SCE 2022 ELRP (EMERGENCY LOAD REDUCTION PROGRAM) LOAD IMPACT REPORT

FINAL

Submitted to:
Southern California Edison

Prepared by:
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Public Version. Redactions in PY 2022 SCE ELRP Load Impact Evaluation Report and Appendices

Confidential Content Removed and Blacked Out

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1 EXECUTIVE SUMMARY

The Emergency Load Reduction Program (ELRP) is a Southern California Edison (SCE) demand response (DR) pilot,[1] authorized by the California Public Utilities Commission (CPUC) for five years, that allows the Investor-Owned Utilities (IOUs) and the California Independent System Operator (CAISO) to access additional, emergency load reduction during times of high grid stress. The goal of the program is to help the IOUs and CAISO avoid outages while controlling costs to ratepayers. Program participants receive payments for the energy reduction provided over the event period with no capacity payments.

The ELRP is available from May to October, seven days a week from 4:00 P.M. to 9:00 P.M. with a one-hour minimum and a five-hour maximum event duration.[2] Participants can be dispatched using a Day Ahead or Day Of notification for a maximum of 60 hours with no restrictions on consecutive day dispatches.[3] Eligible customers are broken into two distinct groups with multiple subgroups.[4]

Group A participant groups include:

- A.1 - Non-residential customers participants
- A.2 - Non-residential aggregators
- A.3 - Rule 21 exporting distributed energy resources
- A.4 - Virtual power plant aggregators
- A.5 – Electric Vehicle (EV) and Vehicle-to-Grid Integration (VGI) aggregators
- A.6 - Residential customers

Group B participant groups include:

- B.1 - Third-party Demand Response Providers (DRPs)
- B.2 - Capacity Bidding Program (CBP) Aggregators

1 SDG&E and PG&E also administer the ELRP in their respective service territories. PG&E evaluation findings are not included in this report.

2 Subgroup A.6 events are always 5 hours in duration, lasting from 4:00 pm to 9:00 pm.

3 Subgroup A.6 events are always dispatched Day Ahead. There is no Day Of event trigger for this subgroup.

4 Definitions of groups are taken from the ELRP FAQ page. https://elrp.olivineinc.com/customer-faq/

In program year (PY) 2022, the ELRP saw event participation in all groups except Groups A.3 and A.5. Group B.1 participants will not be included in this evaluation to protect aggregator and customer confidentiality.

The objective of this evaluation is to assess the PY 2022 ELRP 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 impact evaluation of the ELRP. These include:

- **Ex Post Analysis:** The goal of the ex post analysis is to estimate incremental load impacts for PY 2022 ELRP 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 incremental load reductions through the life of the ELRP pilot (PY 2023 through PY 2025) under 1-in-2 and 1-in-10 weather scenarios in a manner that conforms to the LIP.

1.1 PARTICIPANT CHARACTERISTICS

SCE had 1,945,428 customers that participated in PY 2022 events in Group A and one aggregator in Group B.2 of the ELRP. Table 2-1 below provides customer counts by ELRP subgroup. The majority of participants were enrolled through subgroup A.6 (residential customers). This is the result of auto-enrolling all California Alternate Rates for Energy Program (CARE), Family Electric Rate Assistance Program (FERA), and high energy use (High-Use) residential customers. Subgroup A.4 is the second largest ELRP subgroup with 1,086 customers enrolled under two aggregators.

TABLE 1-1: ACTIVE PY 2022 ELRP CUSTOMER ENROLLMENT COUNTS

ELRP Group	ELRP Subgroup	Customer Counts*
Group A	A.1 - Non-residential – General	892
	A.2 - Non-residential aggregators – BIP	0
	A.2 - Non-residential aggregators – Non-BIP	5
	A.3 - Rule 21 exporting distributed energy resources	0
	A.4 - Virtual power plant aggregators	1,086
	A.5 - EV and VGI aggregators	0
	A.6 - Residential customers	1,943,445
	Total Group A	**1,945,428**
Group B	B.1 - Third-party Demand Response Providers (DRPs)	NA
	B.2 - Capacity Bidding Program Aggregators	14
	Total Group B	**14†**

*Customer counts only include ELRP participants that participated in at least one event during PY2022.

† Customer counts for Group B exclude B.1 (third party DRPs) from customer counts.

1.2 EVENT INFORMATION

There were eleven ELRP events days during the 2022 event season in SCE's service territory. All events, with one exception, were Day Ahead events. This contrasts with the 2021 event season which only included Day Of events. Table 1-2 below presents the PY 2022 ELRP event days, event times, event duration, subgroups dispatched, and event types. There was no enrollment in subgroups A.3 and A.5 during the PY 2022 events.

TABLE 1-2: PY 2022 SCE ELRP EVENT INFORMATION

Event Date	Event Time	Duration (Hours)	Subgroup(s)*	Event Type
8/17/2022	16:00-21:00	5	A.2 non-BIP, A.4, A.6	Day Ahead
8/31/2022	17:00-20:00	3	All non-A.6	Day Of
9/1/2022	18:00-19:00	1	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/2/2022	16:00-21:00	5	A.6	Day Ahead
9/3/2022	18:00-20:00	2	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/4/2022	17:00-20:00	3	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/5/2022	17:00-21:00	4	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/6/2022	16:00-21:00	5	All non-A.6	Day Ahead (extended Day Of)
	16:00-21:00	5	A.6	Day Ahead
9/7/2022	16:00-21:00	5	All Subgroups	Day Ahead
9/8/2022	16:00-21:00	5	All Subgroups	Day Ahead
9/9/2022	16:00-18:00	2	All non-A.6	Day Ahead (extended Day Of, ended early Day Of)
	16:00-21:00	5	A.6	Day Ahead

*Subgroups A.3 and A.5 participants did not have any enrolled participants during events in PY 2022.

1.3 METHODOLOGY

1.3.1 Ex Post Methodology

The ELRP contains multiple subgroups with unique participant characteristics that necessitate different modeling approaches. As a result, the modeling approach for each subgroup varies, but all fall into three categories of modeling approaches. These include individual customer models, panel models with participant fixed effects, and panel modeling with matched control groups. At a high level, the methodologies for relevant subgroups are as follows.

Subgroups A.1, A.2, and B.2

Subgroup A.1, A.2 and B.2 all represent non-residential customers that are comprised of a wide variety of industry and load types. As a result, Verdant utilized customer specific regression models for estimation of ex post impacts. This approach allows for varying baselines for each customer, specific to their characteristics and load variability.

Subgroup A.4 VPP

Subgroup A.4 represents ELRP participation through VPPs. For SCE, all A.4 VPP participants were residential customers. Given the relative homogeneity of residential loads, Verdant utilized panel modeling with participant fixed effects for estimating impacts. Participants were segmented into modeling groups based on LCA, SubLAP, climate zone, customer type, and dual enrollment status. Additional secondary segmentation was used to model the remaining domains of interest, including NEM status and technology types. For segments without sufficient participant counts for panel modeling, customer specific regression models were used in place of panel models.

Subgroup A.6 Residential

Subgroup A.6 represents the residential component of ELRP that was introduced in PY 2022. Enrollment for this group was automatic for SCE customers in CARE, FERA, and High-Use programs, though there is also a small set of self-enrolled customers. There are two aspects to this subgroup that set it apart from the others. The first is the sheer quantity of participants, which calls for a method that samples customers to assess the impacts. The second is the automatic enrollment for most participants, which makes the use of a control group critical. As a result, panel modeling with non-participant matched control groups was used to estimated load impacts. Additionally, a sample of participants was selected for modeling purposes given the more than 1.5 million customers enrolled in the subgroup A.6 Residential.

1.3.2 Ex Ante Methodology

The goal of the ex ante impact analysis is to estimate program impacts for future years under varying 1-in-10 and 1-in-2 weather scenarios across the ELRP event window (4:00 pm to 9:00 pm).[5] Given that the ELRP is a pilot program, the ex ante analysis seeks to provide ex ante estimates for program years 2023 through 2025. The ex ante analysis only seeks to estimate impacts for subgroups that actively participated in events in PY 2022. The primary reason is that there was no event participation for Groups A.3 and A.5 for SCE. As a result, there are no ex post impacts to inform a LIP-based ex ante analysis.

