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A MEMBER OF THE FSC GROUP

2011 Ex Post Load Impact Evaluation of California's Statewide Base Interruptible Program

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1 Executive Summary

Each of California's three major investor-owned utilities, Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), offer the Base Interruptible Program (BIP). Although minor differences in the tariffs exist across the three utilities, for all three, BIP is a tariff based, emergency-triggered demand response (DR) program that the utilities can dispatch for California Independent System Operator (CAISO) system emergencies and local emergencies. Customers enrolled in BIP receive incentive payments in exchange for committing to reduce their electrical usage to a contractually-established level referred to as the Firm Service Level (FSL). Participants who fail to reduce load down to or below their FSL are subject to a substantial financial penalty assessed on a kWh basis. As of the end of 2011, enrollment in BIP equaled 663 accounts for SCE, 227 accounts for PG&E and 21 accounts for SDG&E.

This report documents the 2011 ex post load impact estimates associated with BIP for all three of California's major investor-owned utilities. This report does not contain ex ante load impact estimates because a final decision regarding the 2012-2014 demand response applications has not been issued. Ex ante impact estimates will be developed following the Commission's final decision regarding the DR Program applications.

1.1 Ex Post Load Impact Estimates

This report provides ex post load impact estimates for events called in 2011. Each utility called a territory-wide test BIP event in 2011. SCE called a test event on September 21 from 2 PM to 4 PM. PG&E implemented a test event on September 7 from 3 PM to 5 PM. In addition to this territory-wide test event, PG&E called an actual, localized event on March 11 for the nine participants in group 8 who are located in the Humboldt region.[1] SDG&E called a BIP test event on August 18 that lasted from 12 PM to 4 PM for BIP option A customers and 3 PM to 6 PM for the single BIP option B customer.

SCE held a system-wide test event with 24-hour advance notice for BIP on September 21 from 2 PM to 4 PM, which was the first SCE BIP event since 2009. Overall, 661 customers participated in the event. The average load drop over the two-hour event period was 790 kW. The aggregate load drop during the event period was 522 MW. This represents nearly a 70% reduction relative to the estimated reference load of 751 MW. From 3 PM to 4 PM, aggregate load lowered to 149 MW and customers provided 91% of the expected load reduction given the aggregate FSL of 97 MW.

PG&E's system-wide BIP test event was held on September 7, 2011 and lasted from 3 PM to 5 PM. The event included all 222 customers who were enrolled in BIP at that time. These customers were provided 48-hour advance notice for this test event. The average load drop over the two-hour event period was 827.5 kW. The aggregate load drop during the event period was 183.7 MW. This represents roughly an 83% reduction relative to the reference load of 220.9 MW. On aggregate, customers performed as expected as the event-period load of 37.2 MW was nearly the same as the aggregate FSL of 36.7 MW.

[1] For the PG&E BIP program, customers are divided into different geographical groups that can be dispatched individually for local emergencies such as this one in the Humboldt region on March 11.

In addition to this system-wide test event, PG&E called an actual, localized event on March 11 for the nine participants in group 8 who are located in the Humboldt region. This was a short event lasting from 7:35 AM to 8:08 AM, as a result of the tsunami in that region. All 9 participants fully complied during the event time period by reducing load below their FSLs, with an average load impact of 677.8 kW per customer. The aggregate load impact specifically for the event time period was around 6.1 MW.

SDG&E called a BIP test event on August 18, 2011 that lasted from 12 PM to 4 PM for BIP option A customers and 3 PM to 6 PM for the single BIP option B customer. Option A customers received 30-minute notice of the event and Option B customers received 3 hours. These were the minimum notification times allowed by the tariff. In total, 21 customers participated in the event. From 3 PM to 4 PM when all customers were participating in the event, the average load drop was 114.1 kW. The aggregate load drop from 3 PM to 4 PM was 2.4 MW. This represents roughly a 35% reduction relative to the reference load of 6.9 MW. The 3 PM to 4 PM aggregate load of 4.5 MW was substantially higher than the aggregate FSL of 0.6 MW. BIP customers under performed during this event, providing only 38% of the 6.3 MW reduction that participants needed in order to be in compliance.

2 Introduction and Program Summary

This report documents the 2011 ex post load impact estimates for California's statewide Base Interruptible Program (BIP). Each of California's three major investor-owned utilities, Southern California Edison (SCE), Pacific Gas and Electric (PG&E) and San Diego Gas & Electric (SDG&E), offer the BIP program. Although minor differences in the tariffs exist across the three utilities, for all three, BIP is a tariff based, emergency-triggered demand response (DR) program that the utilities can dispatch for California Independent System Operator (CAISO) system emergencies and local emergencies. Customers enrolled in BIP receive incentive payments in exchange for committing to reduce their electrical usage to a contractually-established level referred to as the Firm Service Level (FSL). Participants who fail to reduce load down to or below their FSL are subject to a substantial financial penalty assessed on a kWh basis.

Until recently, the state's IOUs could only operate BIP when the CAISO determined that system-wide conditions reached a Stage 2 emergency (e.g., when operating reserves are less than 5%) or on a test-event basis. At the request of the CAISO, the California Public Utilities Commission (CPUC) ruled[2] that the three utilities must modify their tariffs. The revised tariffs allow the utilities to call BIP after CAISO has publicly issued a warning notice and has determined that a stage 1 emergency is imminent when it has exhausted all other options to prevent further degradation of its operating reserves. The other triggering conditions for BIP (local emergencies, Stage 2 alerts or test events) remain.

This report provides ex post load impact estimates for events called in 2011. Each utility called a BIP event in 2011. SCE called a test event on September 21 from 2 PM to 4 PM. PG&E implemented a test event on September 7 from 3 PM to 5 PM. In addition to this system-wide test event, PG&E called an actual, localized event for the nine group 8 participants located in the Humboldt region on March 11.[3] There was one test event held for SDG&E's BIP program in 2011. That event occurred on August 18 and lasted for four hours for option A customers (12 PM to 4 PM) and three hours for option B customers (3 PM to 6 PM).

2.1 Overview of SCE's BIP Program

SCE's BIP program is designed for customers and aggregators with demands of 200 kW and above. The program includes 2 notification options: option A with a 15-minute notification lead time and option B with a 30-minute notification requirement. Interruption events for an individual BIP customer or aggregated group are limited to a single 6-hour event per day, and no more than 180 hours per calendar year. An interruption event may be called at any time during the year.

SCE's I-6 program was a predecessor interruptible tariff designed for large customers with demands of 500 kW and above. The I-6 tariff has been closed to new enrollment since 1996. Starting in 2006, SCE began transitioning I-6 customers to BIP. The transition was complete by the end of 2008. As of September 2011, SCE had 663 service accounts enrolled in the BIP program, of which 90% were in the

[2] CPUC resolution E-4220. January 29, 2009.

[3] For the PG&E BIP program, customers are divided into different geographical groups that can be dispatched individually for local emergencies such as this one in the Humboldt region on March 11th.

30-minute notification option. As indicated in Table 2-1, the largest number of accounts is from the manufacturing sector (56% of the total).

Table 2-1:
Number of Accounts in SCE's BIP Program by Industry

Industry	Number of Accounts
Agriculture, Mining & Construction	63
Manufacturing	374
Wholesale, Transport & Other Utilities	68
Retail Stores	39
Offices, Hotels, Finance & Services	43
Schools	67
Institutional/Government	9
Total	**663**

SCE's service territory includes three CAISO local capacity areas (LCA).[4] The vast majority of service accounts (557 out of the 663 BIP accounts) are in the LA Basin LCA; 81 are located in the Ventura LCA and the remaining 25 are in the Outside LA Basin LCA.

There was one test event held for SCE's BIP program in 2011. That event occurred on September 21 and lasted for two hours, from 2 PM to 4 PM. Section 4 summarizes the ex post results for this event.

2.2 Overview of PG&E's BIP Program

Customers can enroll in PG&E's BIP program either directly or through an aggregator. The program is designed for customers with minimum average monthly demand of at least 100 kW. Customers enrolled in PG&E BIP are notified at least 30 minutes in advance of an event. Previously, there was an option B with a 4-hour notification lead time, but it is no longer offered. At the time option B was discontinued, all PG&E BIP customers were enrolled in the 30-minute notification option. Curtailment events for an individual BIP customer or an aggregated group of customers are limited to a single 4-hour event per day, no more than 10 events per month and no more than 120 event hours per calendar year. A curtailment event may be called under BIP at any time during the year.

As of the end of 2011, there were 227 accounts[5] enrolled in PG&E's BIP program. Since the end of 2010, the number of participants has grown by 38 accounts. Table 2-2 shows the distribution of service

[4] Local capacity area (or LCA) refers to a CAISO-designated load pocket or transmission constrained geographic area for which a utility is required to meet a Local Resource Adequacy capacity requirement. There are currently three LCAs within SCE's service territory, seven in PG&E's service territory and one in SDG&E's service territory. In addition, PG&E has many accounts not located within any specific LCA. These accounts are categorized here as being in the "Other" LCA region.

[5] Officially, PG&E refers to these as "service agreements," but in order to be consistent with the terminology used for SCE and SDG&E, "accounts" is used.

accounts by industry grouping. As in SCE's BIP program, the largest number of accounts comes from the manufacturing sector (37% of the total).

Table 2-2:
Number of Accounts in PG&E's BIP Program by Industry

Industry	Number of Accounts
Agriculture, Mining & Construction	35
Manufacturing	85
Wholesale, Transport & Other Utilities	44
Retail Stores	31
Offices, Hotels, Finance & Services	17
Schools	2
Institutional/Government	13
Total	**227**

Table 2-3 shows the distribution of PG&E BIP accounts across LCAs within PG&E's service area. Most BIP participation comes from the Other and Greater Bay Area LCAs.

Table 2-3:
Number of Service Accounts in PG&E's BIP Program by LCA

Industry	Number of Accounts
Greater Bay Area	68
Greater Fresno	15
Humboldt	7
Kern	22
Northern Coast	19
Other	78
Sierra	8
Stockton	10
Total	**227**

There were two events for PG&E's BIP program in 2011. The system-wide test event occurred on September 7 and lasted for two hours, from 3 PM to 5 PM. In addition to this system-wide test event, PG&E called an actual, localized event on March 11 for the nine participants in group 8 who are located in the Humboldt region. This was a short event lasting from 7:35 AM to 8:08 AM, as a result of the

tsunami in that region. The ex post analysis for PG&E, presented in Section 5, pertains to these two events.

