2024 LOAD IMPACT EVALUATION OF THE CALIFORNIA STATEWIDE BASE INTERRUPTIBLE PROGRAM

CALMAC STUDY ID: SCE0489

**Confidential information is redacted and denoted with black highlighting:* [redacted]

Submitted to:
Southern California Edison
Pacific Gas & Electric

Prepared by:
Verdant Associates, LLC

April 1, 2025

VERDANT

VERDANT

ABSTRACT

This report contains the Program Year (PY) 2024 load impact evaluation results for the Base Interruptible Program (BIP) offered by Pacific Gas and Electric (PG&E) and Southern California Edison (SCE). The BIP is an emergency demand response (DR) program that offers customers a monthly capacity incentive in exchange for their commitment to reduce their energy consumption to an amount that meets each customer's minimum operational requirements, also known as a Firm Service Level (FSL).

This report contains the ex-post load impact estimates for program year 2024 (PY2024) as well as the forecasted ex-ante load impacts for PY2025 through PY2035, which are based on customer performance in PY2024 and the program enrollment forecasts provided by each investor-owned utility (IOU). Load impacts were estimated using an hourly customer-specific regression approach in a manner consistent with the Load Impact Protocols (LIP) adopted by the CPUC in Decision (D.) 08-04-050.

In PY2024, both PG&E and SCE dispatched three events. PG&E dispatched one winter transmission emergency event on February 4th (from 6:00PM – 10:23PM), one summer test event on September 24th (from 4:00PM – 6:00PM), and one summer re-test event on October 21st (from 4:00PM – 6:00PM). All three of SCE's events were summer events, including two transmission emergencies on back-to-back business days (September 6th from 5:09PM – 8:00PM and September 9th from 3:30PM – 8:10PM) and one test event on September 24th (from 3:20PM – 6:00PM).

PG&E dispatched an average of 97 that customers who provided an average of 52.0 MWh/h of load reduction in each BIP PY2024 summer event hour. The largest PG&E load reduction occurred during the September 24th test event, where 163 dispatched customers provided an average of 99.1 MWh/h of load reduction during event hours, equating to 100% of their average FSL commitment. Ex-ante program-level load impacts for a four-hour event on a PG&E-specific August 1-in-2 Monthly System Worst Day are forecasted to grow from 132.4 MW/h in PY2025 to 195.4 MWh/h in PY2035 as program participation is expected to increase in future program years.

For SCE, because there was no full event hour shared by all three events, average event hour impacts are not representative of ex-post event performance. SCE's largest PY2024 load reduction occurred during the September 24th test event, where 314 dispatched customers provided an average of 396.4 MWh/h of load reduction during the event hours, equating to 102% of their average FSL commitment. At the request of SCE, Verdant produced ex-ante impacts for two dispatch scenarios which included a four-hour and a six-hour dispatch. SCE's ex ante program-level load impacts for a six-hour dispatch on an SCE-specific August 1-in-2 Monthly System Worst Day are forecasted to be 419.3 MWh/h per event hour through the forecast period because SCE anticipates constant program participation through PY2035.

VERDANT

TABLE OF CONTENTS

VERDANT

LIST OF FIGURES

LIST OF TABLES

VERDANT

1 EXECUTIVE SUMMARY

This report presents the statewide load impact evaluation results for the Baseline Interruptible Program (BIP) for the 2024 program year (PY2024). This report covers the statewide BIP offered by Pacific Gas and Electric (PG&E) and Southern California Edison (SCE).[1]

The objective of this evaluation is to assess the PY2024 BIP in a manner that conforms to the Load Impact Protocols (LIP) adopted by the CPUC in Decision (D.) 08-04-050. At a high level, there are two main objectives related to the BIP load impact evaluation. These include:

- **Ex-post Analysis:** The goal of the ex-post analysis is to estimate load impacts for PY2024 BIP events and for an average event day in a manner that conforms to the LIP.
- **Ex-ante Analysis**: The goal of the ex-ante analysis is to forecast BIP aggregate MWh/h and per capita kWh/h load reductions for PY2025 through PY2035 under 1-in-2 and 1-in-10 weather scenarios in a manner that conforms to the LIP.

1.1 PROGRAM OVERVIEW

The BIP is an emergency demand response (DR) program that offers customers a monthly capacity incentive in exchange for their commitment to reduce their energy consumption to an amount that meets each customer's minimum operational requirements, also known as a Firm Service Level (FSL).

Each IOU's BIP is a tariff-based, emergency-triggered DR program that they can dispatch in response to California Independent System Operator (CAISO) Energy Emergency Alerts and emergencies local to their individual transmission or distribution systems. The BIP is a Day-Of notification program and participants enroll in a 15-minute or 30-minute notification option. Customers enrolled in the BIP receive incentive payments in exchange for committing to reduce their electrical usage to a contractually established FSL. Participants who fail to reduce load down to or below their FSL are subject to an excess energy charge assessed on a kilowatt hour (kWh) basis.

BIP Enrollment

A total of 198 PG&E customers and 337 SCE customers were enrolled in the BIP for at least part of PY2024. This is a slight decrease from PY2023 participation levels, which were 249 and 351 customers for PG&E and SCE, respectively. Table 1-1 shows customer enrollment by industry type for each utility.

[1] SDG&E does not have a BIP program covered by this evaluation.

TABLE 1-1: BIP ENROLLMENT BY INDUSTRY TYPE

PG&E BIP Participants		SCE BIP Participants	
Industry Group	**Count of Customers**	**Industry Group**	**Count of Customers**
Agriculture, Mining and Construction	72	Agriculture, Mining and Construction	29
Institutional/Government	0	Institutional/Government	1
Manufacturing	66	Manufacturing	215
Office, Hotels, Finance, Services	4	Office, Hotels, Finance, Services	6
Retail Stores	1	Retail Stores	1
Schools	0	Schools	1
Wholesale, Transport and other Utilities	52	Wholesale, Transport and other Utilities	62
Other/Unknown	3	Other/Unknown	22
Total	**198**	**Total**	**337**

BIP Events

In PY2024, both PG&E and SCE had three events days. PG&E had one winter transmission emergency event (consisting of two different dispatch start times), one summer test event, and one summer re-test event. All three SCE events were summer events, including two transmission emergencies on back-to-back business days and one test event. Table 1-2 shows the event information for PY2024.

TABLE 1-2: PY2024 BIP EVENT DAYS

IOU	Event Date	Program Options Deployed	Event Start and End Times	Event Duration (Hours)	Event Type	Customers Dispatched
PG&E	February 4th	BIP30	6:00PM-10:23PM	4.4	Transmission Emergency	12
	February 4th	BIP15, BIP30	6:15PM-10:23PM	4.1	Transmission Emergency	23
	September 24th	BIP15, BIP30	4:00PM-6:00PM	2	Test Event	163
	October 21st	BIP30	4:00PM-6:00PM	2	Re-test Event	31
SCE	September 6th	BIP30	5:09PM-8:00PM	2.9	Transmission Emergency	21
	September 9th	BIP30	3:30PM-8:10PM	4.7	Transmission Emergency	21
	September 24th	BIP15, BIP30	3:20PM-6:00PM	2.7	Test Event	314

1.2 EX-POST METHODOLOGY

Verdant utilized an hourly customer specific regression-based approach for the ex-post analysis. The ex-post regression models are hourly models, where each hour of the day is modeled separately from other hours of the day. Non-residential customers typically have heterogenous loads, making it difficult to broadly apply a given regression model specification across all customers and thus necessitating site-specific models. Additionally, customer-specific regressions facilitate various aggregations of results required for reporting (i.e., industry type, customer size, etc.). The ex-post analysis followed four generalized steps which include: participant analysis, proxy day selection, model selection, and impact estimation. All ex-post models included variables to control for the day of the week, the month of the

year, event days, and dual DR program enrollment (as applicable). Additional variables such as day-of load adjustments or weather variables were included as appropriate, depending on participant characteristics including weather sensitivity.

1.3 EX-ANTE METHODOLOGY

Verdant produced ex-ante load impacts for 11 years following PY2024 (PY2025-PY2035). For each IOU, the ex-ante impacts included the hourly ex-ante load impacts by, at minimum, Size Group, LCA, and SubLAP at the aggregate and per customer basis. Reference loads were produced for each typical event day and monthly IOU and CAISO System Worst Day under 1-in-2 and 1-in-10 weather conditions. Verdant produced ex-ante impacts for event hour windows based on each IOU's request. For PG&E, impacts were estimated for events comprising the first four hours of the RA period in each month. For SCE, impacts were estimated for both a four-hour (HE18 – HE21) and six-hour (HE17 – HE22) dispatch. Verdant's approach to the estimation of ex-ante load impacts was informed by the ex-post performance, future FSL commitments, and PY2024 FSL achievement rates.

1.4 EX-POST RESULTS

This section presents the ex-post load impacts and FSL achievement rates for the average full event hour for each event day. An FSL achievement rate of 0% indicates participants average event day load did not differ from their baseline load, an FSL achievement rate of 100% indicates that on average participants event day load was reduced to their FSL, and an FSL achievement rate exceeding 100% indicates that participants average event load reductions dropped below their FSL. For purposes of this summary of results, a full event hour is defined as an event hour where BIP participants were called to curtail their load for all 60 minutes of that hour.

1.4.1 PG&E Ex-Post Results

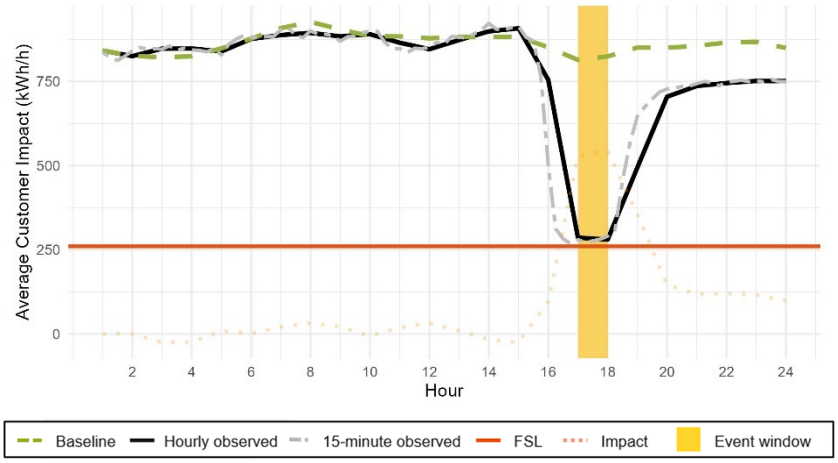
Table 1-3 presents the PG&E ex-post results for PY2024. As seen, the February 4th winter emergency event provided, on average, [redacted] MWh/h of load reduction resulting in a [redacted]% FSL achievement rate and a [redacted]% reduction in load. The September 24th test event provided 99.1 MWh/h of load reduction with an FSL achievement rate of 100%. For the BIP participants that were retested on October 21st, the FSL achievement rate was [redacted]%, providing an average load reduction of [redacted] MWh/h.

TABLE 1-3: PG&E BIP AVERAGE FULL EVENT HOUR LOAD IMPACTS BY EVENT

Event Date (2024)	Num. of Participants Dispatched	Aggregate (MWH/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)[2]
		Reference Load	Load Impact	Reference Load	Load Impact			
February 4th	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
September 24th	163	144.7	99.1	887.6	607.7	68%	45.6	100%
October 21st	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

The impacts for the average PG&E BIP event were developed by averaging load shapes for each customer across all summer events in which they were dispatched. Because BIP events are not typically called in winter months, the winter event was not included in the average event. In PY2024, summer events dispatched an average of 97 customers for two hours (HE17 and HE18). Figure 1-1 presents the per capita average event day load shape for PG&E.

FIGURE 1-1: PG&E BIP AVERAGE PER CAPITA EVENT DAY LOAD SHAPE



1.4.2 SCE Ex-Post Results

Table 1-4 presents the SCE ex-post results for PY2024. As seen, the September 6th emergency event provided, on average, [redacted] MWh/h of load reduction resulting in a [redacted] FSL achievement rate and a [redacted] reduction in load. The September 9th emergency event provided [redacted] MWh/h of load reduction with an FSL achievement rate of [redacted] and load reduction of [redacted]. It should be noted that the September 6th and September 9th event days dispatched the same group of participants for localized emergencies. On September 24th, the remaining BIP participants, that did not participate in the emergency events, were

[2] A value of 100% indicates customers reducing their load to their FSL on average.

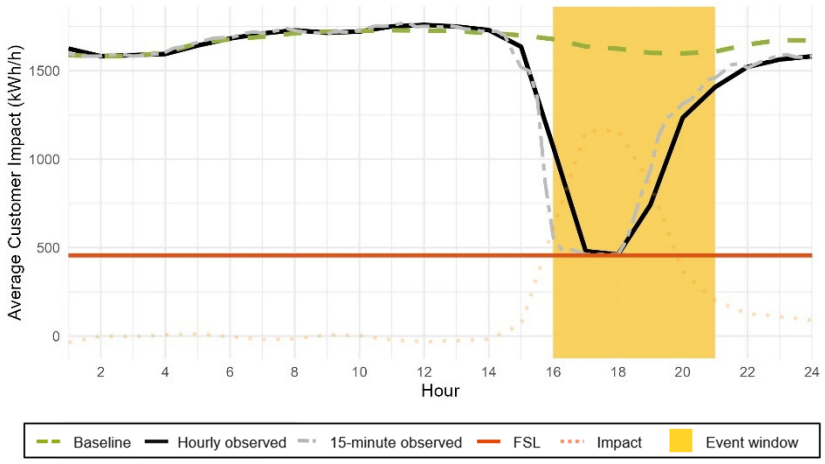
dispatched for a test event. The September 24th event provided, on average, 396.4 MWh/h of load reduction, resulting in a 102% FSL achievement rate and a 74% reduction in load.

TABLE 1-4: SCE BIP AVERAGE FULL EVENT HOUR LOAD IMPACTS BY EVENT

Event Date (2024)	Num. of Participants Dispatched	Aggregate (MWH/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)[3]
		Reference Load	Load Impact	Reference Load	Load Impact			
September 6th	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
September 9th	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
September 24th	314	535.5	396.4	1,705.4	1,262.5	74%	146.4	102%

The impacts for the average SCE BIP event were developed by averaging load shapes for each customer across all events in which they were dispatched. In PY2024, events included an average of 119 customers. Event hours and duration varied widely across the three events in PY2024 such that no hour was a full event hour in all three events. However, HE18 is nearly a full event hour for all events. Figure 1-2 presents the per capita average event day load shape.

FIGURE 1-2: SCE BIP AVERAGE PER CAPITA EVENT DAY LOAD SHAPE[4]



1.5 EX-ANTE RESULTS

The following section presents the major results of the ex-ante analysis for each utility at the program level. Because BIP impacts are counted first, portfolio-level impacts are identical to program-level impacts,

3 A value of 100% indicates customers reducing their load to their FSL on average.

4 Note that the event window is shaded if the hour was a partial or full event hour in any of the three PY2024 SCE BIP events.

with the exception that load impacts are capped at 100% FSL achievement rates for forecasted dual enrolled ELRP customers through the ELRP program sunset. Portfolio level impacts are presented in addition to program level impacts in the full report.

1.5.1 PG&E Ex-Ante Results

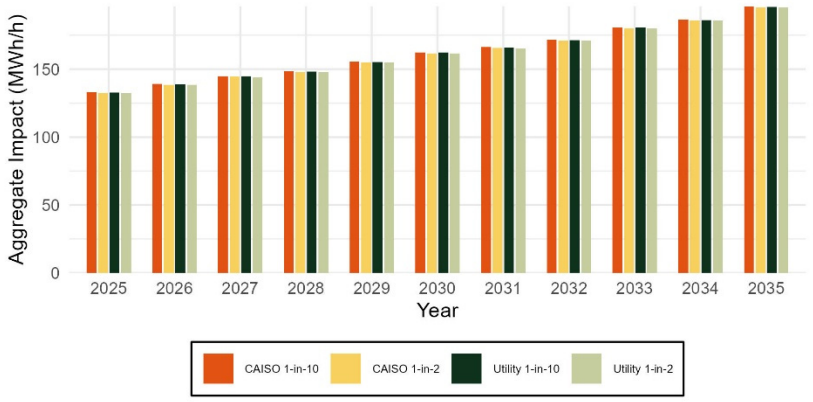
Table 1-5 presents the aggregate and per capita August System Worst Day average event hour ex-ante load impacts over the presumed four-hour dispatch in PY2025. Overall, PG&E BIP participants tend to have weather insensitive loads and impacts are driven by firm service level (FSL) commitments. As a result, there is little variation in estimated load impacts across weather scenarios. The ex-ante analysis found that the average program level ex-ante impacts for a four-hour dispatch in August 2025 ranged from 132.4 MWh/h to 133.1 MWh/h depending on the weather scenario.

TABLE 1-5: PG&E PROGRAM LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) FOR A 4-HOUR DISPATCH

Weather Source	Weather Year	Event Dispatch (HE)	Number of Participants	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh/h)	FSL Achievement Rate (%)
				Ref. Load	Load Impact	Ref. Load	Load Impact			
CAISO	1-in-10	17 - 20	173	187.2	133.1	1,082.1	769.2	71%	54.9	101%
CAISO	1-in-2	17 - 20	173	186.7	132.5	1,079.4	765.8	71%	54.9	101%
Utility	1-in-10	17 - 20	173	187.1	132.9	1,081.6	768.0	71%	54.9	101%
Utility	1-in-2	17 - 20	173	186.6	132.4	1,078.6	765.4	71%	54.9	101%

Figure 1-3 shows that impacts are forecasted to grow across years. This increase is due to PG&E's forecasted growth in participant numbers as a result of increased customer outreach efforts.

FIGURE 1-3: PG&E PROGRAM AUGUST SYSTEM WORST DAY YEARLY AVERAGE EVENT HOUR IMPACTS



1.5.2 SCE Ex-Ante Results

Table 1-6 presents the aggregate and per capita August System Worst Day average event hour load impacts over the presumed six-hour dispatch across all BIP options. Overall, BIP participants tend to have weather insensitive loads and impacts are typically driven by firm service level (FSL) commitments. As a result, there is little variation in the estimated load impacts across the various weather scenarios. The ex-ante analysis found that the average program-level ex-ante impacts for a six-hour dispatch in August of PY2025 across all BIP options ranged from 419.2 MWh/h to 419.6 MWh/h depending on the weather scenario. Because SCE forecasts the same number of customers from PY2025 through PY2035, these values represent the forecasted load impacts for all years in the ex-ante analysis.

TABLE 1-6: SCE PROGRAM-LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025-2035) FOR A 6-HOUR DISPATCH

BIP Option	Weather Source	Weather Year	Event Dispatch (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh/h)	FSL Achievement Rate (%)
					Ref. Load	Load Impact	Ref. Load	Load Impact			
All	CAISO	1-in-10	17 - 22	331	580.9	419.4	1,755.0	1,267.2	72%	140.4	95%
All	CAISO	1-in-2	17 - 22	331	580.5	419.2	1,753.9	1,266.6	72%	140.4	95%
All	Utility	1-in-10	17 - 22	331	581.0	419.6	1,755.2	1,267.5	72%	140.4	95%
All	Utility	1-in-2	17 - 22	331	580.7	419.3	1,754.3	1,266.7	72%	140.4	95%

VERDANT

2 INTRODUCTION

This report presents the statewide load impact evaluation for the Baseline Interruptible Program (BIP) for the 2024 program year (PY2024). This report covers the statewide Base Interruptible Program (BIP), which is offered by Pacific Gas and Electric (PG&E) and Southern California Edison (SCE)[5].

