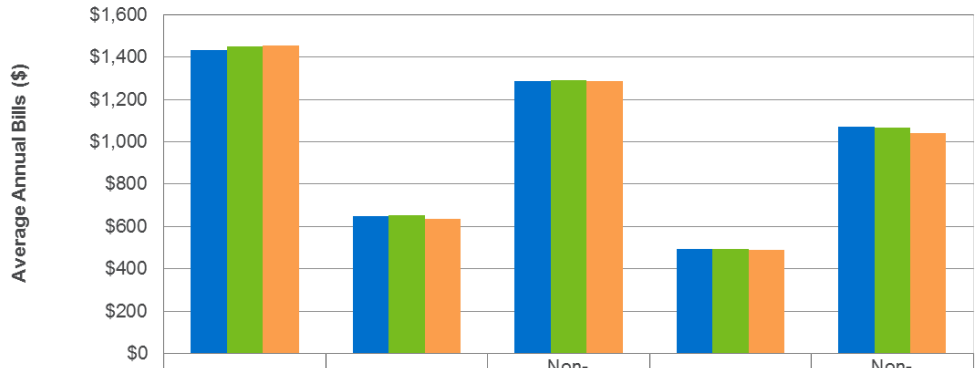
Figure 5.4-8: Rate 2 Annual Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers All Climates	CARE Cool/Moderate	Non-CARE Cool/Moderate
No Change in Behavior or Tariff	$1,043	$569	$1,152
No Change in Behavior, Change in Tariff	$1,043	$570	$1,151
With Change in Behavior and Tariff	$1,028	$560	$1,134
Total Bill Impact	-$15	-$8	-$17
Percent Bill Impact	-1.5%	-1.4%	-1.5%

Figure 5.4-9 presents the three sets of bills for the detailed segments for the moderate and cool climate regions, and for the hot climate region as a whole. On an annual basis, customers in the hot climate region faced structural losses of $16. Unfortunately, these customers could not reduce their total bills through behavior change and ultimately paid about $20 or 1.4% more, on average, than they would have on the OAT. Non-CARE/FERA customers in the cool climate region saved the most money over the course of the year, about $28 on average which is equal to a reduction of 2.6%.

Figure 5.4-9: Rate 2 Annual Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region

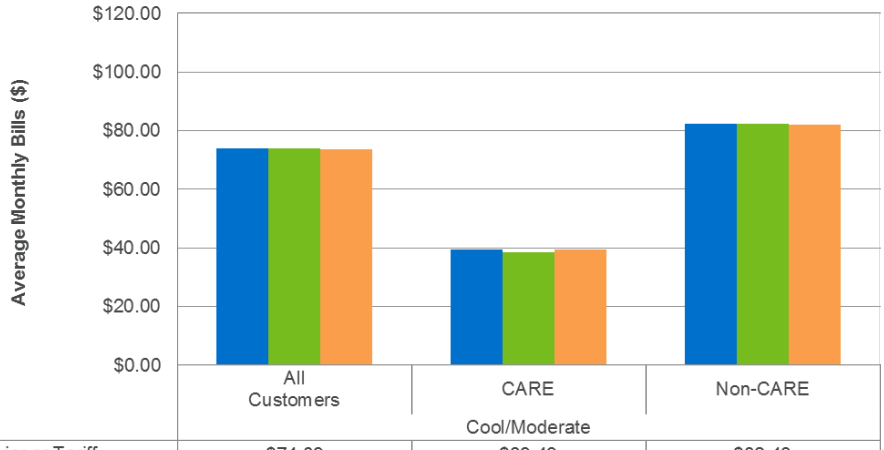


	General	CARE	Non-CARE	CARE	Non-CARE
	Hot	Moderate		Cool	
No Change in Behavior or Tariff	$1,433	$648	$1,285	$492	$1,071
No Change in Behavior, Change in Tariff	$1,449	$652	$1,291	$491	$1,065
With Change in Behavior and Tariff	$1,453	$635	$1,284	$488	$1,043
Total Bill Impact	$20	-$13	$0	-$4	-$28
Percent Bill Impact	1.4%	-2.0%	0.0%	-0.8%	-2.6%

Winter

Figure 5.4-10 presents the three average monthly bills for customers on Rate 1 during the winter period. Bills are presented for customers in the cool and moderate regions combined, and by CARE/FERA and non-CARE/FERA for the combined climate regions. Similar to the annual estimates, customers face very small structural impacts that are less than $1 during the winter months. Total bill impacts were less than 1% for the CARE/FERA and non-CARE/FERA customers combined and separately. This is not surprising considering the relatively flat nature of Rate 1 during the winter period.

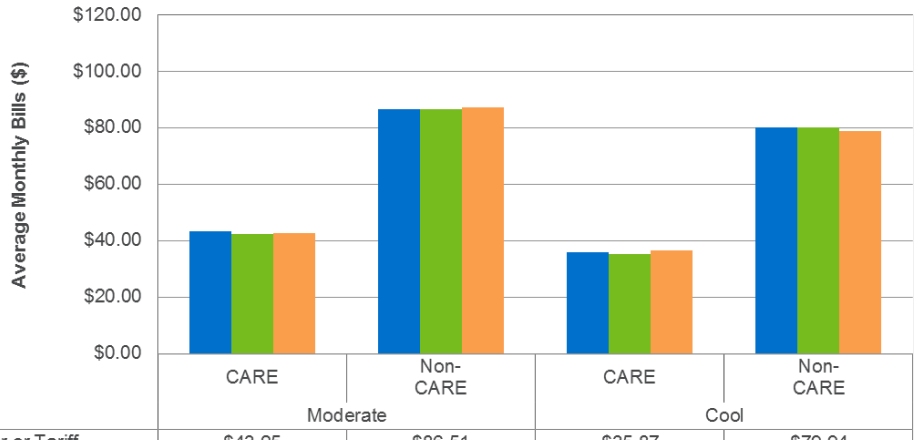
Figure 5.4-10: Rate 1 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers	CARE	Non-CARE
No Change in Behavior or Tariff	$74.09	$39.49	$82.43
No Change in Behavior, Change in Tariff	$73.95	$38.60	$82.47
With Change in Behavior and Tariff	$73.67	$39.43	$81.92
Total Bill Impact	-$0.42	-$0.06	-$0.51
Percent Bill Impact	-0.6%	-0.1%	-0.6%

Figure 5.4-11 presents the three sets of average winter monthly bills for the detailed segments by climate region. Once again, structural bill impacts are essentially zero for the average customer in each segment. For example, CARE/FERA customers faced structural gains of less than $1 and ultimately experienced bill increases of only $0.47 or 1.3% in the winter months.

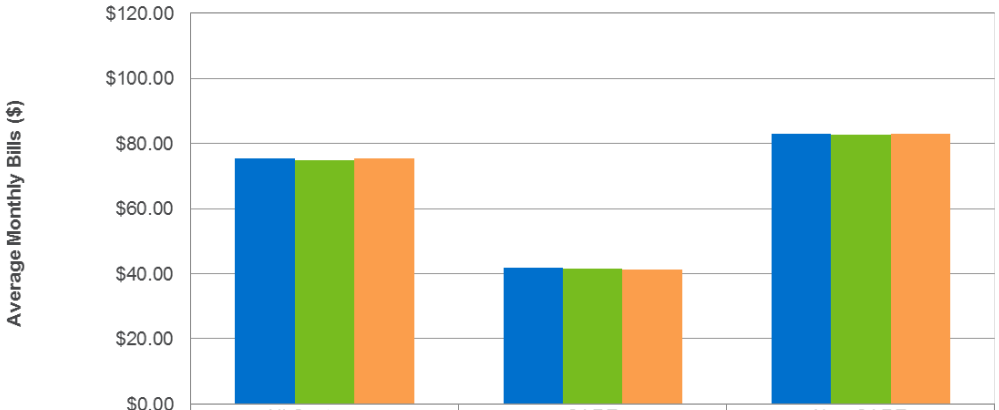
Figure 5.4-11: Rate 1 Winter Bill Impact Due to Differences in the Tariff and Behavior Change Detailed Segments by Climate Region



	Moderate		Cool	
	CARE	Non-CARE	CARE	Non-CARE
No Change in Behavior or Tariff	$43.25	$86.51	$35.87	$79.94
No Change in Behavior, Change in Tariff	$42.29	$86.54	$35.05	$79.99
With Change in Behavior and Tariff	$42.64	$87.14	$36.34	$78.74
Total Bill Impact	-$0.61	$0.64	$0.47	-$1.20
Percent Bill Impact	-1.4%	0.7%	1.3%	-1.5%

Figure 5.4-12 presents the three sets of average monthly bills for customers on Rate 2 in the winter period. Similar to Rate 1, customers did not face meaningful structural or total bill impacts. In fact, for customers in the territory as a whole and for non-CARE/FERA customers in the cool and moderate climate regions combined, their total bill impact was 0% on average. Rate 2 is rather flat, much like Rate 1, in the winter months, so this aligns with the expected outcome.

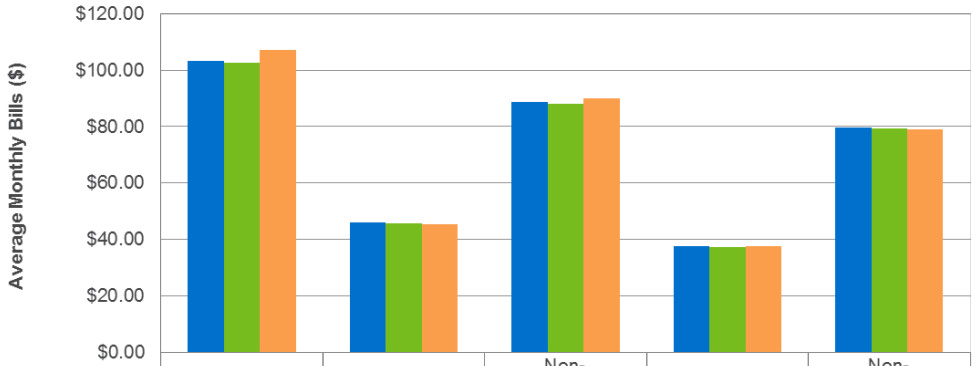
Figure 5.4-12: Rate 2 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
All | CARE/FERA | Non-CARE/FERA



	All Customers All Climates	CARE Cool/Moderate	Non-CARE Cool/Moderate
No Change in Behavior or Tariff	$75.32	$41.73	$83.02
No Change in Behavior, Change in Tariff	$74.90	$41.44	$82.58
With Change in Behavior and Tariff	$75.31	$41.34	$83.05
Total Bill Impact	-$0.01	-$0.39	$0.02
Percent Bill Impact	0.0%	-0.9%	0.0%

Figure 5.4-13 presents the three sets of average winter monthly bills for the individual customer segments for Rate 2. Customers in the hot climate region experienced small bill increases in the winter months, about $4.03 or 3.9% on average. Non-CARE/FERA customers in the moderate climate region also experienced a loss, but to a smaller extent, only $1.24 or 1.4%.

Figure 5.4-13: Rate 2 Winter Bill Impact Due to Differences in the Tariff and Behavior Change
Detailed Segments by Climate Region



	General	CARE	Non-CARE	CARE	Non-CARE
	Hot	Moderate		Cool	
No Change in Behavior or Tariff	$103.25	$45.98	$88.64	$37.64	$79.59
No Change in Behavior, Change in Tariff	$102.55	$45.66	$88.13	$37.37	$79.18
With Change in Behavior and Tariff	$107.28	$45.33	$89.88	$37.48	$78.87
Total Bill Impact	$4.03	-$0.64	$1.24	-$0.16	-$0.72
Percent Bill Impact	3.9%	-1.4%	1.4%	-0.4%	-0.9%

Generally, bill impacts were very small on an annual basis and in the winter months. This is likely due to the fact that both Rate 1 and Rate 2 have very small price differentials in the winter period, which is from November to April.

5.4.3 Change in the Distribution of Bill Impacts Due to Behavior Change

The third analysis presents the distribution of bill impacts[66] for customers with and without behavioral change, and is designed to show how the distribution shifts when customers respond to the rates by changing behavior. Similar to the other analyses, impact distributions are based on the average monthly bills for the first year of the pilot. Bill impacts were estimated for two cases—with and without behavior change. Both are based on the structural bill impact calculations; however, impacts with behavior change show how behavioral impacts are able to affect the structural impact distribution. Customers were segmented into ranges of bill impacts. The percentage of customers in each $10 increment from negative $100 to positive $100 per month (with and without behavior change) was determined with and without behavior change. The underlying calculations used to develop the distributions are based off of a difference-in-differences approach that compares the treatment and control customers based on both pre- and post-treatment bill impacts.[67]

The two distributions are presented on a line graph, with the height of the line at any given $10 increment representing the percentage of customers experiencing a bill impact of the corresponding dollar amount. In this case, the bill impact is measured as the difference between the TOU bill and the OAT bill. If the line for the group with changes in behavior is to the left of the line representing the group with no change in behavior, it shows that at least some customers were able to modify their energy usage such that they had lower total bill impacts compared to if they had not changed their behavior.