2.3 Overview of SDG&E's BIP Program

SDG&E BIP is a voluntary program that offers participants a monthly capacity bill credit in exchange for committing to reduce their demand to a contracted FSL on short notice during emergency situations. SDG&E offers two options that vary with respect to the notification period, number and duration of allowed events and incentive payments:

- BIP-A (Option A): Requires load reduction response within 30 minutes. Incentive payments are $7/kW. The maximum event length is 4 hours per day and the maximum number of events is 10 per month and 120 hours per calendar year; and
- BIP-B (Option B): Requires load reduction response within three hours. Incentive payments are $3/kW. The maximum event length is 3 hours per day and the maximum number of events is 10 per month and 90 hours per calendar year.

Participation in SDG&E's program has been relatively low. There was one participant in 2006 and three in 2007. Participation grew from 3 to 20 participants in 2008, but fell to 19 participants as of January 2010. In October 2010, SDG&E added customers to BIP for the first time in over a year. By the end of 2010, there were 21 accounts enrolled in SDG&E BIP and enrollment remained at that level through the end of 2011. All but one of these accounts is enrolled in option A. The current distribution of accounts by industry is shown in Table 2-4. There is only one LCA in SDG&E's service territory.

Table 2-4:
Number of Service Accounts in SDG&E's BIP Program by Industry

Industry	Number of Accounts
Agriculture, Mining & Construction	2
Manufacturing	7
Wholesale, Transport & Other Utilities	1
Retail Stores	5
Offices, Hotels, Finance & Services	6
Schools	0
Institutional/Government	0
Total	**21**

There was one event held for SDG&E's BIP program in 2011. That event occurred on August 18 and lasted for four hours for option A customers (12 PM to 4 PM) and three hours for option B customers (3 PM to 6 PM). Section 6 presents the ex post analysis for the 2011 SDG&E BIP event.

2.4 Report Structure

The remainder of this report is organized as follows. Section 3 discusses the methodology for the ex post evaluation. Sections 4, 5 and 6 include the ex post load impact estimates for each utility. All of the required ex post hourly load impact tables are included in the electronic appendices.

3 Methodology

This section discusses the methodology that was used to develop ex post load impact estimates for BIP. It covers the regression model development and assessment of its accuracy.

3.1 Model Development

For demand response resources that have numerous events, regression analysis can be used to estimate the typical (absolute or percentage) load reduction associated with events as a function of event-day conditions (e.g., weather, day-of-week, etc.). These regression models can then be used to predict ex post impacts as a function of the conditions that occurred on those historical days or that are expected to occur on future days on which program events are most likely to be called.

With DR resources for which there is little event history like BIP, for ex post load impact estimation purposes, regression analysis can be used to predict the reference load for the historical event day; the actual metered load for that day can be subtracted from the reference load to estimate the load impact. However, this regression-based method cannot be used to predict load reductions because there is not enough empirical event data for estimating the impact coefficients.

The regression models used to predict reference loads for the purpose of ex post estimation were developed with the primary goal of accurately predicting the average customer load given time-of-day, day-of-week, month and temperature. Given that all BIP customers are on TOU rates, rate-period variables were also included in the model specification. The estimated models were based on one year of hourly load data for each customer. Individual regressions with all 24 hours included were run for each customer.

The dependent variable in the regression model was the kW load in each hourly interval for each participant. The regression model contained hundreds of variables, consisting largely of shape and trend variables (and interaction terms) designed to track variation in load across days of the week and hours of the day. Weather variables were tested and had significant impacts for certain customers. Binary variables representing when the underlying TOU rates changed during the day and season were also included to capture the change in load due to price variation. The regression model is as follows:

$$kW_t = A + B \times SummerOn_t + C \times SummerMid_t + D \times SummerOff_t + E \times WinterMid_t$$
$$+ \sum_{i=1}^{24}\sum_{j=1}^{5} F_{ij} \times Hour_i \times DayType_j + \sum_{i=1}^{24}\sum_{j=1}^{12} G_{ij} \times Hour_i \times Month_j +$$
$$+ \sum_{i=1}^{24} H_{ij} \times Hour_i \times TotalCDH_t + \sum_{i=1}^{24} I_{ij} \times Hour_i \times TotalCDHsqr_t$$
$$+ \sum_{i=1}^{24} J_{ij} \times Hour_i \times TotalHDH_t + \sum_{i=1}^{24} K_{ij} \times Hour_i \times TotalHDHsqr_t$$
$$+ \sum_{i=1}^{24} L_i \times Hour_i \times Other\_Eventday_t$$
$$+ \sum_{i=1}^{24}\sum_{j=1}^{2} M_{ij} \times Hour_i \times BIP\_Eventday_j + e_t$$

Table 3-1:
Variable Descriptions

Variable	Description
kW_t	hourly BIP customer load at time t
A	estimated constant term
B through M_{ij}	estimated parameters
$SummerOn_t$, $SummerMid_t$, $SummerOff_t$ and $WinterMid_t$	binary variables that indicate which TOU rate block is in effect for each hour
$Hour_i$	series of binary variables for each hour, which is interacted with all of the remaining variables because each has an impact that varies by hour
$DayType_j$	series of binary variables representing five different day types (Mon, Tues-Thurs, Fri, Sat, Sunday/Holiday)
$Month_j$	series of binary variables for each month
$TotalCDH_t$	total number of cooling degree hours (base 70) per day
$TotalCDHsqr_t$	total number of cooling degree hours per day squared
$TotalHDH_t$	total number of heating degree hours (base 70) per day
$TotalHDHsqr_t$	total number of heating degree hours squared
$Other\_Eventday_t$	binary variable for event days from other DR programs
$BIP\_Eventday_j$	binary variable representing each BIP event day;[6]
e_t	error term

3.2 Model Accuracy and Validity Assessment

Although regressions were run for each individual customer in the BIP program, what matters most is that the reference loads for all customers combined, or for selected groups of customers (e.g., industry types, LCA) are accurate. The regressions are not as accurate at the individual customer level, but when

[6] SCE and SDG&E had one event during the time period included in the estimation, whereas some PG&E BIP participants had two events.

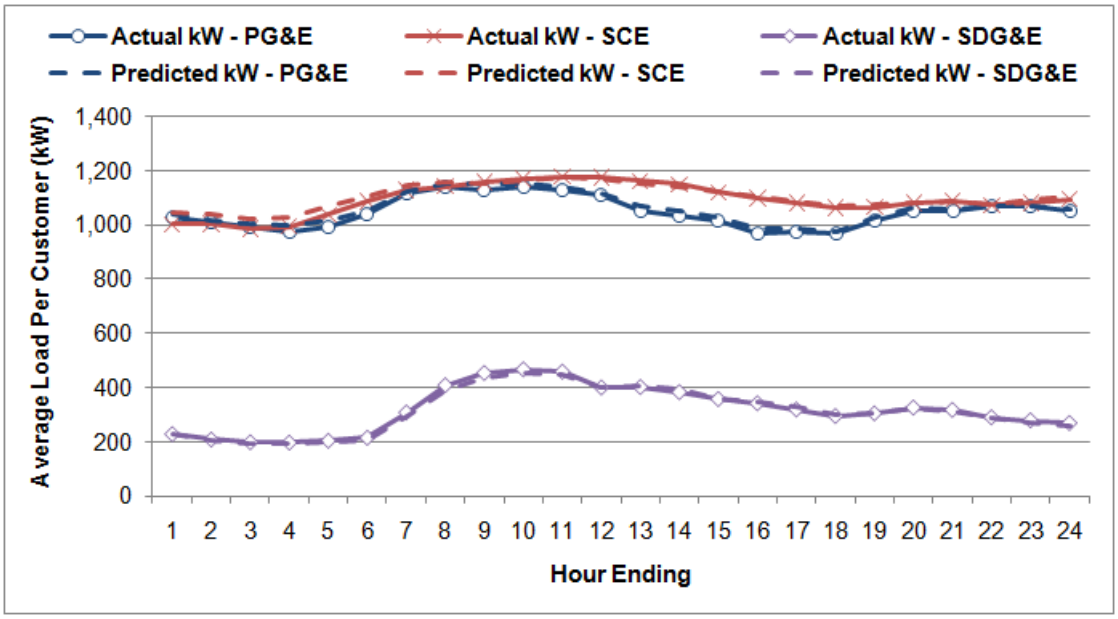
aggregated, overestimates and underestimates generally balance each other out and the resulting aggregate reference load is more accurate. Given that load impacts are calculated as the difference between the reference load and the FSL (after factoring in over/under performance), any error in the estimated reference load would cause an error in the estimated load impact.

3.2.1 Out-of-Sample Validation

Considering that BIP events are usually called on high system load days, it is important that the model predicts accurately on these days. In the first test of model accuracy, a series of out-of-sample validations is conducted. Rather than running the model on all of the available load data, a group of three randomly selected high system load days is withheld from the estimation. Although these three days are not included in the estimating sample, the model is used to predict load on those days. This process is repeated three times so that, in total, out-of-sample predictions of load are generated for the top nine system load days for each customer.

Figure 3-1 shows the results of the out-of-sample validation for the top nine system load days for each customer. As seen in the figure, the model accurately predicts load on high system load days even if those days are not included in the estimating sample. The difference between actual and predicted load did not exceed 5.3% in any hour for each utility. More importantly, the percentage error is low during the afternoon when events are most likely to be called. Between 1 PM and 6 PM, the SCE model very slightly over predicts by 0.1%, the PG&E model over predicts by less than 1.4% and the SDG&E model is also over by 2.2%. Considering that BIP customers typically drop more than 70% of their load during events, an error up to 2.2% will have little effect on the accuracy of the load impact estimates.

Figure 3-1:
Actual v. Predicted Average Load by Utility
Out-of-Sample Validation for Top 9 System Load Days[7]



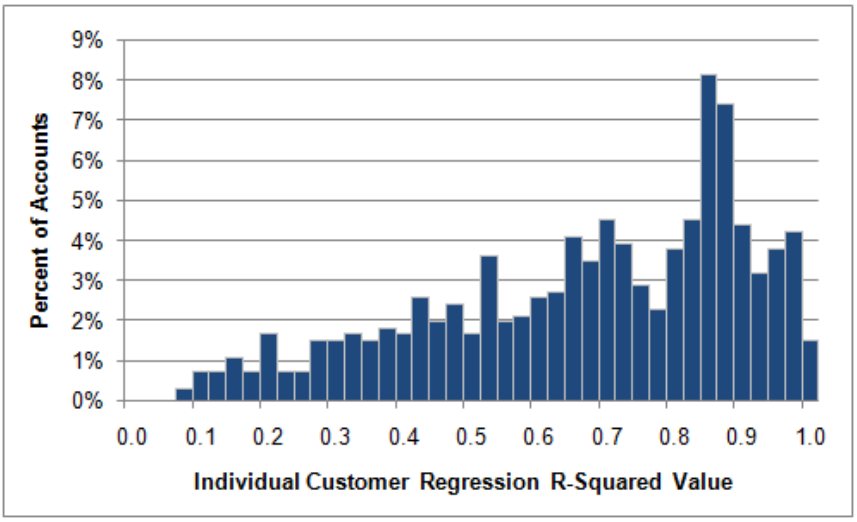
3.2.2 Goodness of Fit Measures

Although regressions were estimated at the individual customer level, from a program standpoint, the focus is less on how the regressions perform for individual customers than it is on how the regressions perform for the average participant and for specific customer segments. Individual customers exhibit more variation and less consistent energy use patterns than the average participant population. Likewise, the regressions are better at explaining the variation in electricity consumption and load impacts for the average customer (or average customer within a specific segment) than for individual customers. Put differently, it is more difficult to fully explain how a customer from a specific industry behaves on an hourly basis than it is to explain how the average customer in that industry behaves on an hourly basis. Because of this, we present measures of the explained variation, as described by the R-squared goodness-of-fit statistic, for the individual regressions, for specific customer segments and for the average customer overall.