2.1 PROGRAM OVERVIEW

The BIP is an emergency demand response (DR) program that offers customers a monthly capacity incentive in exchange for their commitment to reduce their energy consumption to an amount that meets each customer's minimum operational requirements, also known as a Firm Service Level (FSL).

Each IOU's BIP is a tariff-based, emergency-triggered DR program that they can dispatch in response to California Independent System Operator (CAISO) Energy Emergency Alerts and emergencies local to their individual transmission or distribution systems. The BIP is a Day-Of notification program and participants enroll in a 15-minute or 30-minute notification option. Customers enrolled in BIP receive incentive payments in exchange for committing to reduce their electrical usage to a contractually established FSL. Participants who fail to reduce load down to or below their FSL are subject to an excess energy charge assessed on a kilowatt hour (kWh) basis.

2.2 EVALUATION OBJECTIVES

The objective of this evaluation is to assess the PY2024 BIP in a manner that conforms to the Load Impact Protocols (LIP) adopted by the CPUC in Decision (D.) 08-04-050. At a high level, there are two main objectives related to the BIP load impact evaluation. These include:

- **Ex-post Analysis:** The goal of the ex-post analysis is to estimate load impacts for PY2024 BIP events and for an average event day that conforms to the LIP.
- **Ex-ante Analysis**: The goal of the ex-ante analysis is to forecast BIP MW and kWh load reductions for 2025 through 2035 under 1-in-2 and 1-in-10 weather scenarios in a manner that conforms to the LIP.

2.3 PARTICIPANT CHARACTERISTICS

This section presents the participant characteristics for PG&E's and SCE's PY2024 BIP participants. For purposes of the participant characterization, only customers that participated in at least one BIP event

[5] SDG&E does not have a BIP program covered by this evaluation.

are represented. In total PG&E's BIP had 198 participants in the PY2024 program, while SCE had 337 participants as presented in Table 2-1.

PG&E's BIP customer base was largely comprised of Agriculture, Mining and Construction (72 participants), Manufacturing (66 participants), and Wholesale, Transport and other Utilities (52 participants), representing 36%, 33% and 26% of customers, respectively. SCE has a separate Agricultural & Pumping Interruptible (AP-I) program that operates similarly to BIP. As a result, there are fewer Agriculture, Mining and Construction participants in SCE's BIP relative to PG&E. SCE's PY2024 BIP was largely comprised of Manufacturing (215 participants), and Wholesale, Transport and other Utilities (62 participants), representing 64% and 18% of participants respectively.

Table 2-2 presents the North American Industry Classification System (NAICS) code descriptions for these customers

TABLE 2-1: BIP ENROLLMENT BY INDUSTRY TYPE

PG&E BIP Participants		SCE BIP Participants	
Industry Group	**Count of Customers**	**Industry Group**	**Count of Customers**
Agriculture, Mining and Construction	72	Agriculture, Mining and Construction	29
Institutional/Government	0	Institutional/Government	1
Manufacturing	66	Manufacturing	215
Office, Hotels, Finance, Services	4	Office, Hotels, Finance, Services	6
Retail Stores	1	Retail Stores	1
Schools	0	Schools	1
Wholesale, Transport and other Utilities	52	Wholesale, Transport and other Utilities	62
Other/Unknown	3	Other/Unknown	22
Total	**198**	**Total**	**337**

TABLE 2-2: INDUSTRY TYPE TO NAICS CODE MAPPING

Industry Type	NAICS Code (First Two Digits)
Agriculture, Mining and Construction	11, 21, 23
Institutional/Government	71, 92
Manufacturing	31 – 33
Office, Hotels, Finance, Services	51 – 56, 62, 72, 81
Retail Stores	44, 45
Schools	61
Wholesale, Transport and other Utilities	22, 42, 48, 49
Other/Unknown	Invalid or missing codes

Table 2-3 presents the count of participants and average August aggregate load (MWh/h) by SubLAP. Emergency events can be localized to a single SubLAP or block, so the geographic location of participants

and their aggregate loads is important for understanding where available resources are physically available.

TABLE 2-3: BIP PARTICIPATION BY SUBLAP

PG&E Participants				SCE Participants			
SubLAP	Count of Customers	Avg. August 2024 Aggregate Load (MWh/h)	Aggregate FSL (MW)	SubLAP	Count of Customers	Avg. August 2024 Aggregate Load (MWh/h)	Aggregate FSL (MW)
PGCC	3	[redacted]	[redacted]	SCEC	149	215.9	60.2
PGEB	14	[redacted]	[redacted]	SCEN	15	[redacted]	[redacted]
PGF1	76	18.7	6.3	SCEW	126	183.7	39.7
PGFG	2	[redacted]	[redacted]	SCHD	15	[redacted]	[redacted]
PGHB	1	[redacted]	[redacted]	SCLD	2	[redacted]	[redacted]
PGKN	12	[redacted]	[redacted]	SCNW	30	45.0	26.6
PGNC	7	[redacted]	[redacted]	**Total**	**337**	**606.3**	**159.0**
PGNP	23	38.1	7.8				
PGSB	7	[redacted]	[redacted]				
PGSF	1	[redacted]	[redacted]				
PGSI	11	[redacted]	[redacted]				
PGST	12	[redacted]	[redacted]				
PGZP	29	20.9	4.6				
Total	**198**	**199.8**	**55.5**				

2.4 EVENT DAYS

Both PG&E and SCE had three events in PY2024. PG&E had one winter event and two summer events, which comprised a winter localized emergency event, a test event and a re-test event. All three SCE events were in September, which included two emergency events and one test event. In all cases, the emergency events were localized emergencies, resulting in dispatches of localized participants. After each IOU's emergency events, the remaining participant population were dispatched for test events. For PG&E, 31 BIP30 participants were re-tested in October.

Table 2-4 and Table 2-5 present the PY2024 BIP event day details, including event dates, options dispatched, event times, event duration, event type, and the number of customers dispatched, for PG&E and SCE respectively.

VERDANT

TABLE 2-4: PG&E BIP EVENT DAYS

Event Date	Program Options Deployed	Event Start and End Times	Event Duration (Hours)	Event Type	Customers Dispatched
February 4th, 2024	BIP30	6:00PM-10:23PM	4.4	Transmission Emergency	12
February 4th, 2024	BIP15, BIP30	6:15PM-10:23PM	4.1	Transmission Emergency	23
September 24th, 2024	BIP15, BIP30	4:00PM-6:00PM	2	Test Event	163
October 21st, 2024	BIP30	4:00PM-6:00PM	2	Re-test Event	31

TABLE 2-5: SCE BIP EVENT DAYS

Event Date	Program Options Deployed	Event Start and End Times	Event Duration (Hours)	Event Type	Customers Dispatched
September 6th, 2024	BIP30	5:09-8:00PM	2.9	Transmission Emergency	21
September 9th, 2024	BIP30	3:30-8:10PM	4.7	Transmission Emergency	21
September 24th, 2024	BIP15, BIP30	3:20-6:00PM	2.7	Test Event	314

3 METHODOLOGY

This section describes the data sources and ex-post and ex-ante methodologies used in the PY2024 Load Impact Evaluation of BIP.

3.1 DATA SOURCES

Verdant worked with the IOUs to obtain the data necessary for conducting the ex-post and ex-ante load impact analyses for the BIP. Descriptions of the data sources are detailed below.

Customer information. These data consist of customer-level information for all PY2024 customers enrolled in the BIP. These data generally contain customer account and premise IDs alongside a variety of other attributes useful for the segmentation of impacts, including participant FSLs, customer size, nearest weather station, SubLAP, net-energy-metering (NEM) status, and North American Industry Classification System (NAICS) codes and/or descriptions.

AMI data. The service-point-level Advanced Metering Infrastructure (AMI) data for BIP customers. AMI data was requested for the period starting November 1st, 2023, through October 31st, 2024. In the ex-ante analysis, November and December load shapes are derived from November, 2023 and December, 2023 conditions. Given BIP events can occur with minimal notice, all AMI data was provided at 15-minute intervals.

Weather data. The study used hourly weather data for all weather stations represented in the customer information data. The dates of the hourly weather data match those of the AMI data (November 1st, 2023, through October 31st, 2024).

BIP, and other DR program data. The study required comprehensive data on customer enrollment in BIP and any other DR programs available to customers for dual enrollment. These data include BIP event dates and times, the duration of each BIP event, and event type information. Verdant also requested relevant information for the AutoDR program and other programs in which BIP participants can be dually enrolled.

Participant forecasts. The ex-ante forecasts rely on participation projections over the forecast horizon. Each IOU provided their participant forecasts for the BIP.

Weather scenarios. The ex-ante forecasts rely on data representative of the various weather scenarios in the each of the climate zones under different conditions (e.g., 1-in-2 and 1-in-10 weather years, typical event day, system peak, etc.). Separate versions of the weather scenario data were provided by both the utility and CAISO, though they are typically very similar.

Data Validation

Upon data receipt, Verdant cataloged and validated the completeness of all datasets. Missing or erroneous data points were reported back to each IOU via a data completeness summary. Verdant flagged gaps in the participant-level AMI data to identify and submit additional requests for these missing AMI usage intervals. To detect potentially erroneous AMI data, Verdant programmatically and visually reviewed daily load shapes for all BIP participants. For example, Verdant reviewed periods of zero or near-zero AMI usage reads that may have indicated that a meter was not reporting usage normally for a given period. Generally, Verdant aimed to omit as little AMI data as possible.

Verdant also reviewed all weather data files for completeness and accuracy. For a few weather stations, Verdant filled in small gaps of missing hourly temperature reads using interpolated values (by way of the average of leading and lagging hourly intervals). Some weather stations included large gaps of consecutive hourly readings or highly irregular or erroneous temperature readings. For these stations, the weather data were not used, and the corresponding participants were remapped to the next closest weather station within the same region (for example, the next closest coastal weather station for a coastal customer).

3.2 EX-POST METHODOLOGY

For the ex-post analysis, Verdant utilized an hourly customer specific regression-based approach with four generalized steps, depicted in Figure 3-1. Each step is explained in further detail in the following subsections.

FIGURE 3-1: EX-POST ANALYSIS STEPS

3.2.1 Participant Analysis

The participant analysis is Verdant's first step in understanding the BIP participant characteristics and whether there are any considerations that may influence Verant's approach to the ex-post analysis. These include a review of participant load shapes, event day loads, and load variability. An additional key component of the participant analysis is a precursory weather sensitivity analysis to determine whether a participant's non-event day load is temperature sensitive. Ex post models for weather sensitive customers included temperature variables to control for the influence of temperature on energy consumption. Given that BIP is active in all months of the year, Verdant examined both summer and winter temperature sensitivity. For purposes of the ex-ante modeling and weather sensitivity analysis,

winter months are defined as November through April and summer is defined as May through October. For winter weather sensitivity Verdant explored both heating and cooling sensitivity. For summer weather sensitivity, Verdant only explored cooling sensitivity.

To perform the weather sensitivity analysis, Verdant conducted a linear regression of average load between hours ending 12 and 21 as a function of month of the year, day of the week, and a degree day threshold, generally CDH65, CDH70, HDH60 or HDH55. If the regression results in degree day coefficients with a positive, statistically significant value at the 90th percentile for at least one of thresholds, the load was considered weather sensitive. In a small number of cases, customers who were identified to be weather sensitive by this analysis later had the weather variables removed from their ex-post regressions. Additional details on the methods and results of the weather sensitivity analysis are presented in Appendix B.

3.2.2 Proxy Day Selection

The second step of the ex-post analysis was selecting proxy days (non-event days with event-like conditions) to test candidate model specifications. Verdant selected proxy event days as non-event day, non-holiday days with weather closest to the average event day temperatures in each season[6] based on the following distance metric that prioritizes matching days on maximum daily temperature, mean daily temperature and mean mid-day temperature[7]:

EQUATION 3-1: PROXY DAY DISTANCE METRIC

$$Distance = |\Delta Max\ Daily\ Temp| + |\Delta Mean\ Daily\ Temp| + |\Delta Mean\ Midday\ Temp|$$

Where the differences (Δ) represent a difference between the corresponding value for a given potential proxy day and the average event day in the same season. For each customer, six weekday and three weekend proxy days were selected for each season in which the customer was dispatched in a BIP event.

6 For the ex-post and ex-ante analysis, seasons were kept separate at all stages, with months Jan, Feb, Mar, Apr, Nov, Dec comprising 'winter' and months May, Jun, Jul, Aug, Sep, Oct comprising 'summer' months. In PY2024, SCE had only summer weekday events, so only summer weekday proxy days were selected.

7 Mid-day hours are defined as hours ending 11 – 15. The max temperature, mean daily temperature, and mean temperature during mid-day hours were computed for the average event day in each season and for all non-event day non-holidays. The sum of the absolute difference in each of these metrics was used to select proxy days.

3.2.3 Model Selection

Verdant tested candidate model specifications for each customer. Candidate models were comprised of two components; a component that includes independent variables to capture event impacts and a component that includes variables meant to capture effects related to the reference loads. Insights gained from the participant analysis (Step 1) informed the model specifications tested for each customer or group of customers. For example, customers with weather sensitive loads were tested with models that included temperature variables, while those that were weather insensitive had specifications that relied on calendar and other effects. In all cases, the regression models controlled for day of the week, month of the year, event days, and dual DR program enrollment (as applicable). Further details on model variables are provided in Section 3.2.4.

A variety of factors were considered when selecting the appropriate model specification for each customer. The model selection process was as follows:

- Verdant reviewed the catalog of internal model specifications from prior DR evaluations (including those previously used for BIP customers) to develop a catalog of candidate models, while incorporating new adjustments based on the needs of the analysis and model performance.

- The performance of candidate models was evaluated using the proxy event days as holdout days with presumed event hours ending 18-20 (to represent each IOU's BIP event dispatch) to assess the bias and error of each candidate model and establish whether a candidate model generated statistically significant impact parameters. Generally, candidate models that produced statistically significant impact estimates on proxy event days were rejected because there should not be statistically significant impacts for days where events did not occur.[8]

- Next, the arbitration routine assessed the model coefficients for anticipated sign, size, and statistical significance. A parameter meant to capture temperature effects, for example, should not be negative. Additionally, Verdant reviewed the model fit statistics to ensure the model adequately explained the variance in the data. Models failing these tests were rejected.

- The bias and error of the remaining candidate models were then examined. Models were selected on a score that weighs the Normalized Mean Absolute Error (NMAE) and the absolute value of the Normalized Mean Bias Error (NMBE) of each model's predicted loads on proxy event days. The candidate model with the lowest score was selected as the final model, which represents the model minimizing bias and error.[9]

[8] For three PG&E participants and two SCE participants, all candidate models showed event hour significance. In these cases, all candidate models were retained through the next steps of the model selection process.

[9] In a small number of cases for PG&E, NMBE and NMAE were unable to be computed due to high rates of 0 kWh loads. In these cases, models were selected using RMSE instead.

- Verdant then compared the average estimated proxy event load for each participant to the average actual proxy event day load. If the selected model did not produce a load shape that sufficiently matched the actual proxy event day load or a shape that contained erroneous load fluctuations, then the candidate models for that participant were revised and the modeling data was reexamined for outliers. After which, steps one through four of the model selection process were repeated.

Because participant loads and weather sensitivity varied across seasons, separate winter and summer models were selected for PG&E participants with events in more than one season. Weekday and weekend models were also fit separately, with weekday models being fit only on weekday data and weekend models only on weekend data. However, the only weekend event in PY2024 was also the only winter event for PG&E. As such, Verdant selected only one model per season.

3.2.4 Impact Estimation

The final selected models were used to predict event day load and estimate program impacts for each hour of each event day. Importantly, model specifications included an event day impact variable to help capture additional event day effects outside of the event window (for example, snapback effects after an event). Equation 3-2 presents the general model specification used to estimate ex-post impacts.

EQUATION 3-2: EX-POST GENERAL MODEL SPECIFICATION

$$kWh_{d,h} = \beta_{0,h} + \beta_{1d,h} EventDay_d EventID_d + \beta_{2,h} Weather_h + \sum_m \beta_{5,h,m} Month_m + \sum_w \beta_{6,h,w} Wday_w + \beta_{6,h,d} AvgLoad_d + \beta_{7,h} OtherEventHour_h + \varepsilon_{d,h}$$

Where:

$kWh_{d,h}$	The hourly delivered kWh usage on event day *d* during hour *h*.
$\beta_{0,\mathrm{h}}$	The intercept of the regression model during hour *h.*
$EventDay_e Hour_{\mathrm{h}}$	The interaction between the event day dummy and an event ID that corresponds to a specific event day. Its coefficient $\beta_{1\mathrm{d},\mathrm{h}}$ yields the impact of an event on usage on day *d* during hour *h.*
$Weather_{\mathrm{h}}$	A temperature-based weather variable in hour *h*[10].
$Month_m$	A dummy variable for each month *m.*
$Wday_d$	A dummy variable indicating the day of the week *d.*
$AvgLoad_d$	The average daily load during a specific period (e.g., the afternoon) of day *d*.
$OtherEventHour_h$	A dummy variable, indicating whether hour *h* is an event hour for a participant dually enrolled in another event-based demand response program.
$\varepsilon_{d,h}$	The error term

[10] Weather terms are only included for weather sensitive customers.

The interaction between $EventDay_d EventIDd$ results in a set of 24 $\beta_{1d,h}$ estimates (one from each hourly model) that capture event-specific impacts. The set of 24 estimates are used to estimate program impacts during the event window and capture any other event day effects, such as snapback, for hours outside of the event window. In essence, $\beta_{1d,h}$captures the difference between actual event day load for a given hour and the estimated baseline. For the ex-post analysis, $\beta_{1d,h}$ estimates over the event window provide the impact estimates for each event day.

The estimated impacts for each participant are aggregated to multiple domains of interest for each BIP product, including but not limited to, industry type, customer size, and geographical location, to provide the IOUs with data on participant and FSL achievement performance at the desired levels.

Dual DR Enrollment

Verdant controlled for dual DR program enrollment when estimating ex-post load impacts. These impacts were accounted for by adding an additional parameter in the ex-post model that represents participation in another DR program. In general, any incremental load reduction beyond FSL commitments for dually enrolled participants in dual program event hours would be attributed to non-BIP programs. However, there were no dual-program event days for either utility in PY2024. As such, all PY2024 ex-post load impacts were attributed to BIP.

FSL Achievement Rates

FSL achievement rates were produced by comparing FSL commitments to actual loads during events. These values represent each participant's ability to reduce their load to their FSL. Mathematically, the achievement rate is the estimated load impact divided by the load impact that would have been observed if the participant exactly reached their FSL. An achievement rate greater than one represents load reductions that exceed a given participant's FSL and, for rates less than one, load reductions that fall short of the FSL commitment. Verdant estimated FSL achievement rates for each participant in each hour of each event as well as for the average event.