Figure 5.4-14 presents the distribution of bill impacts with and without energy use behavior change. The blue line represents the structural bill impacts that result when customers are billed on the TOU rate and do not change their energy use behavior. The green line shows the total bill impacts when customers have responded to the TOU rate and, in some cases, changed their energy use behavior. Bill impacts are calculated as the difference between the TOU bill and the OAT bill. Each point along the line graph represents the percentage of customers within a specific bill impacts bin or range. For example, on Rate 1, approximately 45.5% of the customers have structural bill impact of $1 to $10 per month—the blue line. In other words, approximately 45.5% of the Rate 1 customers would experience an increase of $1 to $10 per month on Rate 1 compared to the OAT without changing their behavior. The green line represents the total bill impacts when customers have had the opportunity to respond to the TOU rate. In this case, the percent of customers experiencing an increase of $1 to $10 per month on Rate 1 compared to the OAT is 40.0%, showing a meaningful decrease.

[66] Bill impacts without behavior change represent the structural bill impact distribution; bill impacts with behavior change show how behavioral impacts affect the structural bill impact distribution.

[67] See Section 3.2.4 in the First Interim Report for additional details on the methodology.

It is important to note that customers could move up or down through the incremental impact bins, and could potentially move more than one bin—meaning that a customer could potentially experience a bill increase due to their behavioral response, or they could jump down several bins and go from a $31 to $40 per month bill impact down to $11 to $20 impact, for example. In the case of the average Rate 1 customers, there is an increase in the percent of customers with a total bill decrease of between $0 and $9 per month. With no change in behavior, 51.5% of customers were in this bin and with behavior change 57.1% of customers are now in this bin.

As noted in the previous section, most customers did not face meaningful structural bill increases or decreases. This is also apparent in the graph below, where the distribution is very evenly split between bill increase and decreases. It's important to remember that instances where the green line is to the right of or above the blue line in the lower bill impact ranges indicate more customers have moved into that bin, likely from higher impact bins.

Figure 5.4-14: Rate 1 Change in the Distribution of Bill Impacts Due to Behavior Change
All | CARE/FERA | Non-CARE/FERA

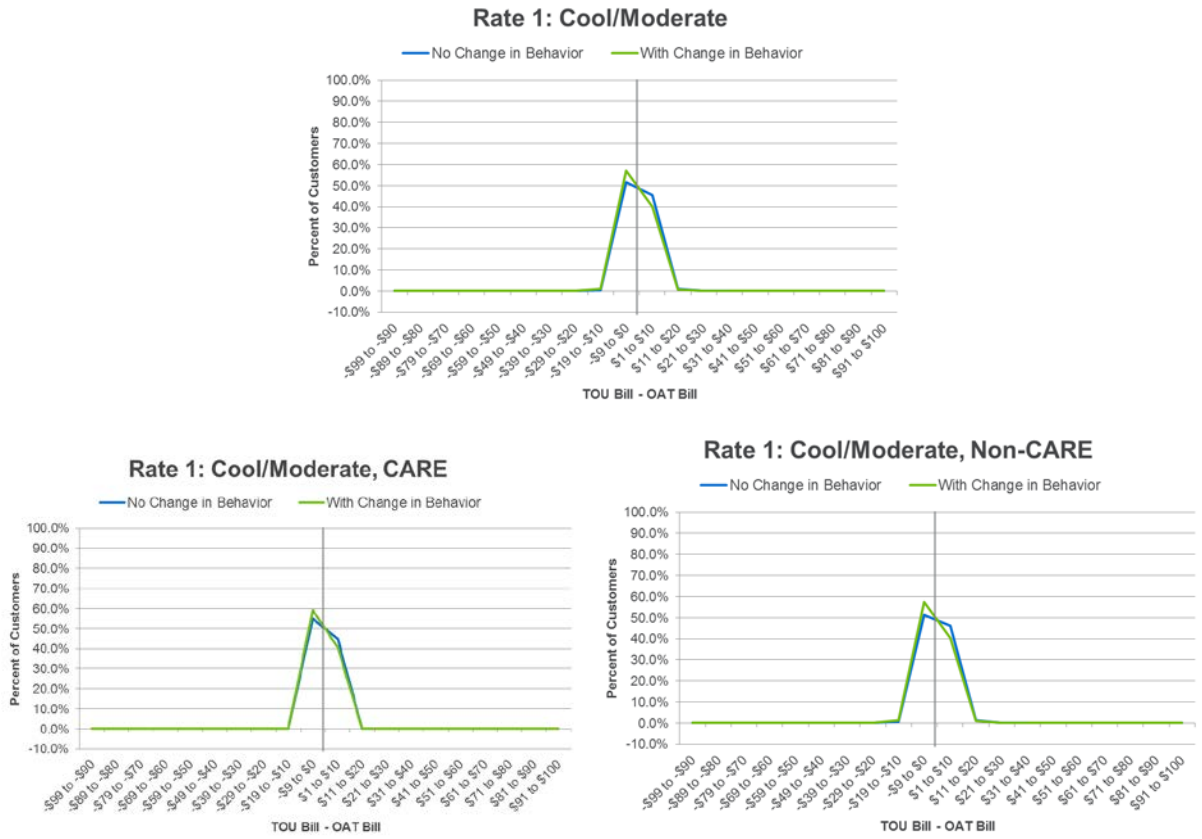
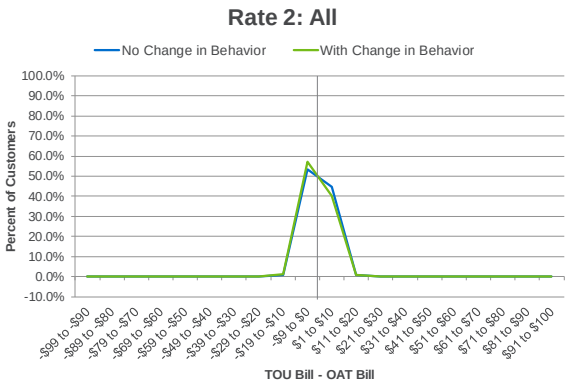


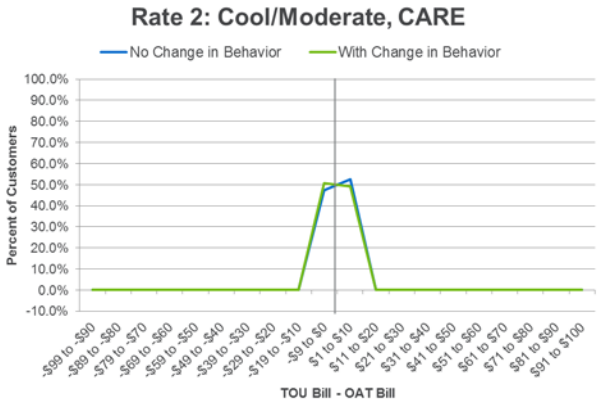
Figure 5.4-15 provides the distribution of average monthly bill impacts for all customers and CARE/FERA and non-CARE/FERA customers in the moderate and cool climate regions on Rate 2 over the first year of the pilot. Without changes in behavior, 44.6% of customers faced bill impacts between $1 and $10. With

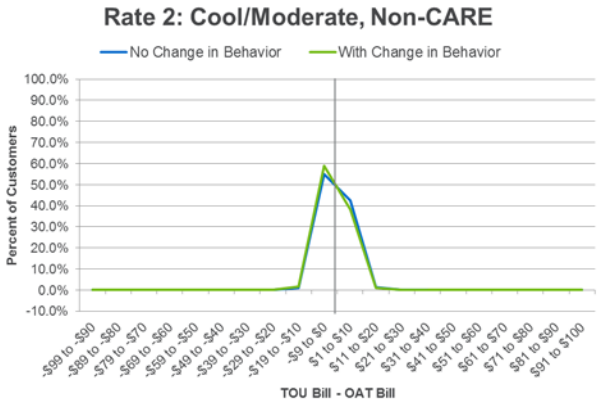
changes in behavior, this was reduced to 40.4% of customers. The distributions of bill impacts for CARE/FERA and non-CARE/FERA customers in the cool and moderate climate regions are very similar to those for Rate 1.

Figure 5.4-15: Rate 2 Change in the Distribution of Bill Impacts Due to Behavior Change
All | CARE/FERA | Non-CARE/FERA

Pilot Bill - Tiered Bill	No Change in Behavior	With Change in Behavior
-$99 to -$90	0.0%	0.0%
-$89 to -$80	0.0%	0.0%
-$79 to -$70	0.0%	0.0%
-$69 to -$60	0.0%	0.0%
-$59 to -$50	0.0%	0.0%
-$49 to -$40	0.0%	0.0%
-$39 to -$30	0.0%	0.0%
-$29 to -$20	0.1%	0.1%
-$19 to -$10	0.9%	1.4%
-$9 to $0	53.3%	57.3%
$1 to $10	44.6%	40.4%
$11 to $20	1.0%	0.8%
$21 to $30	0.1%	0.1%
$31 to $40	0.0%	0.0%
$41 to $50	0.0%	0.0%
$51 to $60	0.0%	0.0%
$61 to $70	0.0%	0.0%
$71 to $80	0.0%	0.0%
$81 to $90	0.0%	0.0%
$91 to $100	0.0%	0.0%







5.5 Synthesis for SDG&E Pilot

This section compares input from the load impact analysis, the bill impact analysis, and the survey analysis. The objective of these comparisons, at least in part, is to determine if the information and conclusions observed for individual metrics are supported by findings from other metrics or, alternatively, findings for one metric contradict those for another metric. We also look for clues from the survey findings that might help explain why load or bill impacts for one rate differ from those for other rates. As in the other synthesis sections, readers are reminded once again that, given the large samples underlying the survey analysis, statistically significant differences may not reflect meaningful differences from a policy perspective.

5.5.1 Synthesis

Table 5.5-1 and Table 5.5-2 summarize some of the relevant findings from the load impact, bill impact and survey analysis. Readers are directed to Section 3.5.1 for an explanation of the variables and symbols contained in the tables. As a reminder, SDG&E had two pilot rates, one with two pricing periods during the winter and the other with three. The peak periods were the same for both rates and start at 4 PM and end at 9 PM. Each rate has the same number of periods on weekdays and weekends, but the shoulder period on weekends is much shorter for the three period rate (Rate 1). The weekday shoulder period for the three period rate is long, beginning at 6 AM, whereas on weekends, the shoulder period begins at 2 PM.

Looking across the various metrics for each customer segment, the load impact and bill impact findings are typically similar across rates. During the winter season, the weekday peak period prices are identical, and the off peak prices are within half a cent of one another. This leaves the primary difference between the rates being the super off peak rate period for Rate 1, which also happens to be within about one cent of the off peak rate. Altogether, this makes for Rates 1 and 2 to be extremely similar during the winter. As such, the performance between rates is expected to be somewhat similar.

Table 5.5-1: Load Impacts, Bill Impacts, and Selected Survey Findings for SDG&E Rate 1

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	General Population	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moderate	Non-CARE/FERA	6.3% ▼	2.6% ▼	1.3% ▼	-$14 ▼	-1% ▼	2.2	26% -	26% -	2.4 -	6%	6.4 ▲	6.8 -
	CARE/FERA	5.2% ▼	0.4% -	0.1% ▼	-$1 -	0% -	2.7	26% -	68% -	4.2 ▲	13%	7.2 -	7.6 -
Cool	Non-CARE/FERA	5.2% ▼	2.9% ▼	1.3% ▼	-$24 ▼	-2% ▼	2.0	29% -	18% ▼	2.0 ▼	5%	6.6 ▲	7.0 -
	CARE/FERA	1.7% ▼	-0.3% -	0.6% ▲	$2 -	0% -	2.6	21% ▼	60% -	3.8 -	12%	7.4 ▲	7.8 -

Table 5.5-2: Load Impacts, Bill Impacts, and Selected Survey Findings for SDG&E Rate 2

Climate	Segment	Load Impacts			Bill Impacts		Survey						
		Summer Peak Period Load Reduction %	Winter Peak Period Load Reduction %	Net Annual kWh Change %	Annual Total Bill Impact $	Annual Total Bill Impact %	Health Index (Range 0-10)	Bill Higher than Expected	Difficulty Paying Bills	Economic Index (Range 0-10)	Understanding TOU Pricing (None-Correct)	Satisfaction w/ Rate (11 pt. Scale)	Satisfaction w/ Utility (11 pt. Scale)
Hot	General Population	6.8% ▼	3.9% ▼	1.2% ▲	$20 ▲	1% ▲	N/A	N/A	35% N/A	N/A	14%	5.8 N/A	6.5 N/A
Moderate	Non-CARE/FERA	5.1% ▼	1.7% ▼	0.4% ▼	$0 -	0% -	2.2	26% -	28% -	2.4 -	14%	6.4 ▲	6.8 -
	CARE/FERA	5.3% ▼	1.3% ▼	1.6% ▼	-$13 ▼	-2% ▼	3.0 ▲	26% -	64% -	4.1 -	28%	7.3 -	7.7 -
Cool	Non-CARE/FERA	4.3% ▼	1.9% ▼	1.2% ▼	-$28 ▼	-3% ▼	2.0	27% -	18% ▼	2.1 -	13%	6.5 ▲	7.1 -
	CARE/FERA	2.6% ▼	0.5% -	0.2% ▼	-$4 ▼	-1% ▼	2.5	23% ▼	63% -	3.8 -	25%	7.6 ▲	8.0 ▲

Non-CARE/FERA Customers

Non-CARE/FERA customers had larger load reductions than CARE/FERA customers for both Rates 1 and 2 in both absolute and percentage terms for the cool/moderate climate regions combined and also in the cool climate region. In the moderate climate region, the non-CARE/FERA absolute and percentage load reductions were also greater for Rate 1, but were not statistically different for Rate 2. The average peak-period load reduction for non-CARE/FERA customers in the cool/moderate regions combined equaled 2.8% and 0.02 kW for Rate 1 and 1.9% and 0.01 kW for Rate 2. The difference in load impacts across the two rates was statistically significant. Absolute impacts were larger in the moderate region for Rate 1 compared with the cool climate region, and the same between climate regions for Rate 2; neither of the differences was statistically significant. In percentage terms, impacts were larger in cool region compared to the moderate region for Rates 1 and 2, but the differences were not statistically significant. Load impacts were generally half the size (in percentage terms) in the winter compared to the summer for non-CARE/FERA customers.