Figure 3-2 shows the distribution of R-squared values from the individual customer regressions for SCE BIP customers. Roughly half of the individual customer regressions had R-squared values above 0.7, which suggests that the model predicts well for most SCE BIP customers. The lower one-third of all individual regressions had R-squared statistics up to 0.6.

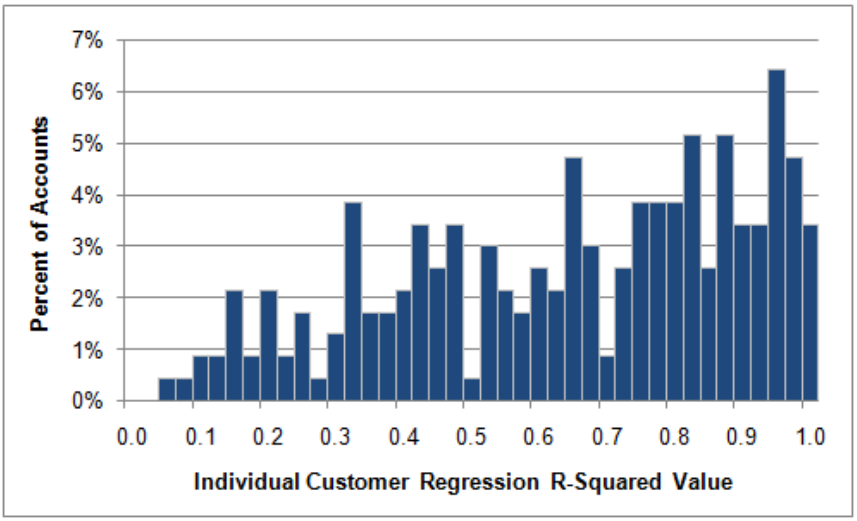
[7] Note that there are two lines for each utility in the graph, but due to the small error between estimated and actual values, it is difficult to distinguish the two lines. A table of the hourly values for each utility is provided in Appendix A.

Figure 3-2:
Distribution of R-squared Values from Individual Regressions for SCE BIP Customers



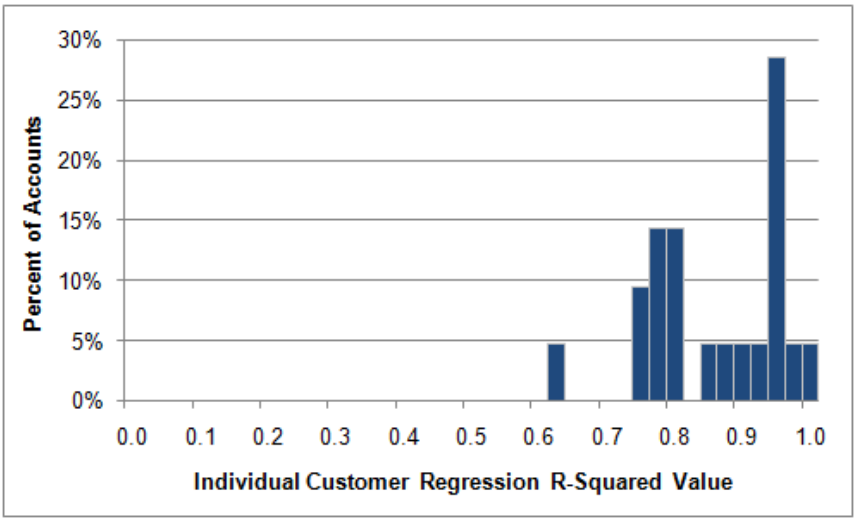
For PG&E BIP customers, the distribution of R-squared values from the individual customer regressions is more variable, as shown in Figure 3-3. About 69% of the individual customer regressions had R-squared values above 0.5. This result suggests that the model explains most of the variation in load for the majority of PG&E BIP customers. The lower one-third of all PG&E individual regressions had R-squared statistics below 0.5. The difference in the distribution of R-squared values between the utilities is primarily a function of the difference in industry mix. PG&E has a relatively large portion of BIP customers in the wholesale, transport & other utilities segment, which has load that is more difficult to explain.

Figure 3-3:
Distribution of R-squared Values from Individual Regressions for PG&E BIP Customers



As shown in Figure 3-4, the model has relatively high R-squared values for SDG&E BIP customers. All individual customer regressions have an R-squared value above 0.6.

Figure 3-4:
Distribution of R-squared Values from Individual Regressions for SDG&E BIP Customers



In order to estimate the average customer R-squared values for each industry, LCA or the program as a whole, the regression-predicted and actual electricity usage values were averaged across all customers for each date and hour. This process produced regression-predicted and actual values for the average customer, which enabled the calculation of errors for the average customer and the calculation of the R-squared value. The R-squared values for the average participant and for the average customer by segment were estimated using the following formula:[8]

$$R^2 = 1 - \frac{\sum_t (y_t - \hat{y}_t)^2}{\sum_t (y_t - \bar{y})^2}$$

Table 3-2:
Variable Descriptions

Variable	Description
y_t	actual energy use at time t
$\hat{y}_t$	regression predicted energy use at time t
$\bar{y}$	average energy use across all time periods

Table 3-3 summarizes the amount of variation explained by the regression model by industry and utility. For all customers, SCE and PG&E have an aggregate R-squared value of 0.7 and 0.78, which means

[8] Technically, the R-squared value needs to be adjusted based on the number of parameters and observations from each regression. Given that the number of observations per regression was typically over 8,000, the effects of the adjustment were anticipated to be minimal. As a result, the unadjusted R-squared is presented in order to avoid the complication of tracking the number of observations and parameters from each individual regression.

that the model explains 70% and 78% of variation in aggregate BIP load for each utility. As suggested by the histograms above, SDG&E BIP customers have a higher R-squared of 0.9. Retail stores have the highest aggregate R-squared value for each utility, ranging from 0.96 for SCE to 0.99 for PG&E. In general, customers in the wholesale, transport & other utilities segment have usage that is relatively more difficult to explain, which is why their aggregate R-squared value is relatively low.

Table 3-3:
Aggregate R-Squared Values by Industry and Utility

Industry	SCE	PG&E	SDG&E
Agriculture, Mining & Construction	0.48	0.72	
Manufacturing	0.66	0.74	0.88
Wholesale, Transport & Other Utilities	0.37	0.62	
Retail Stores	0.96	0.99	0.98
Offices, Hotels, Finance & Services	0.88	0.90	0.83
Schools	0.93		
Institutional/Government	0.93	0.95	
All Customers	**0.70**	**0.78**	**0.90**

Table 3-4 shows the aggregate R-Squared values by LCA. The explained variation varies from 42% to 90% across LCAs. Only 2 of the LCAs have an R-squared value below 0.6 – SCE's Outside LA Basin LCA (0.46) and PG&E's Kern LCA (0.42). As shown in Table 3-3, the model has a relatively low R-squared value for agriculture, mining & construction and wholesale, transport & other utilities customers. These two industries comprise 48% and 55% of the customer mix in the Outside LA Basin and Kern LCAs, respectively, which explains why the R-squared is relatively low.

Table 3-4:
Aggregate R-Squared Values by LCA

Utility	Local Capacity Area	R-Squared
SCE	LA Basin	0.71
	Outside LA Basin	0.46
	Ventura	0.60
PG&E	Greater Bay Area	0.85
	Greater Fresno	0.80
	Humboldt	0.65
	Kern	0.42
	Northern Coast	0.84
	Other	0.68
	Sierra	0.87
	Stockton	0.79
SDG&E	San Diego	0.90

4 SCE Ex Post Load Impact Estimates

SCE held a system-wide test event for BIP on September 21 from 2 PM to 4 PM, which was the first SCE BIP event since 2009. Overall, 661 customers participated in the event, of which 20% were participating in a BIP event for the first time. Although participants are required to respond within 15 to 30 minutes for actual BIP events, 24-hour advance notice was provided for this test event. In the 24-hour advance notice, the exact timing of the event was not provided. SCE started providing final notification of the event at 2 PM on September 21 and customers were required to curtail load within 15 or 30 minutes of receiving notification, depending on their BIP program option. Customers were instructed to curtail load until 4 PM.

Figure 4-1 shows the average load impact per customer in each hour on September 21. As seen, the average load drop over the two-hour event period was 790 kW. There were also significant load impacts after the event, as the average participant load slowly ramped back up after the event and was still nearly 11% below the reference load at the end of the day.

Figure 4-2 shows the aggregate load impact in each hour of the day. The aggregate load drop during the event period was 522 MW. This represents nearly a 70% reduction relative to the reference load of 751 MW. From 3 PM to 4 PM, aggregate load lowered to 149 MW and customers provided 91% of the expected load reduction given the aggregate FSL of 97 MW.