Confidence Intervals

As with most analysis using time series data, it is expected that there will be some autocorrelation in the data. As such, Verdant modelled each hour independently to help alleviate this concern. When estimating confidence intervals surrounding ex-post impacts, it was assumed that impacts are independent across participants. While estimating impacts, the variance of impact estimates were collected and summed according to each level of aggregation. From the sum of the variances, Verdant then calculated standard errors and confidence intervals at the 5%, 10%, 50%, 90%, and 95% levels.

3.3 EX-ANTE METHODOLOGY

Verdant produced ex-ante load impacts for 11 years following PY2024 (PY2025-PY2035). For each IOU, the ex-ante impacts included the hourly ex-ante load impacts by, at minimum, Size Group, LCA, and SubLAP at the aggregate and per customer basis. Reference loads were produced for each typical event day and monthly IOU and CAISO System Worst Day under 1-in-2 and 1-in-10 weather conditions. Verdant produced ex-ante impacts for event hour windows based on each IOU's request. For PG&E, impacts were estimated for events comprising the first four hours of the RA period in each month. For SCE, impacts were estimated for both a four hour (HE18 – 21) and six hour (HE17 – 22) event window.

Verdant's approach to the estimation of ex-ante load impacts was largely informed by the ex-post methodology, future FSL commitments, and PY2024 FSL achievement rates. Using the same segmentation levels provided in each utility's participant forecast, Verdant estimated ex-ante hourly load impacts and reference loads. The generalized steps in the ex-ante analysis are presented in Figure 3-2.

FIGURE 3-2: EX-ANTE ANLAYSIS STEPS

3.3.1 Ex-Ante Driver Development

Prior to ex-ante modeling, Verdant developed an ex-ante drivers dataset containing presumed ex-ante event day characteristics, event hours and the ex-ante weather scenarios that were necessary to predict the ex-ante reference loads for each customer.

3.3.2 Estimate Ex-Ante Per Capita Reference Loads

For customers with a selected ex-post model, in each season (summer and winter) Verdant used the ex-post model and the ex-ante drivers to estimate ex-ante reference loads for each customer. For customers without an ex-post model in a given season (e.g., customers that were not dispatched in an event in that season in PY2024), a new ex-ante model was selected for that customer in that season. For example, all SCE customers required a winter model to be selected because no winter events were dispatched in PY2024. To select ex-ante models, the same approach was taken as for ex-post model selection with the only difference being in the proxy day selection step. Proxy days were selected as days that most closely resemble the 1-in-2 utility-specific Monthly System Worst Day weather scenario for each month. In total, two weekday proxy days were selected per month to ensure ex-ante models were tested for performance across the entire winter or summer season. The same set of models as used in ex-post were tested on

these proxy days, and final ex-ante models were selected following the ex-post selection routine. Reference loads for these customers were then estimated using the fitted models and the ex-ante drivers data set.

Verdant validated the reference loads by comparing them to reference loads observed in the ex-post analysis and to the average aggregate monthly loads seen on November, 2023 through October, 2024. For SCE, Verdant and SCE found that the September average loads were abnormally low in PY2024. As a result, Verdant reviewed the September data and removed the first week of AMI data for all customers in the ex ante modeling.

3.3.3 Estimate Ex-Ante Per Capita Impacts

BIP impacts are historically largely driven by FSL commitments, rather than weather. As a result, ex-ante impacts were guided by PY2024 ex-post FSL achievement rates. Mathematically, the achievement rate is the estimated load impact divided by the load impact that would have been observed if the participant exactly reached their FSL. To calculate ex-ante FSL achievement rates, Verdant used the estimated ex-post impacts for each customer and their PY2025 FSL commitments to reflect likely achievement rates in future program years.[11] Verdant estimated an average FSL achievement rate for each hour relative to the hour of the start of the event for each customer in each season (i.e. and achievement rate for the first, second, third, etc. hour of an event). Customers that de-enrolled from the program prior to PY2025 were excluded from the ex-ante analysis.

To account for potential impacts outside of event hours, including snapback or persisting load reductions, Verdant estimated average FSL achievement rates for each customer in each season from the hour before the event started through to the end of the day. Ex-ante achievement rates were assumed to be 0% (no event influence) from hours HE1 until the hour before the presumed event start. The ex-ante analysis assumes that event notification happens in the hour before the start of the event.

Achievement rates were then multiplied by the expected impact at the FSL (e.g., the difference between the reference load and the FSL) to estimate the hourly event impacts. Hourly event loads are estimated as the difference between the reference load and the estimated impacts. Given this approach relies on the ex-post impact estimation of results, the standard errors from the ex-post analysis were used to develop confidence intervals around the ex-ante analysis.

[11] For customers that decreased their FSL (committed to greater load reductions) ex-ante FSL achievement rates were set to 100%.

3.3.4 Ex-Ante MW Forecast Development

The per capita reference loads and impacts were then averaged to the lowest level of aggregation provided in the participant forecast or desired reporting level (for example a combination of notification option, LCA, SubLAP, and customer size). The averaged reference loads and impacts represent the typical per capita BIP response by participant type under each ex-ante scenario. Afterwards, the per capita reference loads and impacts were multiplied by the participant forecasts to develop ex-ante MW forecasts.

Program and Portfolio Ex-Ante Impacts

For the ex-ante analysis, Verdant developed both program and portfolio ex-ante impacts. Program ex-ante impacts represent what the BIP is capable of providing given a BIP only program dispatch and does not account for dual enrollment, while portfolio impacts represent the contribution of BIP to the entire portfolio of demand response programs and accounts for dual enrollment. When accounting of portfolio level impacts, BIP impacts are counted first. However, BIP customers can also participate in the Emergency Load Reduction Program (ELRP). For dually enrolled BIP and ELRP customers, the BIP claims savings up to the dually enrolled participant's FSL. Impacts beyond the dually enrolled participant's FSL are attributed to ELRP (per ELRP program rules). As a result, BIP portfolio ex-ante impacts for dual BIP and ELRP participants are limited by FSLs. Impacts beyond the FSL are not claimed and are attributed to ELRP. Since the ELRP only operates in summer months (May through October), program and portfolio impacts are the same for winter months (November through April). Additionally, the ELRP programs open to eligible BIP participants (A.1 and A.2 for PG&E and A.2 for SCE) are planned to end after 2027. As a result, portfolio and program level ex-ante impacts are the same after 2027.

Hours of BIP Dispatch

At the request of PG&E, ex-ante impacts were developed using an assumption of a four-hour dispatch in the first four hours of the resource adequacy (RA) window.[12] SCE requested ex-ante impacts for both a four-hour and six-hour dispatch.[13] For all months of the year, the four-hour and six-hour dispatches occur in HE17 to HE20 and HE17 to HE22.

[12] The Resource Adequacy window is 5pm to 10pm in April through May and 4pm to 9pm in all other months.

[13] The BIP has a maximum event hour duration of six hours.

VERDANT

4 EX-POST RESULTS

This section presents the PG&E and SCE BIP ex-post results, which are discussed in separate subsections.

4.1 PG&E EX-POST RESULTS

Load impacts for the average full event hour on each event day are presented in Table 4-1. For purposes of this summary of results, a full event hour is defined as an event hour where BIP participants were called to curtail their load for all 60 minutes of that hour. As seen, the February 4th winter emergency event provided, on average, [redacted] MWh/h of load reduction resulting in a [redacted]% FSL achievement rate and a [redacted]% reduction in load. The September 24th test event provided 99.1 MWh/h of load reduction with an FSL achievement rate of 100%. For the BIP participants that were retested on October 21st, the FSL achievement rate reached [redacted]%, providing an average load reduction of [redacted] MWh/h.

TABLE 4-1: PG&E BIP AVERAGE FULL EVENT HOUR LOAD IMPACTS BY EVENT

Event Date (2024)	Num. of Participants Dispatched	Aggregate (MWH/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)[14]
		Reference Load	Load Impact	Reference Load	Load Impact			
February 4th	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
September 24th	163	144.7	99.1	887.6	607.7	68%	45.6	100%
October 21st	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.1.1 PG&E Load Impacts by Event

Each BIP event day, and their hourly load impacts, are presented in chronological order in Figure 4-1, Figure 4-2, and Figure 4-3. These figures present the aggregate event day load shape for February 4th, September 24th and October 21st respectively. Each figure presents the aggregate reference loads, actual observed loads (hourly and 15-minute), load impacts and FSLs. Event hours are highlighted in yellow.

Table 4-2, Table 4-3, and Table 4-4 present the baseline (reference load), hourly observed load, and load impacts for each hour of the event day for February 4th, September 24th and October 21st respectively (the event day tables following the event day figures). For brevity, only the hour prior to the first event hours through HE24 are presented in the tables. The full range of hours (HE1 through HE24) are presented in

[14] A value of 100% would indicate customers exactly achieving their FSL on average.

the Ex-Post Table Generator (Appendix A). All impacts are reported in MWh/h for consistency in scale, and all times are reported in local prevailing time for ease of interpretation.

February 4th Winter Emergency Event

As previously stated, PG&E had one localized emergency event on February 4th, dispatching 35 BIP participants located in the [redacted] and [redacted] SubLAPs. This was the only winter weekend emergency event for PG&E in PY2024. Figure 4-1 presents the aggregate load shape for this event day. As seen in the in the 15-minute observed load, load reductions begin to appear in the hour prior to the event start indicating a rapid response to event notifications.

FIGURE 4-1: PG&E BIP EVENT FEBRUARY 4, 2024 AGGREGATE LOAD SHAPE

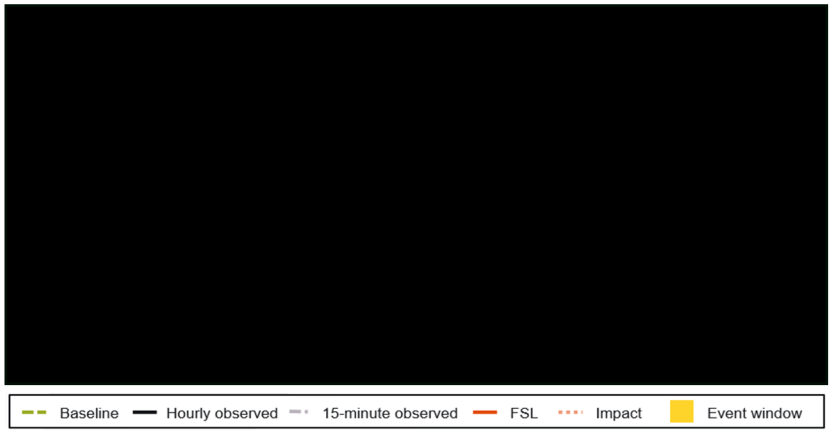


Table 4-2 presents the hour by hour aggregate load impacts for the February 4th event. Across the 4.4 hour dispatch, these BIP customers maintained steady and consistent load reductions. Percent load reduction and FSL achievement rates in full event hours (HE20 through HE22) deviated by only one percentage point resulting in an average load reduction of [redacted] MWh/h across the event.

TABLE 4-2: PG&E BIP EVENT FEBRUARY 4, 2024 AGGREGATE LOAD HOURLY IMPACTS

Hour Ending (Prevailing Time)	Hour Type	Estimated Reference Load (MWh/hour)	Observed Event Day Load (MWh/hour)	Estimated Load Impact (MWh/hour)	Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate[15] (%)
18	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	Event, Partial	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	Event, Partial	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event Hour	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

September 24th Test Event

As previously stated, September 24th was a two hour BIP test event day. PG&E dispatched all BIP participants that had not been previously dispatched for the February 4th emergency event. In total 163 BIP participants were dispatched for testing. Figure 4-2, presents the aggregate load shape for this event day.

FIGURE 4-2: PG&E BIP EVENT SEPTEMBER 24, 2024 AGGREGATE LOAD SHAPE

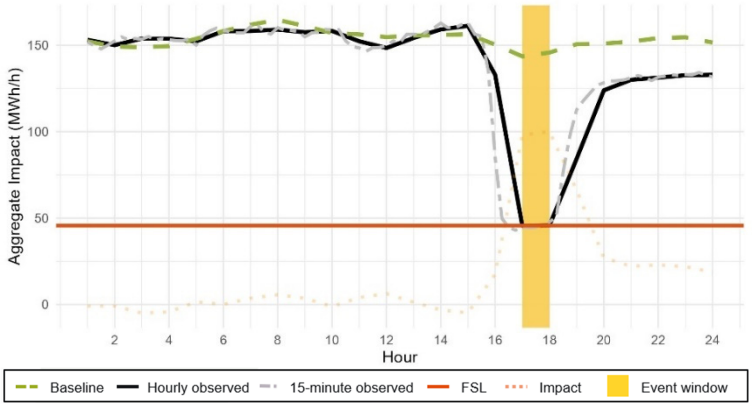


Table 4-3 presents the hour by hour aggregate load impacts for the September 24th event. Across the two hour dispatch, FSL achievement rates were 100% in all hours, providing 98.1 MWh/h and 100.1 MWh/h of load reduction in HE17 and HE18 respectively.

[15] A value of 100% would indicate customers exactly achieving their FSL on average.

TABLE 4-3: PG&E BIP EVENT SEPTEMBER 24, 2024 AGGREGATE LOAD HOURLY IMPACTS

Hour Ending (Prevailing Time)	Hour Type	Estimated Reference Load (MWh/hour)	Observed Event Day Load (MWh/hour)	Estimated Load Impact (MWh/hour)	Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)
16	Non-Event	150.4	132.9	17.5	12%	45.6	17%
17	Event, Full	143.6	45.5	98.1	68%	45.6	100%
18	Event, Full	145.8	45.7	100.1	69%	45.6	100%
19	Non-Event	150.6	84.4	66.2	44%	45.6	63%
20	Non-Event	151.0	123.9	27.1	18%	45.6	26%
21	Non-Event	152.1	130.0	22.1	15%	45.6	21%
22	Non-Event	154.1	131.3	22.9	15%	45.6	21%
23	Non-Event	154.6	132.7	21.9	14%	45.6	20%
24	Non-Event	151.6	132.9	18.7	12%	45.6	18%
Avg. Event Hour	Event, Full	**144.7**	**45.6**	**99.1**	**68%**	45.6	**100%**

October 21st Re-Test Event

After the September 24th test event, a small group of poor performers (based on their ability to reduce load to FSL commitments on September 24th) were asked to participate in a re-test of their BIP dispatch. A total of 31 customers were dispatched in the October 21st re-test event. Figure 4-3 presents the aggregate load shape for this re-test event day.

FIGURE 4-3: PG&E BIP EVENT OCTOBER 21, 2024 AGGREGATE LOAD SHAPE

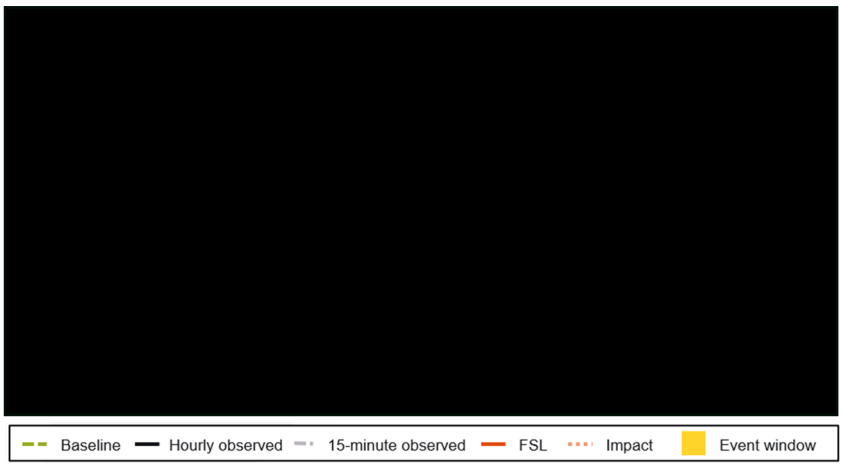


Table 4-4 presents the hour by hour aggregate load impacts for the October 21st re-test event. Across the two hour dispatch, FSL achievement rates were [redacted]% in HE17 and [redacted]% in HE18, providing [redacted] MWh/h and [redacted] MWh/h of load reduction in HE17 and HE18 respectively. After this event some BIP participants were asked to increase their FSL.

TABLE 4-4: PG&E BIP EVENT OCTOBER 21, 2024 AGGREGATE LOAD HOURLY IMPACTS

Hour Ending (Prevailing Time)	Hour Type	Estimated Reference Load (MWh/hour)	Observed Event Day Load (MWh/hour)	Estimated Load Impact (MWh/hour)	Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)
16	Non-Event						
17	Event, Full						
18	Event, Full						
19	Non-Event						
20	Non-Event						
21	Non-Event						
22	Non-Event						
23	Non-Event						
24	Non-Event						
Avg. Event Hour	Event, Full						

4.1.2 PG&E Average Event Load Impacts

The impacts for the average PG&E BIP event were computed by averaging load shapes for each customer across all summer events in which they were dispatched. Because BIP events are not typically called in winter months, the winter event was not included in the average event. In PY2024, a total of 169 unique customers were dispatched during summer events. On average, 97 customers were dispatched per event, with the average event lasting for two hours, HE17 and HE18. Given that the blended participant counts can lead to misleading interpretations of aggregate load, the average PY2024 event load shape is shown in Figure 4-4 and the corresponding hourly impact values in Table 4-5 are presented as per capita load impacts.

FIGURE 4-4: PG&E BIP AVERAGE EVENT DAY PER CAPITA LOAD

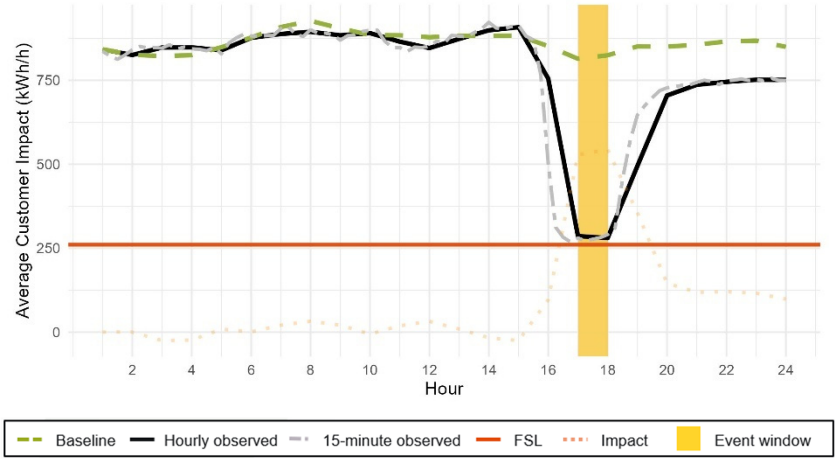


TABLE 4-5: PG&E BIP AVERAGE EVENT DAY PER CAPITA HOURLY IMPACTS

Hour End (Prevailing Time)	Hour Type	Estimated Reference Load (kWh/h)	Observed Event Day Load (kWh/h)	Estimated Load Impact (kWh/h)	Percent Load Reduction (%)	FSL (kW)	FSL Achievement Rate (%)
16	Non-Event	851.7	755.1	96.6	11%	260.6	16%
17	Event, Full	814.1	286.1	528.0	65%	260.6	95%
18	Event, Full	824.5	280.2	544.3	66%	260.6	97%
19	Non-Event	850.9	494.7	356.2	42%	260.6	60%
20	Non-Event	850.4	704.9	145.5	17%	260.6	25%
21	Non-Event	855.8	736.7	119.1	14%	260.6	20%
22	Non-Event	865.9	745.5	120.4	14%	260.6	20%
23	Non-Event	868.0	751.7	116.3	13%	260.6	19%
24	Non-Event	849.7	751.3	98.3	12%	260.6	17%
Avg. Event Hour	**Event, Full**	**819.3**	**283.2**	**536.1**	**65%**	**260.6**	**96%**

4.1.3 PG&E Load Impacts by Subgroupings

Table 4-6 present the BIP load impacts by SubLAP for a PY2024 typical event day. To best capture typical ex-post performance by SubLAP, the October 21st retest event day is excluded from SubLAP level results. As noted previously, the winter emergency event included participants in PGNP and PGST and these participants were not included in the September 24th test event. As a result, PGNP and PGST are represented in the PY2024 typical event day by their participation on February 4th, all other SubLAPs are represented by their September 24th participation. As seen, the SubLAPs providing the greatest aggregate load reductions on average in PY2024 include PGNP ([redacted] MWh/h), PGEB ([redacted] MWh/h), and PGKN ([redacted] MWh/h).