Ex ante impacts are estimated in two ways. These include program level ex ante impacts and the portfolio adjusted ex ante impacts. The program level ex ante impacts represent forecasted program impacts on ELRP-only event days and only include impacts from the ex post analysis in which there is no other DR participation on that day for dually enrolled participants. Conversely, portfolio adjusted ex ante impacts represent ex ante impacts that are incremental to the entire portfolio of SCE's DR programs and represent incremental load reduction (ILR) impacts. Compensation structures differ for dually enrolled participants and there is no mechanism or penalty structure that ensures reliable participation in ELRP. As a result, there are cases where the portfolio adjusted impacts are larger than the program level impacts. An example of this scenario is for BIP dually enrolled participants who are only compensated for ILR during

[5] The 1-in-2 and 1-in-10 weather scenarios include a typical event day, monthly IOU system peak and monthly IOU CAISO system peak, and vary for SCE.

overlapping BIP event hours and are not compensated on ELRP-only event days. As result, load impacts are larger on dual program days (portfolio level) than on days in which there is only an ELRP event.

1.4 EX POST IMPACTS

The average event hour impacts for each SCE event and the average event day are presented in Table 1-3. The average event day impacts do not include impacts from September 9th where a substantial rain event significantly influenced the impacts.

TABLE 1-3: SCE 2021 ELRP AVERAGE EVENT HOUR IMPACTS BY GROUP

Group	Event Date	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Service Point Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
Group A.1 BIP	8/31/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022†	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022†	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022†	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Group A.1 General	8/31/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Group A.1 AP-I	8/31/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022†	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022†	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022†	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Group	Event Date	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Service Point Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
Group A.1 CPP	8/31/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Group A.1 SDP	8/31/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022[†]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Group A.2 Non-BIP	9/7/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Group A.4	8/31/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Group A.6	8/17/2022	1,828,038	2.02	-0.03	-1.4%	-52.1	86.3
	9/1/2022	1,828,573	2.32	-0.07	-3.0%	-126.9	91.7
	9/2/2022	1,830,920	2.35	0.01	0.5%	21.1	91.7
	9/3/2022	1,830,905	2.47	0.01	0.4%	19.7	93.5
	9/4/2022	1,832,205	2.48	0.05	2.0%	89.2	90.8
	9/5/2022	1,832,261	2.62	-0.06	-2.4%	-116.0	95.3
	9/6/2022	1,832,257	2.44	-0.05	-2.0%	-89.1	93.1
	9/7/2022	1,834,878	2.43	-0.02	-0.8%	-37.9	92.9
	9/8/2022	1,834,893	2.29	0.05	2.1%	88.4	94.0

Group	Event Date	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Service Point Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
	9/9/2022*	1,837,282	1.91	0.32	17.0%	594.6	83.1
	Avg. Event	1,832,221	2.33	0.02	0.9%	39.1	91.2
Group B.2 CBP	8/31/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/1/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/4/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/5/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/6/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/7/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/8/2022*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	9/9/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

† Dual Event Day; *Extreme rainfall event, not included in the average event calculations.

SCE Group A.1 BIP participants average event day load reduction was [redacted] in each ELRP event hour. Their largest load reduction, on average, occurred on September 8th, with an average hourly load reduction of [redacted] MWh or [redacted] % of estimated baseline reference load. Group A.1 BIP ELRP participants were only compensated for incremental load reduction on dual BIP ELRP event days. BIP aggregators, however, voluntarily participated on non-BIP days as their largest average load reduction occurred on a non-BIP day.

On the average event day, SCE A.1 General participants provided an average of [redacted] MWh of load reduction in each ELRP event hour. The largest load reduction, on average, occurred on September 7th, with an average hourly load reduction of [redacted] MWh (or [redacted] % of the estimated baseline).

SCE A.1 participants dually enrolled in AP-I do not received compensation for ELRP during AP-I event hours. All load reduction during AP-I/ELRP overlapping event hours are attributed to AP-I. A.1 AP-I participants average event day load reduction was [redacted] MWh in each ELRP event hour. Their largest load reduction, on average, occurred on August 31st, which was not an AP-I event day. Their largest average hourly load reduction was [redacted] MWh or [redacted] % of estimated baseline reference load.

SCE A.1 CPP participants average event day ILR attributable to ELRP was XX MW in each ELRP event hour. Their largest load reduction, on average, occurred on September 4th, with an average hourly ILR of [redacted] MWh or [redacted] % of estimated baseline reference load.

ELRP participants dually enrolled in A.1 and SDP do not receive compensation for ELRP during SDP event hours. Load reduction during overlapping event hours s attributed to SDP. SCE A.1 SDP participants average event day ILR attributable to ELRP was [redacted] MWh in each ELRP event hour. The largest load reduction, on average, occurred on September 1st, with an average hourly load reduction of [redacted] MWh or XX % of the reference baseline.

On the average event day, SCE A.2 Non-BIP participants provided an average of [redacted] MWh of load reduction in each ELRP event hour, which indicates these participants contributed a small average hourly load [redacted] during event hours.

SCE Group A.4 participants are residential customers participating in ELRP through VPP aggregators. Their average event day load reduction was [redacted] MWh in each ELRP event hour. Most of these customers are on a NEM tariff and use a battery or solar PV paired with a battery to participate in ELRP. Their baseline reference net load includes both positive and negative values, therefore the average percent load reduction is not intuitive and is excluded from Table 1-3.

Group A.4's largest load reduction, on average, occurred on September 1st and 3rd, with an average hourly load reduction of [redacted] MWh on each of these days. For Group A.4 participants, the full level of load curtailment lasts for only a maximum of two hours and then severely dissipates in the third hour. The Group A.4 September 1st and 3rd event duration were only one and two hours respectively. During longer duration events, the participants' batteries are often charging during the early and/or late event hours, minimizing the average hourly load reduction during those events.

On the average event day, over 1.8 million customers participated in SCE's A.6 ELRP program, providing an average of 39.1 MWh of load reduction in each ELRP event hour. The largest load reduction, on average, occurred on September 4th, with an average hourly load reduction of 89.2 MWh or 2.0% of the estimated baseline reference load.

There are four enrollment pathways into the A.6 Residential subgroup. These include CARE auto-enrollment, FERA auto-enrollment, High-Use auto-enrollment, and self-enrollment. While Table 1-3 presents the aggregate A.6 load impacts, load impacts were also developed for each subgroup (Table 1-4). The average event day load reduction is largest for the High-Use auto-enrolled subgroup at 21.8 MWh but the largest average per capita impact is from the self-enrolled subgroup at 0.08 kWh or 6.4% of their baseline reference load. Participants that self-enrolled in ELRP have a substantially larger average percent load reduction than customers who were auto-enrolled.

TABLE 1-4: SCE SUBGROUP A.6 RESIDENTIAL AVERAGE EVENT DAY IMPACTS BY ENROLLMENT TYPE

Enrollment Group	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
Auto-Enrollment: CARE	1,124,344	1.93	0.01	0.7%	16.2	91.2
Auto-Enrollment: FERA	24,489	2.45	0.00	-0.1%	0.0	91.1
Auto-Enrollment: High-Use	667,638	3.03	0.03	1.1%	21.8	91.5
Self-Enrollment	15,751	1.21	0.08	6.4%	1.2	87.0
All A.6	**1,832,221**	**2.33**	**0.02**	**0.9%**	**39.1**	**91.2**

All A.6 ELRP events were five hours in duration and each event was also a population level Flex Alert. For purposes of reporting impacts, the reported total load reduction results in Table 1-3 and Table 1-4 are the combined ELRP and Flex Alert impacts. The ex post analysis, however, developed incremental load impact estimates for ELRP and Flex Alerts. Table 1-5 present the incremental load reductions from ELRP and Flex Alerts relative to reported impacts by enrollment type. ELRP's contribution is negative, but virtually zero, for the auto-enrolled subgroups, but positive and substantial for the self-enrolled subgroup. The incremental load reduction analysis shows auto-enrolled customers' load reduction is slightly smaller than the population's Flex Alert load reduction and there is no additional load reduction as a result of auto-enrolling the entire population of CARE, FERA and High-Use customers into the ELRP.

TABLE 1-5: SCE SUBGROUP A.6 RESIDENTIAL AVERAGE EVENT DAY PER CAPITA LOAD IMPACTS CONTRIBUTION – FLEX ALERT VS. ELRP

Load Type	Enrollment Group	Avg. Per Capita Flex Alert Impact Contribution (kWh/h)	Avg. Per Capita ELRP Impact Contribution (kWh/h)	Avg. Per Capita Combined Impact (A.6 Reported Impact) (kWh/h)
Delivered Load	Auto-Enrollment: CARE	0.029	-0.015	0.014
	Auto-Enrollment: FERA	0.038	-0.040	-0.002
	Auto-Enrollment: High-Use	0.057	-0.025	0.032
	Self-Enrollment	-0.013	0.088	0.075

Note: Flex Alert and ELRP impact contributions may not sum to combined impacts due to rounding

1.4.1 Average Event Day Load Shapes

Visually representing event day load shapes and estimated baseline is a powerful tool for understanding event day activity and for framing impact estimates. For this reason, this report first presents event day load shapes for each subgroup. Given that events occurred on varying hours across event days, the density of the shaded areas relates to the frequency of event days where a given hour was an event hour. The opaquer the shading on an event hour, the more frequently that hour was an event hour.