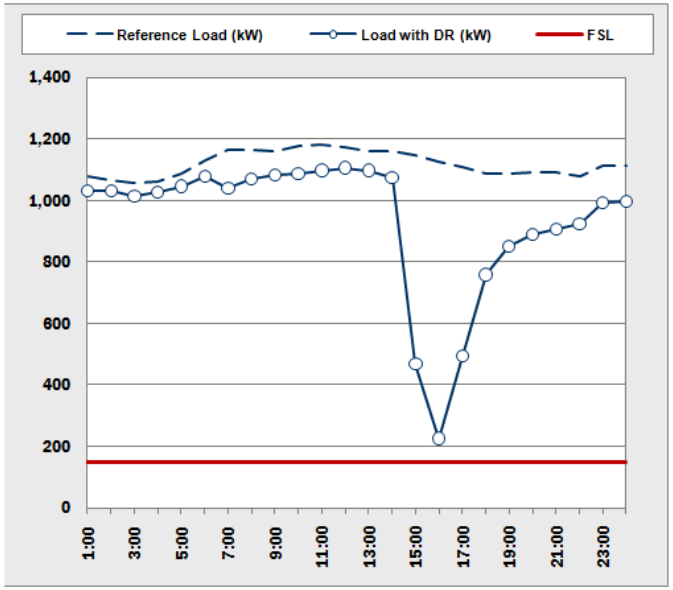
Figure 4-1:
Average Ex Post Load Impact (kW) per Participant for SCE BIP Event (September 21, 2011)

TABLE 1: Menu options

Type of Results	Average Enrolled Account
Event	Wednesday, September 21, 2011
Customer Characteristic	All Customers

TABLE 2: Output

Number of Accounts	661
Average FSL (kW)	146.6



Hour Ending	Reference Load (kW)	Load with DR (kW)	Load Impact (kW)	Weighted Temp (F)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
1:00	1080.0	1029.4	50.7	62.7	5.9	32.3	50.7	69.0	95.4
2:00	1066.7	1029.9	36.8	62.0	-7.9	18.5	36.8	55.1	81.5
3:00	1054.5	1013.0	41.5	61.5	-3.3	23.2	41.5	59.8	86.3
4:00	1059.7	1026.2	33.5	60.9	-11.5	15.1	33.5	51.9	78.4
5:00	1085.2	1045.1	40.1	60.7	-4.8	21.8	40.1	58.5	85.0
6:00	1128.9	1077.3	51.5	60.3	6.6	33.2	51.5	69.9	96.4
7:00	1163.5	1040.2	123.3	61.1	78.4	104.9	123.3	141.7	168.2
8:00	1162.7	1068.3	94.4	63.6	49.6	76.0	94.4	112.7	139.2
9:00	1160.0	1083.1	76.9	67.6	32.8	58.9	76.9	95.0	121.1
10:00	1174.8	1085.9	88.8	72.6	44.6	70.7	88.8	106.9	133.0
11:00	1179.0	1097.0	82.0	76.4	37.9	64.0	82.0	100.1	126.1
12:00	1171.8	1105.6	66.2	78.0	22.2	48.2	66.2	84.1	110.1
13:00	1160.7	1097.2	63.5	79.5	19.5	45.5	63.5	81.5	107.4
14:00	1157.9	1074.0	83.9	80.0	40.0	65.9	83.9	101.9	127.8
15:00	1146.4	467.5	678.9	79.0	634.9	660.9	678.9	696.9	722.9
16:00	1125.9	224.8	901.2	77.6	857.2	883.2	901.2	919.1	945.1
17:00	1108.0	492.7	615.2	74.9	571.2	597.2	615.2	633.2	659.2
18:00	1086.5	758.4	328.1	72.1	284.1	310.1	328.1	346.1	372.1
19:00	1087.2	849.4	237.9	69.5	193.8	219.8	237.9	255.9	281.9
20:00	1089.4	888.8	200.6	68.0	156.6	182.6	200.6	218.7	244.7
21:00	1091.0	905.6	185.4	66.4	141.1	167.3	185.4	203.6	229.7
22:00	1078.9	922.6	156.3	65.5	112.0	138.2	156.3	174.4	200.6
23:00	1113.8	991.8	122.0	64.5	77.2	103.7	122.0	140.3	166.8
0:00	1113.6	996.1	117.6	64.1	72.9	99.3	117.6	135.8	162.2

	Reference Energy Use (kWh)	Energy Use with DR (kWh)	Change in Energy Use (kWh)	Cooling Degree Hours (Base 70)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
Daily	26,845.9	22,369.7	4,476.2	60.1	4258.8	4387.3	4476.2	4565.2	4693.6

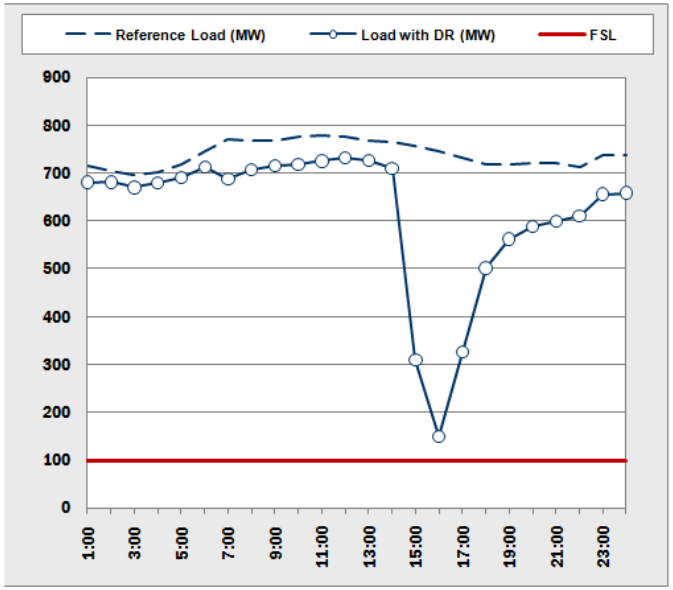
Figure 4-2:
Aggregate Ex Post Load Impact (MW) for SCE BIP Event (September 21, 2011)

TABLE 1: Menu options

Type of Results	Aggregate
Event	Wednesday, September 21, 2011
Customer Characteristic	All Customers

TABLE 2: Output

Number of Accounts	661
Aggregate FSL (MW)	96.9



Hour Ending	Reference Load (MW)	Load with DR (MW)	Load Impact (MW)	Weighted Temp (F)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
1:00	713.9	680.4	33.5	62.7	3.9	21.4	33.5	45.6	63.1
2:00	705.1	680.7	24.3	62.0	-5.2	12.2	24.3	36.4	53.9
3:00	697.0	669.6	27.4	61.5	-2.2	15.3	27.4	39.5	57.0
4:00	700.4	678.3	22.1	60.9	-7.6	10.0	22.1	34.3	51.8
5:00	717.3	690.8	26.5	60.7	-3.1	14.4	26.5	38.7	56.2
6:00	746.2	712.1	34.1	60.3	4.4	21.9	34.1	46.2	63.8
7:00	769.1	687.6	81.5	61.1	51.8	69.3	81.5	93.7	111.2
8:00	768.5	706.1	62.4	63.6	32.8	50.3	62.4	74.5	92.0
9:00	766.8	715.9	50.9	67.6	21.7	38.9	50.9	62.8	80.0
10:00	776.5	717.8	58.7	72.6	29.5	46.8	58.7	70.7	87.9
11:00	779.3	725.1	54.2	76.4	25.1	42.3	54.2	66.1	83.4
12:00	774.5	730.8	43.7	78.0	14.7	31.8	43.7	55.6	72.8
13:00	767.2	725.2	42.0	79.5	12.9	30.1	42.0	53.8	71.0
14:00	765.4	709.9	55.5	80.0	26.4	43.6	55.5	67.3	84.5
15:00	757.8	309.0	448.7	79.0	419.7	436.8	448.7	460.6	477.8
16:00	744.2	148.6	595.7	77.6	566.6	583.8	595.7	607.5	624.7
17:00	732.4	325.7	406.7	74.9	377.6	394.8	406.7	418.6	435.8
18:00	718.2	501.3	216.9	72.1	187.8	205.0	216.9	228.8	245.9
19:00	718.7	561.4	157.2	69.5	128.1	145.3	157.2	169.1	186.3
20:00	720.1	587.5	132.6	68.0	103.5	120.7	132.6	144.5	161.7
21:00	721.1	598.6	122.6	66.4	93.3	110.6	122.6	134.5	151.8
22:00	713.1	609.8	103.3	65.5	74.0	91.3	103.3	115.3	132.6
23:00	736.2	655.6	80.6	64.5	51.0	68.5	80.6	92.8	110.2
0:00	736.1	658.4	77.7	64.1	48.2	65.6	77.7	89.8	107.2

	Reference Energy Use (MWh)	Energy Use with DR (MWh)	Change in Energy Use (MWh)	Cooling Degree Hours (Base 70)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
Daily	17,745.2	14,786.4	2,958.8	60.1	2815.1	2900.0	2958.8	3017.6	3102.5

Table 4-1 shows the average load impact per customer across the event period by industry group and Table 4-2 shows the aggregate impact by industry. The overall results for all customers were primarily driven by participants in the manufacturing sector, which accounted for 56.6% of event participants and 64.9% of the aggregate load reduction. Manufacturing customers also had the highest performance, providing 84.4% of the expected load reduction. The agriculture, mining & construction segment was the only other industry group to provide more than 7% of the aggregate load reduction. Although customers in this segment accounted for less than 10% of event participants, they comprised 19.3% of the aggregate load reduction because agriculture, mining & construction customers had the highest reference load per customer (over 2.1 MW) and largest percent load reduction (76.6%).

Table 4-1:
Average Customer Load Impact by Industry for September 21, 2011 SCE Event

Industry	Number of Customers	Reference Load (kW)	Load with DR (kW)	Load Reduction (kW)	Average FSL (kW)	Performance (%)
Agriculture, Mining & Construction	62	2,119.6	496.3	1,623.3	136.3	81.8
Manufacturing	374	1,246.4	340.5	905.9	172.5	84.4
Wholesale, Transport & Other Utilities	67	772.4	242.2	530.2	107.0	79.7
Retail Stores	39	617.8	357.8	260.0	83.9	48.7
Offices, Hotels, Finance & Services	43	836.3	437.4	399.0	232.0	66.0
Schools	67	532.9	272.8	260.1	22.9	51.0
Institutional/Government	9	659.7	381.4	278.4	224.4	64.0
All Customers	**661**	**1,136.2**	**346.2**	**790.0**	**146.6**	**79.8**

Table 4-2:
Aggregate Load Impact by Industry for September 21, 2011 SCE Event

Industry	Number of Customers	Reference Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction	% of Aggregate Load Reduction
Agriculture, Mining & Construction	62	131.4	30.8	100.6	76.6	19.3
Manufacturing	374	466.1	127.3	338.8	72.7	64.9
Wholesale, Transport & Other Utilities	67	51.8	16.2	35.5	68.6	6.8
Retail Stores	39	24.1	14.0	10.1	42.1	1.9
Offices, Hotels, Finance & Services	43	36.0	18.8	17.2	47.7	3.3
Schools	67	35.7	18.3	17.4	48.8	3.3
Institutional/Government	9	5.9	3.4	2.5	42.2	0.5
All Customers	**661**	**751.0**	**228.8**	**522.2**	**69.5**	**100.0**

Tables 4-3 and 4-4 show the breakdown of load impacts by LCA. Although customers in the LA Basin LCA had the lowest average load reduction per customer (682.5 kW), this LCA accounted for 72.7% of the aggregate load reduction because 556 of 661 event participants were located there. Customers in the Outside LA Basin LCA provided the largest average load reduction per participant (2,357,8 kW) and highest percent load reduction (80.5%).