TABLE 4-6: PG&E BIP LOAD IMPACTS BY SUBLAP (SEPTEMBER 24 AND FEBRURARY 4, 2024 EVENTS)

SubLAP	Event Date Represented	Number of Participants	Estimated Reference Load (MWh/h)	Observed Load (MWh/h)	Estimated Impact (MWh/h)	Percent Load Reduction (%)	Aggregate FSL (MW)	FSL Achievement Rate (%)
PGCC	9/24/2024	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGEB	9/24/2024	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGF1	9/24/2024	76	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGFG	9/24/2024	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGHB	9/24/2024	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGKN	9/24/2024	12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGNC	9/24/2024	7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGNP	2/4/2024	23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGSB	9/24/2024	7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGSF	9/24/2024	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGSI	9/24/2024	11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGST	2/4/2024	12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PGZP	9/24/2024	29	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 4-7 presents the typical event day load reductions by Industry Type. For the representation of the typical event day by Industry Type, only the September 24, 2024 event day is represented.

TABLE 4-7: PG&E BIP LOAD IMPACTS BY INDUSTRY TYPE (SEPTEMBER 24, 2024 EVENT)

Industry Type	Number of Participants	Estimated Reference Load (MWh/h)	Observed Load (MWh/h)	Estimated Impact (MWh/h)	Percent Load Reduction (%)	Aggregate FSL (MW)	FSL Achievement Rate (%)
Agriculture, Mining and Construction	67						
Manufacturing	41						
Office, Hotels, Finance, Services	4						
Retail Stores	1						
Wholesale, Transport and other Utilities	47						
Other/Unknown	3						

4.1.4 PG&E FSL Achievement Rates

Individual customers varied widely in FSL achievement rates. Figure 4-5, Figure 4-6, and Figure 4-7, present the share of customers and corresponding load impacts during full event hours shown for bins of FSL achievement rates for the February 4th, September 24th and October 21st events, respectively. For the February 4th and September 24th events, the 100-125% FSL achievement bin has the largest number of participants. For the October 21st retest event, however, the <25% FSL achievement bin has the largest share of participants, consistent with the desire to retest these participants to determine if they could meet their FSL.

FIGURE 4-5: DISTRIBUTION OF FSL ACHIEVEMENT AND IMPACTS, FEBRUARY 4, 2024 EVENT[16]

[16] Bins are inclusive of the lower extreme of each range and exclusive of the upper extreme. However, all values represented are fractional and, as such, all customers that achieve their FSL in the average event hour are included in the '100-125%' bin.

FIGURE 4-6: DISTRIBUTION OF FSL ACHIEVEMENT AND IMPACTS, SEPTEMBER 24, 2024 EVENT

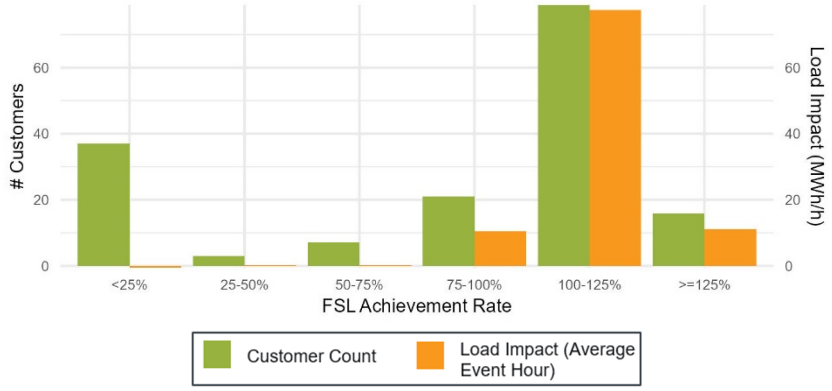


FIGURE 4-7: DISTRIBUTION OF FSL ACHIEVEMENT AND IMPACTS, OCTOBER 21, 2024 EVENT

4.2 SCE EX-POST RESULTS

Load impacts for the average full event hour on each event day are presented in Table 4-9. For purposes of this summary of results, a full event hour is defined as an event hour where BIP participants were called to curtail their load for all 60 minutes of that hour. As seen, the September 6th emergency event provided, on average, [redacted] MWh/h of load reduction resulting in a [redacted] FSL achievement rate and a [redacted] reduction in load. The September 9th emergency event provided [redacted] MWh/h of load reduction with an FSL achievement rate of [redacted] and a [redacted] reduction in load. It should be noted that the September 6th and September 9th event days dispatched the same group of participants for localized emergencies. On September 24th, the remaining BIP participants, that did not participate in the emergency events, were dispatched for a test event. The September 24th event provided, on average, 396.4 MWh/h of load reduction, resulting in a 102% FSL achievement rate and a 74% reduction in load.

TABLE 4-8: SCE BIP AVERAGE FULL EVENT HOUR LOAD IMPACTS BY EVENT

Event Date (2024)	Num. of Participants Dispatched	Aggregate (MWH/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)[17]
		Reference Load	Load Impact	Reference Load	Load Impact			
September 6th	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
September 9th	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
September 24th	314	535.5	396.4	1,705.4	1,262.5	74%	146.4	102%

4.2.1 SCE Load Impacts by Event

Each BIP event day and their hour by hour load impacts are presented in chronological order in Figure 4-8, Figure 4-9, and Figure 4-10. These figures present the aggregate event day load shapes for the September 6th, September 9th and September 24th events respectively. Each figure presents the aggregate reference loads, actual observed loads (hourly and 15-minute), load impacts and FSLs. Event hours are highlighted in yellow.

Table 4-9, In some cases, back-to-back events may lead to reduced customer performance due to challenges with accommodating repeated schedule interruptions. The FSL achievement rate for the September 9th event, however, improved relative to the previous event (Friday, September 6th). The findings presented in Table 4-10 show an overall achievement rate of [redacted] during full event hours. Across the entire range of full event hours (HE17 through HE20), the percent load reductions and FSL achievement rate remained consistent, ranging from an hourly percent load reduction from [redacted] to [redacted] and FSL achievement rates from [redacted] to [redacted]. BIP participants on September 9th provided an average load reduction of [redacted] MWh/h during HE17 through HE20.

Table 4-10, and Table 4-11 (following each respective aggregate event day load shape) contains the hourly estimated baseline (reference load), observed load, and load impacts for each hour of the event day (September 6th, September 9th and September 24th respectively). For brevity, only the hour prior to the first event hours through HE24 are presented. The full range of hours (HE1 through HE24) are presented in the Ex-Post Table Generator (Appendix A). All impacts are reported in MWh/h for consistency in scale, and all times are reported in local prevailing time for ease of interpretation.

September 6th Emergency Event

As previously stated, SCE had two Emergency events in PY2024. September 6th was the first of the two emergency events where BIP participants located in [redacted] were dispatched for event participation. Figure

[17] A value of 100% would indicate customers exactly achieving their FSL on average.

4-8 presents the aggregate load shape for this event day. As seen in the 15-minute observed load, load reductions begin to appear rapidly, demonstrating that the BIP participants quickly reduce their loads.

FIGURE 4-8: SCE BIP EVENT SEPTEMBER 6, 2024 AGGREGATE LOAD

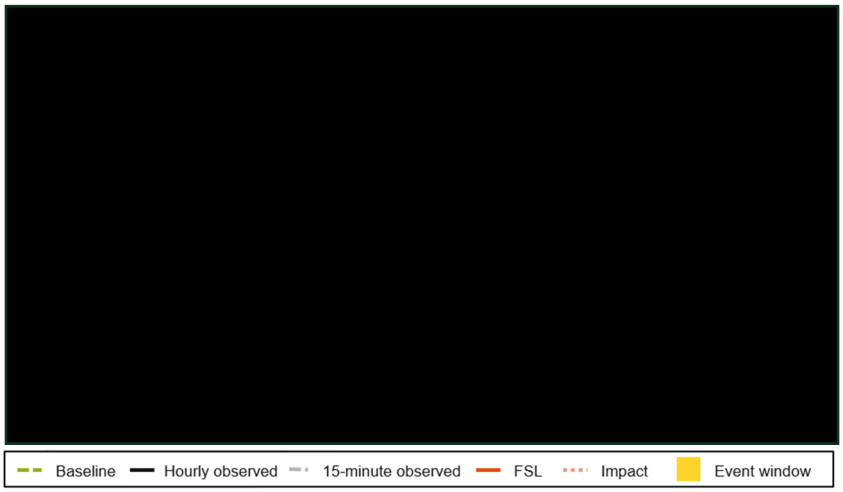


Table 4-9 presents the hour by hour aggregate load impacts for the September 6th event. Across the two full hours dispatched, the FSL achievement rates were [redacted] in HE19 and [redacted] in HE20, providing [redacted] MWh/h and [redacted] MWh/h of load reduction, respectively.

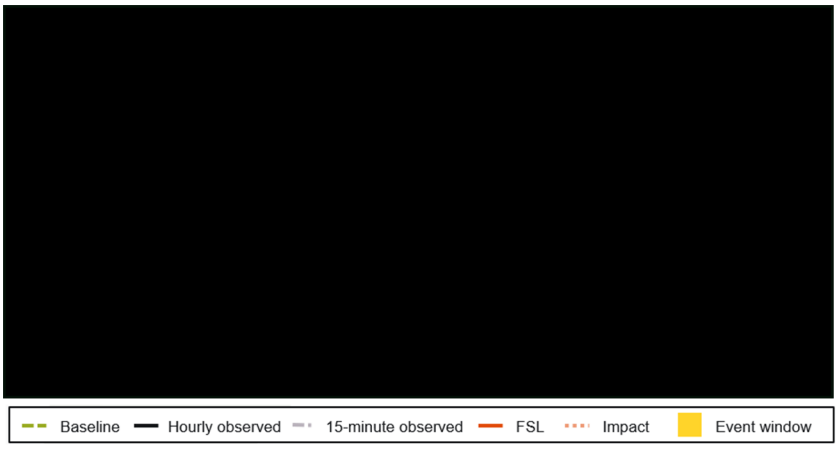
TABLE 4-9: SCE BIP EVENT SEPTEMBER 6, 2024 AGGREGATE LOAD HOURLY IMPACTS

Hour Ending (Prevailing Time)	Hour Type	Estimated Reference Load (MWh/hour)	Observed Event Day Load (MWh/hour)	Estimated Load Impact (MWh/hour)	Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)
17	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	Event, Partial	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event Hour	**Event, Full**	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

September 9th Emergency Event

On the September 9th event (a Monday), the same group of participants ([redacted]) were dispatched as in the September 6th event (a Friday), representing the second of the two back-to-back business day emergency events for these customers. Figure 4-9 below presents the aggregate event day load shape for the September 9th event.

FIGURE 4-9: SCE BIP EVENT SEPTEMBER 9, 2024 AGGREGATE LOAD



In some cases, back-to-back events may lead to reduced customer performance due to challenges with accommodating repeated schedule interruptions. The FSL achievement rate for the September 9th event, however, improved relative to the previous event (Friday, September 6th). The findings presented in Table 4-10 show an overall achievement rate of [redacted] during full event hours. Across the entire range of full event hours (HE17 through HE20), the percent load reductions and FSL achievement rate remained consistent, ranging from an hourly percent load reduction from [redacted] to [redacted] and FSL achievement rates from [redacted] to [redacted]. BIP participants on September 9th provided an average load reduction of [redacted] MWh/h during HE17 through HE20.

TABLE 4-10: SCE BIP EVENT SEPTEMBER 9, 2024 AGGREGATE LOAD HOURLY IMPACTS

Hour Ending (Prevailing Time)	Hour Type	Estimated Reference Load (MWh/hour)	Observed Event Day Load (MWh/hour)	Estimated Load Impact (MWh/hour)	Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)
15	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	Event, Partial	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	Event, Full	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	Event, Partial	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	Non-Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event Hour	**Event, Full**	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

September 24th Test Event

For the September 24th BIP test event day, SCE dispatched all BIP participants that had not been previously dispatched for the September 6th and September 9th emergency events. In total 314 BIP participants were dispatched for testing. Figure 4-10, presents the aggregate load shape for this event day.

FIGURE 4-10: SCE BIP EVENT SEPTEMBER 24, 2024 AGGREGATE LOAD

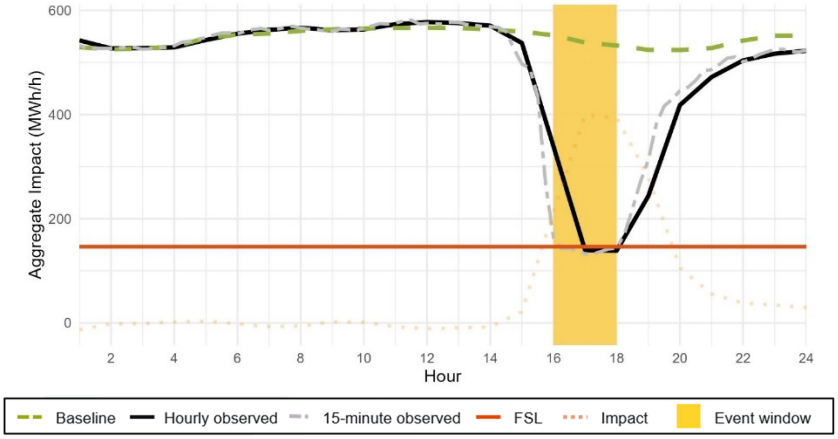


Table 4-11 presents the hour by hour aggregate load impacts for the September 24th event. Across the two full hours of dispatch (HE18 to HE19), FSL achievement rates were 102%, providing 399.0 MWh/h and 393.8 MWh/h of load reduction in HE17 and HE18 respectively.

TABLE 4-11: SCE BIP EVENT SEPTEMBER 24, 2024 AGGREGATE LOAD HOURLY IMPACTS

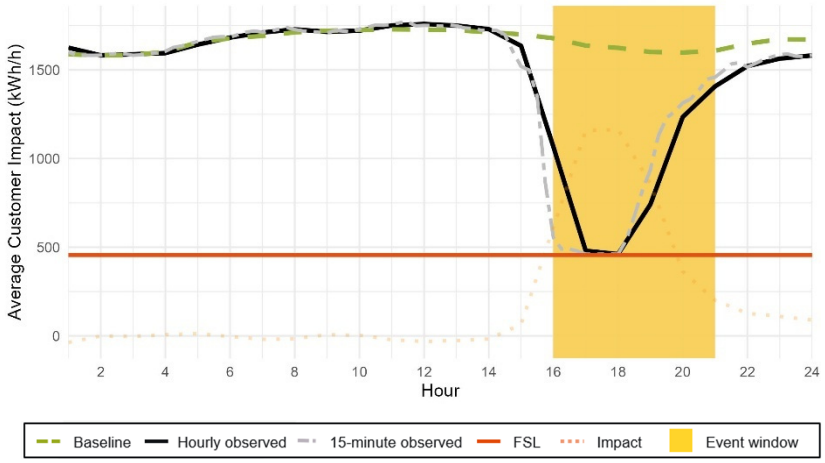
Hour Ending (Prevailing Time)	Hour Type	Estimated Reference Load (MWh/hour)	Observed Event Day Load (MWh/hour)	Estimated Load Impact (MWh/hour)	Percent Load Reduction (%)	FSL (MW)	FSL Achievement Rate (%)
15	Non-Event	559.4	537.5	21.9	4%	146.4	5%
16	Event, Partial	552.2	338.8	213.4	39%	146.4	53%
17	Event, Full	538.4	139.4	399.0	74%	146.4	102%
18	Event, Full	532.6	138.8	393.8	74%	146.4	102%
19	Non-Event	524.2	243.7	280.5	54%	146.4	74%
20	Non-Event	523.9	418.2	105.7	20%	146.4	28%
21	Non-Event	527.7	472.0	55.7	11%	146.4	15%
22	Non-Event	542.1	504.1	38.0	7%	146.4	10%
23	Non-Event	551.6	516.9	34.7	6%	146.4	9%
24	Non-Event	551.7	522.6	29.1	5%	146.4	7%
Avg. Event Hour	**Non-Event**	**535.5**	**139.1**	**396.4**	**74%**	**146.4**	**102%**

4.2.2 SCE Average Event Load Impacts

The impacts for the average SCE BIP event were computed by averaging load shapes for each customer across all events in which they were dispatched. In PY2024, events dispatched an average of 119

customers. Event hours and duration varied widely across the three events in PY2024 such that no hour was a full event hour in all three events. Figure 4-11 illustrates the average baseline, event load impact and hourly and 15 minute observed load. Table 4-12 presents the average event per capita hourly impacts.

FIGURE 4-11: SCE BIP AVERAGE EVENT PER CAPITA LOAD[18]



Because there are no full event hours shared by all three PY2024 events, average full event hour values are not computed. The best performance in the average event is at the hour ending 18, where the FSL achievement rate reaches 100% and the observed load is 72% below the reference load.

TABLE 4-12: SCE BIP AVERAGE EVENT PER CAPITA LOAD HOURLY IMPACTS

Hour Ending (Prevailing Time)	Number of Events Full Event Hour	Estimated Reference Load (kWh/hour)	Observed Event Day Load (kWh/hour)	Estimated Load Impact (kWh/hour)	Percent Load Reduction (%)	Per Capita FSL (kW)	FSL Achievement Rate (%)
15	0/3	1,700.7	1,635.9	64.9	4%	455.6	5%
16	0/3	1,678.6	1,066.1	612.4	36%	455.6	50%
17	2/3	1,637.4	479.7	1,157.7	71%	455.6	98%
18	2/3	1,624.6	461.2	1,163.4	72%	455.6	100%
19	2/3	1,601.1	742.0	859.1	54%	455.6	75%
20	2/3	1,597.9	1,234.6	363.3	23%	455.6	32%
21	0/3	1,608.2	1,407.3	200.9	12%	455.6	17%
22	0/3	1,648.3	1,521.4	126.9	8%	455.6	11%
23	0/3	1,673.3	1,563.8	109.6	7%	455.6	9%
24	0/3	1,671.2	1,581.8	89.4	5%	455.6	7%

[18] Note that the event window is shaded if the hour was a partial or full event hour in any of the three PY2024 SCE BIP events

4.2.3 SCE Load Impacts by Customer Subgroupings

To best capture the potential for each customer group on a given event day, results in the tables below are only shown for the largest event, spanning multiple SubLAPs and Industry Types: the September 24, event. Given the emergency events are not represented, these results exclude 21 BIP customers in SubLAP [redacted].