Additionally, ELRP impacts represent ILR. As a result, the ex post baseline includes other DR program impacts, which presents visually as a kink in the ELRP baseline. This is most noticeable in the A.1 AP-I and A.1 BIP load shapes (Figure 1-2 and Figure 1-3, respectively).

FIGURE 1-1: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 GENERAL

[redacted]

FIGURE 1-2: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 AP-I

[redacted]

FIGURE 1-3: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 BIP

[redacted]

FIGURE 1-4: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 CPP

[redacted]

FIGURE 1-5: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 SDP

[redacted]

FIGURE 1-6: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.2 NON-BIP

[redacted]

FIGURE 1-7: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.4 VPP

[redacted]

FIGURE 1-8: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.6 RESIDENTIAL

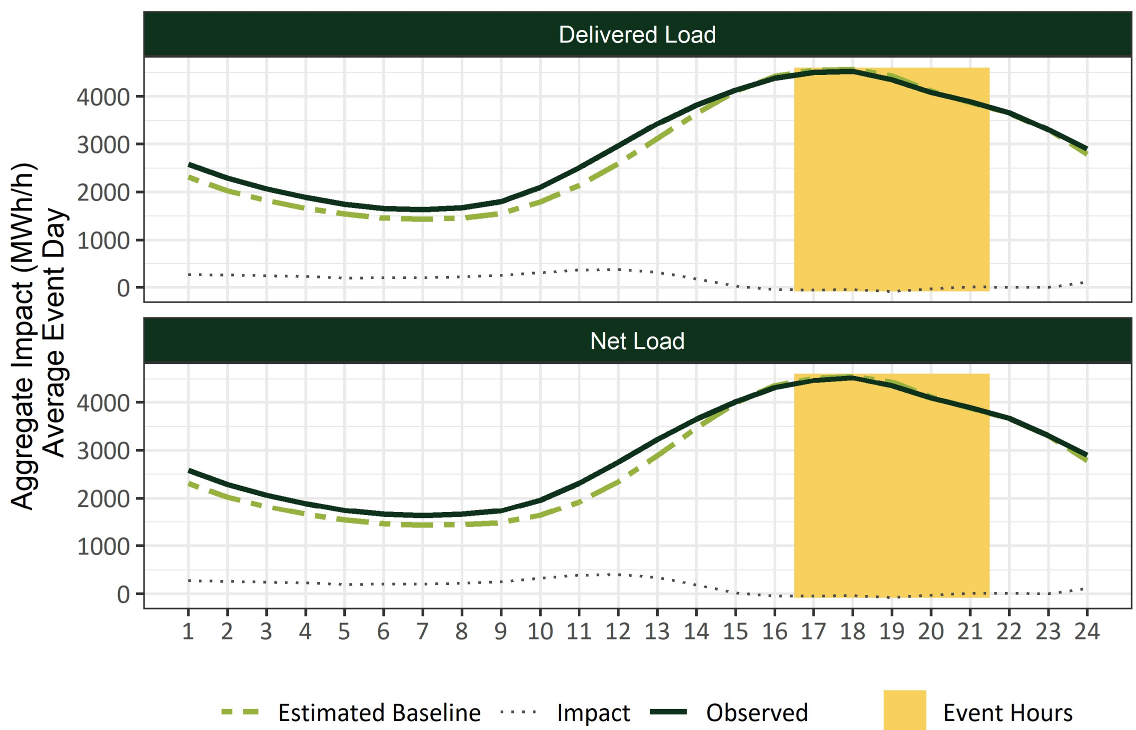


FIGURE 1-9: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP B.2 CBP AGGREGATOR

[redacted]

1.5 EX ANTE IMPACTS

Table 1-6 and Table 1-7 provide the portfolio adjusted utility typical event day aggregate ex ante forecasts under 1-in-10 and 1-in-2 weather scenarios, respectively, by year. As seen the PY 2023 ex ante forecast under a 1-in-10 weather scenario is 82.5 MWh across all ELRP program segments covered in this evaluation and 52.1 MWh for 1-in-2 weather conditions. The substantial increase in ex ante forecast between the 1-in-2 and the 1-in-10 weather scenarios is due to the positive correlation between temperature and impact for the subgroup A.6 residential participants.

TABLE 1-6: UTILITY 1-IN-10 TYPICAL EVENT DAY EX ANTE AGGREGATE IMPACTS BY PROGRAM YEAR AND ELRP SUBGROUP – PORTFOLIO ADJUSTED

	Utility 1-in-10 Typical Event Day					
	PY 2023		PY 2024		PY 2025	
ELRP Subgroup	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**
A.1 – All	906	24.8	915	25.1	924	25.3
A.2 Non-BIP	7	0	7	0	7	0
A.4 VPP	1,318	1.3	1,384	1.3	1,453	1.4
A.6 Residential*	1,919,790	56.2	1,900,592	55.6	1,881,586	55.1
B.2 CBP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ELRP Total	1,922,035	82.8	1,902,912	82.5	1,883,984	82.3

*Indicates estimations based on Delivered Load

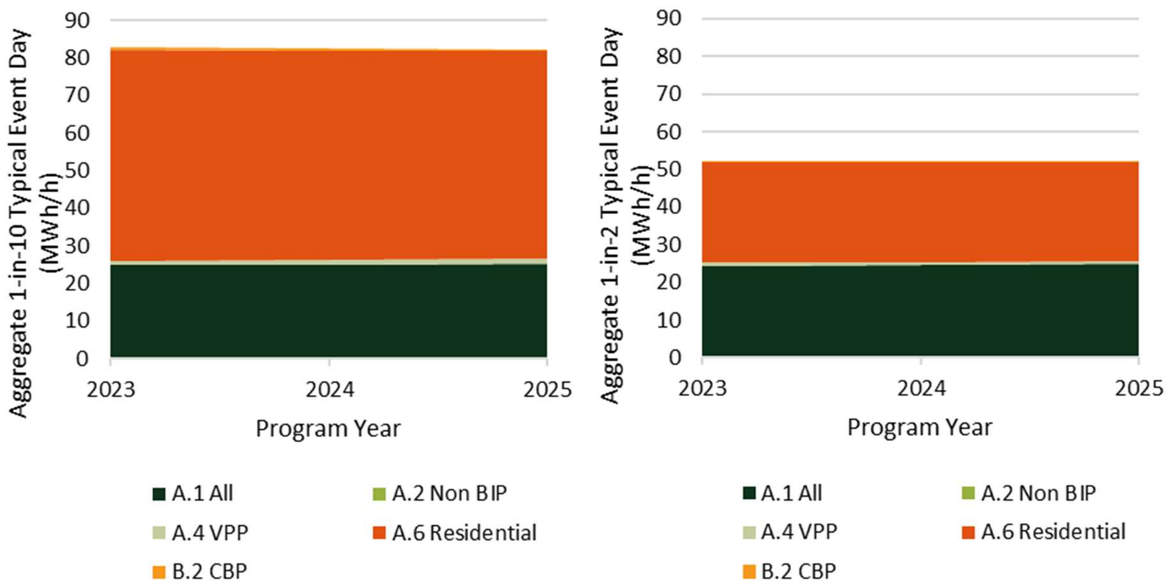
TABLE 1-7: UTILITY 1-IN-2 TYPICAL EVENT DAY EX ANTE AGGREGATE IMPACTS BY PROGRAM YEAR AND ELRP SUBGROUP – PORTFOLIO ADJUSTED

	Utility 1-in-2 Typical Event Day					
	PY 2023		PY 2024		PY 2025	
ELRP Subgroup	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**
A.1 – All	906	24.3	915	24.5	924	24.8
A.2 Non-BIP	7	0	7	0	7	0.0
A.4 VPP	1318	0.9	1384	0.9	1453	1.0
A.6 Residential*	1,919,790	26.7	1,900,592	26.4	1,881,586	26.2
B.2 CBP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ELRP Total	1,922,035	52.2	1,902,912	52.1	1,883,984	52.3

*Indicates estimations based on Delivered Load

Figure 1-10 presents the MWh ex ante forecasts by year visually. As seen the largest driver for differences between the 1-in-10 and 1-in-2 weather scenarios is driven by subgroup A.6 Residential. A.6 Residential is substantially higher in the 1-in-10 ex ante compared to the 1-in-2 forecasts.