Table 4-3:
Average Customer Load Impact by Local Capacity Area
for September 21, 2011 SCE Event

Local Capacity Area	Number of Customers	Reference Load (kW)	Load with DR (kW)	Load Reduction (kW)	Average FSL (kW)	Performance (%)
LA Basin	556	1,019.2	336.8	682.5	145.3	78.1
Outside LA Basin	24	2,927.4	569.6	2,357.8	291.9	89.5
Ventura	81	1,408.1	344.3	1,063.8	112.6	82.1
All Customers	**661**	**1,136.2**	**346.2**	**790.0**	**146.6**	**79.8**

Table 4-4:
Aggregate Load Impact by Local Capacity Area for September 21, 2011 SCE Event

Local Capacity Area	Number of Customers	Reference Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction	% of Aggregate Load Reduction
LA Basin	556	566.7	187.3	379.4	67.0	72.7
Outside LA Basin	24	70.3	13.7	56.6	80.5	10.8
Ventura	81	114.1	27.9	86.2	75.5	16.5
All Customers	**661**	**751.0**	**228.8**	**522.2**	**69.5**	**100.0**

5 PG&E Ex Post Load Impact Estimates

The ex post load impact estimates presented first in this section are for PG&E's system-wide BIP test event that occurred on September 7, 2011. That event lasted from 3 PM to 5 PM. It was a test event that included all of the 222 customers that were enrolled in BIP at that time. Although participants are required to respond within 30 minutes for actual BIP events, 48-hour advance notice was provided for this test event.

Figure 5-1 shows the average load impact per customer in each hour on September 7. As seen, the average load drop over the two-hour event period was 827.5 kW. In the hour prior to the event, the average load reduction equaled 366.8 kW, and in the first hour after the event, load was still nearly 450 kW below the reference load.

Figure 5-2 shows the aggregate load impact in each hour of the day. The aggregate load drop during the event period was 183.7 MW. This represents roughly a 83% reduction relative to the reference load of 220.9 MW. On aggregate, customers performed as expected as the event-period load of 37.2 MW was nearly the same as the aggregate FSL of 36.7 MW.

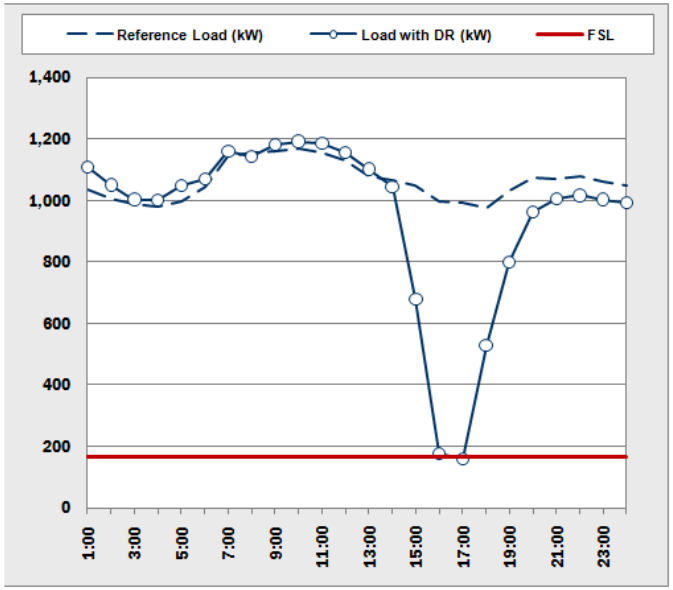
Figure 5-1:
Average Ex Post Load Impact (kW) per Participant for PG&E BIP Event (September 7, 2011)

TABLE 1: Menu options

Type of Results	Average Enrolled Account
Event	Wednesday, September 07, 2011
Customer Characteristic	All Customers

TABLE 2: Output

Number of Accounts	222
Average FSL (kW)	165.5



Hour Ending	Reference Load (kW)	Load with DR (kW)	Load Impact (kW)	Weighted Temp (F)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
1:00	1033.9	1106.7	-72.8	67.3	-124.5	-93.9	-72.8	-51.6	-21.0
2:00	1002.9	1049.7	-46.7	65.9	-98.5	-67.9	-46.7	-25.6	5.0
3:00	988.0	1002.7	-14.8	64.9	-66.4	-35.9	-14.8	6.3	36.8
4:00	978.8	999.4	-20.6	63.5	-72.1	-41.7	-20.6	0.5	30.9
5:00	995.0	1046.8	-51.7	62.6	-103.1	-72.7	-51.7	-30.7	-0.4
6:00	1044.6	1070.1	-25.5	62.3	-77.0	-46.6	-25.5	-4.5	25.9
7:00	1140.6	1159.2	-18.6	61.9	-70.0	-39.6	-18.6	2.4	32.8
8:00	1156.0	1142.4	13.6	63.0	-37.8	-7.4	13.6	34.7	65.1
9:00	1158.8	1182.3	-23.4	67.1	-74.7	-44.4	-23.4	-2.5	27.8
10:00	1169.6	1191.1	-21.5	72.7	-72.8	-42.5	-21.5	-0.6	29.7
11:00	1154.7	1184.9	-30.2	77.6	-81.5	-51.2	-30.2	-9.1	21.2
12:00	1129.1	1156.1	-27.0	82.0	-77.9	-47.8	-27.0	-6.1	24.0
13:00	1076.7	1100.9	-24.2	85.8	-74.9	-45.0	-24.2	-3.5	26.5
14:00	1065.1	1044.1	21.0	89.3	-29.7	0.3	21.0	41.8	71.7
15:00	1046.1	679.3	366.8	91.5	316.3	346.1	366.8	387.5	417.3
16:00	997.7	176.6	821.2	92.3	770.6	800.5	821.2	841.9	871.8
17:00	992.5	158.7	833.8	92.3	783.4	813.2	833.8	854.5	884.3
18:00	976.9	528.6	448.3	91.1	397.7	427.6	448.3	469.0	498.8
19:00	1031.1	799.3	231.7	88.4	181.0	211.0	231.7	252.5	282.5
20:00	1075.1	963.0	112.1	83.0	61.1	91.2	112.1	133.0	163.1
21:00	1069.2	1006.2	63.0	78.4	11.9	42.1	63.0	83.9	114.0
22:00	1079.4	1016.1	63.3	74.9	12.2	42.4	63.3	84.2	114.4
23:00	1061.9	1002.2	59.7	72.1	8.6	38.8	59.7	80.6	110.7
0:00	1048.0	992.7	55.3	70.2	4.1	34.3	55.3	76.2	106.5

	Reference Energy Use (kWh)	Energy Use with DR (kWh)	Change in Energy Use (kWh)	Cooling Degree Hours (Base 70)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
Daily	25,471.8	22,759.0	2,712.8	191.6	2462.3	2610.3	2712.8	2815.2	2963.2

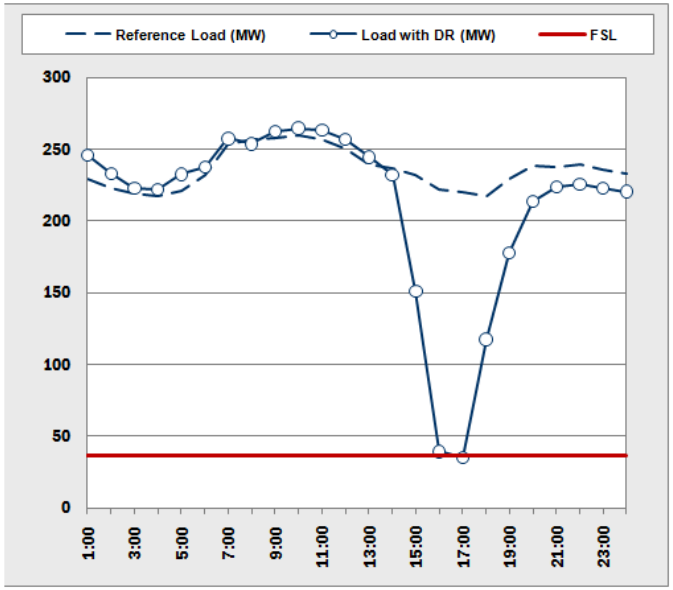
Figure 5-2:
Aggregate Load Impact (MW) for PG&E BIP Event (September 7, 2011)

TABLE 1: Menu options

Type of Results	Aggregate
Event	Wednesday, September 07, 2011
Customer Characteristic	All Customers

TABLE 2: Output

Number of Accounts	222
Aggregate FSL (MW)	36.7



Hour Ending	Reference Load (MW)	Load with DR (MW)	Load Impact (MW)	Weighted Temp (F)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
1:00	229.5	245.7	-16.2	67.3	-27.6	-20.9	-16.2	-11.4	-4.7
2:00	222.7	233.0	-10.4	65.9	-21.9	-15.1	-10.4	-5.7	1.1
3:00	219.3	222.6	-3.3	64.9	-14.7	-8.0	-3.3	1.4	8.2
4:00	217.3	221.9	-4.6	63.5	-16.0	-9.3	-4.6	0.1	6.9
5:00	220.9	232.4	-11.5	62.6	-22.9	-16.1	-11.5	-6.8	-0.1
6:00	231.9	237.6	-5.7	62.3	-17.1	-10.3	-5.7	-1.0	5.7
7:00	253.2	257.3	-4.1	61.9	-15.5	-8.8	-4.1	0.5	7.3
8:00	256.6	253.6	3.0	63.0	-8.4	-1.6	3.0	7.7	14.4
9:00	257.3	262.5	-5.2	67.1	-16.6	-9.9	-5.2	-0.5	6.2
10:00	259.6	264.4	-4.8	72.7	-16.2	-9.4	-4.8	-0.1	6.6
11:00	256.4	263.0	-6.7	77.6	-18.1	-11.4	-6.7	-2.0	4.7
12:00	250.7	256.7	-6.0	82.0	-17.3	-10.6	-6.0	-1.4	5.3
13:00	239.0	244.4	-5.4	85.8	-16.6	-10.0	-5.4	-0.8	5.9
14:00	236.5	231.8	4.7	89.3	-6.6	0.1	4.7	9.3	15.9
15:00	232.2	150.8	81.4	91.5	70.2	76.8	81.4	86.0	92.6
16:00	221.5	39.2	182.3	92.3	171.1	177.7	182.3	186.9	193.5
17:00	220.3	35.2	185.1	92.3	173.9	180.5	185.1	189.7	196.3
18:00	216.9	117.4	99.5	91.1	88.3	94.9	99.5	104.1	110.7
19:00	228.9	177.5	51.4	88.4	40.2	46.8	51.4	56.1	62.7
20:00	238.7	213.8	24.9	83.0	13.6	20.3	24.9	29.5	36.2
21:00	237.4	223.4	14.0	78.4	2.6	9.3	14.0	18.6	25.3
22:00	239.6	225.6	14.1	74.9	2.7	9.4	14.1	18.7	25.4
23:00	235.7	222.5	13.2	72.1	1.9	8.6	13.2	17.9	24.6
0:00	232.7	220.4	12.3	70.2	0.9	7.6	12.3	16.9	23.6

	Reference Energy Use (MWh)	Energy Use with DR (MWh)	Change in Energy Use (MWh)	Cooling Degree Hours (Base 70)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
Daily	5,654.7	5,052.5	602.2	191.6	546.6	579.5	602.2	625.0	657.8

Table 5-1 shows the average load impact per customer across the event period by industry group and Table 5-2 shows the aggregate impact by industry. One industry group (schools) is excluded from the tables because it had less than four customers.