Table 4-13 presents the SCE BIP load impacts by SubLAP for a PY2024 typical event day. To best capture typical ex-post performance by SubLAP, the September 24th event is used to represent the typical BIP event as it includes the majority of SCE BIP participants. As seen, the SubLAPs providing the greatest aggregate load reductions on average in PY2024 include SCEC (42.1 MWh/h) and SCEW (40.4 MWh/h).

TABLE 4-13: SCE BIP LOAD IMPACTS BY SUBLAP SEPTEMBER 24, 2024 EVENT

SubLAP	Number of Participants	Estimated Reference Load (MWh/h)	Observed Load (MWh/h)	Estimated Impact (MWh/h)	Percent Load Reduction (%)	Aggregate FSL (MW)	FSL Achievement Rate (%)
SCEC	128	174.4	42.1	132.4	75.9%	50.9	107%
SCEW	126	184.6	40.4	144.2	78.1%	38.1	98%
SCNW	30	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SCEN	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SCHD	15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SCLD	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 4-7 presents the typical event day load reductions by Industry Type. As seen, the largest share of customer and load impacts belong to the Manufacturing industry type with 200 participants and 212.0 MWh/h of load reductions.

TABLE 4-14: SCE BIP LOAD IMPACTS BY INDUSTRY TYPE SEPTEMBER 24, 2024 EVENT

Industry Type	Number of Participants	Estimated Reference Load (MWh/h)	Observed Load (MWh/h)	Estimated Impact (MWh/h)	Percent Load Reduction (%)	Aggregate FSL (MW)	FSL Achievement Rate (%)
Manufacturing	200	286.9	74.9	212.0	73.9%	88.2	107%
Wholesale, Transport and other Utilities	56	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Agriculture, Mining and Construction	27	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Office, Hotels, Finance, Services	6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Institutional/Government	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Retail Stores	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Schools	1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Other/Unknown	22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.2.4 SCE FSL Achievement Rates

Individual customers varied widely in FSL achievement rates. Figure 4-12, Figure 4-13, and Figure 4-14 present the share of customers and corresponding load impacts during full event hours shown for bins of FSL achievement rates for the September 6th, 9th, and 24th events, respectively. For the September 6th and 9th events, the [redacted] achievement bin has the largest share of participants. For the September 24th test event, however, the 100-125% FSL achievement bin has the largest number of participants, consistent with customers responding more completely with advance event notice.

FIGURE 4-12: DISTRIBUTION OF FSL ACHIEVEMENT AND IMPACTS, SEPTEMBER 6, 2024 EVENT

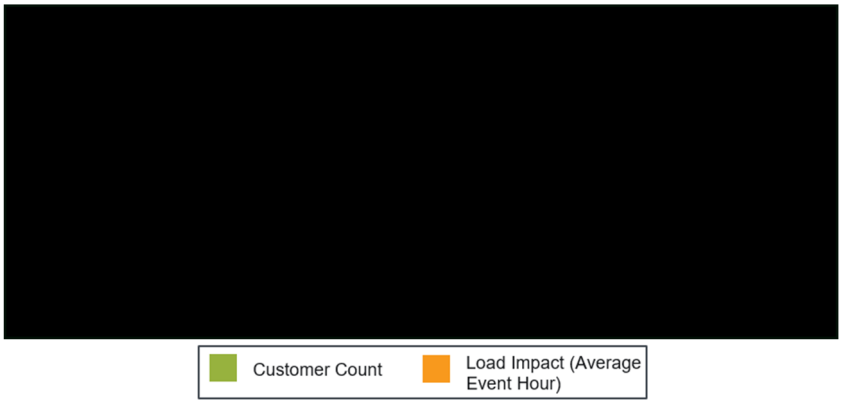
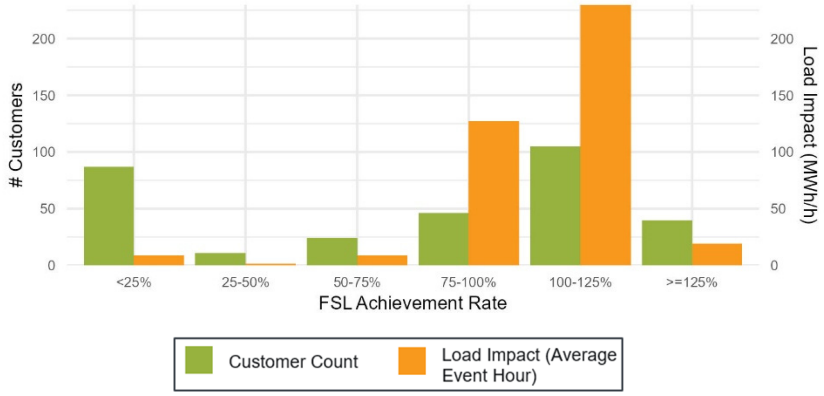


FIGURE 4-13: DISTRIBUTION OF FSL ACHIEVEMENT AND IMPACTS, SEPTEMBER 9, 2024 EVENT

FIGURE 4-14: DISTRIBUTION OF FSL ACHIEVEMENT AND IMPACTS, SEPTEMBER 24, 2024 EVENT



5 EX-ANTE RESULTS

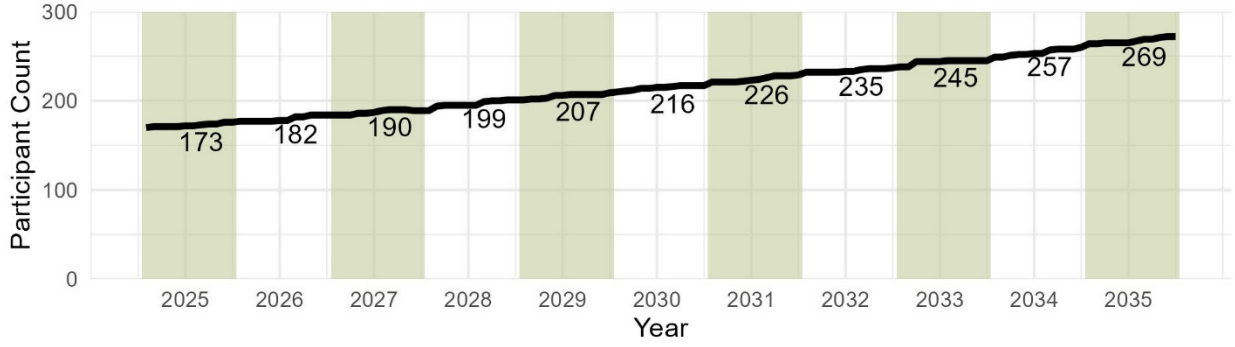
This section presents the ex-ante enrollment forecasts and load impacts for PG&E and SCE. Given that program and portfolio level impacts are very similar for both PG&E and SCE, the ex-ante discussion focuses on program level impacts. However, portfolio level impacts for PY2025 are provided at the end of each IOU's ex-ante discussion. Additionally, ex-ante impacts for SCE were developed for both a four-hour and six-hour dispatch. Since the six-hour dispatch covers all five hours of the RA window, the SCE four-hour dispatch is not discussed in this report. Ex ante scenarios not discussed in this report are presented in the Ex-Ante Table Generators for each IOU (Appendix A). The SCE four-hour dispatch scenarios are also presented in the summary tables located in the Appendix of the Executive Summary.

ENROLLMENT FORECASTS

5.1.1 PG&E Ex-Ante Enrollment Forecasts

PG&E provided Verdant with participant forecasts for PY2025 through PY2035 which are presented in Figure 5-1. This figure shows the month over month forecast growth and the forecasted enrollment count for August of each year. PG&E projects an average annual growth rate of approximately 4.5% such that participation is expected to grow from 173 customers in August of 2025 to 269 customers by August 2035 (272 customers by December 2035) due to increased customer outreach and marketing efforts.

FIGURE 5-1: PG&E PARTICIPANT FORECAST – 2025 THROUGH 2035



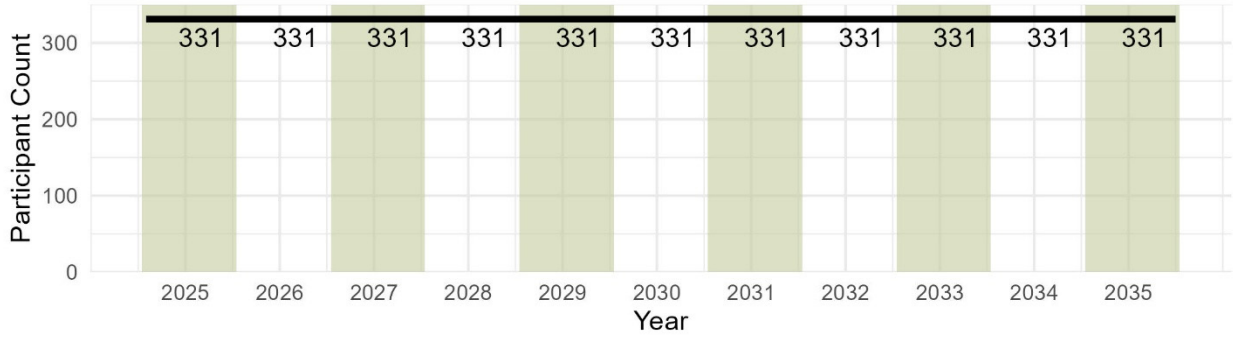
Note: Participant counts are labeled for August of each year. Background color alternates by calendar year.

The PG&E supplied enrollment forecasts were delivered to Verdant with segmented enrollment counts by LCA, SubLAP, Industry Type, Dual Enrollment status, and Size Group. The enrollment forecasts were not segmented by BIP option (BIP15 or BIP30). As a result, the PG&E ex-ante analysis only produced ex-ante impacts for the BIP overall and did not account for notification type enrollment.

5.1.2 SCE Ex-Ante Enrollment Forecasts

SCE provided Verdant with participant forecasts for PY2025 through PY2035 as presented in Figure 5-2. SCE's participant forecasts were segmented by BIP option (BIP15 and BIP30). SCE anticipates 48 BIP15 enrollees and 283 BIP30 enrollees for the entirety of the forecast window (for a total of 331 BIP enrollees). Verdant segmented the enrollment forecasts by LCA, SubLAP, and Size Group based on the distribution of customers in the BIP in January of 2025.

FIGURE 5-2: SCE PARTICIPANT FORECAST – 2025 THROUGH 2035



Note: Participant counts are labeled for August of each year. Background color alternates by calendar year.

5.2 PG&E EX-ANTE MW FORECASTS

Prior to discussing the ex-ante results for PG&E, it is worth visually presenting the ex-ante load shape for context. Figure 5-3 presents the program-level aggregate ex-ante load shape for PY2025 under PG&E 1-in-2 August System Worst Day conditions. PG&E ex-ante results are presented for a four-hour event dispatch in the first four hours of the RA window for all months of the year. The average event hour FSL achievement rate forecasted is 101%. Because customers may rapidly increase load after the end of an event (resulting in snapback) or may continue reduced operations after participating in a BIP event, impacts are modeled through HE24. The yellow highlighted hours indicate the full RA window. The grey dashed lines denote the start and end of the four-hour dispatch. As seen in Figure 5-3, impacts are forecasted to persist throughout the remainder of the day after the end of the event dispatch.

FIGURE 5-3: PG&E BIP PROGRAM LEVEL EX-ANTE LOAD SHAPE (PG&E 1-IN-2 AUGUST SYSTEM WORST DAY, 2025)

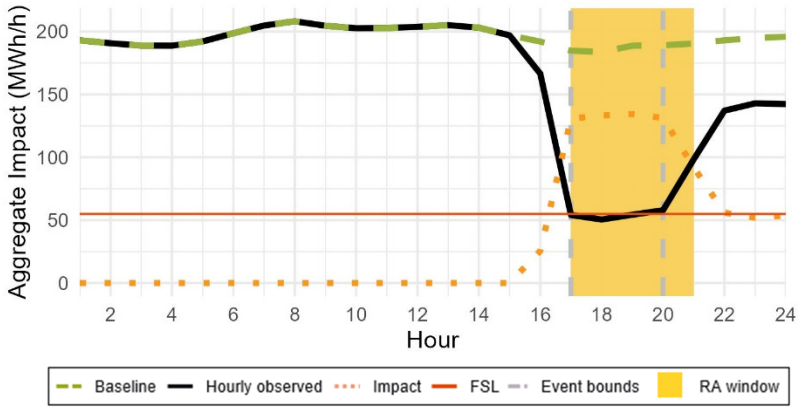


Table **5-1** presents the aggregate and per capita August System Worst Day average event hour ex-ante load impacts over the presumed four-hour dispatch in 2025. Overall, PG&E BIP participants tend to have weather insensitive loads. Additionally, impacts are driven by firm service level (FSL) commitments. As a result, there is little variation in estimated load impacts across weather scenarios. The ex-ante analysis found that the average program level ex-ante impacts for a four-hour dispatch in August 2025 ranged from 132.4 MWh/h to 133.1 MWh/h depending on the weather scenario. Across all weather scenarios, the ex-ante analysis anticipates a 71% load reduction and a 101% FSL achievement rate after accounting for participant changes in FSL commitments.

TABLE 5-1: PG&E PROGRAM LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) FOR A 4-HOUR DISPATCH

Weather Source	Weather Year	Event Dispatch (HE)	Number of Participants	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh/h)	FSL Achievement Rate (%)
				Ref. Load	Load Impact	Ref. Load	Load Impact			
CAISO	1-in-10	17 - 20	173	187.2	133.1	1,082.10	769.2	71%	54.9	101%
CAISO	1-in-2	17 - 20	173	186.7	132.5	1,079.40	765.8	71%	54.9	101%
Utility	1-in-10	17 - 20	173	187.1	132.9	1,081.60	768.0	71%	54.9	101%
Utility	1-in-2	17 - 20	173	186.6	132.4	1,078.60	765.4	71%	54.9	101%

Table 5-2 presents the average aggregate and per capita August System Worst Day load impacts over the full five-hour RA window. Given that the fifth hour of the RA window is not an event hour, the average impacts are lower than the average of the four-hour dispatch. However, impacts are still expected to persist after the end of the four-hour BIP event. The ex-ante analysis found that the average August program level ex-ante impacts over the full RA window ranged from 124.4 MWh/h to 124.9 MWh/h

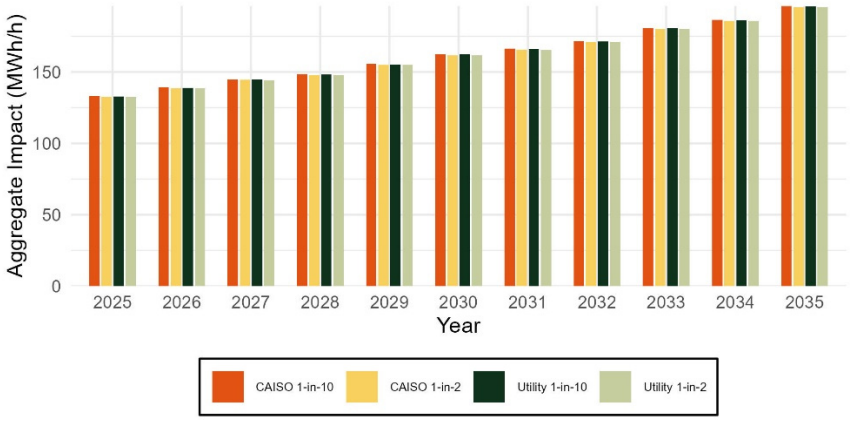
depending on the weather scenario. Across all weather scenarios, the ex-ante analysis anticipates a 66% load reduction and a 94% FSL achievement rate.

TABLE 5-2: PG&E PROGRAM LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) OVER THE 5-HOUR RA WINDOW

Weather Source	Weather Year	RA Window (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
				Ref. Load	Load Impact	Ref. Load	Load Impact			
CAISO	1-in-10	17 – 21	173	187.9	124.9	1,086.10	722.0	66%	54.9	94%
CAISO	1-in-2	17 – 21	173	187.5	124.4	1,083.80	719.2	66%	54.9	94%
Utility	1-in-10	17 – 21	173	187.9	124.8	1,086.20	721.4	66%	54.9	94%
Utility	1-in-2	17 - 21	173	187.4	124.4	1,083.10	718.7	66%	54.9	94%

Figure 5-4 presents the predicted average event hour (four-hour dispatch) aggregate load impact for each year in the participant forecast. This figure shows that the difference in predicted load impacts does not vary greatly by weather scenario. Impacts are forecast to grow across program years due to increases in the participant forecast. At its highest peak, the ex-ante load impacts (~217 MWs) in October of 2035 are still below the reliability MW cap for PG&E.

FIGURE 5-4: PG&E PROGRAM AUGUST SYSTEM WORST DAY YEARLY AVERAGE EVENT HOUR IMPACTS



5.2.1 PG&E Hourly Ex-Ante Load Impacts

Table 5-3 shows the forecasted 2025 aggregate load impacts for HE16 through the end of the day for each month in the PG&E System Worst Day 1-in-2 weather scenario. Cells are colored by event hour and RA window, where green cells are event hours in the RA window and orange cells are non-event hours in the RA window.

Table 5-4 shows the same information for the PG&E System Worst Day 1-in-10 weather scenario. Impacts do not vary greatly between the weather scenarios as most large BIP customers are not weather sensitive. In most months, impacts are marginally higher on average in the 1-in-10 scenario relative to the 1-in-2 scenario. In February and March, impacts are slightly higher in the 1-in-2 scenario relative to the 1-in-10 scenario because some customers are expected to consume more energy in colder temperatures (e.g., are winter heating sensitive). As such, in the 1-in-10 scenario, where February and March are forecasted to be warmer relative to the 1-in-2 scenario, these customers are forecasted to use less energy.