FIGURE 1-10: SCE 1-IN-10 (RIGHT) AND 1-IN-2 (LEFT) UTILITY TYPICAL EVENT DAY EX ANTE AGGREGATE IMPACTS BY PROGRAM YEAR AND ELRP SUBGROUP



2 INTRODUCTION

The Emergency Load Reduction Program (ELRP) is a Southern California Edison (SCE) demand response (DR) pilot,[6] authorized by the California Public Utilities Commission (CPUC) for five years, that allows the Investor-Owned Utilities (IOUs) and the California Independent System Operator (CAISO) to access additional, emergency load reduction during times of high grid stress. The goal of the program is to help the IOUs and CAISO avoid outages while controlling costs to ratepayers. Program participants receive payments for the energy reduction provided over the event period with no capacity payments.

The ELRP is available from May to October, seven days a week from 4:00 P.M. to 9:00 P.M. with a one-hour minimum and a five-hour maximum event duration.[7] Participants can be dispatched using a Day Ahead or Day Of notification for a maximum of 60 hours with no restrictions on consecutive day dispatches.[8] Eligible customers are broken into two distinct groups with multiple subgroups.[9]

Group A participant groups include:

- A.1 - Non-residential customers participants
- A.2 - Non-residential aggregators
- A.3 - Rule 21 exporting distributed energy resources
- A.4 - Virtual power plant aggregators
- A.5 – Electric Vehicle (EV) and Vehicle-to-Grid Integration (VGI) aggregators
- A.6 - Residential customers

Group B participants groups include:

- B.1 - Third-party Demand Response Providers (DRPs)
- B.2 - Capacity Bidding Program (CBP) Aggregators

In program year (PY) 2022, the ELRP saw event participation in all groups except Group A.3 and A.5. Group B.1 participants is not included in this evaluation to protect customer and aggregator confidentiality.

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6 SDG&E and PG&E also administer the ELRP in their respective service territories. PG&E evaluation findings are not included in this report.

7 Subgroup A.6 events are always 5 hours in duration, lasting from 4:00 pm to 9:00 pm.

8 Subgroup A.6 events are always dispatched Day Ahead. There is no Day Of event trigger for this subgroup.

9 Definitions of groups are taken from the ELRP FAQ page. https://elrp.olivineinc.com/customer-faq/

2.1 EVALUATION OBJECTIVES

The objective of this evaluation is to assess the PY 2022 ELRP 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 impact evaluation of the ELRP. These include:

- **Ex Post Analysis:** The goal of the ex post analysis is to estimate incremental load impacts for PY 2022 ELRP 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 incremental load reductions through the life of the ELRP pilot (PY 2023 through PY 2025) under 1-in-2 and 1-in-10 weather scenarios in a manner that conforms to the LIP.

2.2 PARTICIPANT CHARACTERISTICS

SCE had 1,945,428 customers that participated in PY 2022 events in Group A and one aggregator in Group B.2 of the ELRP. Table 2-1 below provides customer counts by ELRP subgroup. The majority of participants were enrolled through subgroup A.6 (residential customers). This is the result of auto-enrolling all California Alternate Rates for Energy Program (CARE), Family Electric Rate Assistance Program (FERA), and high energy use (High-Use) residential customers. Subgroup A.4 is the second largest ELRP subgroup with 1,086 customers enrolled under two aggregators.

TABLE 2-1: ACTIVE PY2022 ELRP CUSTOMER ENROLLMENT COUNTS

ELRP Group	ELRP Subgroup	Customer Counts*
Group A	A.1 - Non-residential – General	892
	A.2 - Non-residential aggregators – BIP	0
	A.2 - Non-residential aggregators – Non-BIP	5
	A.3 - Rule 21 exporting distributed energy resources	0
	A.4 - Virtual power plant aggregators	1,086
	A.5 - EV and VGI aggregators	0
	A.6 - Residential customers	1,943,445
	Total Group A	**1,945,428**
Group B	B.1 - Third-party Demand Response Providers (DRPs)	NA
	B.2 - Capacity Bidding Program Aggregators	14
	Total Group B	**14†**

*Customer counts only include ELRP participants that participated in at least one event during PY2022.

† Customer counts for Group B exclude B.1 (third party DRPs) from customer counts.

One of the key features of the ELRP is dual enrollment, the enrollment in the ELRP and another DR program. Table 2-2 below provides the counts of dually enroll ELRP participants by subgroup and program of dual enrollment. While not all ELRP participants are dually enrolled, dual event participation is taken into account for purposes of estimating ex post impacts and generating ex ante forecasts so that impacts represent incremental load reductions (ILR). Details of the estimation of ILR are provided in section 3.2.

TABLE 2-2: ELRP DUAL ENROLLMENT BY SUBGROUP AND PROGRAM

ELRP Subgroup	AP-1	BIP	CBP	CPP	SDP	SEP
A.1	54	18	--	86	7	--
A.2 Non-BIP	--	--	--	2	--	--
A.4 VPP	--	--	--	--	1	1
A.6 Residential*	--	--	--	--	--	2
B.2 CBP Aggregators	--	--	14	--	--	--

*Dually enrolled customers not evaluated.

In general, ELRP participants make up a wide range of customer types, sizes and geographies. Figure 2-1 through Figure 2-5 present the counts and relative shares of participant characteristics for subgroups A.1, A.2 Non-BIP, A.4 VPP, A.6 Residential and B.2 CBP Aggregators respectively. The presented participant characteristics include sub-Load Aggregation Point (SubLAP), customer size, climate zones, customer types and Net Energy Metering (NEM) Status (in that order). For A.6 Residential, enrollment reason and disadvantaged community (DAC) status are presented in place of customer size and type.