Non-CARE/FERA customers in the moderate climate region on Rates 1 and 2 experienced the largest structural bill impacts, which were almost as large as the structural impacts of the general population in the hot climate region on Rate 2. Non-CARE/FERA customers on Rates 1 and 2 in both the moderate and cool climate regions were able to achieve either no total annual bill impact or annual bill reductions up to $28 for the cool climate region customers on Rate 2.

Non-CARE/FERA customers tended to have low percentages of customers receiving bills higher than expected, and also had low percentages of customers having difficulty paying bills. Neither of these metrics have statistically significant differences between the treatment group and the control group. Similarly, there were no statistically significant increases in the economic index. In fact, there was actually a statistically significant decrease for the non-CARE/FERA customers in the cool climate region on Rate 1.

When excluding the hot climate region, non-CARE/FERA customers had the highest percent reduction in peak period energy use, the highest percent reduction in annual kWh usage on Rate 1, and second highest on Rate 2. They also had the highest bill reduction due to behavior change in three out of the four segments. Non-CARE/FERA customers understood the rates better than the CARE/FERA customers (as indicated by the low percent that couldn't identify at least some hours that fell into the peak period). All non-CARE/FERA segments had statistically significantly higher satisfaction ratings for the rate plan compared to the control group. These metrics paint an internally consistent picture of a customer segment that understood the rate features relatively well, worked to reduce usage which resulted in bills similar or less than what they would have experienced on the OAT, and were ultimately more satisfied with their rate than control group customers.

CARE/FERA Customers

As discussed above, CARE/FERA customers tended to have load reductions that were smaller than non-CARE/FERA customers overall and in the cool climate region on both rates. In the moderate climate region, the difference in load impacts between the two segments was not statistically significant. CARE/FERA customers on average produced behavioral bill reductions significantly smaller than non-

CARE/FERA customers in the cool climate region on both rates and produced a mix of higher and lower impacts in the moderate climate region.

One potentially important finding related to the rates that could affect performance of CARE/FERA customers is the lower understanding of the timing of the peak period, as evidenced by the much higher percent of customers who could not identify any hours that fell during the high priced period. Taking a simple average across the climate regions and rates for this metric, only about 10% of non-CARE/FERA customers were unable to correctly identify any peak-period hours, whereas twice as many (20%) CARE/FERA customers fell into this category. An additional point of interest on this topic is that Rate 1 customers improved on this metric, whereas Rate 2 CARE/FERA customers experienced an increase of ten percentage points, meaning that far more customers couldn't identify any of the peak period hours. The related question regarding identifying 50% or more of the peak hours correctly saw improvements in every customer segment. However, the improvements were fairly negligible, between 1 and 2 percentage points, for the CARE/FERA customers on Rate 2 who experienced the 10 percentage point increase on the answering none correct question. This points to a general decline in understanding of the peak periods for Rate 2 customers, but a moderate improvement for Rate 1 customers.

Turning to other metrics of interest, in stark contrast to the bill impacts at PG&E and SCE, the average structural bill increase for CARE/FERA customers at SDG&E was less than $4 per year in the moderate climate region, and customers in the cool climate region actually saw a bill reduction of a dollar or more on average. On average, customers experienced a $2 per year structural loss, but ultimately didn't experience a statistically significant change in total annual cost. It may be possible that the underlying distribution of customers has some customers who benefit significantly, but a large portion of customers who are worse off. This could result in the bill impacts appearing to be negligible, while enough customers are struggling to affect the economic index.

Most CARE/FERA customers produced behavioral bill reductions, although only behavioral bill reductions from the moderate climate region segment on Rate 2 were statistically significant. This resulted in all CARE/FERA segments either experiencing total bill impacts that weren't statistically significant—on Rate 1— or were in the range of $4 to $13 savings per year on Rate 2.

CARE/FERA customers in both climate regions on both rates reported higher difficulty in paying bills compared to non-CARE/FERA customers, but the difference was not statistically different compared to the control group. CARE/FERA customers in the moderate climate region on Rate 1 had the highest economic index score of 4.2, and it was statistically significantly higher for the treatment group compared to the control group. This group also had the highest percentage of customers with difficulty paying bills at 68%. Interestingly, this segment produced among the largest impacts in the summer, but negligible impacts in the winter.

CARE/FERA customers tended to be more satisfied with the rate and with SDG&E compared to non-CARE/FERA customers. In the cool climate region, CARE/FERA customers had statistically significantly higher levels of satisfaction with the rate compared to the control group. On Rate 2, these customers also had a statistically significantly higher level of satisfaction with SDG&E compared to the control group as well.

Hot Climate Region General Population

General population households in the hot climate region on Rate 2 had load reductions in the peak period equal to 3.9%, which was larger than any of the other customer segment/climate region groups. The next closest comparable impact was from non-CARE/FERA customers on Rate 1 in the cool climate region with peak period reductions equal to 2.9%. Net annual kWh reductions for general population customers in the hot climate region, at negative 1.2%, were the largest increases in total energy use, and with the relatively large peak period reduction, suggest that these customers are shifting use to the off peak hours, or actually increasing off peak hour energy use.

Structural bill impacts for the hot region were slightly higher than those for non-CARE/FERA customers in the moderate region, and the highest across all segments. Due to the increase in net annual kWh, customers weren't able to produce behavioral bill impacts large enough to offset these structural increases, resulting in total annual bill increases of approximately $20.

Customer surveys were not administered to the control group in the hot region due to implementation decisions made by SDG&E, so several of the survey related metrics that make comparisons between the treatment and control group, such as being uncomfortably hot or cold, higher bill than expected, difficulty of paying bills, and the economic index, could not be calculated. 14% of treatment households in the hot region could not correctly identify any of the peak period hours, which was a similar to the other non-CARE/FERA segments on Rate 2. Finally, the satisfaction scores for the Rate 2 customers in the hot climate region are the lowest across all other segments, at 5.8 and 6.5 for satisfaction with the rate and the utility, respectively. This is reasonable given these customers also have the highest structural bill impacts, and the highest overall bills. These scores are lower than the scores from the non-CARE/FERA customers on both rates in the moderate climate region, which were 6.4 and 6.8 for the rate and utility satisfaction, respectively.

5.5.2 Key Findings

Key findings pertaining to load impacts from the SDG&E pilots include:

1. Customers can and will respond to TOU rates with peak periods that extend well into the evening hours during the winter – peak period load reductions averaged roughly 2.3% for Rate 1 and 1.7% for Rate 2 across the service territory as a whole.
2. The average winter impact of 2.0% is slightly less than half the size of the load impact from the first summer of approximately 5.0%. However, there was significant variation in the relationship between summer and winter impacts across rates and customer segments.
3. For Rate 2, which has the same prices in effect on weekends as on weekdays, the pattern of load impacts across rate periods on weekends was very similar to weekdays for all climate regions combined– that is, customers can and will reduce loads on weekends in the winter.
4. There was a small but statistically reduction in net annual electricity use for both rates – for Rate 1, the average reduction was 1.0% for the moderate/cool regions combined while for Rate 2, it was 0.8% for all three climate regions combined.[68]

[68] Note that the hot region in SDG&E's service territory has a very low population weight and does not materially impact this average.

5. For Rate 2, load impacts, in both absolute and percentage terms, were largest in the hot climate region, and there was not a statistically significant difference between the moderate and cool climate regions.
6. CARE/FERA customers generally had lower peak period load reductions compared with non-CARE/FERA customers—although not all differences were statistically significant.
7. Load impacts are not available for senior households or households with incomes below 100% of FPG because the sample sizes (and population) in SDG&E's hot region are too small.
8. Customers who received Weekly Alert Emails in the moderate climate region had incremental impact improvements of approximately 0.01 kW, whereas customers in the cool climate region had impacts decline by approximately 0.01 kW. In both cases, the difference was negligible due to the small impacts in general.

Key findings pertaining to bill impacts include:

1. Average winter monthly structural bill differences were negligible and ranged from a bill decrease of $0.70 to an increase of $0.05.
2. In stark contrast to the findings for PG&E and SCE, bill impacts for SDG&E's pilot rates were quite small, both before and after behavioral adjustments. For some customer segments and climate regions, customers could fully offset the structural increases in annual bills by shifting usage so that the total bills were slightly lower than they would have been on the OAT.
3. Over the course of a year, most customers experienced a slight decrease in total annual cost in the moderate and cool regions of up to $28—for non-CARE/FERA customers in the cool climate region on Rate 2. Customers in the hot climate region on Rate 2 experienced total annual bill increases of approximately $20.

Key findings from the survey research include the following:

1. **Economic Hardship:** Rate 1 CARE/FERA customers in the hot region had a higher economic index score when compared to the Control group. This increase in economic index scores is equivalent to a customer noting difficulty paying one additional bill during the previous six months. In contrast, Rate 1 non-CARE/FERA customers in the cool region had a lower economic index score compared to the Control group. Corroborating this finding, non-CARE/FERA customers in the cool region also reported less difficulty paying their bills than control customers.
2. **Health Hardship:** Rate 2 CARE/FERA customers in the moderate region had a higher health index score compared to the Control Group, which is the equivalent to a customer noting a slightly higher frequency of being in poor health and/or having their poor health limit their usual activities during the previous six months. In addition, about 5% more Rate 1 and Rate 2 CARE/FERA customers in the moderate climate region sought medical attention due to excessive heat when compared to their Control groups.[69] In contrast, about 3% fewer Rate 1 non-CARE/FERA customers in the cool region and Rate 2 non-CARE/FERA customers in the moderate region sought medical attention due to excessive heat compared to the Control groups.[70] About 14% fewer Rate 2 non-CARE/FERA customers in the moderate region with a disabled

[69] These customers all had air conditioning.

[70] These customers all had air conditioning.

household member sought medical attention due to excessive cold[71] or heat[72] compared to the Control groups.

3. **Satisfaction:** Except for Rate 2 CARE/FERA customers in the cool climate region, customer satisfaction ratings for SDG&E did not differ between the TOU rate and control groups. Most Rate customers, however, reported slightly higher satisfaction with their rate compared to Control groups. The differences in ratings for both the rate and SDG&E for CARE/FERA moderate region customers, while statistically significant are very small, 0.3 differences between control and treatment groups on an 11-point scale. In addition, compared to results from the first survey, Rate 2 customers' satisfaction with SDG&E improved, and Control and Rate 1 customers' satisfaction levels slightly declined; satisfaction levels with the rate, however, slightly improved most customer segments.
4. **Bill protection, understanding of rates, and actions taken:**
    - More than one-third of customers reported receiving a letter from SDG&E mentioning their bill protection and about half reported knowing when their bill protection ends. When customers were asked if they understand bill protection, 87% or more reported they did.
    - Though agreement ratings for "rate is easy to understand" were high (generally between 7.0 and 7.4), customer's understanding of their rates indicate a disconnect between customer's rating of understandability and actual understanding (with 5% to 25% of customers unable to identify peak hours). Non-CARE/FERA customers were more likely to answer correctly than CARE/FERA customers. In addition, compared to results from the first survey, Rate 1 customers' understanding of their rate slightly improved and the percentage of Rate 2 customers who selected half or more peak hours also slightly improved, but the percentage of Rate 2 customers who did not select any correct answer slightly worsened.
    - When asked if customers agreed that peak and off-peak times were easy to remember, Rate 2 customers provided higher agreement ratings than Rate customers. However, a similar proportion of Rate 1 and 2 customers provided "over half correct" answers to the rate understanding questions and more Rate 2 customers did not select any of the correct answers.[73]
    - Customers on TOU rates were more likely to take time-specific actions than customers in the control condition. For example, while a similar proportion of customers from control and rate groups indicated they turned off their lights to conserve energy, a larger proportion of treatment customers indicated they shifted doing laundry and running the dishwasher during peak hours. This trend suggests that while fewer rate customers understood the nuances of their rates, they did know and take actions that helped them shift use.

[71] These customers all had electric heat, and a household member who requires heating.

[72] These customers all had air conditioning, and a household member who requires cooling.

[73] These survey items were coded much like a test with partial credit; customers would get 50% right if they could identify half of the peak hours for their test rate.