TABLE 5-3: 2025 PG&E PROGRAM 1-IN-2 SYSTEM WORST DAY HOURLY TABLE (HE16 THROUGH HE24, MWH/H)

Hour Ending	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
16	20.5	22.9	0.0	0.0	0.0	25.0	25.1	25.5	25.2	25.7	24.4	20.8
17	117.3	122.5	22.6	23.5	26.7	132.2	129.5	130.7	133.0	132.7	131.5	119.7
18	122.0	125.6	123.8	126.5	129.6	137.9	133.2	133.3	136.8	144.4	138.9	124.1
19	122.0	126.2	134.2	136.9	138.4	138.2	133.2	134.4	133.7	145.0	138.9	124.3
20	118.7	123.7	131.6	136.1	136.2	136.1	130.3	131.2	134.4	143.3	136.2	120.6
21	80.5	83.6	128.3	138.4	137.9	89.4	85.7	92.0	92.3	91.3	87.8	80.2
22	50.9	54.2	87.2	93.5	93.7	53.5	50.3	55.9	56.1	55.8	55.0	49.6
23	46.5	49.8	51.8	53.3	53.5	48.0	45.8	52.0	52.3	51.4	50.5	45.4
24	49.4	51.5	45.2	45.0	28.4	49.0	45.9	53.6	50.7	53.0	55.1	48.7

Event hour in RA window Non-event hour in RA window

TABLE 5-4: 2025 PG&E PROGRAM 1-IN-10 SYSTEM WORST DAY HOURLY TABLE (HE16 THROUGH HE24, MWH/H)

Hour Ending	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
16	20.5	22.8	0.0	0.0	0.0	25.0	25.1	25.6	25.3	25.8	24.3	20.8
17	117.4	122.3	22.2	23.6	26.7	132.7	129.7	131.0	134.5	134.2	131.0	119.8
18	122.1	125.5	120.0	126.6	130.4	138.7	133.5	133.9	138.6	146.4	138.5	124.1
19	122.1	126.1	129.8	137.7	139.7	139.2	133.4	134.7	135.9	146.7	138.9	124.4
20	118.8	123.6	128.1	137.2	137.7	137.2	130.6	131.9	136.7	145.3	136.3	120.7
21	80.6	83.5	126.3	140.0	138.8	89.8	85.7	92.5	93.3	92.4	87.9	80.3
22	51.0	54.2	86.4	94.7	94.2	53.5	50.2	56.0	56.1	55.8	55.1	49.7
23	46.6	49.8	51.6	53.4	53.2	48.0	45.7	52.0	52.2	51.4	50.5	45.4
24	49.4	51.5	45.1	45.3	28.2	49.0	45.9	53.6	50.7	53.1	55.1	48.7

Event hour in RA window Non-event hour in RA window

5.2.2 PG&E Portfolio-Level Impacts

Table 5-5 and Table 5-6 present the August System Worst Day average hourly portfolio-level ex-ante impacts for the event hours in a four-hour dispatch and over the full RA window in 2025, respectively. Overall, program-level and portfolio-level ex-ante impacts are very similar. The only difference between

them is that the portfolio-level impacts account for dual participation in the ELRP. In portfolio-level impacts, dual BIP and ELRP program participants have their BIP ex-ante impacts capped by their FSL. However, since the ELRP season only occurs in summer months (May through October), program and portfolio-level impacts are the same in the winter months. Additionally, the ELRP programs that are open to BIP customers are planned to sunset at the end of 2027. As a result, portfolio and program-level ex-ante impacts are the same for all months starting in 2028.

The aggregate portfolio-level impacts for an average event hour in a four-hour dispatch presented in Table 5-5 are roughly 2 MWh/h lower than program-level impacts (shown in Table 5-1 above) and range from 130.7 MWh/h to 131.2MWh/h depending on the weather scenario.

TABLE 5-5: PG&E PORTFOLIO-LEVEL EX-ANTE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) AVERAGE IMPACTS OF A 4-HOUR DISPATCH

Weather Source	Weather Year	Event Dispatch (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
				Ref. Load	Load Impact	Ref. Load	Load Impact			
CAISO	1-in-10	17 - 20	173	187.2	131.2	1,082.1	758.6	70%	54.9	99%
CAISO	1-in-2	17 - 20	173	186.7	130.7	1,079.4	755.6	70%	54.9	99%
Utility	1-in-10	17 - 20	173	187.1	131.1	1,081.6	757.6	70%	54.9	99%
Utility	1-in-2	17 - 20	173	186.6	130.7	1,078.6	755.5	70%	54.9	99%

Similarly, the average August System Worst Day portfolio-level impacts over the full five-hour RA window presented in Table 5-6 are roughly 1.5 MWh/h lower than program-level impacts (shown in Table 5-2 above) and range from 122.9 MWh/h to 123.3 MWh/h depending on the weather scenario.

TABLE 5-6: PG&E PORTFOLIO-LEVEL EX-ANTE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) AVERAGE IMPACTS OVER THE 5-HOUR RA WINDOW

Weather Source	Weather Year	Event Dispatch (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
				Ref. Load	Load Impact	Ref. Load	Load Impact			
CAISO	1-in-10	17 - 21	173	187.9	123.3	1,086.1	712.7	66%	54.9	93%
CAISO	1-in-2	17 - 21	173	187.5	122.9	1,083.8	710.3	66%	54.9	93%
Utility	1-in-10	17 - 21	173	187.9	123.2	1,086.2	712.3	66%	54.9	93%
Utility	1-in-2	17 - 21	173	187.4	122.9	1,083.1	710.1	66%	54.9	93%

5.3 SCE EX-ANTE MW FORECASTS

Prior to discussing the ex-ante results for SCE it is worth visually presenting the ex-ante load shape for context. Figure 5-5 presents the program-level aggregate PY2025 ex-ante load shape for SCE's BIP under 1-in-2 SCE August System Worst Day conditions. SCE ex-ante results are presented for a six-hour event dispatch starting in HE17 for all months of the year and completely overlap with the RA window. The average event hour FSL achievement rate forecasted is 95%. Because customers may rapidly increase load after the end of an event (resulting in snapback) or may continue reduced operations after participating in a BIP event, impacts are modeled through hour ending (HE) 24. The yellow highlighted hours indicate the full resource adequacy (RA) window. The grey dashed lines denote the start and end of the six-hour dispatch. As shown in Figure 5-5, impacts are forecasted to persist throughout the remainder of the day after the end of the event dispatch, with an expected load reduction in this scenario of 23% two hours after the end of the event. Load reductions are expected to decrease each hour after the event, returning to less than 10% within 3-4 hours after the end of the event.

FIGURE 5-5: SCE BIP PROGRAM 1-IN-2 2025 AUGUST SYSTEM WORST DAY FORECASTED LOAD SHAPE

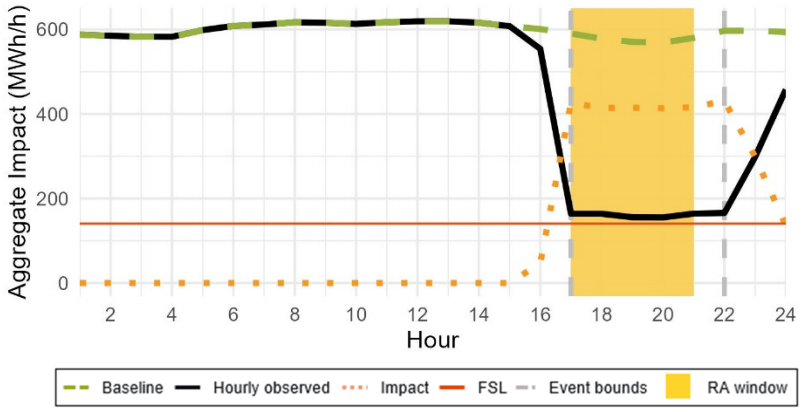


Table 5-7 presents the aggregate and per capita August System Worst Day average event hour load impacts over the presumed six-hour dispatch across all BIP options, as well as the BIP15 and BIP30 options separately. Overall, BIP participants tend to have weather insensitive loads and impacts are typically driven by firm service level (FSL) commitments. As a result, there is little variation in estimated load impacts across the various weather scenarios. The ex-ante analysis found that the average program-level ex-ante impacts for a six-hour dispatch in August of PY 2025 across all BIP options ranged from 419.2 MWh/h to 419.6 MWh/h depending on the weather scenario. Across all weather scenarios, the ex-ante analysis anticipates a 72% load reduction and a 95% FSL achievement rate after accounting from participant changes in FSL commitments. Further, the ex-ante analysis anticipates that approximately 53% of BIP total load impacts will be attributable to BIP15 customers despite them comprising only 14% of

participant counts. BIP15 customers have per capita reference loads more than 4,000 kWh/h higher than BIP30 customers and average FSL achievement rates of 102% as opposed to 88% for BIP 30 customers.

TABLE 5-7: SCE PROGRAM-LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) OF A 6-HOUR DISPATCH

BIP Option	Weather Source	Weather Year	Event Dispatch (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
					Ref. Load	Load Impact	Ref. Load	Load Impact			
All	CAISO	1-in-10	17 - 22	331	580.9	419.4	1,755.0	1,267.2	72%	140.4	95%
All	CAISO	1-in-2	17 - 22	331	580.5	419.2	1,753.9	1,266.6	72%	140.4	95%
All	Utility	1-in-10	17 - 22	331	581.0	419.6	1,755.2	1,267.5	72%	140.4	95%
All	Utility	1-in-2	17 - 22	331	580.7	419.3	1,754.3	1,266.7	72%	140.4	95%
BIP15	CAISO	1-in-10	17 - 22	48	251.1	220.5	5,230.3	4,593.0	88%	34.5	102%
BIP15	CAISO	1-in-2	17 - 22	48	251.1	220.5	5,232.2	4,594.8	88%	34.5	102%
BIP15	Utility	1-in-10	17 - 22	48	251.1	220.5	5,230.7	4,593.4	88%	34.5	102%
BIP15	Utility	1-in-2	17 - 22	48	251.1	220.5	5,231.1	4,593.8	88%	34.5	102%
BIP30	CAISO	1-in-10	17 - 22	283	329.8	198.9	1,165.5	703.1	60%	105.9	89%
BIP30	CAISO	1-in-2	17 - 22	283	329.4	198.7	1,163.9	702.0	60%	105.9	89%
BIP30	Utility	1-in-10	17 - 22	283	329.9	199.0	1,165.7	703.3	60%	105.9	89%
BIP30	Utility	1-in-2	17 - 22	283	329.6	198.8	1,164.6	702.4	60%	105.9	89%

Table 5-8 presents the aggregate and per capita August System Worst Day average ex-ante load impacts over the five-hour RA window and excludes the sixth hour of dispatch. This view of results focuses on the hours most important to resource adequacy. The ex-ante analysis found that average program-level ex-ante impacts over the RA window in August 2025 ranges from 416.9 MWh/h to 417.0 MWh/h depending on the weather scenario. Across all weather scenarios, the ex-ante analysis anticipates a 72% load reduction and a 95% FSL achievement rate after accounting for participant changes in FSL commitments. Aggregate impacts are slightly smaller when only looking over the RA window due to lower reference loads between HE17 and HE21 relative to HE22. This is likely the result of time-of-use (TOU) rates that make energy more expensive during the peak period (4pm to 9pm) which coincides with the RA window. Similar to results for the full event window, BIP15 customers are expected to deliver 52% of the load impacts across the full RA window while comprising 14% of the program participants.

TABLE 5-8: SCE PROGRAM-LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) OVER THE 5-HOUR RA WINDOW

Option	Weather Source	Weather Year	RA Window (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
					Ref. Load	Load Impact	Ref. Load	Load Impact			
All	CAISO	1-in-10	17 – 21	331	577.5	416.9	1,744.8	1259.6	72%	140.4	95%
All	CAISO	1-in-2	17 – 21	331	577.3	416.9	1,744.2	1259.5	72%	140.4	95%
All	Utility	1-in-10	17 – 21	331	577.6	417.0	1,745.1	1259.9	72%	140.4	95%
All	Utility	1-in-2	17 – 21	331	577.5	417.0	1,744.6	1259.6	72%	140.4	95%
BIP15	CAISO	1-in-10	17 – 21	48	250.0	218.8	5,208.7	4559.4	88%	34.5	102%
BIP15	CAISO	1-in-2	17 – 21	48	250.1	218.9	5,209.7	4560.3	88%	34.5	102%
BIP15	Utility	1-in-10	17 – 21	48	250.0	218.8	5,208.9	4559.6	88%	34.5	102%
BIP15	Utility	1-in-2	17 – 21	48	250.0	218.8	5,209.0	4559.6	88%	34.5	102%
BIP30	CAISO	1-in-10	17 – 21	283	327.5	198.1	1,157.3	700.0	60%	105.9	89%
BIP30	CAISO	1-in-2	17 – 21	283	327.3	198.0	1,156.4	699.6	60%	105.9	89%
BIP30	Utility	1-in-10	17 – 21	283	327.6	198.2	1,157.6	700.3	61%	105.9	89%
BIP30	Utility	1-in-2	17 - 21	283	327.4	198.0	1,157.0	699.9	60%	105.9	89%

5.3.1 SCE Hourly Ex-Ante Load Impacts

Table 5-9 shows the forecasted aggregate load impacts for HE16 (the hour preceding the six-hour dispatch) through the end of the day for each month under the SCE System Worst Day 1-in-2 weather scenario. Because ex-ante enrollment is static from 2025 to 2035, the hourly table represents the hourly forecasted load reductions for all years in the ex-ante forecast. Cells are colored by event hour and RA window, where dark green cells are event hours in the RA window and light green cells are event hours outside the RA window. Table 5-10 shows the same information for the utility 1-in-10 weather year. Impacts do not vary greatly between the weather years because most large customers are not weather sensitive. However, impacts are somewhat higher for most of the year in the 1-in-10 scenario. In February and November, impacts are somewhat lower for the 1-in-10 weather year. This decrease can be attributed to winter heating sensitive customers in these months that are predicted to use less heating energy in warmer winter months.

TABLE 5-9: SCE PROGRAM 1-IN-2 SYSTEM WORST DAY HOURLY TABLES (HE16 THROUGH HE24, MWH/H)

Hour Ending	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
16	33.0	33.7	28.1	39.7	40.2	47.8	45.4	46.8	41.9	44.0	43.8	34.6
17	414.4	413.6	395.5	402.1	410.4	448.8	426.9	426.3	437.7	443.9	465.1	453.2
18	391.3	391.4	378.2	397.8	393.2	424.9	409.7	414.3	418.9	423.7	447.0	428.5
19	393.0	392.5	377.6	405.5	397.8	425.1	407.0	414.8	397.6	420.4	449.7	425.7
20	393.6	390.8	377.8	411.0	397.5	425.2	406.9	413.4	403.3	413.3	451.3	421.3
21	394.1	391.3	375.2	419.4	399.1	429.0	409.1	415.8	407.0	408.5	448.4	422.7
22	398.1	397.4	386.3	433.2	400.1	436.2	421.6	430.9	422.8	418.8	441.6	424.7
23	268.9	275.5	234.2	286.8	280.3	300.4	293.8	298.7	301.3	299.9	306.9	296.5
24	179.6	185.2	95.6	134.8	137.5	140.6	137.4	136.2	136.2	138.5	141.6	201.8

Event hour in RA window Event hour outside RA window

TABLE 5-10: SCE PROGRAM 1-IN-10 SYSTEM WORST DAY HOURLY TABLES (HE16 THROUGH HE24, MWH/H)

Hour Ending	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
16	32.7	34.1	30.4	39.3	40.1	47.7	45.2	46.8	41.7	44.0	44.1	34.5
17	421.1	410.3	396.0	406.1	411.0	449.0	427.3	426.5	438.1	444.2	466.2	455.7
18	394.6	388.4	381.1	397.2	394.1	425.4	410.1	414.6	419.3	424.1	446.8	429.5
19	394.2	388.6	381.1	404.0	399.7	425.7	408.9	414.8	398.2	420.8	447.9	425.4
20	394.8	388.9	380.0	411.2	397.8	425.6	406.5	413.4	403.3	413.5	448.0	420.8
21	396.3	390.3	377.2	420.3	398.5	429.9	405.6	415.9	407.6	408.7	443.1	422.6
22	400.8	397.1	382.7	447.2	400.5	436.4	420.9	432.0	428.3	420.6	449.0	425.1
23	271.9	274.9	233.8	272.7	280.6	299.9	294.8	299.5	302.4	300.7	301.5	297.2
24	182.6	184.5	100.5	138.6	137.6	140.5	137.3	136.2	136.3	138.6	142.6	202.5

Event hour in RA window Event hour outside RA window

5.3.2 SCE Portfolio-Level Impacts

Table 5-11 and Table 5-12 present the August System Worst Day average hourly portfolio-level ex-ante impacts for the event hours in a six-hour dispatch and over the five-hour RA window in 2025, respectively. Overall, program-level and portfolio-level ex-ante impacts are very similar. The only difference between them is portfolio-level impacts account for dual participation in the ELRP. In portfolio-level impacts, dual BIP and ELRP program participants have their BIP ex-ante impacts capped by their FSL. However, since the ELRP season only occurs in summer months (May through October), program and portfolio-level impacts are the same in winter months. Additionally, the ELRP programs that are open to BIP customers are planned to sunset at the end of 2027. As a result, portfolio and program-level ex-ante impacts are the same for all months starting in 2028. For all hours outside of the RA window, portfolio and program-level impacts are also the same (as the ELRP event window aligns with the RA window hours). As with program-

level impacts, BIP15 customers are expected to comprise the majority of load impacts both at the per capita and aggregate level.

As presented in Table 5-11 portfolio-level impacts over the average event hour in a six-hour dispatch are roughly 5 MWh/h lower than program level impacts and range from 413.5 MWh/h to 413.9 MWh/h depending on the weather scenario.

TABLE 5-11: SCE PORTFOLIO-LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) OF A 6-HOUR DISPATCH

BIP Option	Weather Source	Weather Year	Event Dispatch (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
					Ref. Load	Load Impact	Ref. Load	Load Impact			
All	CAISO	1-in-10	17 - 22	331.0	580.9	413.8	1,755.0	1,250.1	71%	140.4	94%
All	CAISO	1-in-2	17 - 22	331.0	580.5	413.5	1,753.9	1,249.5	71%	140.4	94%
All	Utility	1-in-10	17 - 22	331.0	581.0	413.9	1,755.2	1,250.4	71%	140.4	94%
All	Utility	1-in-2	17 - 22	331.0	580.7	413.6	1,754.3	1,249.6	71%	140.4	94%
BIP15	CAISO	1-in-10	17 - 22	48.0	251.1	217.8	5,230.3	4,536.4	87%	34.5	101%
BIP15	CAISO	1-in-2	17 - 22	48.0	251.1	217.8	5,232.2	4,538.2	87%	34.5	101%
BIP15	Utility	1-in-10	17 - 22	48.0	251.1	217.8	5,230.7	4,536.8	87%	34.5	101%
BIP15	Utility	1-in-2	17 - 22	48.0	251.1	217.8	5,231.1	4,537.2	87%	34.5	101%
BIP30	CAISO	1-in-10	17 - 22	283.0	329.8	196.0	1,165.5	692.7	59%	105.9	88%
BIP30	CAISO	1-in-2	17 - 22	283.0	329.4	195.7	1,163.9	691.6	59%	105.9	88%
BIP30	Utility	1-in-10	17 - 22	283.0	329.9	196.1	1,165.7	692.9	59%	105.9	88%
BIP30	Utility	1-in-2	17 - 22	283.0	329.6	195.9	1,164.6	692.0	59%	105.9	88%

As presented in Table 5-12, portfolio-level impacts over in the five-hour RA window are roughly 7 MWh/h lower than program-level impacts and range from 410.1 MWh/h to 410.2 MWh/h depending on the weather scenario.