FIGURE 2-1: A.1 PARTICIPANT COUNTS BY POPULATION CHARACTERISTIC TYPE

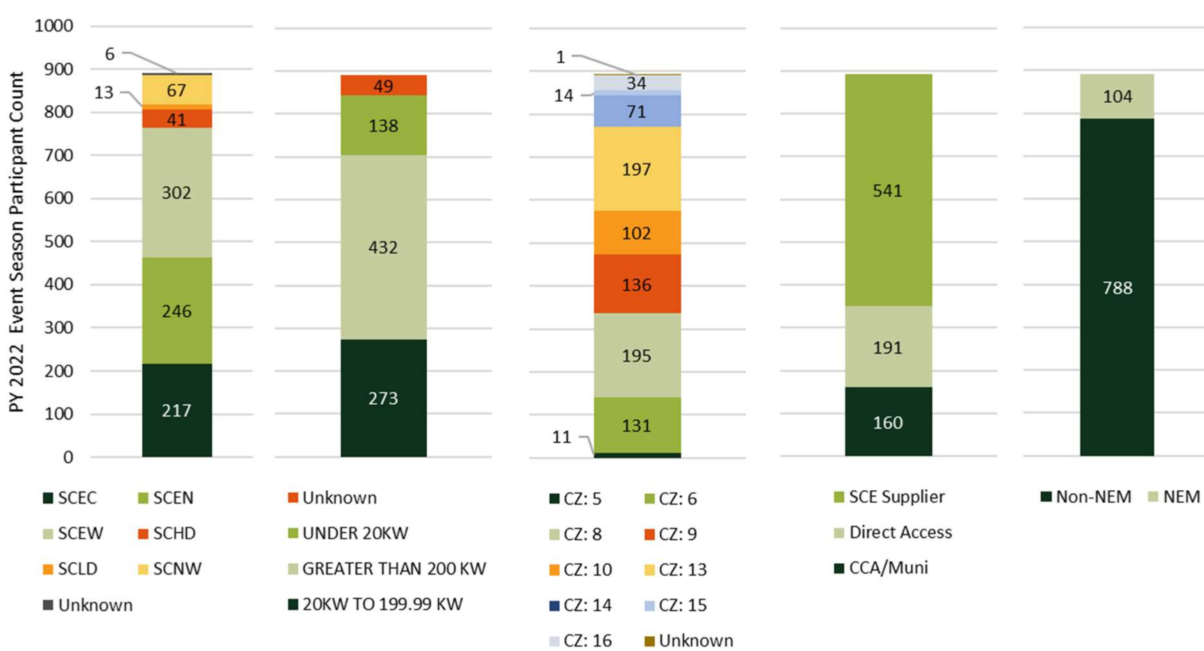


FIGURE 2-2: A.2 NON-BIP PARTICIPANT COUNTS BY POPULATION CHARACTERISTIC TYPE

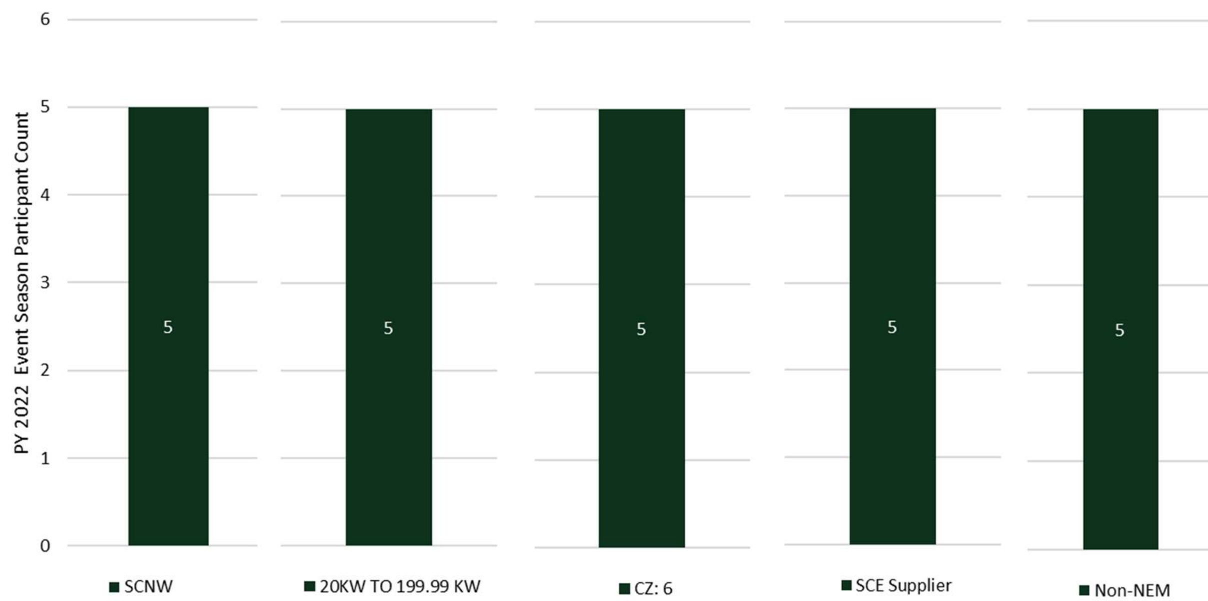


FIGURE 2-3: A.4 VPP PARTICIPANT COUNTS BY POPULATION CHARACTERISTIC TYPE

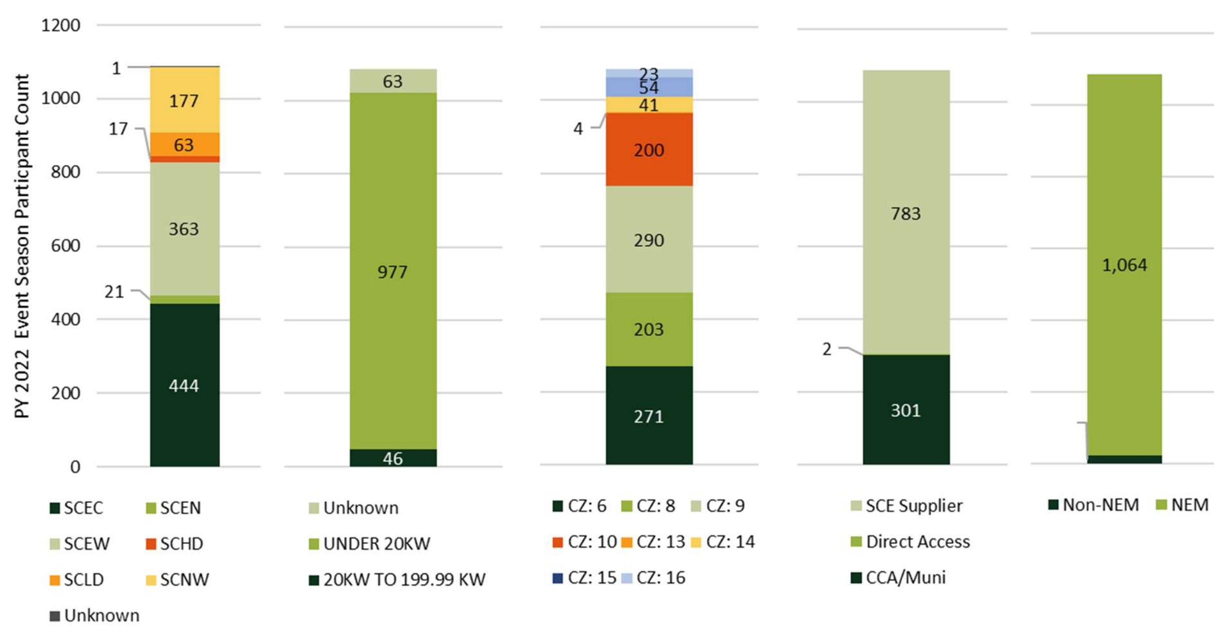


FIGURE 2-4: A.6 RESIDENTIAL PARTICIPANT COUNTS BY POPULATION CHARACTERISTIC TYPE

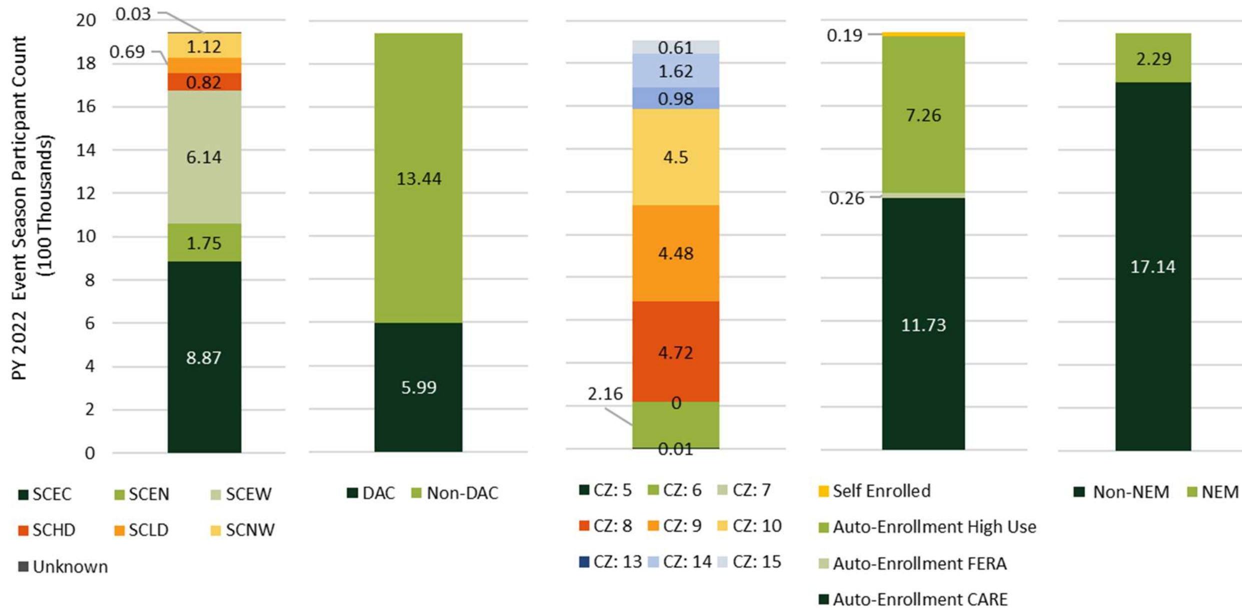
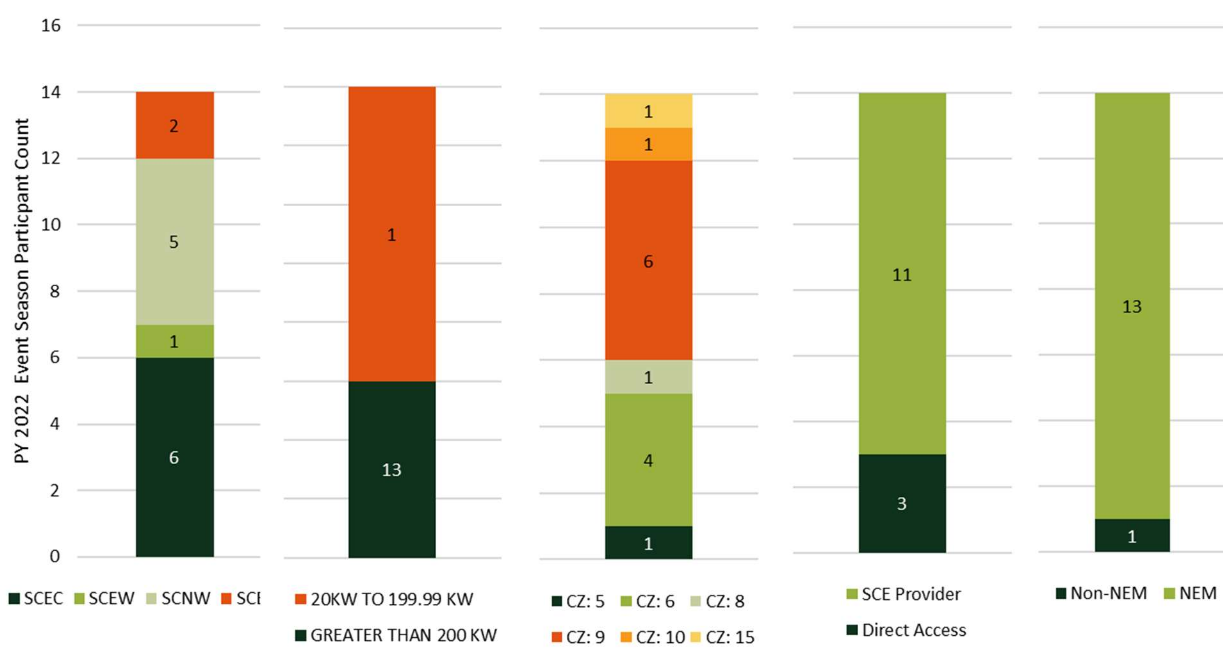