Overall findings and conclusions include:

- Customers continued to respond to the TOU price signals at the end of a full year. As expected, the load impacts were lower during the winter compared to the first summer. Load impact persistence will be examined in the final report once data from the second summer becomes available.
- The majority of customers across both rates experienced slight net annual total bill decreases. However, customers in the hot climate were more likely to experience net annual bill increases.
- Evidence from the second survey still suggests that the education and outreach to low income customers did not generate the same level of understanding of TOU rates as it did for non-low income customers. This could partly result from the fact that more CARE/FERA customers have English as a second language but there may be other reasons. In some cases the level of understanding between the first and second survey went down, such as with Rate 2. The level of understanding went up for Rate 1. Nexant continues to recommend that this issue be carefully addressed and studied further in the upcoming default pilots where there is a much greater emphasis on and opportunity to test ME&O alternatives for all segments.

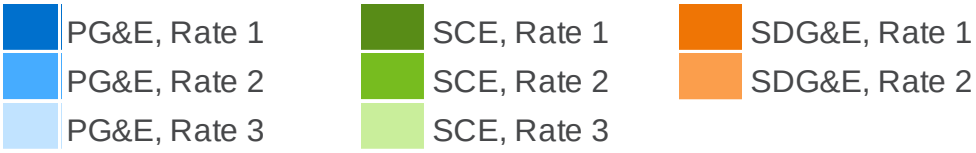
6 Overall Summary

This section begins with a comparison of load impacts and bill impacts across utility service territories. Although the experiment was not designed to make cross-utility comparisons, such comparisons are likely to be made nonetheless, and it's important that any observed differences be put into the proper perspective so that they are not misinterpreted. Following that discussion is a brief summary of the key conclusions that can be drawn from looking across all treatments statewide.

6.1 Cross Utility Comparisons of Load and Bill Impacts

When comparing rate impacts or bill impacts across utility service territories, it is very important to keep in mind that any observed differences across service territories could easily be due to differences in the populations or climate regions across the service territories rather than due to differences in the tariffs themselves. Another possible explanation for any observed differences is variation in the months included in the analysis – recall that average impacts for PG&E and SCE's Rate 1 and Rate 2 span October through May. Their Rate 3 winter periods cover October through February, and SDG&E's winter period is October through April. Finally, as discussed in each utility section, when comparing peak period load impacts across rates, even within a service territory, differences could be due to variation in the timing and length of the peak periods rather than to differences in price ratios, for example.

Some of the above factors can be controlled for by limiting the cross-utility comparisons to only the hours that all utility tariffs have in common and only the months that are common across all rates and service territories. As such, in the discussion below, peak period load impacts are presented only for the hours from 6 to 8 PM and peak period and daily load impacts and bill impacts are presented only for the months of November through February[74]. For all of the figures below, the following legend applies:



6.1.1 Load Impacts

Figure 6.1-1 shows the load reduction from 6 to 8 PM on the average weekday in November, December, January, and February for each service territory as a whole and for each climate region for the eight different tariffs tested across the three utilities. The load impacts are also shown for CARE/FERA and non-CARE/FERA customers within each region. The bar graphs show the percent reduction across these hours while absolute reductions are shown below the graph. Table 6.1-1 shows the marginal price for

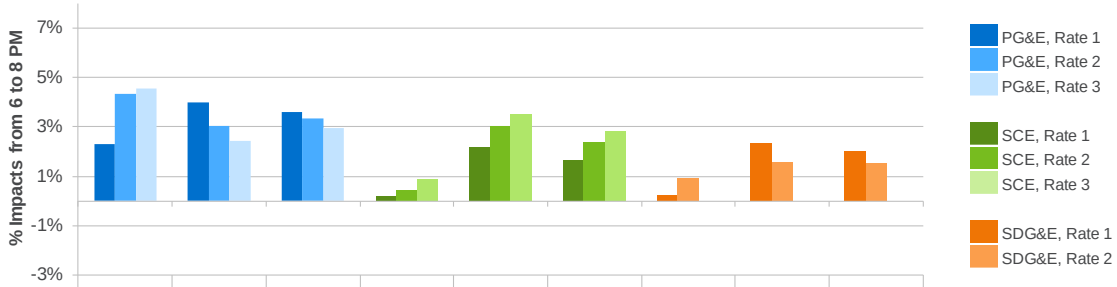
[74] Because the impacts presented her cover only the hours from 6 to 8 PM and are only for the months of November through February, they will differ from the load reductions reported in prior sections of the report, which represent the average across the full peak period and different months for the winter period.

the hours from 6 to 8 PM for each tariff and also for the OAT. The TOU prices represent the price for usage above the baseline allocation.

All rates in all service territories showed reductions for these early evening hours, ranging from a low of 1.5% for SDG&E's Rate 2 to a high of 3.6% for PG&E's Rate 1 for the "All" customer category. The average percent load reduction across all three rates for PG&E was 3.3%, while SCE's average was 2.3%. SDG&E's average reduction across its two rates was 1.7%.

For non-CARE/FERA customers, the largest load reduction, 4.0%, occurred for PG&E's Rate 1 and the smallest, 1.6%, was for SDG&E's Rate 2.[75] The average reduction across the multiple rate treatments in each service territory for non-CARE/FERA customers was 3.2% for PG&E, 2.9% for SCE and 1.9% for SDG&E. For CARE/FERA customers, the average reductions were 3.7%, 0.5%, and 0.6% for PG&E, SCE, and SDG&E, respectively. On average, CARE/FERA customers had lower percent reductions in peak period usage than non-CARE/FERA customers. This difference could explain, in part, why SCE's average reduction for all customers in its service territory is lower than PG&E as SCE has a greater percent of CARE/FERA customers among the pilot eligible population (31%) compared with PG&E (27%).

Figure 6.1-1: Load Reductions Between 6 and 8 PM by Rate and Service Territory, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
Rate 1	% Impact	2.3%	4.0%	3.6%	0.2%	2.2%	1.7%	0.2%	2.3%	2.0%
	kW Impact	0.02	0.04	0.03	0.00	0.02	0.02	0.00	0.02	0.02
Rate 2	% Impact	4.3%	3.0%	3.3%	0.4%	3.0%	2.4%	0.9%	1.6%	1.5%
	kW Impact	0.04	0.03	0.03	0.00	0.03	0.02	0.01	0.01	0.01
Rate 3	% Impact	4.6%	2.5%	3.0%	0.9%	3.5%	2.8%			
	kW Impact	0.04	0.02	0.03	0.01	0.03	0.03			

Table 6.1-1shows the peak period prices for each pilot rate as well as the Tier 2 and 3 prices for the otherwise applicable tariff faced by the control group. As indicated in the title to the table, the treatment group prices represent the marginal price excluding the baseline discount. The most comparable OAT price is the price that applies between 100% and 200% of the baseline quantity. As

[75] The comparisons are primarily described in percentage terms due to the level differences in average customer energy usage across utilities. The percentage results help to normalize the level differences and show the proportion of load being curtailed. The average kW impacts are provided; however, caution should be used when making any sort of direct comparison.

seen in the table, there is not much variation in the marginal price that applies to the peak period hours across rates within a service territory as well as across service territories, with the exception of notably higher prices for SDG&E.

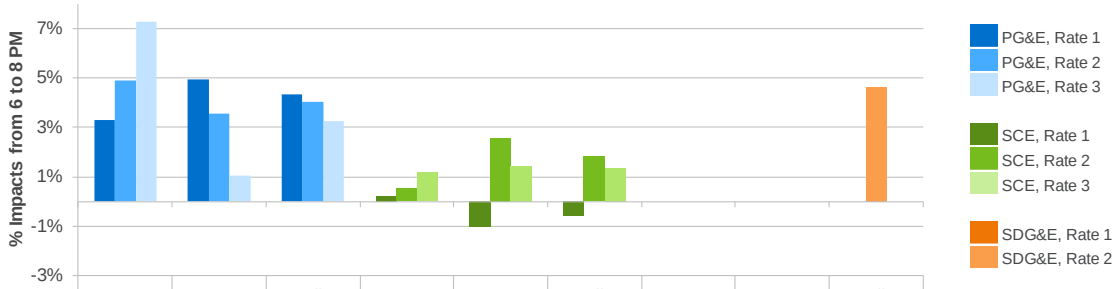
Table 6.1-1: Peak Period Price Above Baseline Quantity (¢/kWh)

Utility	Customer Segment	Rate 1	Rate 2	Rate 3	Control Group Tariff (OAT)	
					101 – 200% of Baseline	>200% of Baseline
PG&E	Non-CARE	29.0	29.6	29.0	24.1	40.0
	CARE	16.1	16.5	16.1	14.7	21.7
	Total	25.5	26.1	25.5	21.6	35.0
SCE	Non-CARE	27.5	27.9	21.0[76]	22.9	29.2
	CARE	19.9	20.2	15.2	15.7	21.8
	Total	25.2	25.5	19.2	20.7	26.9
SDG&E	Non-CARE	37.3	37.3	n/a	36.2	n/a
	CARE	24.1	24.1	n/a	40	n/a
	Total	34.8	24.8	n/a	36.9	n/a

Figure 6.1-2 shows the average load reduction for each rate for the hours from 6 to 8 PM in the hot climate region for the population as a whole as well as for CARE/FERA and non-CARE/FERA segments. Customers in PG&E's hot climate region had larger load reductions for both customer segments compared to SCE. In fact, non-CARE/FERA customers in SCE's hot climate region had load increases of 1% during the common winter period. The greatest percent impacts came from CARE/FERA customers in PG&E's hot climate region on Rate 3 (7.3% or 0.07 kW).

[76] There is no baseline allowance for SCE's Rate 3.

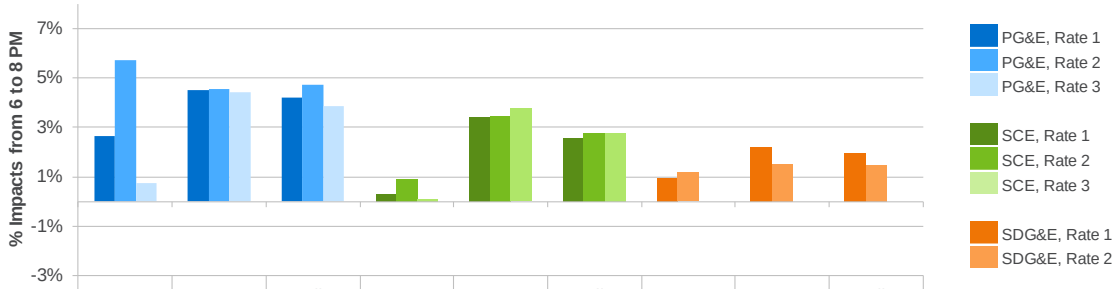
Figure 6.1-2: Load Reductions Between 6 and 8 PM for Hot Climate Regions by Customer Segment, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
Rate 1	% Impact	3.3%	4.9%	4.3%	0.2%	-1.0%	-0.6%			
	kW Impact	0.03	0.05	0.04	0.00	-0.01	-0.01			
Rate 2	% Impact	4.9%	3.5%	4.0%	0.5%	2.5%	1.8%			4.6%
	kW Impact	0.04	0.04	0.04	0.00	0.03	0.02			0.06
Rate 3	% Impact	7.3%	1.0%	3.3%	1.2%	1.5%	1.4%			
	kW Impact	0.07	0.01	0.03	0.01	0.01	0.01			

Figure 6.1-3 shows the average load reductions from 6 to 8 PM for CARE/FERA and non-CARE/FERA customers and for the population as a whole in the moderate climate regions in each service territory. As in the hot climate region, PG&E customers had greater load impacts than their counterparts at SCE. Load impacts were consistent for non-CARE/FERA customers across all rates within each utility; about 4.5% at PG&E, 3.6% at SCE, and 1.9% at SDG&E. CARE/FERA customers at SCE provided the smallest load impacts, about 0.4% on average. It is notable that SCE impacts across rates were consistent in the moderate climate zone, but there was no clear pattern in the hot climate region.

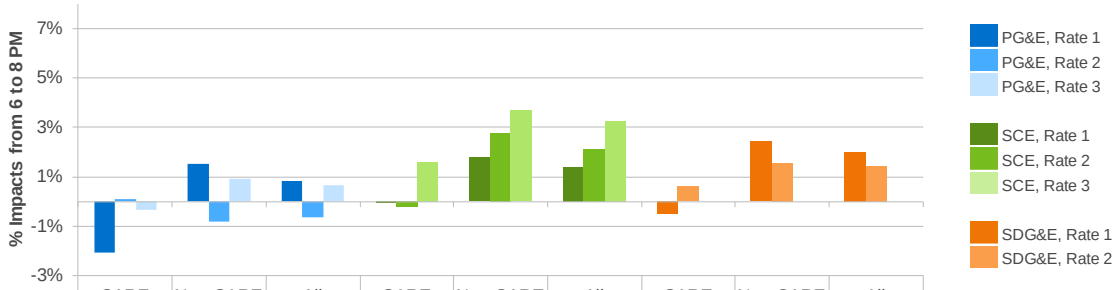
Figure 6.1-3: Load Reductions Between 6 and 8 PM for Moderate Climate Regions by Customer Segment, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
Moderate										
Rate 1	% Impact	2.7%	4.5%	4.2%	0.3%	3.4%	2.6%	1.0%	2.2%	1.9%
	kW Impact	0.02	0.05	0.04	0.00	0.04	0.02	0.01	0.02	0.02
Rate 2	% Impact	5.7%	4.5%	4.7%	0.9%	3.5%	2.8%	1.2%	1.5%	1.5%
	kW Impact	0.05	0.05	0.05	0.01	0.04	0.03	0.01	0.01	0.01
Rate 3	% Impact	0.7%	4.4%	3.9%	0.1%	3.8%	2.8%			
	kW Impact	0.01	0.04	0.04	0.00	0.04	0.03			

Figure 6.1-4 shows the load reductions from 6 to 8 PM for CARE/FERA and non-CARE/FERA customers and for the population as a whole in the cool climate region for each service territory. The cool climate region is the only area where PG&E saw negative load impacts during the common winter period, with no clear pattern across rates. Average impacts between 6 and 8 PM for PG&E, SCE, and SDG&E were 0.3%, 2.3%, and 1.7%, respectively. Non-CARE/FERA customers in SCE's cool climate region had the greatest load impacts, about 2.8% on average.