VERDANT

TABLE 5-12: SCE PORTFOLIO-LEVEL EX-ANTE AVERAGE IMPACTS (AUGUST SYSTEM WORST DAY, 2025) OVER A 5-HOUR RA WINDOW

BIP Option	Weather Source	Weather Year	RA Window (HE)	Number of Customers	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
					Ref. Load	Load Impact	Ref. Load	Load Impact			
All	CAISO	1-in-10	17 – 21	331	577.5	410.1	1,744.8	1,239.1	71%	140.4	94%
All	CAISO	1-in-2	17 – 21	331	577.3	410.1	1,744.2	1,239.0	71%	140.4	94%
All	Utility	1-in-10	17 – 21	331	577.6	410.2	1,745.1	1,239.4	71%	140.4	94%
All	Utility	1-in-2	17 – 21	331	577.5	410.2	1,744.6	1,239.1	71%	140.4	94%
BIP15	CAISO	1-in-10	17 – 2	48	250.0	215.6	5,208.7	4,491.5	86%	34.5	100%
BIP15	CAISO	1-in-2	17 – 21	48	250.1	215.6	5,209.7	4,492.4	86%	34.5	100%
BIP15	Utility	1-in-10	17 – 21	48	250.0	215.6	5,208.9	4,491.6	86%	34.5	100%
BIP15	Utility	1-in-2	17 – 21	48	250.0	215.6	5,209.0	4,491.7	86%	34.5	100%
BIP30	CAISO	1-in-10	17 – 21	283	327.5	194.5	1,157.3	687.5	59%	105.9	88%
BIP30	CAISO	1-in-2	17 – 21	283	327.3	194.5	1,156.4	687.2	59%	105.9	88%
BIP30	Utility	1-in-10	17 – 21	283	327.6	194.7	1,157.6	687.8	59%	105.9	88%
BIP30	Utility	1-in-2	17 - 21	283	327.4	194.5	1,157.0	687.4	59%	105.9	88%

VERDANT

6 COMPARISON OF RESULTS

This section presents a comparison of PY2024 results with prior years. For both PG&E and SCE the following comparisons are made:

- Previous versus current ex-post results
- Previous ex-ante versus current ex-post results
- Previous versus current ex-ante
- Current ex-post versus current ex-ante

6.1 PG&E COMPARISON OF RESULTS

6.1.1 PG&E Previous Versus Current Ex-Post

Table 6-1 shows the average aggregate and per customer load impacts for the average event day in PY2023 and PY2024. Note that the number of customers per event is lower for the average event day in PY2024 than PY2023 as it represents the average of the September 24, 2024 test event and the October 21, 2024 re-test event. However, the PY2023 'average' event represented only a single five minute event that dispatched 214 customers. The difference in event duration likely explains most of the difference in performance between PY2024 and PY2023 when examined at the hour level.

TABLE 6-1: PG&E COMPARISON OF PY2023 AND PY2024 EX-POST LOAD IMPACTS

Evaluation Year	Estimate Type	Number of Customers per Event	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2023	Avg. Event Day	214	164	36	766	168	22%	48	31%
2024	Avg. Event Day	97	79	52	819	536	65%	25	96%

6.1.2 PG&E Previous Ex-Ante Versus Current Ex-Post

Table 6-2 compares the PY2023 ex-ante estimate for 2024 (PG&E August 1-in-2 typical event day) to the PY2024 ex-post average event day. Differences in aggregate load impacts and FSLs are largely attributable to the difference in the number of customers deployed in the average event. Ex ante predictions demonstrate the aggregate capacity of a full program dispatch, while the average ex-post event day is the realized aggregate impacts across multiple deployments in the program year. As such, the more relevant

comparison is between the per capita load impacts, the percent load reduction and the FSL achievement rates.

TABLE 6-2: PG&E COMPARISON OF PY2023 EX-ANTE AND PY2024 EX-POST LOAD IMPACTS

Evaluation Year	Estimate Type	Number of Participants	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2023	Ex-ante for 2024	195	194	144	999	739	74%	50	97%
2024	Ex-post Avg. Event Day	97	79	52	819	536	65%	25	96%

The data presented in Table 6-2 show that the FSL achievement rates are similar between the PY2023 ex-ante forecast and the PY2024 ex-post average event day. The per capita reference loads and load impacts, however, are observed to be lower in the ex-post average event day than the ex-ante forecast. The smaller ex-post load impacts are driven by the combination of the per capita reference load and the FSL commitments. The FSL in the ex-post average event day and the ex-ante forecast are very similar on a per capita basis, such that the lower per capita reference load with a similar per capita FSL leads to a smaller ex-post load impact. Several factors are likely contributing to these findings including:

- **Events Included in the Average Event Day:** The PY2024 average event day includes both a large test event and a smaller re-test event. Event impacts for the September 2024 event were higher than for the average event, at 607 kWh/h per customer, but still lower than the prior year's ex-ante forecast.

- **Forecast Month:** The ex-post average event day represents an average of a September and October event. The PY2023 ex-ante forecast in Table 6-2 is an August 1-in-2 typical event day. The PY2023 ex-ante per capita impacts were estimated to be lower for September and October of 2024 (under monthly system peak days) relative to the August 2024 forecast (with per capita impacts of 729 kWh/h and 722 kWh/h, respectively). However, the September and October forecasted values are still larger than the PY2024 ex-post impacts.

- **Event Window:** The PY2024 average event hours are represented by HE17 and HE18, while the ex-ante forecasted event window included HE17 to HE21. During the PY2024 event, the load impact for HE17 was less than load impacts for HE18. The impacts used to develop the PY2023 ex-ante forecast include an initial hour with a lower impact and three subsequent hours with larger impacts. The longer event window, combined with the three high performing hours in PY2023 ex-ante relative to the PY2024 ex-post event, contributes to the PY2023 higher load impact forecast.

- **Day of the Week of Ex-Post Events:** Some customer loads are highly dependent on the day of week. The PY2023 ex-ante model's forecast reference loads for an 'average weekday', whereas the ex-post model's estimate reference loads for specific event days which occurred on a Tuesday and Monday for the September and October events, respectively. In Verdant's review of 2024 BIP participant loads, it was found that reference loads were often lower earlier in the week, especially on Mondays. Given

that impacts are driven by the combination of reference loads and FSL commitments, impacts were smaller as there was less load available for curtailment in the ex-post relative to the ex-ante forecast.

6.1.3 PG&E Previous Versus Current Ex-Ante

Table 6-3 shows a comparison of the PY2023 and PY2024 ex-ante forecasts for PY2025. The PY2024 participant forecasts include a drop in BIP enrollment from PY2024 to PY2025, based on observed de-enrollments at the end of 2024, resulting in a smaller enrollment forecast for 2025 relative to the PY2023 enrollment forecasts. As such, the PY2024 forecast of the 2025 aggregate load impacts are slightly lower than the PY2023 forecast despite larger per capita load impacts in the PY2024 forecast. However, the difference in per capita impacts between the two ex-ante forecasts (27 kWh/h) is within the typical error bounds for these measurements and, as such, should not be too heavily emphasized.

TABLE 6-3: PG&E COMPARISON OF PY2023 EX-ANTE AND PY2024 EX-ANTE LOAD IMPACTS

Evaluation Year	Estimate Type	Number of Participants	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2023	Ex-ante for 2025	205	205	151	999	738	74%	52	99%
2024	Ex-ante for 2025	173	187	132	1,079	765	71%	55	101%

6.1.4 PG&E Current Ex-Post Versus Current Ex-Ante

Table 6-4 shows a comparison of the PY2024 ex-post average event day and ex-ante forecasts for PY2025 under a PG&E August System Worst Day 1-in-2 weather year to demonstrate how program performance is expected to change between the current and future program year. Again, it is most relevant to focus on per capita results due to different interpretations of participant counts between the ex-post average event day and ex-ante enrollment forecast.

TABLE 6-4: PG&E COMPARISON OF PY2024 EX-POST (AVERAGE EVENT) AND EX-ANTE (PG&E AUGUST SYSTEM WORST DAY 1-IN-2, 2025) IMPACTS

Evaluation Year	Estimate Type	Number of Participants	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2024	Ex-post Avg. Event	97	79.5	52.0	819.3	536.1	65%	25	96%
2024	Ex-ante for 2025	173	186.6	132.4	1,078.6	765.4	71%	55	101%

Program performance is expected to improve in 2025 relative 2024 average event day. This finding is likely due to several factors including:

- **De-enrollment/FSL increases of underperforming customers**: PG&E gave underperforming customers the option to de-enroll from BIP, increase their FSL commitments, or participate in another re-test event. Several underperforming customers opted to de-enroll or increase their FSL commitments. As such, the expected overall FSL achievement rate for 2025 exceeds that of 2024. Additionally, several smaller capacity customers de-enrolled from the program, leading to an increase in the forecasted per capita reference loads.

- **Inclusion of the re-test event:** The ex-post average event day includes the October re-test event, which included low performing BIP customers. As result, the PY2024 average event day over emphasizes low performers relative to the ex-ante analysis. Additionally, some of these low performing customers changed their FSLs after the re-test event making it easier for them to perform as expected in BIP events.

6.2 SCE COMPARISON OF RESULTS

In the following comparison of SCE results, the September 24th event is used to represent the PY2024 ex-post in lieu of the average event day because there were no full event hours that overlapped among all three PY2024 events, which makes the average event day less representative of actual ex-post performance.

6.2.1 SCE Previous Versus Current Ex-Post

Table 6-5 shows the average aggregate and per capita impacts for the average event day in PY2023 and the September 24th event in PY2024. Note that the PY2023 average event represents a single event that was less than one hour in duration. The difference in event duration explains most of the increase in performance listed in Table 6-5 for PY2024 relative to PY2023 where the impacts are presented at an hourly level.

TABLE 6-5: SCE COMPARISON OF PY2023 (AVERAGE EVENT DAY) AND PY2024 (SEPTEMBER 24TH) EX-POST IMPACTS

Evaluation Year	Estimate Type	Number of Participants	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2023	Avg. Event Day	351	616	344	1,755	980	56%	136	72%
2024	Sept. 24th	314	536	396	1,705	1,262	74%	146	102%

6.2.2 SCE Previous Ex-Ante Versus Current Ex-Post

Table 6-6 shows the PY2023 ex-ante estimates for 2025 (under SCE August 1-in-2 typical event day conditions) and the PY2024 ex-post results for September 24th. As seen, there are differences in aggregate load impacts and FSLs (MW) that are largely attributable to the difference in the number of customers dispatched in ex-post and the PY2023 ex-ante enrollment forecasts.

Ex ante predictions demonstrate the capability of a full program deployment, where the ex-post captures the realized aggregate impacts for the participants dispatched in an event. As such, the more relevant comparison is of the per capita load impacts, the percent load reduction and FSL achievement rates. The difference between ex-ante and ex-post per capita load impacts is less than 20 kWh/h. This difference is well within the typical uncertainty range for average event hour impact values, meaning they are statistically indistinguishable. As such, PY2024 performance closely resembles the ex-ante forecasts.

TABLE 6-6: SCE COMPARISON OF PY2023 EX-ANTE AND EVENT EX-POST (SEPTEMBER 24TH) LOAD IMPACTS

Evaluation Year	Estimate Type	Number of Customers per Event	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2023	Ex-ante for 2024	325	584	416	1,797	1,280	71%	170	101%
2024	September 24th	314	536	396	1,705	1,262	74%	146	102%

6.2.3 SCE Previous Versus Current Ex-Ante

Table 6-7 presents the PY2023 and PY2024 ex-ante forecasts for 2025 (under SCE 1-in-2 August typical event day conditions). There is little difference between PY2023 and PY2024 ex-ante estimates for 2025. The ex-ante per capita load impacts differ by less than 20 kWh/h, which is well within the typical uncertainty range and the enrollment forecasts differ by only 6 participants.

It is worth noting that while the per capita impacts between forecasts are virtually the same there is a difference in FSL achievement rates between program years. However, it should be noted that PY2024 ex-ante forecasts contain lower FSL commitments (i.e. a greater decrease in aggregate load). This change is largely attributable to customers de-enrolling from the program and a small number of customers reducing their FSL commitments by multiple MWs. The overall percentage load reductions and aggregate impacts remain similar.

TABLE 6-7: SCE COMPARISON OF PY2023 EX-ANTE AND PY2024 EX-ANTE (SCE 1-IN-2 TYPICAL EVENT DAY, 2025)

Evaluation Year	Estimate Type	Number of Customers per Event	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2023	Ex-ante for 2025	325	584	416	1,797	1,280	71%	170	101%
2024	Ex-ante for 2025	331	580	419	1,754	1,267	72%	140	95%

6.2.4 SCE Current Ex-Post Versus Current Ex-Ante

Table 6-8 shows a comparison of PY2024 ex-post results and the ex-ante forecast (under SCE 1-in-2 August System Worst Day conditions for 2025) to demonstrate how program performance is expected change between the current and future program year. Again, it is most relevant to focus on per capita results as ex-ante predictions represent full program deployment and not all customers were dispatched for the September 24th event. Once again, per capita load impacts are statistically indistinguishable and lower forecasted FSL achievement rates are balanced by lower average FSL commitments.

TABLE 6-8: SCE COMPARISON OF PY2024 EX-POST (SEPTEMBER 24TH) AND PY2024 EX-ANTE (SCE 1-IN-2 AUGUST WORST DAY, 2025)

Program Year Evaluation	Estimate Type	Number of Customers per Event	Aggregate (MWh/h)		Per Capita (kWh/h)		Percent Load Reduction (%)	FSL (MWh)	FSL Achievement Rate (%)
			Ref. Load	Load Impact	Ref. Load	Load Impact			
2024	Ex-post - Sept. 24th	314	535.5	396.4	1,705.4	1,262.5	74%	146.4	102%
2024	Ex-ante for 2025	331	580.7	419.3	1,754.3	1,266.7	72%	140.4	95%

7 FINDINGS

PG&E Findings

The PY2024 BIP Load Impact Evaluation key findings for the PG&E BIP are as follows:

- On February 4th, a subset of BIP participants were dispatched for a localized emergency event. On average these customers provided [redacted] MWh/h of load reductions during event hours, and the event hour FSL achievement rate was [redacted]%.
- On September 24th, almost all BIP customers were dispatched for a test event. On average these customers provided 99.1 MWh/h of load reductions during event hours with an FSL achievement rate of 100%.
- On October 21st, a subset of BIP customers that underperformed in earlier events were re-tested. On average, these customers provided [redacted] MWh/h of load reductions during event hours with an FSL achievement rate of only [redacted]%. After this event, some customers increased their FSL or de-enrolled from the program.
- The average event day FSL achievement rate was 96% in average event hour. Customers delivered an average of 536.1 kWh/h of per capita load impacts during event hours. However, the average event day is influenced by the re-test event.
- The ex-ante analysis finds that PG&E's BIP is anticipated to provide an average hourly load reduction of 132.4 MWh/h to 133.1 MWh/h during a four-hour dispatch of all customers in August 2025 depending on the weather scenario (124.4 MWh/h to 124.9 MWh/h over the full five-hour RA window). Per capita impacts in PY2025 are expected to increase relative to the average PY2024 ex-post events due in part to de-enrollment from under-performing participants. This trend is also driven by the fact that the "average" ex-post event includes the re-test event, which emphasizes lower performing customers relative to the ex-ante analysis.

SCE Findings

The PY2024 Load Impact Evaluation key findings for the SCE BIP are as follows:

- SCE's BIP dispatched two emergency events to a subset of BIP customers located in [redacted] on September 6th (Friday) and September 9th (Monday), representing back-to-back business day events. Customers increased their performance in the second event compared to the first event. The BIP provided aggregate load reductions of [redacted] MWh/h and [redacted] MWh/h during event hours on September 6th and September 9th (respectively) with an FSL achieved rate of [redacted] and [redacted], respectively.
- On September 24th, all BIP customers not included in the prior emergency events were dispatched for a test event. On average, these customers provided 396.4 MWh/h of load reductions during event hours with an FSL achievement rate was 102%.

- Though no hour was a full event hour for all three PY2024 events, HE18 was at least a partial event hour in all events. In HE18, the FSL achievement rate was 100% and customers delivered an average of 1,163.4 kWh/h of per capita load impacts during event hours, representing a 72% reduction in load.

- The ex-ante analysis finds that SCE's BIP is anticipated to provide an average hourly load reduction of 419.4 MWh/h to 419.6 MWh/h during a six-hour dispatch of all customers in August 2025 depending on the weather scenario. However, the impacts are slightly lower when looking at hours exclusively within the 5-hour RA window (416.9 MWh/h to 417.0 MWh/h depending on the weather scenario). This is likely due to the influence of TOU rates, where peak pricing coincides with the RA window. As such, reference loads are anticipated to be lower in the RA window than the surrounding hours, resulting in slightly lower impacts from 4pm to 9pm.

- The ex-ante analysis also finds that BIP15 customers are expected to provide more load impacts than BIP30 customers, despite having substantially lower forecasted enrollment (48 versus 283 customers). BIP15 customers are expected to provide 220.5 MWh/h of load impacts over a 6 hour event window while BIP30 customers are expected to provide 198.7 MWh/h to 199.0 MWh/h, dependent on weather year.

APPENDIX A TABLE GENERATORS

Verdant produced table generators for each utility that produce all tables as required by the Protocols. These are provided in separate files:

- Appendix A-1: PY2024_PG&E_BIP_Ex_Post_Load_Impacts_FINAL_PUBLIC.xlsx
- Appendix A-2: PY2024_SCE_BIP_Ex_Post_Load_Impacts_FINAL_PUBLIC.xlsx
- Appendix A-3: PY2024_PG&E_BIP_Ex_Ante_Load_Impacts_FINAL_PUBLIC.xlsx
- Appendix A-4: PY2024_SCE_BIP_Ex_Ante_Load_Impacts_FINAL_PUBLIC.xlsx

VERDANT

APPENDIX B WEATHER SENSITIVITY RESULTS

The suite of candidate models tested on proxy days for each participant was dependent on their weather sensitivity. Verdant explored various types of weather sensitivity, including summer cooling, winter heating, and winter cooling for each participant. Equation B-1 presents the general model specification used to estimate the impact of cooling degree days on customer load (e.g., 'cooling sensitivity'). The approach for testing heating sensitivity is identical to cooling sensitivity except that the CDD term is replaced with HDD (Heating Degree Day). Verdant tested exclusively for cooling sensitivity in summer months (May – October). However, Verdant tested for both cooling and heating sensitivity in the winter months (January- April and November - December) as some Californians experience mild winters. For the weather sensitivity analysis, energy usage data were limited to hours between 11am and 9pm. Additionally, weekday and weekend weather sensitivity results were assessed separately to account for the frequent differences in weekday and weekend loads. Specifically, for the ex-post analysis, modeling data were limited to weekends only for PG&E's winter season because the February 4th event occurred on a Sunday. Otherwise, modeling data was limited to weekdays as all other events for PG&E (and all events for SCE) occurred on weekdays.