FIGURE 2-5: B.2 CBP AGGREGATOR PARTICIPANT COUNTS BY POPULATION CHARACTERISTIC TYPE



2.3 EVENT INFORMATION

There were twelve ELRP events days during the 2022 event season in SCE's service territory. All events, with one exception, were Day Ahead events. This contrasts with the 2021 event season which only included Day Of events. Table 2-3 below presents the PY 2022 ELRP event days, event times, event duration, subgroups dispatched, and event types. There was no enrollment in subgroups A.3 and A.5 during PY 2022 events.

TABLE 2-3: PY 2022 SCE ELRP EVENT INFORMATION

Event Date	Event Time	Duration (Hours)	Subgroup(s)*	Event Type
8/17/2022	16:00-21:00	5	A.2 non-BIP, A.4, A.6	Day Ahead
8/31/2022	17:00-20:00	3	All non-A.6	Day Of
9/1/2022	18:00-19:00	1	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/2/2022	16:00-21:00	5	A.6	Day Ahead
9/3/2022	18:00-20:00	2	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/4/2022	17:00-20:00	3	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/5/2022	17:00-21:00	4	All non-A.6	Day Ahead
	16:00-21:00	5	A.6	Day Ahead
9/6/2022	16:00-21:00	5	All non-A.6	Day Ahead (extended Day Of)
	16:00-21:00	5	A.6	Day Ahead
9/7/2022	16:00-21:00	5	All	Day Ahead
9/8/2022	16:00-21:00	5	All	Day Ahead
9/9/2022	16:00-21:00	5	A.6	Day Ahead
9/9/2022	16:00-18:00	2	All non-A.6	Day Ahead (extended Day Of, ended early Day Of)

*Subgroups A.3 and A.5 participants did not have any enrolled participants during events in PY 2022.

ELRP event days were dual program days for many ELRP participants that were enrolled in DR programs outside of the ELRP. Additionally, all ELRP event days are Flex Alert days (as Flex Alerts are one of the triggers for an ELRP event). Table 2-4 below presents the event dates for programs that overlap with ELRP event days.

TABLE 2-4: PY 2022 SCE DUAL PROGRAM EVENT DAYS FOR DUALLY ENROLLED ELRP PARTICPANTS

Date	AP-I	BIP	CPP	CBP	SDP	SEP
8/17/2022	--	--	Event	--	--	Event
8/31/2022	--	--	--	Event	--	Event
9/1/2022	--	--	Event	Event	--	--
9/2/2022	--	--	--	Event	--	Event
9/3/2022	--	--	--	--	--	--
9/4/2022	--	--	--	--	--	--
9/5/2022	Event	Event	Event	--	Event	Event
9/6/2022	Event	Event	Event	Event	Event	Event
9/7/2022	Event	Event	Event	Event	Event	Event
9/8/2022	--	--	Event	Event	Event	--
9/9/2022	--	--	--	--	--	--
9/9/2022	--	--	--	--	--	--
9/9/2022	--	--	--	--	--	--

2.4 REPORT ORGANIZATION

The remaining sections of this report are organized as follows:

- **Section 3 Data and Methods.** This section presents the data and methods used for the PY 2022 evaluation of the ELRP.
- **Section 4 Ex Post Results.** This section presents the ex post analysis results from PY 2022 ELRP participation and supporting analysis.
- **Section 5 Ex Ante Results.** This section presents forecasts of the ELRP ex ante impacts for PY 2022 through PY 2025.
- **Section 6 Comparison Between Ex Post and Ex Ante.** This section discusses the difference between the ex post and ex ante impacts, as well as why they are different.
- **Section 7 Findings and Recommendations.** This section presents the findings and recommendations for the ex post and ex ante impact analysis.
- **Appendices A and B.** These appendices present the ex post and ex ante table generators and various proxy day analyses that support the ex post and ex ante methodology and results.

3 DATA AND METHODS

This section presents the data sources and evaluation methodology used for the PY 2022 ex post and ex ante impact analysis.

3.1 DATA SOURCES

The data sources that are required for the 2022 ELRP evaluation include:

- Participant information and characteristics
- ELRP event information
- Non-ELRP event information for programs associated with dually enrolled participants including BIP Firm Service Level (FSL) commitments.
- AMI (Advanced Metering Infrastructure) interval data for participants and residential non-participants
- Participant and non-participant billing data
- Historical hourly weather and irradiance data
- Ex ante weather scenarios
- Participant enrollment forecasts

Data Collection

Verdant worked with SCE to obtain the necessary data to estimate the ex post impacts and forecast ex ante load reductions for the ELRP. The data required for ex post and ex ante analyses of the ELRP include the following items.

Customer Information and AMI data. Verdant requested customer information and service point level AMI data for customers enrolled in the ELRP. Given the desire to use a control group for A.6 Residential customers Verdant requested AMI data for all ELRP participants and for the eligible population of residential non-participant customers (after sampling). AMI data was requested from May through October of 2022 and May through October of 2021 for sampled A.6 customers and the non-participant control group. The requested customer information included those necessary to segment the data by the domains of interest (e.g., sector, industry) as well as information to map to any weather stations.

Customer Billing Data. Verdant requested participant billing data and a stratified random sample of non-participant billing data to use for selection of A.6 Residential matched control groups. Billing data was requested for 2021 and 2022.

Program information. Verdant requested information on customers' program participation, the date customers enrolled in the ELRP and other relevant DR programs and the timing of disenrollment if the customer left the ELRP or other DR programs. Verdant requested information from SCE on the timing and duration of ELRP events.

Other DR participation. The evaluation required accounting for participation in other utility DR programs. Verdant requested enrollment dates and de-enrollment dates for other program participation for dually enrolled ELRP participants and the event times and durations for those events

Weather and irradiance data. SCE provided the weather data that is necessary to model weather sensitive loads as well as irradiance data to be used for participants with on-site solar generation.

Participant forecasts. The ex ante forecasts rely on a projection of participation over the forecast horizon. SCE provided these data. SCE provided their participant forecasts for relevant ELRP subgroups by customer size, Local Capacity Area, SubLAP and dual enrollment status.

Weather scenarios. The ex ante forecasts also rely on data to reflect the different weather scenarios in the different 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 data were provided by both the utilities and CAISO, though they are typically very similar.

3.1.1 SCE Participant Data Attrition

The evaluation of SCE's ELRP experienced some level of data attrition through various aspects of the analysis. This sub-section details the data attrition.