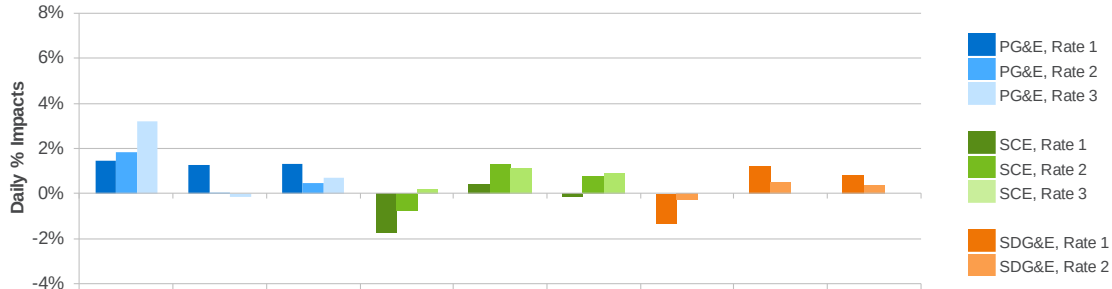
Figure 6.1-4: Load Reductions Between 6 and 8 PM for Cool Climate Regions by Customer Segment, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
Cool										
Rate 1	% Impact	-2.1%	1.5%	0.8%	0.0%	1.8%	1.4%	-0.5%	2.4%	2.0%
	kW Impact	-0.01	0.01	0.01	0.00	0.02	0.01	0.00	0.02	0.02
Rate 2	% Impact	0.1%	-0.8%	-0.6%	-0.2%	2.8%	2.1%	0.6%	1.6%	1.4%
	kW Impact	0.00	-0.01	0.00	0.00	0.03	0.02	0.00	0.01	0.01
Rate 3	% Impact	-0.4%	0.9%	0.7%	1.6%	3.7%	3.3%			
	kW Impact	0.00	0.01	0.01	0.01	0.04	0.03			

Figure 6.1-5 shows the average reduction in daily electricity use for each of the 8 rate treatments tested across the three utilities. With the exception of PG&E's Rate 3, daily load reductions fell between about negative 1.5% and positive 1.5%, indicating that customers may have shifted their energy use to off peak periods rather than reducing usage overall. In SCE and SDG&E's territory, non-CARE/FERA customers reduced consumption on a daily basis more than their CARE/FERA counterparts. The opposite is true for PG&E.

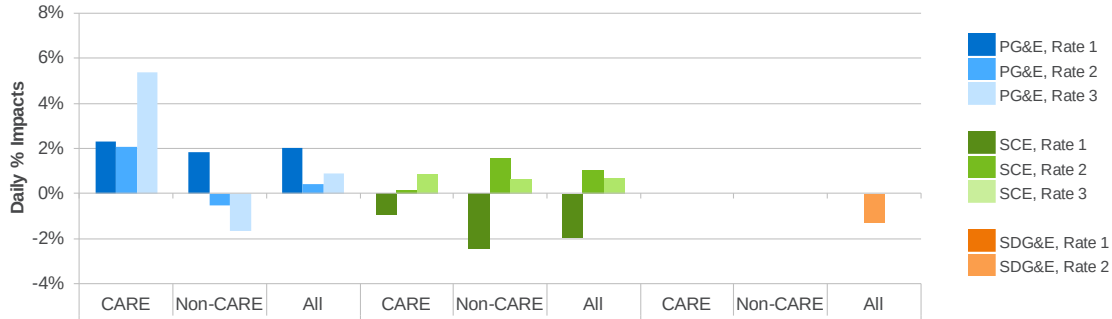
Figure 6.1-5: Daily Load Reductions by Rate and Service Territory, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
		Territory Wide								
Rate 1	% Impact	1.5%	1.3%	1.3%	-1.7%	0.4%	-0.2%	-1.3%	1.2%	0.8%
	kW Impact	0.01	0.01	0.01	-0.01	0.00	0.00	-0.01	0.01	0.00
Rate 2	% Impact	1.8%	0.0%	0.5%	-0.8%	1.3%	0.8%	-0.3%	0.5%	0.4%
	kW Impact	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Rate 3	% Impact	3.2%	-0.2%	0.7%	0.2%	1.1%	0.9%			
	kW Impact	0.02	0.00	0.00	0.00	0.01	0.01			

Figure 6.1-6 shows the variation in daily load impacts across tariffs, segments, and service territories for selected customer segments in the hot climate region. Recall that the sample sizes in SDG&E's hot region are not large enough to support segmentation for reasons discussed previously. Like the service territory as whole, CARE/FERA customers on PG&E's Rate 3 had the greatest daily load reductions (5.4%) compared with the other rates and segments in the hot climate region. Customers on SCE's Rate 1 showed daily load increases for both customer segments in the hot climate region (about 1.9%). This could be due to the longer peak period on Rate 1 versus the other two rates – perhaps customers tried to shift more of their usage to the off-peak period. Customers in SDG&E's hot climate region also showed daily load increases of about 1.3% or 0.01 kW.

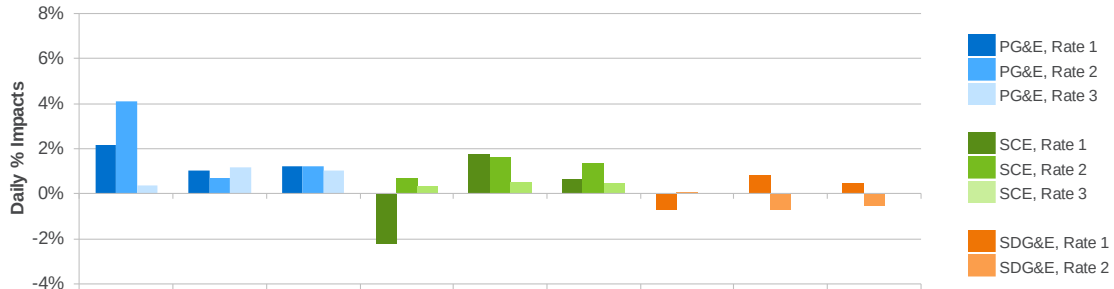
Figure 6.1-6: Daily Load Reductions for Hot Climate Regions by Customer Segment, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
		Hot								
Rate 1	% Impact	2.3%	1.8%	2.0%	-1.0%	-2.5%	-1.9%			
	kW Impact	0.01	0.01	0.01	-0.01	-0.02	-0.01			
Rate 2	% Impact	2.1%	-0.5%	0.4%	0.1%	1.5%	1.1%			-1.3%
	kW Impact	0.01	0.00	0.00	0.00	0.01	0.01			-0.01
Rate 3	% Impact	5.4%	-1.6%	0.9%	0.9%	0.6%	0.7%			
	kW Impact	0.03	-0.01	0.01	0.01	0.00	0.01			

Figure 6.1-7 shows the variation in daily load impacts across tariffs, segments, and service territories for selected customer segments in the moderate climate region on the average winter weekday. Customers in the moderate climate region in SDG&E's territory did not provide meaningful daily load reductions, but most customer segments in PG&E and SCE's moderate climate regions did. CARE/FERA customers on PG&E's Rate 2 had the greatest daily load reductions (4.1% or 0.2 kW)

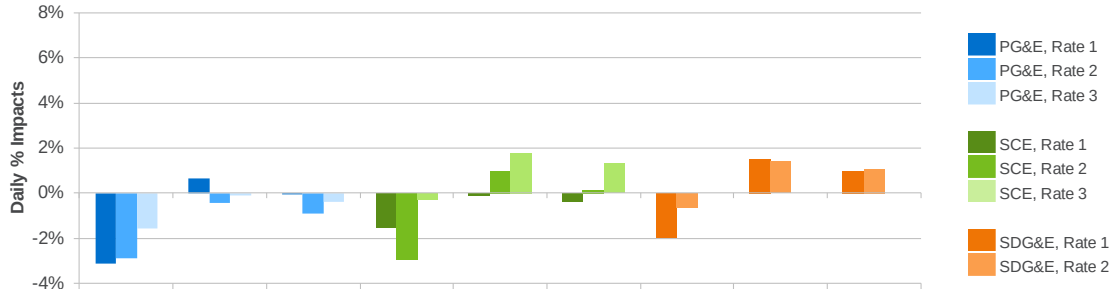
Figure 6.1-7: Daily Load Reductions for Moderate Climate Regions by Customer Segment, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
Moderate										
Rate 1	% Impact	2.2%	1.0%	1.2%	-2.2%	1.8%	0.6%	-0.7%	0.8%	0.5%
	kW Impact	0.01	0.01	0.01	-0.01	0.01	0.00	0.00	0.00	0.00
Rate 2	% Impact	4.1%	0.7%	1.2%	0.7%	1.6%	1.4%	0.1%	-0.7%	-0.5%
	kW Impact	0.02	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Rate 3	% Impact	0.4%	1.2%	1.0%	0.3%	0.5%	0.5%			
	kW Impact	0.00	0.01	0.01	0.00	0.00	0.00			

Finally, Figure 6.1-8 shows the average reduction in daily electricity use in the cool climate regions for each rate, segment, and service territory. The average reduction across the three rates for the population as a whole equaled negative 0.4%, positive 0.4%, and 1.0% for PG&E, SCE, and SDG&E respectively. CARE/FERA customers in all three IOUs had an average increase in daily electricity use while non-CARE/FERA customers did not follow a clear pattern.

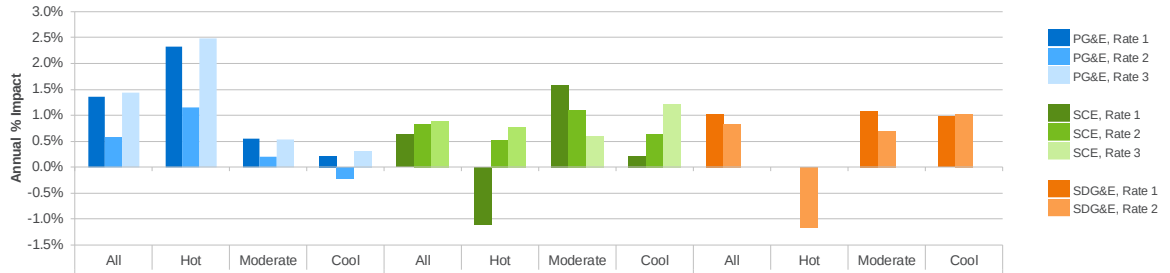
Figure 6.1-8: Daily Load Reductions for Cool Climate Regions by Customer Segment, Average Winter Weekday



		CARE	Non-CARE	All	CARE	Non-CARE	All	CARE	Non-CARE	All
		PG&E			SCE			SDG&E		
Cool										
Rate 1	% Impact	-3.1%	0.7%	-0.1%	-1.5%	-0.1%	-0.4%	-2.0%	1.5%	1.0%
	kW Impact	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.01	0.01	0.00
Rate 2	% Impact	-2.9%	-0.4%	-0.9%	-2.9%	1.0%	0.1%	-0.7%	1.4%	1.1%
	kW Impact	-0.01	0.00	0.00	-0.01	0.01	0.00	0.00	0.01	0.01
Rate 3	% Impact	-1.6%	-0.1%	-0.4%	-0.3%	1.8%	1.3%			
	kW Impact	-0.01	0.00	0.00	0.00	0.01	0.01			

Figure 6.1-9 presents the annual conservation effects for each rate for PG&E, SCE, and SDG&E. Effects are shown for the territory as a whole and for each climate region individually. Estimates for SCE's Rate 3 do not include July 2016 due to the late start in enrollment for this group. As such, the total kWh only represents 11 months. For each service territory, customers on every rate were able to conserve energy throughout the first year of the pilot. For PG&E, SCE, and SDG&E the annual conservation effects were 1.1%, 0.8%, and 0.9% on average, respectively. In PG&E's territory, customers in the hot climate region conserved the most energy (about 2.0% on average), but this was not the case in SCE's and SDG&E's territories where customers in the moderate (1.1%) and cool (1.0%) regions had the greatest effects, respectively.