EQUATION B-1: WEATHER SENSITIVITY MODEL SPECIFICATION

$$AvgLoad_d = \beta_0 + \beta_1 CDD_d + \sum_w \beta_{2w} DayType_d + \sum_m \beta_{3m} Month_d + \varepsilon_d$$

Where:

$AvgLoad_d$	The average hourly kWh load on day *d* between 11am and 9pm
β_0	The intercept of the regression model
β_1	The coefficient for effect on load of Cooling Degree Days (or Heating Degree Days for winter models)
CDD_d	The total Cooling Degree Days on day *d.* This value is replaced with HDD (Heating Degree Days) to determine heating sensitivity.
β_{2w}	The set of coefficients for effect on load by day of the week *w* (either Monday through Friday or Saturday-Sunday)
$DayType_d$	A dummy variable for the day of the week for day *d*
β_{3m}	The set of coefficients for effect on load by month of the year (Summer months or Winter months)
$Month_d$	A dummy variable for the month of the year for day *d*
ε_d	The error term

The cooling weather sensitivity regression model was tested for three separate CDD thresholds for each participant (CDD60, CDD65, and CDD70). The heating weather sensitivity regression model was also tested for three separate HDD thresholds (HDD50, HDD55 and HDD60 degrees). If the coefficient on β_1 is positive

and statistically significant at the 90% level for any CDD or HDD threshold, the participant was considered cooling or heating sensitive (respectively). Table B-1 and Table B-2 show the results of the weather sensitivity analysis for PG&E and SCE, respectively.

TABLE B-1: PG&E WEATHER SENSITIVITY ANALYSIS RESULTS

	Summer Cooling Sensitivity			Winter Cooling Sensitivity[1]			Winter Heating Sensitivity		
Industry Type	Num. Tested	Num. Weather Sensitive	Percent Weather Sensitive	Num. Tested	Num. Weather Sensitive	Percent Weather Sensitive	Num. Tested	Num. Weather Sensitive	Percent Weather Sensitive
Agriculture, Mining and Construction	72	21	29%	73	10	14%	73	3	4%
Manufacturing	66	9	14%	67	10	15%	67	11	16%
Office, Hotels, Finance, Services	[redacted]								
Retail Stores	[redacted]								
Wholesale, Transport and other Utilities	52	16	31%	51	6	12%	51	4	8%
Other/Unknown	[redacted]								
Total	**198**	**49**	**25%**	**199**	**29**	**15%**	**199**	**18**	**9%**

Note: Totals vary slightly between seasons because of cases of mid-season enrollment and de-enrollment

TABLE B-2: SCE WEATHER SENSITIVITY ANALYSIS RESULTS

	Summer Cooling Sensitivity			Winter Cooling Sensitivity			Winter Heating Sensitivity		
Industry Type	Num. Tested	Num. Weather Sensitive	Percent Weather Sensitive	Num. Tested	Num. Weather Sensitive	Percent Weather Sensitive	Num. Tested	Num. Weather Sensitive	Percent Weather Sensitive
Agriculture, Mining and Construction	29	4	14%	29	4	14%	29	2	7%
Institutional/Government	[redacted]								
Manufacturing	214	55	26%	214	62	29%	214	17	8%
Office, Hotels, Finance, Services	[redacted]								
Retail Stores	[redacted]								
Schools	[redacted]								
Wholesale, Transport and other Utilities	62	13	21%	62	17	27%	62	11	18%
Other/Unknown	22	5	23%	22	5	23%	22	2	9%
Total	**336**	**82**	**24%**	**336**	**92**	**27%**	**336**	**34**	**10%**

[1] Winter weather sensitivity results for PG&E are presented for weekend data as the winter (February 4th) event was a weekend event.

VERDANT

APPENDIX C MODEL VALIDITY

The model selection for each participant is based on an assessment of candidate model performance on a set of proxy event days. Proxy days are set of non-event, non-holiday days that have event-like weather conditions. Ex-post proxy days were chosen for each season in which an event occurred for a given utility. Proxy day selection was based on a distance metric (Equation B-1) that compared each non-event day's temperature profile and the temperature profile of the average event day in the same season. This was done for each participant for each weather station. Ex ante proxy days were selected using the same distance metric but compared each candidate day's temperature profile to that of the utility-specific 1-in-2 weather year forecast in the same month for each weather station. For both ex-ante and ex-post, a different set of proxy days were selected for each weather station. Table C-1 and Table C-2 show the primary ex-post proxy days selected for PG&E and SCE, respectively. In rare cases, customers had missing AMI data for one or more of the proxy days selected for their weather station. In these cases, the next best proxy day(s) were used for that customer. Table C-1 and Table C-2 present the selected ex-post proxy days for PG&E and SCE respectively.

TABLE C-1: PG&E EX-POST PROXY DAYS

Weather Station	Summer Weekday	Winter Weekend
Angels Camp	2024-05-09, 2024-05-20, 2024-09-19, 2024-10-22, 2024-10-23, 2024-10-25	2023-11-04, 2023-11-05, 2023-11-11
Auburn	2024-06-12, 2024-06-24, 2024-08-01, 2024-08-05, 2024-08-08, 2024-10-08	--
Bakersfield	2024-06-11, 2024-08-01, 2024-08-28, 2024-09-05, 2024-10-02, 2024-10-04	--
Chico	2024-05-01, 2024-05-02, 2024-05-03, 2024-05-08, 2024-05-24, 2024-10-23	2023-11-04, 2023-11-05, 2023-11-11
Concord	2024-06-04, 2024-07-18, 2024-08-27, 2024-09-04, 2024-10-04, 2024-10-08	2023-11-04, 2023-11-05, 2023-11-11
Cupertino	2024-07-12, 2024-07-24, 2024-08-07, 2024-08-26, 2024-08-28, 2024-10-04	--
Eureka	2024-05-09, 2024-05-10, 2024-07-04, 2024-07-05, 2024-08-20, 2024-09-04	--
Fresno	2024-06-05, 2024-06-07, 2024-07-15, 2024-08-28, 2024-10-02, 2024-10-04	--
Marysville	--	2023-11-04, 2023-11-05, 2023-11-11
Oakland	2024-05-10, 2024-06-18, 2024-07-12, 2024-08-07, 2024-08-20, 2024-10-08	--
Paso Robles	2024-05-30, 2024-06-06, 2024-07-15, 2024-08-28, 2024-09-13, 2024-10-10	--
Potrero	2024-07-16, 2024-07-18, 2024-08-22, 2024-08-23, 2024-08-28, 2024-10-15	--
Red Bluff	--	2023-11-04, 2023-11-05, 2023-11-11
Sacramento	2024-07-08, 2024-07-18, 2024-08-28, 2024-10-02, 2024-10-03, 2024-10-08	2023-11-04, 2023-11-05, 2023-11-11
Salinas	2024-07-01, 2024-07-12, 2024-07-18, 2024-08-02, 2024-08-06, 2024-10-10	--
San Rafael	--	2023-11-04, 2023-11-05, 2023-11-11
San Ramon	2024-06-11, 2024-07-10, 2024-08-27, 2024-09-04, 2024-09-23, 2024-10-04	--
Santa Maria	2024-06-11, 2024-07-08, 2024-07-09, 2024-07-17, 2024-07-30, 2024-09-11	--
Santa Rosa	2024-07-08, 2024-07-30, 2024-07-31, 2024-09-02, 2024-09-11, 2024-10-15	--
Stockton	2024-07-01, 2024-09-04, 2024-09-05, 2024-10-02, 2024-10-04, 2024-10-07	2023-11-04, 2023-11-05, 2023-11-11
Ukiah	2024-08-06, 2024-09-04, 2024-09-05, 2024-09-23, 2024-10-01, 2024-10-02	--

TABLE C-2: SCE EX-POST PROXY DAYS

Weather Station	Summer Weekday
Barstow	2024-05-30, 2024-06-04, 2024-06-10, 2024-06-21, 2024-09-25, 2024-09-26
Cathedral City	2024-06-06, 2024-06-28, 2024-08-01, 2024-08-07, 2024-08-12, 2024-10-02
El Segundo	2024-06-05, 2024-09-23, 2024-10-02, 2024-10-09, 2024-10-11, 2024-10-25
Goleta	2024-06-04, 2024-06-06, 2024-06-07, 2024-06-11, 2024-06-13, 2024-09-27
Long Beach	2024-06-06, 2024-06-14, 2024-06-19, 2024-09-26, 2024-09-27, 2024-10-09
Moorpark	2024-06-05, 2024-06-13, 2024-08-30, 2024-09-25, 2024-10-08, 2024-10-18
Rialto	2024-06-05, 2024-06-12, 2024-06-14, 2024-08-29, 2024-08-30, 2024-09-11
Ridgecrest	2024-05-29, 2024-05-30, 2024-06-18, 2024-06-19, 2024-09-13, 2024-09-26
Rimforest	2024-07-15, 2024-08-01, 2024-08-07, 2024-08-08, 2024-08-12, 2024-08-13
Romoland	2024-07-09, 2024-07-10, 2024-07-11, 2024-07-24, 2024-07-25, 2024-09-04
Rosemead	2024-06-04, 2024-06-07, 2024-06-12, 2024-09-12, 2024-10-14, 2024-10-25
San Dimas	2024-06-04, 2024-06-18, 2024-08-30, 2024-09-13, 2024-09-26, 2024-09-27
Santa Ana	2024-06-10, 2024-06-13, 2024-06-19, 2024-09-25, 2024-10-15, 2024-10-25
Tulare	2024-07-16, 2024-07-18, 2024-07-31, 2024-08-30, 2024-09-02, 2024-09-03
Valencia	2024-06-05, 2024-06-12, 2024-06-14, 2024-08-28, 2024-08-30, 2024-10-10
Ventura	2024-06-06, 2024-06-07, 2024-06-13, 2024-09-25, 2024-10-14, 2024-10-15
Victorville	2024-06-04, 2024-06-21, 2024-08-15, 2024-08-29, 2024-09-23, 2024-09-26
Westminster	2024-06-13, 2024-06-14, 2024-06-19, 2024-09-25, 2024-09-26, 2024-10-15

Selected Model Performance

The assessment of model performance on proxy days is concerned primarily with accuracy and precision. Accuracy represents how closely on average the calculated baseline matches the observed load. Bias is a component of measuring accuracy, which indicates the extent to which the calculated baseline over- or under-estimates the load. In contrast, precision indicates how reliably close estimated load is to actual observed load. It is possible to have a model that on average is highly accurate with very poor precision, such as when a method both under- and over-predicts load by substantial amounts with regularity. Likewise, it is possible to have a method that is very precise but highly inaccurate, such as when a model over- or under-estimates the load with high consistency.

The primary metrics for accuracy and precision in this analysis are Normalized Mean Bias Error (NMBE) and Normalized Mean Absolute Error (NMAE), respectively. Other assessments of baselines have often used the Mean Percent Error (MPE) as the metric to assess accuracy and the Mean Absolute Percent Error (MAPE) and Coefficient of Variation of the Root Mean Square Error (CVRMSE) as the metrics for precision. Table C-3 presents descriptions and the equations for all metrics.

TABLE C-3: DESCRIPTIONS AND EQUATIONS FOR PERFORMANCE METRICS

Metric Type	Metric	Description	Equation
Accuracy/Bias	Mean Percent Error (MPE)	Represents the average of the errors in the calculated baselines as a percentage of the observed load.	$MPE = \frac{1}{n}\sum_{i=1}^{n}\frac{y_i - \hat{y}_i}{y_i}$
	Normalized Mean Bias Error (NMBE)	Represents the normalized average bias in the calculated baselines.	$NMBE = \frac{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)}{\bar{y}}$
	Root Mean Squared Errors (RMSE)	Represents the average of the squared errors between the observed load and the calculated baselines.	$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}$
Precision	Mean Absolute Percent Error (MAPE)	Represents the average of the absolute errors in the calculated baselines as a percentage of the observed load.	$MAPE = \frac{1}{n}\sum_{i=1}^{n}\left\|\frac{y_i - \hat{y}_i}{y_i}\right\|$
	Normalized Mean Absolute Error (NMAE)	Represents the average of the normalized absolute error in the calculated baselines.	$NMAE = \frac{\frac{1}{n}\sum_{i=1}^{n}\lvert y_i - \hat{y}_i\rvert}{\bar{y}}$
	Coefficient of Variation of the Root Mean Squared Errors (CV[RMSE])	Represents the normalized average of the squared errors between the observed load and calculated baselines.	$CV[RMSE] = \frac{\sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}}{\bar{y}}$

Where y_i indicates observed loads, $\hat{y}_i$ indicated estimated loads, and $\bar{y}$ indicates average loads. The preference for NMBE and NMAE is based primarily on a shortcoming of the MPE and MAPE when working with observed values of zero, which result in a division-by-zero error and the loss of the corresponding data point. Notably, the formulas for the NMBE and NMAE go against a convention seen in some contexts (e.g., ASHRAE), where the error is calculated as the baseline minus the observed. This runs contrary to the more typical conventions of calculating MPE and MAPE. For the sake of consistent interpretation of the NMBE and MPE, where negative values indicate overestimation of the baseline, Verdant has calculated the error as the observed load minus the calculated baseline for all metrics.

Because different industries tend to vary in their load volatility (and, therefore, predictability) Table C-4 and Table C-5 show the selected model performance results for the ex-post analysis segmented by industry type. Results are shown only for customers deployed in at least one event in the corresponding season in PY2024. Models were selected by a combination of NMBE and NMAE. In all cases, model fits are statistically significant and generally good, with some variation by industry type. For both utilities, the industry types with the strongest predictive statistics are those that are generally expected to have consistent occupancy and operations (and, therefore, load shapes), including Offices, Retail Stores, and Schools.

TABLE C-4: PG&E EX-POST PROXY DAY TESTING SPECIFICATION RESULTS

	Summer Weekday					Winter Weekend				
Industry Type	Num. of Cust.	CV RMSE	NMBE	NMAE	Adj. R^2	Num. of Cust.	CV RMSE	NMBE	NMAE	Adj. R^2
Agriculture, Mining and Construction	68	0.208	0.000	0.057	0.626	5	[redacted]	[redacted]	[redacted]	[redacted]
Manufacturing	46	0.189	0.000	0.087	0.583	25	[redacted]	[redacted]	[redacted]	[redacted]
Office, Hotels, Finance, Services	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	-	-	-	-
Retail Stores	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	-	-	-	-
Wholesale, Transport and other Utilities	47	0.592	0.000	0.207	0.607	5	[redacted]	[redacted]	[redacted]	[redacted]
Other/Unknown	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	-	-	-	-

TABLE C-5: SCE EX-POST PROXY DAY TESTING SPECIFICATION RESULTS[2]

Industry Type	Num. of Customers	CV RMSE	NMBE	NMAE	Adjusted R^2
Agriculture, Mining and Construction	29	0.188	-0.001	0.065	0.559
Institutional/Government	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Manufacturing	213	0.468	0.000	0.100	0.602
Office, Hotels, Finance, Services	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Retail Stores	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Schools	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Wholesale, Transport and other Utilities	61	0.303	0.000	0.107	0.569
Other/Unknown	22	0.292	0.000	0.096	0.634

Table C-6 and Table C-7 show the model specification results for the ex-ante analysis, which includes results for the additional models selected for customers who did not have an ex-post model selected for the corresponding season. In the ex-ante analysis, event days were presumed to be weekdays. As such, all model specifications in the following tables are for weekday-specific models. As in the ex-post analysis, industries that tend to have more consistent daily load shapes, such as Offices, Retails Stores, and Schools also tend to have the best (e.g., lowest) NMAE values for both utilities.

[2] SCE ex-post models were only tested on summer weekdays because all PY2024 events occurred on summer weekdays.

TABLE C-6: PG&E EX-ANTE PROXY DAY TESTING SPECIFICATION RESULTS

	Summer Weekday					Winter Weekday				
Industry Type	Num. of Cust.	CV RMSE	NMBE	NMAE	Adj. R^2	Num. of Cust.	CV RMSE	NMBE	NMAE	Adj. R^2
Agriculture, Mining and Construction	74	0.241	0.000	0.078	0.620	78	0.361	0.000	0.079	0.512
Manufacturing	66	0.203	0.000	0.091	0.586	67	0.218	0.000	0.096	0.596
Office, Hotels, Finance, Services	4	0.111	0.000	0.044	0.542	4	0.161	0.000	0.062	0.431
Retail Stores	[redacted]									
Wholesale, Transport and other Utilities	52	0.514	0.000	0.185	0.621	51	0.734	-0.001	0.218	0.615
Other/Unknown	3	0.354	0.001	0.194	0.609	3	0.458	-0.001	0.253	0.455

TABLE C-7: SCE EX-ANTE PROXY DAY TESTING SPECIFICATION RESULTS

	Summer Weekday					Winter Weekday				
Industry Type	Num. of Cust.	CV RMSE	NMBE	NMAE	Adj. R^2	Num. of Cust.	CV RMSE	NMBE	NMAE	Adj. R^2
Agriculture, Mining and Construction	29	0.188	-0.001	0.065	0.559	29	0.316	0.000	0.067	0.587
Institutional/Government	[redacted]									
Manufacturing	214	0.463	0.000	0.103	0.603	214	0.522	0.000	0.110	0.656
Office, Hotels, Finance, Services	6	0.028	0.000	0.017	0.701	6	0.089	-0.001	0.023	0.506
Retail Stores	[redacted]									
Schools	[redacted]									
Wholesale, Transport and other Utilities	62	0.306	0.000	0.107	0.562	62	0.485	0.000	0.134	0.527
Other/Unknown	22	0.292	0.000	0.096	0.634	22	0.257	0.001	0.095	0.620

Actual versus Predicted Proxy Day Load Shapes

The best performing model (based on accuracy and bias metrics) are selected for each customer based on predictions of load on proxy days. Figure C-1 and Figure C-2 show the actual and model-predicted average customer loads on the average proxy day for PG&E and SCE, respectively. Overall, customer proxy day loads are well predicted by the selected models on average.

Figure C-1 represents 169 customers for summer weekdays and 35 for winter weekends, corresponding to the number of customers dispatched and day type of events in PY2024 for each season. Likewise, Figure C-2 represents 333 customers for summer weekdays.

FIGURE C-1: PG&E AVERAGE PROXY DAY LOAD PREDICTION

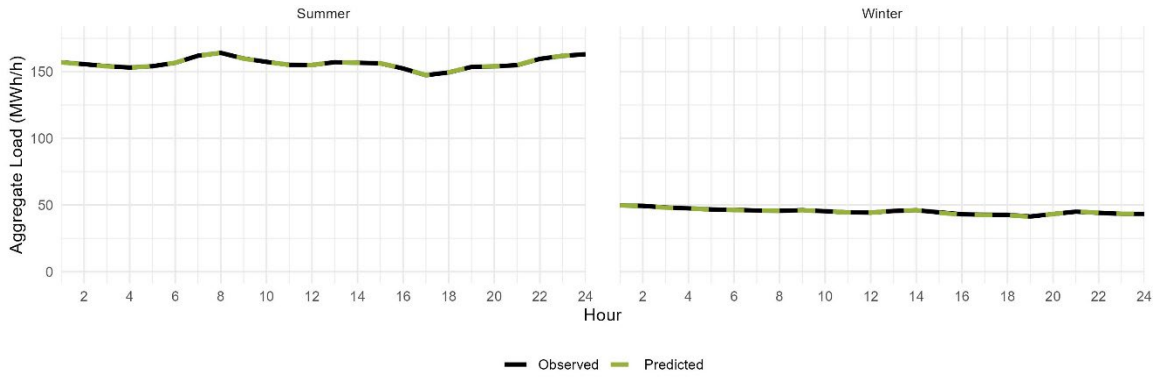


FIGURE C-2: SCE AVERAGE PROXY DAY LOAD PREDICTION