Non-A.6 Ex Post and Ex Ante Data Attrition

The evaluation of the PY 2022 ELRP attempted to include all PY 2022 A.1, A.2 Non-BIP, A.4 VPP and B.2 CBP Aggregator participants into the estimation of ex post and ex ante impacts. However, not all of SCE's PY 2022 participant population were included in the non-A.6 subgroups due to missing or insufficient interval data for modeling impacts. Despite this, data attrition in these groups is fairly low with almost all participants being accounted for in the evaluation of A.1, A.2 Non-BIP, A.4 VPP and B.2 CBP. Table 3-1 below presents the data attrition by event date and group.

VERDANT

TABLE 3-1: SCE NON-A.6 DATA ATTRITION BY EVENT DAY AND SUBGROUP

Sub-group	Metric	PY 2022 ELRP Event Date									
		8/17	8/31	9/1	9/3	9/4	9/5	9/6	9/7	9/8	9/9
A.1 (All)	Num. of Event Evaluated	0	693	693	729	729	763	761	786	826	853
	Num. of Event Parts	0	705	705	741	741	772	773	795	839	866
	Share (%) Evaluated	**--**	**98%**	**98%**	**98%**	**98%**	**99%**	**98%**	**99%**	**98%**	**98%**
A.2 Non-BIP	Num. of Event Evaluated	0	0	0	0	0	0	0	5	5	5
	Num. of Event Parts	0	0	0	0	0	0	0	5	5	5
	Share (%) Evaluated	**--**	--	--	--	--	--	--	**100%**	**100%**	**100%**
A.4 VPP	Num. of Event Evaluated	270	728	746	799	915	982	1004	1023	1048	1064
	Num. of Event Parts	271	732	749	802	918	985	1008	1027	1051	1067
	Share (%) Evaluated	**100%**	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
B.2 CBP Aggregator	Num. of Event Evaluated	0	14	14	14	14	14	14	14	14	14
	Num. of Event Parts	0	14	14	14	14	14	14	14	14	14
	Share (%) Evaluated	--	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

A.6 Residential Ex Post and Ex Ante Data Attrition

Data attrition is a more complicated matter for the A.6 participants and cannot be summarized as succinctly as with the other groups. In general, data attrition for A.6 is associated with issues similar to the other groups, such as missing or poor-quality data, but there are several differences for this group that make it difficult to provide a clear accounting. First, the analysis was based on a sample because it would have been impractical to use the nearly two million participants in the program, let alone the number of non-participants required for selection of a control group. Even with relatively large samples, most of the accounts in the population are excluded from the analysis. The second difference is there were additional steps to the analysis related to the development of the control group, each of which introduced the possibility for loss of data. Finally, the estimation of impacts was based on panel data models, which, in contrast to individual customer models, require a relative balance or symmetry in the days of data for each customer. This resulted in the dropping of a small share of customers that for various reasons had data less aligned with the others in the segment.

3.2 EX POST IMPACT METHODOLOGY

The ex post impact methodology is designed to achieve the goal of the ex post analysis. The goals for the ex post impact analysis include:

- Estimating the aggregate and per-customer hourly load impacts and average daily load impacts for each event in PY 2022 and an average event day and relevant domains of interest.
- Calculation of confidence intervals surrounding impact estimates for each hour, as well as the average event hour.

The load impacts were developed for different domains of interest. The domains of interest for each subgroup are presented in Table 3-2 below.

TABLE 3-2: EX POST IMPACT REPORTING DOMAINS OF INTEREST BY SUBGROUP

Reporting Domains	Reporting Group Types	ELRP Subgroup				
		A.1	**A.2**	**A.4**	**A.6**	**B.2**
Population	All Customers	X	X	X	X	X
Location	LCA, SubLAP, Climate Zone	X	X	X	X	X
NAICS Description	NAICS Description	X	X			X
Customer Size	Load Size Ranges	X	X	X	X	X
Customer Type	Bundled, Direct Access, CCA	X	X	X	X	X
NEM and Technology	NEM Status (general), Solar, Storage, EV	X	X	X	X	X
Dual Enrollment	Dually Enrolled (general), BIP, CBP, CPP, etc.	X	X	X	X	X
Notification Success	Notification Received, Notification Failure				X	
Notification Type	No notification, App, Email, Text				X	
Enrollment Type	High-Use, CARE/FERA, Self-Enrolled				X	
Disadvantaged Community (DAC)	Census Tract DAC Designation				X	

The ELRP contains multiple subgroups with unique participant characteristics that necessitate different modeling approaches. As a result, the modeling approach for each subgroup varies, but all fall into three categories of modeling approaches. These include individual customer models, panel models with participant fixed effects, and panel modeling with matched control groups.

This section first presents the approaches used for the various subgroups, then goes into greater detail on the general modeling framework, and finally into details on impact estimation and challenges.

3.2.1 Subgroups A.1, A.2, and B.2

Subgroup A.1, A.2 and B.2 all represent non-residential customers that are comprised of a wide variety of industry and load types. As a result, Verdant utilized customer specific regression models for estimation of ex post impacts. This approach allows for varying baselines for each customer, specific to their characteristics and load variability.

3.2.2 Subgroup A.4 VPP

Subgroup A.4 represents ELRP participation through Virtual Power Plants (VPP). For SCE, all A.4 VPP participants were residential customers. Given the relative homogeneity of residential loads. Verdant utilized panel modeling with participant fixed effects for estimating impacts. Participants were segmented into modeling groups based on LCA, SubLAP, climate zone, customer type, and dual enrollment status. Additional secondary segmentation was used to model the remaining domains of interest, including NEM status and technology types. For segments without sufficient participant counts for panel modeling, customer specific regression models were used in place of panel models.

3.2.3 Subgroup A.6 Residential

Subgroup A.6 represents the residential component of ELRP that was introduced in PY 2022. Enrollment for this group was automatic for SCE customers in CARE, FERA, and High-Use customers, though there is also a small set of self-enrolled customers. There are two aspects to this subgroup that set it apart from the others. The first is the sheer quantity of participants (slightly less than 2 million), which called for an approach based on sampling. The second is the automatic enrollment for most participants, which makes the use of a control group critical. As a result, panel modeling with non-participant matched control groups was used to estimate the load impacts.

Matched Control Group Development

Verdant used SCE's "premise" as a proxy for individual households. In the customer data provided, the participant and non-participant populations consisted of 2,053,145 and 2,643,472 unique premises, respectively. The final counts of unique premises by group (enrollment type for participants and CARE or FERA status for non-participants) that were included in the population frame are presented in Table 3-3.

TABLE 3-3: PARTICIPANT AND NON-PARTICIPANT POPULATION PREMISE COUNTS

Cohort	Group	Unique Premises
Participants	Auto-CARE	1,202,285
	Auto-FERA	26,737
	Auto-HEU	804,802
	Self-Enrolled	19,321
	Total	**2,053,145**
Non-Participants	CARE	102,668
	FERA	3,165
	Others	2,537,639
	Total	**2,643,472**

Sampling

As discussed previously, with more than 2 million participants, the A.6 participants required sampling for the estimation of impacts.

While there are many domains of interest (disadvantaged communities, customer type, etc.), sampling was based on three main strata:

- Enrollment type
- SubLAP
- NEM

the three strata account for 71 segments, with high variability in the number of participants in each. Verdant sampled one thousand participants from each segment, so segments with fewer participants used the entire population. Based on the population frame used for sampling, 36 (slightly under 50% of the total) of the segments had fewer than 1,000 participants and relied on the full population. While using the population is generally a good thing, of these segments, around half had fewer than 50 participants, which has ramifications for the ability to model their impacts reliably. The analysis called for a control group, so a sample was also necessary for non-participants. Verdant selected twenty times the sample count from the participant sample, which would allow enough non-participants from which to identify a matched control group.

Matched Control Group Development

As discussed previously, several aspects of the A.6 group call for the use of a control group to reliably estimate impacts. The objective is to find a control group with similar load profiles to the ELRP customers in each of the sampled segments. Verdant relied on stratified propensity score matching (SPSM) with replacement to identify a control group from the broader population of non-ELRP customers. SPSM is based on a logistic regression model that predicts participation as a function of various load characteristics. Because of the large number of accounts in the sample, Verdant conducted SPSM in two stages. The first stage relied on monthly data, which was requested for the complete set of participant and non-participant samples. Monthly data does not allow for matching on load profiles, but it does help to narrow down the non-participant population to customers with similar levels of consumption and weather sensitivity.

The results of the monthly SPSM matching produced a set of potential non-participant matches for each participant. After requesting the interval data for all sample participants and the subset of control group accounts, the next stage repeated the SPSM process, but relying on variables calculated using hourly data.