Figure 6.1-9: Annual Conservation Effects by Climate Region

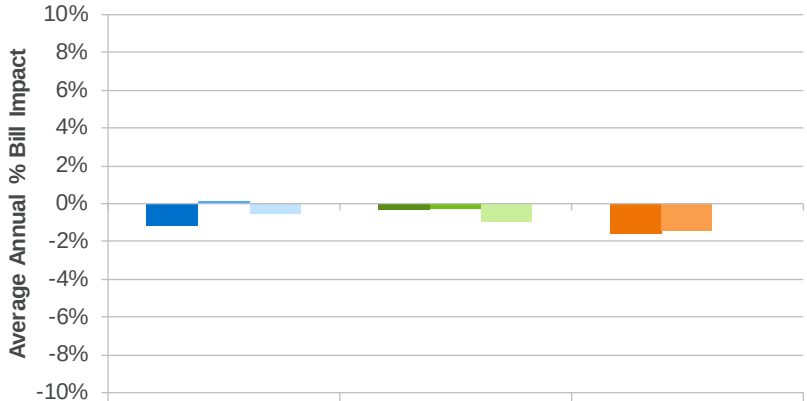


		All	Hot	Moderate	Cool	All	Hot	Moderate	Cool	All	Hot	Moderate	Cool
		PG&E				SCE				SDG&E			
Rate 1	% Impact	1.4%	2.3%	0.6%	0.2%	0.6%	-1.1%	1.6%	0.2%	1.0%		1.1%	1.0%
	kWh Impact	75.17	159.71	29.35	8.39	38.71	-87.45	107.60	11.60	47.54		55.89	41.96
Rate 2	% Impact	0.6%	1.2%	0.2%	-0.2%	0.8%	0.5%	1.1%	0.7%	0.8%	-1.2%	0.7%	1.0%
	kWh Impact	32.62	79.26	10.43	-8.66	51.55	41.00	75.44	34.21	39.10	-86.03	35.95	43.60
Rate 3	% Impact	1.4%	2.5%	0.5%	0.3%	0.9%	0.8%	0.6%	1.2%				
	kWh Impact	80.02	170.21	28.72	12.26	47.93	52.73	35.72	56.93				

6.1.2 Bill Impacts

Figure 6.1-10 shows the average percentage bill impacts by rate and utility for the service territory as a whole for the first year of the pilot. Keep in mind once again that the values below do not include July for SCE's Rate 3. As discussed previously, total bill impacts over the course of the year were small, which is a good indicator that the rates are indeed revenue neutral. For the PG&E territory, customers experienced average bill increases of $0.11 for the entire year on Rate 2, or bill reductions of $12.87 and $5.78 for Rate 1 and Rate 3, respectively. Customers on SDG&E's Rate 1 and Rate 2 had the largest total cost reductions of $16.38 and $15.21, respectively. There is not much variation between rates within each utility.

Figure 6.1-10: Average Annual Bill Impacts by Rate for Each Utility Service Territory[77]

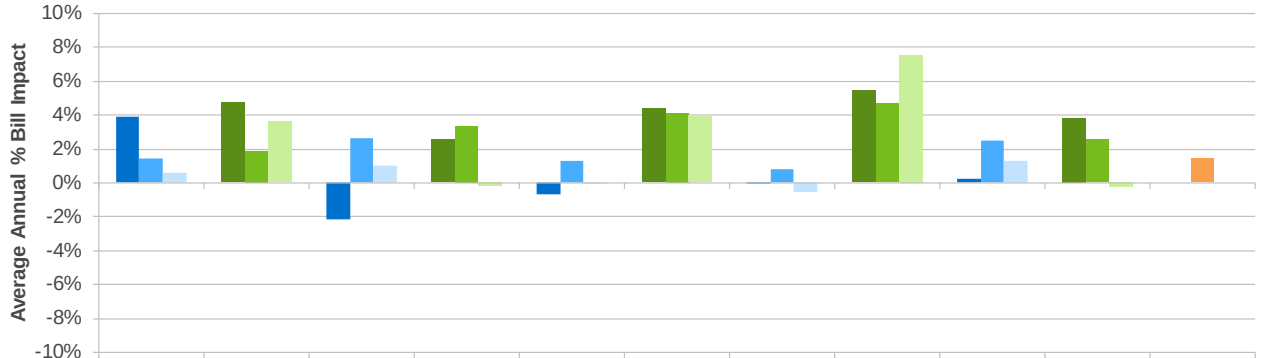


		PG&E	SCE	SDG&E
			Territory Wide	
Rate 1	% Impact	-1.1%	-0.3%	-1.6%
	$ Impact	-$12.87	-$3.17	-$16.38
Rate 2	% Impact	0.0%	-0.2%	-1.5%
	$ Impact	$0.11	-$2.46	-$15.21
Rate 3	% Impact	-0.5%	-1.0%	
	$ Impact	-$5.78	-$9.55	

[77] SCE Rate 3 annual results do not include July 2016

Figure 6.1-11 presents the average bill impacts for the first year of the pilot for each segment in the hot climate region. In general, customers on all three rates at SCE experienced bill increases during the first year of the pilot of approximately $60 (7.6%) or less for the entire year). Percent bill impacts were similar for the targeted customer segments in PG&E's hot climate zone and SDG&E's hot climate zone as a whole, where impacts were generally less than 2% in either direction. The exception was households with incomes below 100% FPG on PG&E's Rate 1, who faced bill increases of nearly 4% throughout the year.

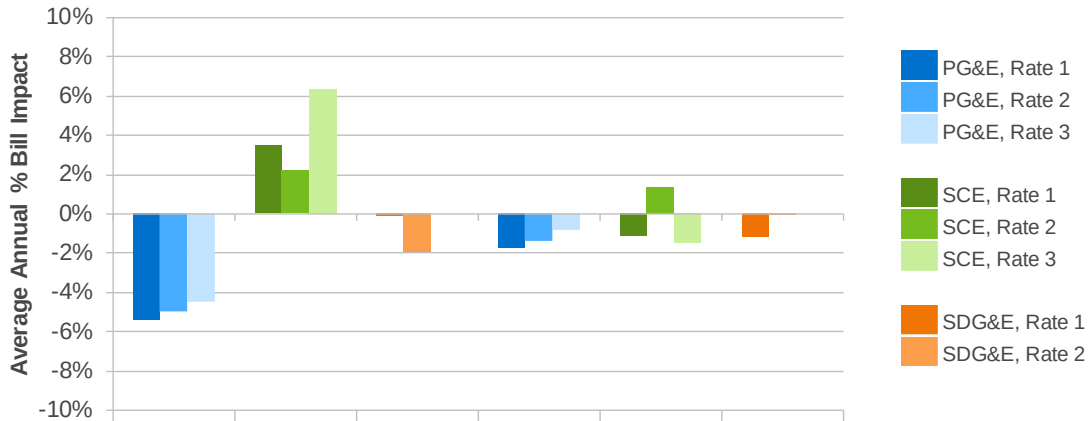
Figure 6.1-11: Average Annual Bill Impacts by Customer Segment for Hot Climate Regions



		PG&E	SCE	PG&E	SCE	PG&E	SCE	PG&E	SCE	PG&E	SCE	
		Below 100% FPG		100% - 200% FPG		Senior		CARE		Non-CARE		SDG&E
Rate 1	% Impact	3.9%	4.7%	-2.1%	2.6%	-0.6%	4.4%	0.0%	5.4%	0.2%	3.8%	
	$ Impact	$36.78	$45.86	-$22.57	$31.58	-$8.11	$62.28	-$0.38	$46.88	$3.70	$63.62	
Rate 2	% Impact	1.5%	1.9%	2.6%	3.4%	1.3%	4.1%	0.8%	4.6%	2.5%	2.6%	1.4%
	$ Impact	$14.33	$18.93	$28.90	$38.24	$16.28	$56.52	$7.04	$40.31	$40.16	$42.22	$20.29
Rate 3	% Impact	0.6%	3.6%	1.0%	-0.2%	-0.1%	4.0%	-0.5%	7.6%	1.3%	-0.3%	
	$ Impact	$5.55	$32.16	$11.62	-$1.99	-$0.87	$45.77	-$4.82	$56.30	$21.07	-$3.65	

Figure 6.1-12 shows the bill impacts in the moderate climate regions for each utility service territory. As in the hot climate region, PG&E customers experienced bill reductions over the first year of the pilot without much variation between rates. CARE/FERA customers at PG&E had greater reductions than non-CARE/FERA customers. The opposite was true at SCE, where CARE/FERA customers on rates experienced bill increases between 2.2% and 6.4% but non-CARE/FERA customers experienced total bill impacts between negative 2% and positive 2%. Customers in SDG&E's moderate climate region experienced small total bill impacts as well.

Figure 6.1-12: Average Annual Bill Impacts by Customer Segment for Moderate Climate Regions



		CARE			Non-CARE		
		PG&E	SCE	SDG&E	PG&E	SCE	SDG&E
Rate 1	% Impact	-5.4%	3.4%	-0.1%	-1.7%	-1.1%	-1.1%
	$ Impact	-$35.79	$24.17	-$0.65	-$20.34	-$16.06	-$14.30
Rate 2	% Impact	-5.0%	2.2%	-2.0%	-1.4%	1.3%	0.0%
	$ Impact	-$31.38	$16.20	-$12.75	-$17.75	$18.66	-$0.34
Rate 3	% Impact	-4.5%	6.4%		-0.8%	-1.4%	
	$ Impact	-$27.87	$39.38		-$8.50	-$18.35	

Figure 6.1-13 shows the bill impacts in the cool climate regions within each utility's territory. Unlike the other climate regions, the cool climate region shows greater variation between rates for CARE/FERA customers, but bill impacts for these customers were still relatively small over the course of the year. Non-CARE/FERA customers at all three utilities and on all rates experienced bill reductions, on average.

Figure 6.1-13: Average Annual Bill Impacts by Customer Segment for Cool Climate Regions

		CARE			Non-CARE		
		PG&E	SCE	SDG&E	PG&E	SCE	SDG&E
Rate 1	% Impact	-1.6%	1.8%	0.4%	-2.8%	-2.6%	-2.3%
	$ Impact	-$7.97	$9.61	$2.03	-$25.59	-$28.01	-$24.29
Rate 2	% Impact	-0.8%	0.8%	-0.8%	-1.8%	-3.6%	-2.6%
	$ Impact	-$3.80	$4.07	-$3.78	-$15.94	-$42.08	-$27.85
Rate 3	% Impact	-4.4%	7.3%		-2.8%	-4.4%	
	$ Impact	-$21.84	$35.38		-$23.65	-$47.04	

6.2 Overall Key Findings

The first year of the TOU pilots summarized above has produced a large amount of information that will be useful in guiding California's pricing strategy over the coming years. The first year has provided insights regarding changes in customers' energy use in response to TOU rates during the summer, winter, spring, and for the full year, along with a variety of bill impact metrics on an equivalent seasonal and annual basis. One of the final research objectives for the pilot, to evaluate impact persistence, will follow in the final report after data from the second summer is available for analysis. Also, as mentioned numerous times above, when interpreting results to date, policymakers must keep in mind that statistically significant differences do not necessarily translate into material differences, especially for survey findings, since the large number of customers participating in the pilots (which was driven largely by the desire to estimate load impacts with reasonable precision) combined with the decision to survey all participants means that even very small differences in survey metrics can be found to be statistically significant. With these cautions in mind, the remainder of this section provides a high level summary of key findings.

6.2.1 Load Impacts

Key findings for load impacts include the following:

- While many pricing pilots and programs have been evaluated in the electricity industry nationwide and in California, few if any have tested tariffs that have peak pricing periods that

extend well into the evening hours when many residential households have occupants arriving home from work and engaging in evening activities. This second interim report now evaluates how customers responded to the Time-Of-Use rates during the winter and spring seasons. All eight tariffs tested in these pilots had a substantial portion of the peak period covering key evening hours, which include more hours after the sun has set, compared to the summer season. Indeed, the common hours across all eight tariffs are from 6 to 8 PM. Some tariffs had peak periods extending until 9 PM and some had shoulder periods extending until midnight. As such, a key finding from the pilots in the winter season is that statistically significant load reductions were found for all rates tested for the service territory as a whole and for nearly all climate regions. Table 6.2-1 summarizes the percentage and absolute peak period load reductions for each rate and service territory. As seen, the lowest load impact occurred for SCE's Rate 1, showing an average reduction of 1.4% and 0.01 kW, and the highest occurred for PG&E's Rate 1 and Rate 2, which had average percentage reductions of 3.6% and 0.03 kW.

Table 6.2-1: Peak Period Load Reductions

Utility	Metric	Rate 1	Rate 2	Rate 3
PG&E	Peak Period Hours	4-9 PM	6-9 PM	4-9 PM
	% Impact	3.6%	3.6%	3.5%
	Absolute Impact (kW)	0.03 kW	0.03 kW	0.03 kW
SCE	Peak Period Hours	2-8 PM	5-8 PM	4-9 PM
	% Impact	1.4%	2.0%	3.2%
	Absolute Impact (kW)	0.01 kW	0.02 kW	0.03 kW
SDG&E	Peak Period Hours	4-9 PM	4-9 PM	N/A
	% Impact	2.3%	1.7%	N/A
	Absolute Impact (kW)	0.02 kW	0.01 kW	N/A

- Another important policy question given shifting load patterns at some utilities is the magnitude of peak period load reductions on weekends. Peak period load reductions on weekends and the pattern of load reductions across rate periods on weekends were generally similar to weekday impacts.
- Also often of interest when examining TOU rates is whether peak period reductions consist primarily of load shifting, in which case daily usage would remain roughly the same, load reductions that are not completely offset by increases in other rate periods, which would reduce usage overall, or whether customers actually take advantage of lower off-peak prices by consuming more in lower priced periods than is reduced during high priced periods in which case overall usage would increase. For the majority of rates, climate regions and customer segments, there was a small but statistically significant overall reduction in electricity use. The reduction in total annual usage ranged from very small negative values (e.g., an increase) to as high as 2.5%.
- For PG&E, winter load impacts in both absolute and percentage terms, were largest in the hot climate region, second largest in the moderate region, and lowest in the cool region for Rates 1 and 3 (although the differences were not always statistically significant). PG&E load impacts were slightly larger in the moderate climate region than the hot region for Rate 2, though the

difference is not statistically significant. At SDG&E, load impacts for Rate 2 in both absolute and percentage terms, were largest in the hot climate region, and there was not a statistically significant difference between the moderate and cool climate regions. However, at SCE, the pattern of load reductions was not the same. In general, the differences across regions were smaller and in some cases, the largest load reductions were found in the moderate or cool climate region and the smallest in the hot region. It is noteworthy that SCE's hot region experiences some of the most extreme temperature swings both seasonally and daily. In fact, SCE's hot region is generally SCE's coldest region in the winter.