Among the six industry groups included in Table 5-1, customers in the agriculture, mining & construction and wholesale, transport & other utilities segments had the highest performance during the event. Both of these industries achieved performance above 100% (i.e., reduced load below their FSL). The performance for retail stores was substantially lower, only providing 9.2% of the expected load reduction. Customers in the manufacturing and wholesale, transport & other utilities segments provided the largest percentage load drop (around 88% of the reference load). In aggregate, the manufacturing sector provided 65.3% of the total load reduction on the event day. This result is consistent with the 2009 and 2010 ex post evaluations, where manufacturing customers provided over 65% of the aggregate load reduction for the past two annual test events.

Table 5-1:
Average Customer Load Impact by Industry for September 7, 2011 PG&E Event

Industry	Number of Customers	Reference Load (kW)	Load with DR (kW)	Load Reduction (kW)	Average FSL (kW)	Performance (%)
Agriculture, Mining & Construction	35	542.1	114.8	427.3	152.9	109.8
Manufacturing	82	1,654.8	191.5	1,463.3	196.0	100.3
Wholesale, Transport & Other Utilities	46	589.0	71.8	517.1	190.5	129.8
Retail Stores	30	216.8	203.2	13.6	69.7	9.2
Offices, Hotels, Finance & Services	14	2,053.5	439.9	1,613.6	296.8	91.9
Institutional/Government	14	261.7	124.6	137.1	22.4	57.3
All Customers	**222**	**995.1**	**167.6**	**827.5**	**165.5**	**99.7**

Table 5-2:
Aggregate Load Impact by Industry for September 7, 2011 PG&E Event

Industry	Number of Customers	Reference Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction	% of Aggregate Load Reduction
Agriculture, Mining & Construction	35	19.0	4.0	15.0	78.8	8.1
Manufacturing	82	135.7	15.7	120.0	88.4	65.3
Wholesale, Transport & Other Utilities	46	27.1	3.3	23.8	87.8	12.9
Retail Stores	30	6.5	6.1	0.4	6.3	0.2
Offices, Hotels, Finance & Services	14	28.7	6.2	22.6	78.6	12.3
Institutional/Government	14	3.7	1.7	1.9	52.4	1.0
All Customers	**222**	**220.9**	**37.2**	**183.7**	**83.2**	**100.0**

Tables 5-3 and 5-4 show the breakdown of load impacts by LCA. Six of the eight LCAs within PG&E's service territory had 21 or fewer accounts enrolled in BIP at the time of the event. Around 35% of all accounts were located in the Other LCA and nearly 29% in the Greater Bay Area LCA. Half of the customers in the manufacturing segment were located in the Other LCA. This concentration of manufacturing customers explains why the average load reduction in the Other LCA was 860 kW higher than in any of the other areas. As a result, the Other LCA accounted for 69.4% of the aggregate load reduction. This result is consistent with the 2009 and 2010 ex post evaluations, where customers in the Other LCA provided around 70% of the aggregate load reduction for the past two annual test events.

Percent load reductions and performance relative to the FSL vary substantially by LCA. Customers in the Humboldt, Other and Sierra LCAs complied with their FSL and provided a percent load reduction of over 90%. In the Kern LCA, customers under performed slightly and provided a 79.3% load reduction. The Greater Fresno LCA was the only area in which performance was significantly below 75%, but these customers were relatively small (average reference load of 322.4 kW), so they did not have much of an impact on the overall ex post results for all customers.

Table 5-3:
Average Customer Load Impact by Local Capacity Area
for September 7, 2011 PG&E Event

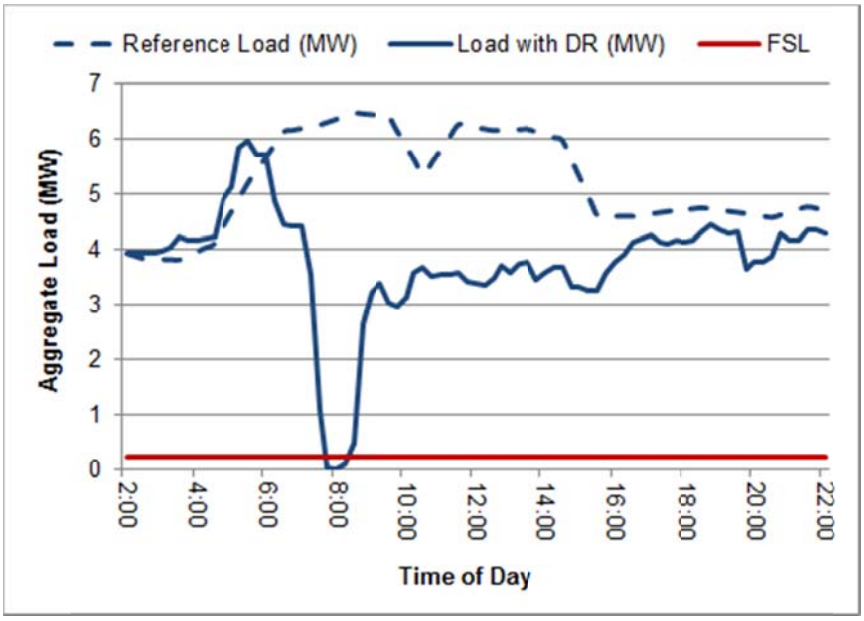
Local Capacity Area	Number of Customers	Reference Load (kW)	Load with DR (kW)	Load Reduction (kW)	Average FSL (kW)	Performance (%)
Greater Bay Area	64	648.3	239.1	409.2	132.2	79.3
Greater Fresno	16	322.4	171.5	150.9	66.8	59.0
Humboldt	7	466.1	18.7	447.4	25.7	101.6
Kern	21	627.8	130.0	497.8	125.0	99.0
Northern Coast	19	379.6	93.4	286.3	70.7	92.7
Other	78	1,808.5	173.2	1,635.3	279.1	106.9
Sierra	8	948.4	25.5	922.9	109.5	110.0
Stockton	9	217.1	90.4	126.7	47.8	74.8
All Customers	**222**	**995.1**	**167.6**	**827.5**	**165.5**	**99.7**

Table 5-4:
Aggregate Load Impact by Local Capacity Area for September 7, 2011 PG&E Event

Local Capacity Area	Number of Customers	Reference Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction	% of Aggregate Load Reduction
Greater Bay Area	64	41.5	15.3	26.2	63.1	14.3
Greater Fresno	16	5.2	2.7	2.4	46.8	1.3
Humboldt	7	3.3	0.1	3.1	96.0	1.7
Kern	21	13.2	2.7	10.5	79.3	5.7
Northern Coast	19	7.2	1.8	5.4	75.4	3.0
Other	78	141.1	13.5	127.6	90.4	69.4
Sierra	8	7.6	0.2	7.4	97.3	4.0
Stockton	9	2.0	0.8	1.1	58.3	0.6
All Customers	**222**	**220.9**	**37.2**	**183.7**	**83.2**	**100.0**

In addition to this system-wide test event, PG&E called an actual, localized event on March 11 for the nine participants in group 8 who are located in the Humboldt region. This was a short event lasting from 7:35 AM to 8:08 AM, as a result of the tsunami in that region. Figure 5-3 shows the aggregate reference load, load with DR and FSL for this event. Results in this figure are presented at the 15-minute interval level because the event lasted less than an hour. As shown in the figure, participants fully complied during the event. Aggregate participant load was below the FSL from 7:30 AM to 8:15 AM and the aggregate load impact during that time period was 6.3 MW. In the hourly ex post load impact tables provided as an electronic appendix, the aggregate load reduction is less than 6.3 MW for 7 AM or 8 AM because the event only occurred during a portion of the hour.

Figure 5-3:
Aggregate Reference Load, Load with DR and FSL (MW)
for PG&E's Group 8 BIP Event (March 11, 2011)



6 SDG&E Ex Post Load Impact Estimates

SDG&E called a BIP event on August 18, 2011 that lasted from 12 PM to 4 PM for BIP option A customers and 3 PM to 6 PM for the single BIP option B customer. Option A customers received 30-minute notice of the event and Option B customers received 3 hours. In total, 21 customers participated in the event.

Figures 6-1 and 6-2 show the average load impact per customer and aggregate impacts in each hour on August 18. The event period common to all participants (3 PM to 4 PM) is highlighted in the figures. As seen in Figure 6-1, the average load drop per customer from 3 PM to 4 PM was 114.1 kW. Figure 6-2 shows that the aggregate load drop from 3 PM to 4 PM was 2.4 MW. This represents roughly a 35% reduction relative to the reference load of 6.9 MW. The 3 PM to 4 PM aggregate load of 4.5 MW was substantially higher than the aggregate FSL of 0.6 MW. BIP customers under performed during this event, providing only 38% of the 6.3 MW reduction that participants needed in order to be in compliance.