- Load impacts in the winter are slightly smaller than in the summer even though, according to survey results, customers mostly persisted in taking several actions to shift or reduce their usage during the summer and the winter. This is likely due to customers having fewer opportunities to take actions in the winter that have a large impact on their electricity load, such as reducing or turning off their air-conditioning. Customers did report reducing or turning off their heat during the winter, for example, but most customers use natural gas for heating their homes, which would have little to no impact on electricity usage.
- For the service territory as a whole for all three utilities, CARE/FERA customers had lower average percent and absolute peak period load reductions than non-CARE/FERA customers for all rates. This pattern was typically (although not universally) true at PG&E, SCE, and SDG&E for all rates and climate regions.
- Senior households in both PG&E's and SCE's hot climate region had load reductions generally similar to those for the general population in the hot climate region. However, SCE Senior households had slightly lower load reductions than the general population in the hot climate region, and PG&E Seniors had slightly larger load reductions than the general hot climate region.
- Households with incomes below 100% of the Federal Poverty Guidelines (FPG) in hot climate regions did not reduce peak period loads in PG&E's service territory but had load reductions slightly larger compared to the general population in SCE's hot climate region.
- Households who had previously purchased smart thermostats reduced winter peak period usage by approximately 4.87%, which was significantly higher compared to non-CARE/FERA population weighted load reductions of 1.8%. Nest offered its "Time of Savings" support service for the second summer, which could affect second summer impacts in the final report.
- SDG&E customers who received Weekly Alert Emails in the moderate climate region had incremental impact improvements of approximately 0.01 kW, whereas customers in the cool climate region had impacts decline by approximately 0.01 kW. In both cases, the difference was negligible due to the small impacts in general.
- SDG&E offered rebates for smart thermostats to customers through the Whenergy program. 2,214 customers were reached out to via direct mail and 4,889 customers were contacted via email for the $100 rebate offer. A similar number of customers were offered the $200 rebate (2,201 direct mail and 4,920 email).[78] 349 applications were received, and of those, 246 were deemed eligible and ultimately accepted. Of the 246 applications accepted, 95 were for the $100 rebate offer, and 151 were for the $200 rebate offer.

[78] It isn't currently known if there was any overlap between the email and direct mail channels. This will be clarified and additional details regarding acceptance rates by incentive level and treatment versus control group will be included in the final report. Load impacts were not estimated for the customers who received the rebates due the sample size being too small to yield statistically significant impacts.

- PG&E continued to offer a smart phone app that would provide a variety of information to those who downloaded it that might help them to manage their energy use. The number of customers who successfully downloaded the app was quite low and there were not enough users to determine whether the app had an impact.

6.2.2 Bill Impacts

Key findings concerning bill impacts include the following:

- Annual bill impacts were very small at all three utilities, with total bill impacts between a reduction of 2% and an increase of 2% at the territory-level. The 12-month bill impacts varied by climate region and CARE/FERA status. At SCE, CARE/FERA customers faced greater bill increases than non-CARE/FERA customers.
- At both PG&E and SCE, average monthly winter bills were lower for all TOU rates than they would have been on the OAT for nearly all customer segments and all climate regions. The exception was CARE/FERA customers on Rate 3 in SCE's cool climate region. Average monthly bill reductions over the winter months ranged from a low of roughly $1 to as much as $12. Most segments on average were only able to save a small amount more in addition to the structural bill reduction by reducing or shifting usage. It is important to keep in mind that customers generally faced bill increases during the summer months of the pilot.
- Bill impacts at SDG&E were quite different from those at PG&E and SCE, with very small structural impacts in the winter months. Customers faced winter bill impacts that were generally less than 1% in either direction, at the territory level and at the CARE/FERA and non-CARE/FERA level.
- Average annual total bill impacts varied significantly by utility, rate, and climate region. The average customer at PG&E across all three rates either had no change in the total annual cost of energy or a slight reduction of up to $6. The largest decrease was $36 for CARE/FERA customers in the moderate climate region on Rate 1, and the largest annual bill increase was $40 for non-CARE/FERA customers on Rate 2 in the hot climate region. At SCE, the average customer across all three rates either had no change in the total annual cost of energy or a slight reduction of up to $10. The largest decrease was $47 for SCE non-CARE/FERA customers in the cool climate region on Rate 3, and the largest annual bill increase was $64 for non-CARE/FERA customers on Rate 1 in the hot climate region. At SDG&E, the average customer across both rates had a slight reduction of up to $10 in the total annual cost of energy. The largest decrease was $28 for SDG&E non-CARE/FERA customers in the cool climate region on Rate 2, and the largest annual bill increase was $20 for general population on Rate 2 in the hot climate region.

Overall, the average customer across all utilities experienced a slight decrease in the annual cost of electricity. The findings varied significantly by utility, rate, climate region, and customer segment ranging from an increase of $64 to a decrease of $47 per year. While this is the net difference in total bills for the year, it's important to keep in mind that lower winter prices offset the higher summer prices. Many customers experienced summertime bill increases of $20 to $35 a month on average. While bill volatility is a legitimate concern in light of the relatively large bill increases experienced by many pilot participants over the few summer months covered the initial evaluation period, this is not an indication that a good solution to this problem is to mute the TOU price signal.

Seasonal bill volatility exists even under the OAT in California due to tiered pricing and variation in usage over seasons. Importantly, SDG&E's pilot tariffs had TOU price signals higher than some of the PG&E and SCE pilot rates that were associated with much higher bill volatility. Designing TOU tariffs that account for the seasonal differentiation in the OAT (or lack thereof), and offering balanced payment programs, which allow customers to pay the same bill each month based on historical usage and current rates (with periodic true-ups), combined with first year bill protection, may be better solutions that will protect customers while improving economic efficiency through TOU prices that more accurately reflect cost causation. The extent to which this option might mute TOU price signals is subject to debate but will be examined in the default pilots that the IOUs will implement in 2018.

A final point to keep in mind as default tariff options are designed is that all customers who will be defaulted onto TOU rates in 2019 will receive bill protection for the first full year on the new tariff. As such, while summer bills may be higher than under the OAT, customers who stay for a full year will not pay a higher bill than they would under the OAT.

6.2.3 Customer Attrition

Customer attrition is driven by three very different factors. One is customers who move, referred to as customer churn. Another is customers who become ineligible as a result of factors such as installing solar, going onto medical baseline, or switching to service from a Community Choice Aggregator (CCA). The final factor is customers who consciously opt out of the rate because they are unhappy being on a TOU rate. Key findings concerning customer attrition include the following:

- **Cumulative opt-out rates between enrollment and the end of June 2017 have been quite low for nearly all rates and customer segments.** For PG&E, the cumulative percent of treatment customers who dropped off the rate was between 1% and 7% and at SCE it was between 0.5% and 12%. For SDG&E, opt-out rates were between 1% and 3.5%.
- At PG&E and SCE, there are small differences in the cumulative percent of opt outs between tariffs at each utility. Cumulative opt-out rates are greatest for PG&E and SCE's Rate 3 (about 4.5%). At SDG&E, the greatest cumulative opt-out rates, about 3.5%, are among customers in the hot climate region on Rate 2.
- The number of customers dropping off the TOU rates was highest in the hot region, second in the moderate and lowest in the cool climate region for all tariffs.
- Opt-out rates were slightly lower for CARE/FERA customers in PG&E and SDGE's service territory compared with non-CARE/FERA customers. In SCE's territory, the differences between CARE/FERA and non-CARE/FERA were small. Opt-out rates leveled off over the course of the winter.
- Overall attrition ranged from as low as 10% to as high as 33% with the highest being for CARE/FERA customers in SCE's hot climate region on Rate 3. Given that the pilot planning assumption was that total attrition would be roughly 25% over the course of the two summer periods, this segment may be at risk of having sample sizes that are lower than ideal by summer 2017.

- Attrition has also been high in PG&E's moderate and cool climate regions for some segments due primarily to customers switching to CCAs, which are quite active in PG&E's service territory.

6.2.4 Survey Findings

Key findings from the surveys that were administered include the following:

- **There were no statistically significant increases in the economic hardship of treatment customers, as measured by the economic index, compared to control customers for segments of interest at SCE. PG&E Rate 3 CARE/FERA customers in the hot region** (and SDG&E Rate 1 CARE/FERA customers in the moderate region) **had higher economic index scores, or greater economic hardship, compared to control group customers.** For context, the size of the difference in the economic index score is equivalent to the difference in the value of the index from using one additional non-income based method to pay bills or from having difficulty paying one additional bill over the summer. An important policy question is whether TOU rates might increase economic hardship for selected customer segments in the hot climate region for PG&E and SCE. The surveys included questions pertaining to economic hardship and responses to several questions were combined to produce an economic index. The value of this index was compared between treatment and control customers to determine whether the TOU rates increase the value of the index.
- **There were no statistically significant increases in health hardship of treatment customers, as measured by the health index, compared to control customers for segments of interest at PG&E and SCE.** SDG&E Rate 2 CARE/FERA customers in the moderate climate region had a higher health index score, or greater health hardship, compared to control group customers. For context, the size of the difference in the health index score is equivalent to the difference in the value of the index from having a slightly higher frequency of experiencing poor health or having poor health limit usual activities (e.g. from rarely to sometimes, sometimes to often, etc.) since December 2016. Another important policy question is whether TOU rates might increase health hardship for selected customer segments in the hot climate region for PG&E and SCE. The surveys included questions pertaining to health hardship and responses to two questions were combined to produce a health index. The value of this index was compared between treatment and control customers to determine whether the TOU rates increase the value of the index.
- **There were no significant increases in the health metrics, measuring whether customers sought medical attention for being too hot or cold in their home, for treatment customers, compared to control customers in segments of interest at PG&E. About 6% more SCE Rate 1 CARE/FERA customers and Rate 1 and 2 customers on or eligible for CARE/FERA, who have electric heat, reported seeking medical attention due to excessive cold compared to control customers; there were no significant increases regarding excessive heat for SCE customers.** About 5% more SDG&E Rate 1 and Rate 2 CARE/FERA customers in the moderate climate region, who have air conditioning, sought medical attention due to excessive heat compared to the control customers; there were no significant increases regarding excessive cold for SDG&E customers. The surveys asked customers whether they had sought medical attention due to excessive heat or cold in their home (health metrics), and these responses were compared between treatment and control customers. The comparisons regarding excessive heat were made only for customers who reported having air conditioning, and for those who require air conditioning due to a medical condition. The comparisons regarding excessive cold were made

only for customers who reported having electric heat, and for those who require heating due to a medical condition.

- At PG&E and SCE, satisfaction ratings with the TOU rate and with the utility were typically slightly higher for TOU rate customers than for control customers, which is a reversal of trends from the first survey, and these differences were sometimes statistically significant but they were always less than 1 point on an 11-point scale. Put another way, none of these differences are likely to be judged as material.
- The surveys revealed that a much smaller percent of customers on TOU rates received bills during the previous six months that were higher than expected compared to the results from the first survey, which asked about bills during the summer months. The percentage difference on this metric between treatment and control customers was significant lower for the majority of rates and customer segments in the hot and moderate climate regions at PG&E, and for one SCE and two SDG&E segments. This is an important finding that should influence not only the timing of enrollment for customers on TOU rates (e.g., enrolling customers during winter or spring, not in summer or early-fall) but also the content of ME&O materials, which should be designed to prepare customers for higher than expected bills in the summer period (while reminding them about lower bills at other times of the year).
- The surveys showed that about half to two-thirds of customers reported knowing when bill protection ends, but that customers' understanding of bill protection may depend on how the question is asked. SCE and SDG&E customers were provided a brief explanation of bill protection and asked if they understand what it means. Over 86% reported they did understand. PG&E customers, however, were provided the same brief explanation but were asked to choose what bill protection means among four possible choices. Between 28% and 59% selected the correct meaning while 25% to 51% reported they did not know. Net of each IOU's outreach to customers about bill protection, customers may overwhelmingly understand bill protection generally, but many do not understand the specifics when presented with other possible meanings.
- The surveys also showed a significant disparity in understanding of the timing of the peak period between CARE/FERA and non-CARE/FERA customers. For some rates and climate regions, between 14% and 44% of CARE/FERA customers could not identify a single hour that fell in the peak period rate window, while the percent of non-CARE/FERA customers that had the same level of misunderstanding was often significantly lower or even in the single digits. While many customers' understanding of rates improved compared to results from the first survey, particularly for PG&E, the level of understanding for some customers worsened. This issue should be carefully addressed and studied further in the upcoming default pilots where there is a much greater emphasis on and opportunity to develop and test ME&O options and content for all segments.
- For all three utilities, customers on TOU rates were more likely to 'often' take time-specific actions than customers on the OAT. For example, while a similar proportion of customers from control and treatment groups indicated they often turned off their lights to conserve energy, a larger proportion of treatment customers indicated they often shifted doing laundry and running the dishwasher during peak hours. In addition, substantial percentages of customer reported taking several of actions often to shift or reduce usage. Trends in the actions taken results suggest that many treatment customers did know about and take several actions that helped them shift usage even though fewer of them understood the nuances of their rates.

- Overall, the opt-in TOU pilot customer survey answered the research questions it was designed to address, including TOU rates' effects on customers' economic and health statuses, satisfaction, bill expectations, understanding of rates, actions taken to shift and/or reduce usage, and attitudes toward smart technologies, demand response and energy efficiency, and TOU outreach materials. However, the results also revealed some questions to begin or to continue exploring, such as how to improve customers' understanding of TOU rates (particularly their on-peak hours) and bill protection, their satisfaction with different aspects of the rates, and their persistence in taking actions to shift and/or reduce usage.

Appendix A Listing of Electronic Tables

The following Microsoft Excel files have been filed as electronic tables in conjunction with the primary report. Given the large volume of different rates and customer segments across utilities, electronic tables are the most efficient medium to present this data. Within these tables, users are able to select options such as the rate or customer segment of interest. The numbering of the tables corresponds to the section of the report containing the corresponding static figures and tables. In cases where more than one table corresponds to a section, each electronic table is labeled as X.X-1 and X.X-2. The file names for the electronic tables do not directly tie to any particular figure or table numbers, even though the naming convention is similar. These electronic tables allow the reader to access the underlying data that created the figures, and to determine actual values for data points within figures.

E-Table 3.3-1 - PG&E Load Impacts by Hour

E-Table 3.3-2 - PG&E Load Impact Tables & Figures

E-Table 3.3-3 – PG&E Annual kWh Impacts

E-Table 3.4 - PG&E Bill Impacts

E-Table 4.3-1 - SCE Load Impacts by Hour

E-Table 4.3-2 - SCE Load Impact Tables & Figures

E-Table 4.3-3 - SCE Annual kWh Impacts

E-Table 4.4 - SCE Bill Impacts

E-Table 5.3-1 - SDG&E Load Impacts by Hour

E-Table 5.3-2 - SDG&E Load Impact Tables & Figures

E-Table 5.3-3 - SDG&E Annual kWh Impacts

E-Table 5.4 - SDG&E Bill Impacts

E-Table 6.1 - Cross Utility Comparison

Appendix B Comparison of Original and Updated Tariffs

Table B-1: PG&E Tariff Summary

Rate	Season	Period/Percent of Baseline	Non-CARE		CARE	
			June 2016	March 2017	June 2016	March 2017
Rate 1	Summer	Off Peak	31.7	30.7	17.8	17.8
		Peak	42.0	41.0	24.3	24.3
	Winter	Off Peak	27.1	26.1	14.9	14.8
		Peak	29.0	28.0	16.1	16.0
	Baseline Credit		-11.7	-8.8	-4.7	-4.8
Rate 2	Summer	Off Peak	29.6	28.6	16.5	16.5
		Partial Peak	39.3	38.3	21.9	21.9
		Peak	44.5	43.5	24.9	24.8
	Winter	Off Peak	27.0	26.0	15.0	15.0
		Peak	29.6	28.6	16.5	16.5
	Baseline Credit		-11.7	-8.8	-4.7	-4.8
Rate 3	Spring	Off Peak	26.7	25.8	14.9	14.8
		Peak	36.0	34.7	20.1	20.0
		Super Off Peak	18.0	17.4	10.0	10.0
	Summer	Off Peak	28.6	27.8	16.0	15.9
		Peak	57.2	55.6	31.9	31.8
	Winter	Off Peak	27.1	26.1	15.1	15.0
		Peak	29.0	28.0	16.1	16.1
	Baseline Credit		-11.7	-8.8	-4.7	-4.8
OAT	Spring	0%-100%	18.2	20.0	11.9	12.6
		101%-200%	24.1	27.6	14.7	17.3
		200-400%	40.0	27.6	21.7	17.3
		Over 400%	40.0	40.1	21.7	24.0
	Summer	0%-100%	18.2	20.0	11.9	12.6
		101%-200%	24.1	27.6	14.7	17.3
		200-400%	40.0	27.6	21.7	17.3
		Over 400%	40.0	40.1	21.7	24.0
	Winter	0%-100%	18.2	20.0	11.9	12.6
		101%-200%	24.1	27.6	14.7	17.3
		200-400%	40.0	27.6	21.7	17.3
		Over 400%	40.0	40.1	21.7	24.0
Delivery Minimum Bill Amount			32.9	32.9	16.4	16.4
FERA Discount			12% discount on bill			

Table B-2: SCE Tariff Summary

Rate	Season	Period/Percent of Baseline	Non-CARE		CARE	
			June 2016	January 2017	June 2016	January 2017
Rate 1	Summer	On Peak	34.5	34.8	24.2	24.3
		Off Peak	27.6	27.8	19.2	19.3
		Super Off Peak	23.0	23.2	15.9	16.0
	Winter	On Peak	27.5	27.3	19.1	18.9
		Off Peak	22.9	22.7	15.8	15.6
		Super Off Peak	22.9	22.7	15.8	15.6
	Baseline Credit		-9.9	-9.1	-6.9	-6.4
Rate 2	Summer	On Peak	53.3	55.2	37.8	39.0
		Off Peak	29.3	29.1	20.5	20.3
		Super Off Peak	17.3	17.6	11.8	12.0
	Winter	On Peak	27.9	27.6	19.4	19.1
		Off Peak	26.0	25.5	18.1	17.7
		Super Off Peak	17.4	17.7	11.9	12.0
	Baseline Credit		-9.9	-9.1	-6.9	-6.4
Rate 3	Spring	On Peak	24.9	25.0	17.2	17.3
		Mid Peak	21.0	21.1	14.4	14.4
		Off Peak	18.2	18.3	12.5	12.5
		Super Off Peak	9.9	10.0	6.5	6.5
	Summer	Super On Peak	37.0	37.0	26.0	25.9
		On Peak	22.6	22.6	15.6	15.5
		Mid Peak	18.8	18.7	12.8	12.7
		Off Peak	16.4	16.3	11.1	11.0
	Winter	Mid Peak	21.0	21.1	14.4	14.4
		Off Peak	18.2	18.3	12.5	12.5
		Super Off Peak	10.4	10.2	6.8	6.6
	All Seasons	0%-100%	15.7	16.3	10.2	11.0
		101%-200%	22.9	24.9	15.7	16.7
		200%- 400%	29.2	24.9	21.7	16.7
		400%+	29.2	31.4	21.7	21.1
Single Family Basic Charge/day			3.1	3.1	2.4	2.4
Multi Family Basic Charge/day			2.4	2.4	1.8	1.8
Min Charge/day			32.9	32.9	16.4	16.4
FERA Discount			12% discount on bill			

Table B-3: SDG&E Tariff Summary

Rate	Season	Period/Percent of Baseline	Non-CARE		CARE	
			August 2016	March 2017	August 2016	March 2017
Rate 1	Summer	Off Peak	34.9	38.0	22.1	23.5
		Peak	56.6	62.0	36.4	38.7
		Super Off Peak	29.7	32.0	18.9	20.3
		Baseline Credit	-20.3	-22.0	-13.0	-13.9
	Winter	Off Peak	36.2	40.0	22.8	24.7
		Peak	37.3	41.0	24.1	25.4
		Super Off Peak	35.1	39.0	22.1	24.1
		Baseline Credit	-18.6	-20.0	-12.4	-12.7
Rate 2	Summer	Off Peak	32.9	36.0	20.8	22.2
		Peak	56.6	62.0	36.4	38.7
		Baseline Credit	-20.3	-22.0	-13.0	-13.9
	Winter	Off Peak	35.8	39.0	22.8	24.7
		Peak	37.3	41.0	24.1	25.4
		Baseline Credit	-18.6	-20.0	-12.4	-12.7
OAT	Summer	130	19.1	21.0	11.7	12.7
		Over 130%	40.0	43.0	25.4	26.6
	Winter	130	17.5	20.0	11.1	12.0
		Over 130%	36.2	40.0	22.8	24.7
FERA Discount			12% discount on bill			

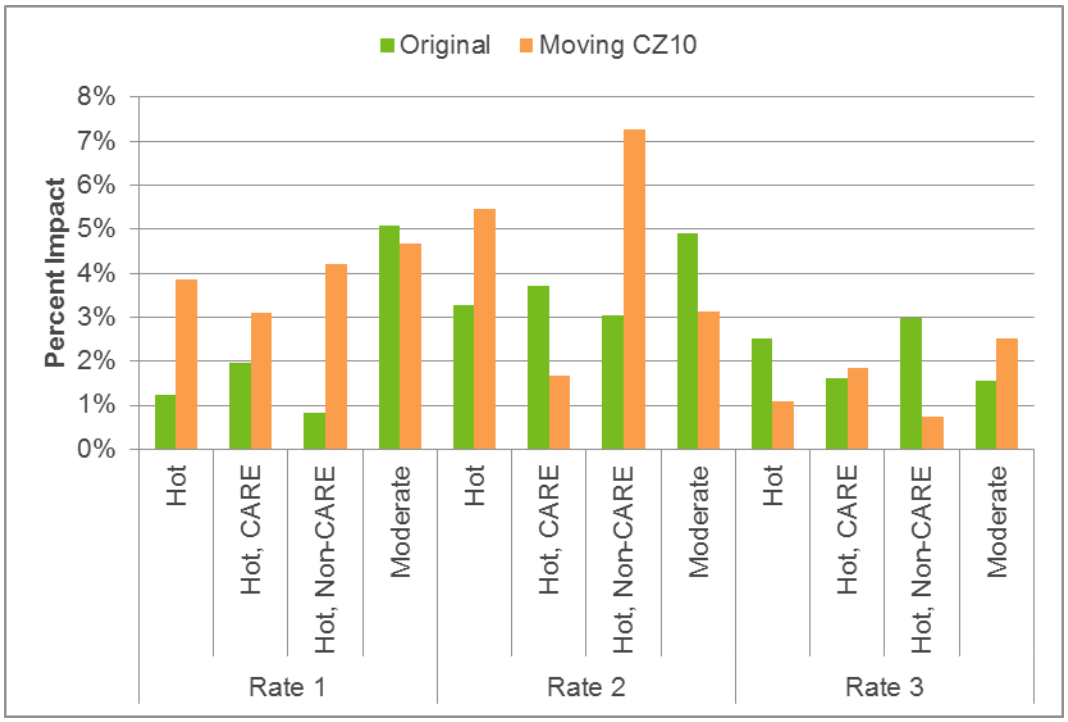
Appendix C Climate Zone 10 – Additional Analysis

At the request of the TOU Working Group, Nexant estimated SCE summer peak-period load impacts from the first summer with an alternative segmentation in which customers in SCE's Climate Zone 10 were included in the hot climate region rather than the moderate climate region. These customers made up a large portion of the moderate climate region, and as such, the "alternative" moderate climate region could not be split into CARE/FERA and non-CARE/FERA for load impact estimation purposes. The table and figure included below summarize the changes in peak period load impacts from moving Climate Zone 10 customers to the hot climate region. There doesn't appear to be a universal pattern to the outcome across all of the rates.

Table C-1: Comparison of Summer Peak Percent Impacts

Rate	Segment	Original	Moving CZ10	Effect on Impact
Rate 1	Hot	1.2%	3.9%	▲
	Hot, CARE	2.0%	3.1%	▲
	Hot, Non-CARE	0.8%	4.2%	▲
	Moderate	5.1%	4.7%	▼
Rate 2	Hot	3.3%	5.5%	▲
	Hot, CARE	3.7%	1.7%	▼
	Hot, Non-CARE	3.1%	7.3%	▲
	Moderate	4.9%	3.1%	▼
Rate 3	Hot	2.5%	1.1%	▼
	Hot, CARE	1.6%	1.8%	▲
	Hot, Non-CARE	3.0%	0.7%	▼
	Moderate	1.5%	2.5%	▲

Figure C-1: Comparison of Summer Peak Percent Impacts



For Rate 1, moving the Climate Zone 10 customers from the moderate region to the hot region made the percent impacts very similar between the two regions. This could imply that the Climate Zone 10 customers behave more like the moderate region customers than the original customers in the hot climate region given the major difference in percent impacts. The impacts for CARE/FERA customers in the hot region increased slightly, whereas those for non-CARE/FERA increased by quite a bit.

The results of this analysis were similar for Rate 2. The impacts in the moderate climate region decreased, while the impacts in the hot climate region increased. It appears that the Climate Zone 10 customers have greater impacts than the other two regions (without Climate Zone 10 included).

Rate 3 had very different results. After moving customers in Climate Zone 10, impacts in the moderate region increased while those in the hot region decreased. This was especially noticeable among non-CARE/FERA customers in the hot region. This implies that customers in Climate Zone 10 had small impacts on Rate 3.