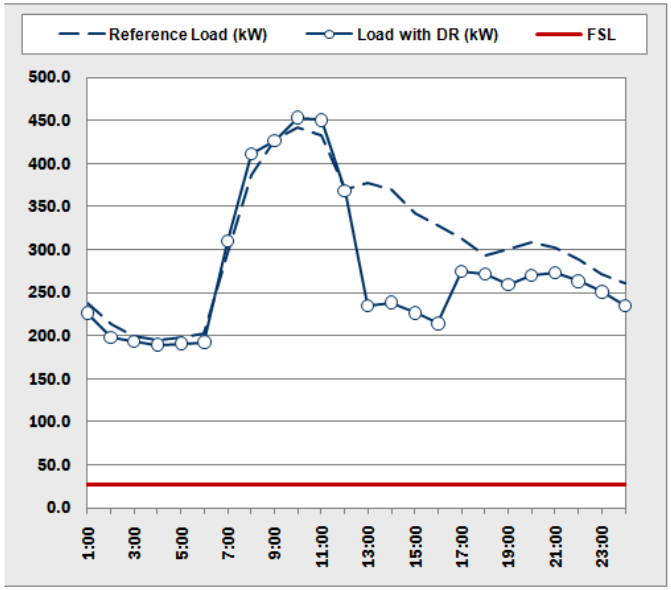
Figure 6-1:
Average Ex Post Load Impact (kW) per Participant for SDG&E BIP Event (August 18, 2011)

TABLE 1: Menu options

Type of Results	Average Enrolled Account
Event	Thursday, August 18, 2011
Customer Characteristic	All Customers

TABLE 2: Output

Number of Accounts	21
Average FSL (kW)	26.8



Note: 3 to 4 PM is the event window that is common to all customers in this category.

Hour Ending	Reference Load (kW)	Load with DR (kW)	Load Impact (kW)	Weighted Temp (F)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
1:00	237.9	226.0	11.9	63.1	-18.1	-0.4	11.9	24.1	41.8
2:00	212.8	198.2	14.6	62.7	-15.4	2.3	14.6	26.8	44.5
3:00	199.4	193.1	6.2	63.1	-23.7	-6.0	6.2	18.5	36.1
4:00	194.8	189.4	5.5	62.5	-24.4	-6.8	5.5	17.7	35.4
5:00	197.9	190.9	7.0	62.9	-22.9	-5.2	7.0	19.2	36.9
6:00	202.2	192.3	9.9	62.9	-19.9	-2.3	9.9	22.2	39.8
7:00	296.0	309.4	-13.4	63.9	-43.5	-25.7	-13.4	-1.0	16.8
8:00	386.7	411.0	-24.3	65.4	-55.2	-37.0	-24.3	-11.7	6.6
9:00	428.5	426.8	1.7	67.5	-29.2	-10.9	1.7	14.4	32.6
10:00	442.1	453.1	-11.0	71.3	-41.9	-23.6	-11.0	1.7	20.0
11:00	432.6	450.3	-17.7	74.0	-48.5	-30.3	-17.7	-5.1	13.1
12:00	370.3	368.2	2.2	74.4	-28.7	-10.5	2.2	14.8	33.0
13:00	376.6	234.9	141.7	75.0	110.9	129.1	141.7	154.3	172.5
14:00	370.0	238.4	131.6	74.7	100.7	119.0	131.6	144.3	162.5
15:00	342.3	226.3	115.9	74.7	85.5	103.5	115.9	128.4	146.4
16:00	328.1	214.0	114.1	72.9	83.5	101.6	114.1	126.6	144.6
17:00	313.0	274.8	38.2	70.0	7.9	25.8	38.2	50.6	68.4
18:00	292.4	271.1	21.2	68.0	-8.9	8.9	21.2	33.6	51.4
19:00	299.9	259.3	40.6	65.9	10.1	28.1	40.5	53.0	71.0
20:00	307.6	269.5	38.1	64.5	7.5	25.6	38.1	50.7	68.8
21:00	302.6	273.0	29.7	64.1	-0.7	17.3	29.7	42.1	60.1
22:00	288.0	263.2	24.8	63.3	-5.5	12.4	24.8	37.1	55.0
23:00	271.4	250.9	20.4	63.3	-9.5	8.2	20.4	32.7	50.4
0:00	261.3	234.4	26.9	64.2	-3.1	14.6	26.9	39.2	56.9

	Reference Energy Use (kWh)	Energy Use with DR (kWh)	Change in Energy Use (kWh)	Cooling Degree Hours (Base 70)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
Daily	7,354.4	6,618.6	735.8	27.0	587.0	674.9	735.8	796.6	884.5

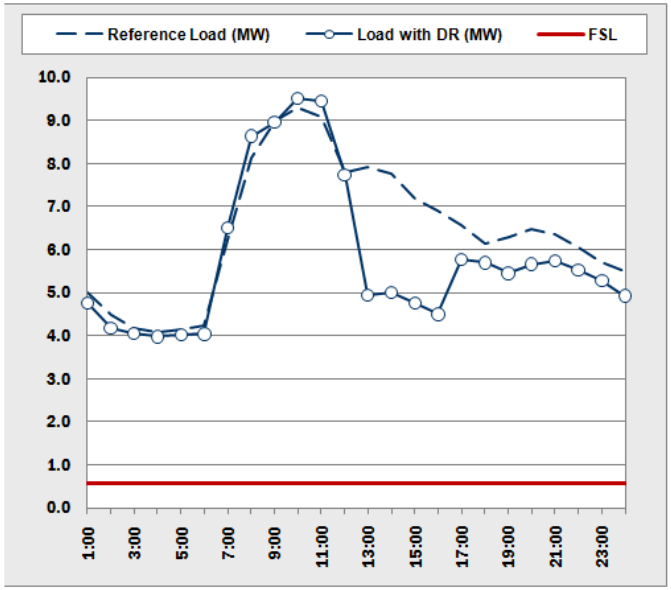
Figure 6-2:
Aggregate Load Impact (MW) for SDG&E BIP Event (August 18, 2011)

TABLE 1: Menu options

Type of Results	Aggregate
Event	Thursday, August 18, 2011
Customer Characteristic	All Customers

TABLE 2: Output

Number of Accounts	21
Aggregate FSL (MW)	0.6



Note: 3 to 4 PM is the event window that is common to all customers in this category.

Hour Ending	Reference Load (MW)	Load with DR (MW)	Load Impact (MW)	Weighted Temp (F)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
1:00	5.0	4.7	0.2	63.1	-0.4	0.0	0.2	0.5	0.9
2:00	4.5	4.2	0.3	62.7	-0.3	0.0	0.3	0.6	0.9
3:00	4.2	4.1	0.1	63.1	-0.5	-0.1	0.1	0.4	0.8
4:00	4.1	4.0	0.1	62.5	-0.5	-0.1	0.1	0.4	0.7
5:00	4.2	4.0	0.1	62.9	-0.5	-0.1	0.1	0.4	0.8
6:00	4.2	4.0	0.2	62.9	-0.4	0.0	0.2	0.5	0.8
7:00	6.2	6.5	-0.3	63.9	-0.9	-0.5	-0.3	0.0	0.4
8:00	8.1	8.6	-0.5	65.4	-1.2	-0.8	-0.5	-0.2	0.1
9:00	9.0	9.0	0.0	67.5	-0.6	-0.2	0.0	0.3	0.7
10:00	9.3	9.5	-0.2	71.3	-0.9	-0.5	-0.2	0.0	0.4
11:00	9.1	9.5	-0.4	74.0	-1.0	-0.6	-0.4	-0.1	0.3
12:00	7.8	7.7	0.0	74.4	-0.6	-0.2	0.0	0.3	0.7
13:00	7.9	4.9	3.0	75.0	2.3	2.7	3.0	3.2	3.6
14:00	7.8	5.0	2.8	74.7	2.1	2.5	2.8	3.0	3.4
15:00	7.2	4.8	2.4	74.7	1.8	2.2	2.4	2.7	3.1
16:00	6.9	4.5	2.4	72.9	1.8	2.1	2.4	2.7	3.0
17:00	6.6	5.8	0.8	70.0	0.2	0.5	0.8	1.1	1.4
18:00	6.1	5.7	0.4	68.0	-0.2	0.2	0.4	0.7	1.1
19:00	6.3	5.4	0.9	65.9	0.2	0.6	0.9	1.1	1.5
20:00	6.5	5.7	0.8	64.5	0.2	0.5	0.8	1.1	1.4
21:00	6.4	5.7	0.6	64.1	0.0	0.4	0.6	0.9	1.3
22:00	6.0	5.5	0.5	63.3	-0.1	0.3	0.5	0.8	1.2
23:00	5.7	5.3	0.4	63.3	-0.2	0.2	0.4	0.7	1.1
0:00	5.5	4.9	0.6	64.2	-0.1	0.3	0.6	0.8	1.2

	Reference Energy Use (MWh)	Energy Use with DR (MWh)	Change in Energy Use (MWh)	Cooling Degree Hours (Base 70)	Uncertainty Adjusted Impact - Percentiles				
					10th	30th	50th	70th	90th
Daily	154.4	139.0	15.5	27.0	12.3	14.2	15.5	16.7	18.6

Table 6-1 shows the average load impact per customer for program option A, for all customers and for the three industry categories with more than three event participants.[9] Table 6-2 shows the aggregate impacts. For each customer category, ex post results are reported for the event window that is common to all customers in that category. Manufacturing customers under performed, providing only 9.9% of the expected load reduction. It does not seem like the five retail stores responded to the event because the event impact is slightly negative and their aggregate load on that day does not show any change in the usual load shape pattern. Customers in the offices, hotels, finance & services segment had the highest performance of the categories listed below (59%). From 12 PM to 4 PM, program option A provided an average load reduction of 130 kW per participant, 39% performance and an aggregate load impact of 2.6 MW.

Table 6-1:
Average Customer Load Impact for August 18, 2011 SDG&E Event

Customer Category	Common Event Window	Number of Customers	Ref. Load (kW)	Load with DR (kW)	Load Reduction (kW)	Average FSL (kW)	Performance (%)
Manufacturing	3 to 4 PM	7	354.0	320.0	34.0	10.1	9.9
Retail Stores	12 to 4 PM	5	154.6	156.5	-1.9	11.2	-1.3
Offices, Hotels, Finance & Services	12 to 4 PM	6	445.1	183.7	261.4	1.8	59.0
Program Option A	12 to 4 PM	20	358.7	228.7	130.0	25.7	39.0
All Customers	3 to 4 PM	21	328.1	214.0	114.1	26.8	37.9

Table 6-2:
Aggregate Load Impact for August 18, 2011 SDG&E Event

Customer Category	Common Event Window	Number of Customers	Ref. Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction	FSL (MW)	Performance (%)
Manufacturing	3 to 4 PM	7	2.48	2.24	0.24	9.6	0.07	9.9
Retail Stores	12 to 4 PM	5	0.77	0.78	-0.01	-1.2	0.06	-1.3
Offices, Hotels, Finance & Services	12 to 4 PM	6	2.67	1.10	1.57	58.7	0.01	59.0
Program Option A	12 to 4 PM	20	7.17	4.57	2.60	36.2	0.51	39.0
All Customers	3 to 4 PM	21	6.89	4.49	2.40	34.8	0.56	37.9

6.1 Multiple Program Participation

There are six SDG&E customers that are dually enrolled in BIP and Critical Peak Pricing (CPP), which is the only other DR program in which SDG&E BIP customers can participate. Table 6-3 provides the 2010 and 2011 CPP and BIP event load impacts per customer for these dually enrolled participants. Table 6-4 provides the aggregate load impacts. Dually enrolled customers participated in four CPP events in 2010,

[9] Results for program option B, wholesale, transport & other utilities and agriculture, mining & construction are omitted because these customer categories had three or fewer event participants.

two CPP events in 2011 and one BIP event in 2011.[10] The average and aggregate reference loads and load reductions decrease from 2010 to 2011 because one large dually enrolled customer dropped out of BIP in 2010 and was replaced by a smaller customer in 2011. Although the customer mix changed from year to year, dually enrolled customers consistently provided a large percent load reduction for all CPP event days and the 2011 BIP event day. In the two CPP events in 2011, dually enrolled customers provided 69.9% and 58.6% load reductions. These percent load reductions are substantially higher than the 6.3% and 5.2% load reductions for the average CPP customer overall.

The 2011 BIP percent load impact is similar to the CPP percent impact for dually enrolled customers. For the 2011 BIP event day, dually enrolled customers provided a 61.5% load impact, which is in between the 58.6% and 69.0% percent load impacts for the two CPP event days. This result suggests that these dually enrolled SDG&E CPP/BIP customers are unlikely to provide an incremental load impact if both programs were called on the same day.[11] Portfolio forecasting methods assume all events are called on the same day and are required for many resource planning proceedings. Without an incremental benefit when both events are called on the same day, there will be no increase in the portfolio forecast due to dual participation. Nonetheless, this finding does not imply that dual enrollment has no benefits. If these dually enrolled customers were forced to choose between BIP and CPP, they might choose BIP because it has large incentives and BIP events are called less frequently (albeit with a much shorter notification lead time). Considering that these customers provide substantially higher percent load reductions on CPP event days than the average participant, this would lower the amount of load reduction available for the more frequent CPP events.

Table 6-3:
Average Customer Load Impact for Dually Enrolled CPP/BIP Participants for CPP and BIP Events in 2010 and 2011

Event Date and Type	Event Window	Number of Customers	Average FSL (kW)	Ref. Load (kW)	Load with DR (kW)	Load Reduction (kW)	% Load Reduction
August 25, 2010 CPP Event	11 AM to 6 PM	6	2.3	806.6	147.6	659.0	81.7
August 26, 2010 CPP Event	11 AM to 6 PM	6	2.3	801.9	140.5	661.4	82.5
September 27, 2010 CPP Event	11 AM to 6 PM	6	2.3	836.4	185.8	650.6	77.8
September 28, 2010 CPP Event	11 AM to 6 PM	6	2.3	821.1	168.0	653.1	79.5
August 18, 2011 BIP Event	12 to 4 PM	6	10.7	435.0	167.3	267.7	61.5
August 27, 2011 CPP Event	11 AM to 6 PM	6	10.7	378.9	114.1	264.8	69.9
September 7, 2011 CPP Event	11 AM to 6 PM	6	10.7	442.0	183.1	258.9	58.6

[10] On September 27, 2010, SDG&E called events for both BIP and CPP. Dually enrolled CPP/BIP participants were instructed to only respond to the CPP event and did not participate in the BIP event. Considering that September 27 was the only BIP event day in 2010, dually enrolled CPP/BIP participants did not participate in a BIP event in 2010.

[11] This comparison is approximate because these event days had different weather patterns and CPP and BIP have different event hours.

Table 6-4:
Aggregate Load Impact for Dually Enrolled CPP/BIP Participants for CPP and BIP Events in 2010 and 2011

Event Date and Type	Event Window	Number of Customers	FSL (MW)	Ref. Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction
August 25, 2010 CPP Event	11 AM to 6 PM	6	0.01	4.84	0.89	3.95	81.7
August 26, 2010 CPP Event	11 AM to 6 PM	6	0.01	4.81	0.84	3.97	82.5
September 27, 2010 CPP Event	11 AM to 6 PM	6	0.01	5.02	1.11	3.90	77.8
September 28, 2010 CPP Event	11 AM to 6 PM	6	0.01	4.93	1.01	3.92	79.5
August 18, 2011 BIP Event	12 to 4 PM	6	0.06	2.61	1.00	1.61	61.5
August 27, 2011 CPP Event	11 AM to 6 PM	6	0.06	2.27	0.68	1.59	69.9
September 7, 2011 CPP Event	11 AM to 6 PM	6	0.06	2.65	1.10	1.55	58.6

Dually enrolled CPP/BIP participants also provide substantially higher percent load reductions than the average BIP customer. Table 6-5 provides the 2010 and 2011 BIP event load impacts per customer for BIP-only participants. Table 6-6 provides the aggregate load impacts. BIP customers that are not dually enrolled in CPP provided an 18.7% load reduction for the 2011 BIP event, which is less than one-third of the percent load impact provided by CPP/BIP participants. Without dually enrolled participants, the aggregate impact for the 2011 BIP event would have been 0.8 MW. CPP/BIP customers accounted for 6 out of 21 participants in the 2011 BIP event, but 67% of the aggregate load impact. In short, dually enrolled CPP/BIP participants provide relatively large percent load impacts that are valuable to both programs.

Table 6-5:
Average Customer Load Impact for BIP-only Participants for BIP Events in 2010 and 2011

Event Date and Type	Common Event Window	Number of Customers	Average FSL (kW)	Ref. Load (kW)	Load with DR (kW)	Load Reduction (kW)	% Load Reduction
September 27, 2010 BIP Event	3 to 6 PM	13	6.5	192.5	160.2	32.2	16.7
August 18, 2011 BIP Event	3 to 4 PM	15	33.3	285.2	231.9	53.3	18.7

Table 6-6:
Aggregate Load Impact for BIP-only Participants for BIP Events in 2010 and 2011

Event Date and Type	Common Event Window	Number of Customers	FSL (MW)	Ref. Load (MW)	Load with DR (MW)	Load Reduction (MW)	% Load Reduction
September 27, 2010 BIP Event	3 to 6 PM	13	0.08	2.50	2.08	0.42	16.7
August 18, 2011 BIP Event	3 to 4 PM	15	0.50	4.28	3.48	0.80	18.7

Appendix A. Table of Hourly Values for Figure 3-1

In Figure 3-1, the magnitude of the difference between predicted and actual kW is unclear because the two lines for each utility are close together on the graph. Table A-1 provides the underlying hourly predicted and actual kW values that are reflected in Figure 3-1.

Table A-1:
Hourly Predicted and Actual kW Values Reflected in Figure 3-1

Hour	SCE				PG&E				SDG&E			
	Actual kW	Predicted kW	Error	% Error	Actual kW	Predicted kW	Error	% Error	Actual kW	Predicted kW	Error	% Error
1	1,002.6	1,047.9	45.3	4.52%	1,026.9	1,040.2	13.3	1.30%	228.5	227.8	-0.7	-0.29%
2	1,004.5	1,038.7	34.2	3.41%	1,007.9	1,018.4	10.4	1.03%	208.4	206.3	-2.1	-1.00%
3	985.2	1,023.8	38.6	3.92%	992.2	1,003.7	11.5	1.16%	198.7	194.9	-3.7	-1.88%
4	994.5	1,028.7	34.1	3.43%	973.0	996.2	23.2	2.38%	197.2	192.7	-4.6	-2.31%
5	1,037.7	1,067.7	30.0	2.89%	990.7	1,014.6	23.8	2.41%	204.0	198.0	-6.0	-2.92%
6	1,085.8	1,107.3	21.5	1.98%	1,039.9	1,054.0	14.1	1.36%	214.9	206.5	-8.4	-3.93%
7	1,128.7	1,145.2	16.5	1.46%	1,116.4	1,122.7	6.2	0.56%	307.9	293.8	-14.1	-4.57%
8	1,141.8	1,156.6	14.8	1.29%	1,141.1	1,152.9	11.8	1.04%	408.0	386.3	-21.8	-5.34%
9	1,157.2	1,152.7	-4.5	-0.39%	1,128.3	1,150.2	21.9	1.94%	453.2	435.7	-17.4	-3.85%
10	1,169.0	1,163.4	-5.7	-0.49%	1,139.6	1,154.1	14.6	1.28%	466.1	452.1	-14.1	-3.02%
11	1,177.5	1,176.5	-1.0	-0.08%	1,129.5	1,137.7	8.2	0.73%	457.9	446.9	-11.0	-2.40%
12	1,176.2	1,170.8	-5.5	-0.47%	1,110.2	1,116.2	6.1	0.55%	399.5	402.4	2.9	0.73%
13	1,162.4	1,154.5	-7.9	-0.68%	1,053.2	1,066.9	13.7	1.30%	401.4	403.6	2.2	0.55%
14	1,150.7	1,142.6	-8.1	-0.70%	1,036.0	1,053.2	17.2	1.66%	382.5	392.0	9.5	2.47%
15	1,121.0	1,121.7	0.7	0.07%	1,018.0	1,030.3	12.3	1.21%	357.3	361.7	4.5	1.25%
16	1,098.1	1,102.6	4.6	0.42%	968.7	986.8	18.1	1.87%	341.8	349.9	8.1	2.38%
17	1,081.0	1,086.9	5.9	0.55%	971.6	984.5	12.9	1.33%	318.8	327.5	8.7	2.73%
18	1,063.2	1,066.6	3.4	0.32%	966.4	974.0	7.6	0.79%	295.1	301.4	6.3	2.13%
19	1,064.7	1,072.0	7.2	0.68%	1,015.5	1,025.4	9.9	0.98%	304.7	307.8	3.1	1.03%
20	1,081.0	1,081.1	0.1	0.01%	1,049.4	1,061.9	12.5	1.19%	326.1	321.6	-4.5	-1.37%
21	1,088.8	1,088.9	0.1	0.01%	1,048.5	1,056.7	8.2	0.78%	317.6	310.6	-7.0	-2.21%
22	1,073.1	1,072.0	-1.1	-0.10%	1,066.8	1,067.4	0.6	0.06%	290.4	287.7	-2.7	-0.93%
23	1,081.6	1,089.7	8.1	0.75%	1,068.9	1,068.6	-0.3	-0.03%	279.1	272.0	-7.1	-2.53%
24	1,094.0	1,101.7	7.7	0.70%	1,049.5	1,059.5	10.0	0.96%	269.4	259.3	-10.1	-3.74%
Avg. (1-6 PM)	**1,102.8**	**1,104.1**	**1.3**	**0.12%**	**992.2**	**1,005.8**	**13.6**	**1.37%**	**339.1**	**346.5**	**7.4**	**2.19%**