The objective of the SPSM is to find control groups with similar load profiles to the ELRP customers in the various segments. For the monthly stage of matching, the variables used in the SPSM models included:

- Average daily kWh
- Correlation between kWh and cooling degree days
- Coefficient of variation (COV) for average daily kWh
- Dummy for Presence of EV (if applicable for segment)
- Dummy for TOU rate (if applicable for segment)
- Percent of bills exhibiting export (NEM only)

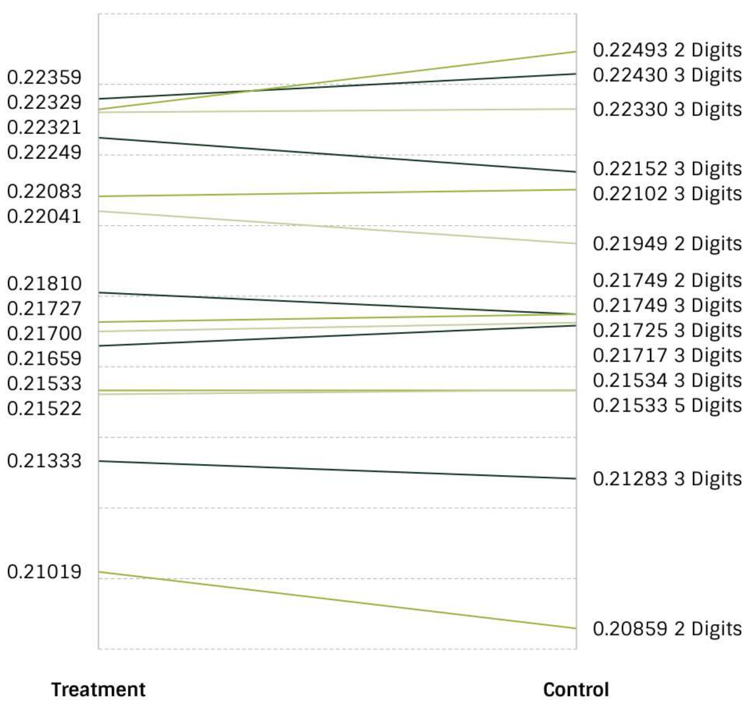
For the matching using hourly data, the variables used in the SPSM models included:

- Average daily kWh
- COV for daily kWh
- COV for hourly kWh
- Average mid-day hourly kWh
- Average evening hourly kWh
- Correlation between hourly kWh and cooling-degree hours
- Percent of hours exhibiting export (NEM only)
- Size of solar system (NEM only)
- Dummy for Presence of EV (if applicable for segment)
- Dummy for TOU rate (if applicable for segment)

Using the above as the independent variables for the respective stage, Verdant estimated a logit for each of the SubLAP, NEM status, and enrollment strata where ELRP participation was the binary dependent variable. The result of these models is a propensity score (ranging from 0 to 1) for each account that represents the likelihood that the account would be predicted to participate in the program. Both participant and control accounts have a propensity score, so the next step is to find a non-participant for each participant that has a similar score.

The level of precision in this process matters because it is unlikely, particularly in models with many continuous independent variables, that any two accounts will generate the exact same propensity score. For example, a participant with a rounded propensity score of 0.22041 might not have a match at five digits of precision, so a match needs to be found with fewer digits. For this reason, the process is done iteratively, starting with six digits of precision, and then lowering the level of precision required for matching each time until a match is found for each participant. An example of this is presented in Figure 3-1, which shows the propensity scores for the participants and the matched control accounts along with the digits or precision used to find a match. In this example, the participant with the propensity score of 0.22041 did not find a match until the precision was lowered to two digits, finally aligning with a control group account with a score of 0.2149.

FIGURE 3-1: PROPENSITY SCORE MATCHING EXAMPLE



After this process of selecting the control group accounts, the next step is to validate that the matching process resulted in a good control group. Verdant applied two screens for this validation. The first control group validation was based on independent sample t-tests for the logit model's independent variables where the participant was compared, first, to the full set of candidate control group accounts, and then with just those accounts that were matched to a participant. If the t-tests for the different metrics were not significantly different after selection of the control group, then the control group should be a good match. If there are still metrics with significant differences, then the matching did not produce as reliably similar a control group for the segment. This screen results in thousands of individual tests, so to summarize the results, Table 3-4 shows the number of segments that were modeled along with the count and percentage of t-test results that were statistically significant for, first, the comparison of the participants to the final matched control, and then for the comparison with the full control sample.

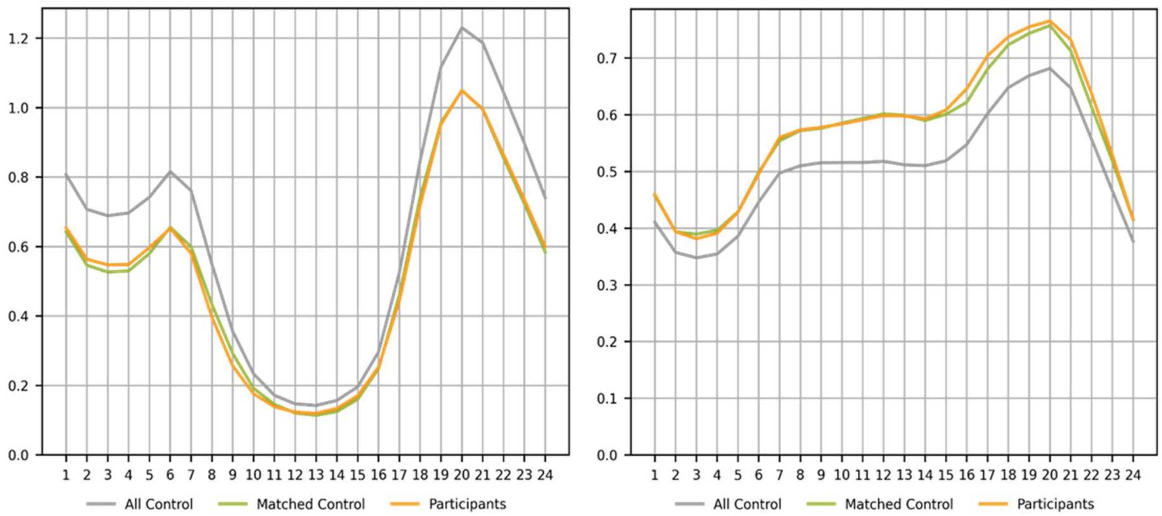
As seen in Table 3-4, of the 63 segments modeled, eight of the t tests were significantly different when comparing the participants to their matched control customers. Six of these were associated with the high-use enrollment group, however, for which matches were difficult to identify, since, by definition, the participant segment was composed of all high-consumption customers. In contrast, when comparing the participants to the full control population, the number of significantly different tests is substantial. For example, the correlation between hourly kWh and CDH was significantly different for nearly 65% of the segments. After matching, this was reduced to just one, suggesting that the matching process worked well.

TABLE 3-4: SUMMARY OF T-TESTS RESULTS FROM HOURLY SPSM MATCHING FOR SCE A.6

SPSM Variable	Segments Modeled	Participants to Matched Control		Participants to All Control	
		# With Significant Difference	% With Significant Difference	# With Significant Difference	% With Significant Difference
COV for daily kWh	63	2	3%	15	24%
COV for hourly kWh	63	0	0%	20	32%
EV Dummy	1	0	0%	0	0%
Average daily kWh	63	1	2%	40	63%
Average mid-day hourly kWh	63	1	2%	29	46%
Average evening hourly kWh	63	1	2%	40	63%
Correlation hourly kWh and CDH	63	1	2%	41	65%
Percent of hours exhibiting export	39	0	0%	10	26%
Solar system size	39	2	5%	17	44%
TOU Dummy	62	0	0%	14	23%

The second validation is a more subjective visual evaluation of the results where the load profiles for the treatment group are compared with the full set of control group candidates and the final matched group. While there are hundreds of potential comparisons, examples of the profiles for NEM and Non-NEM segments are shown in Figure 3-2, which show the average hourly delivered load profiles for the participants, the matched control, and full control sample. As both figures clearly show, the load profiles for the full control samples are markedly different from the participants, whereas the matched control groups are far more similar.

FIGURE 3-2: LOAD PROFILE VALIDATION FOR NEM (RIGHT) AND NON-NEM (LEFT) SPSM CONTROL GROUP



3.2.4 Ex Post Analysis Framework

There are several analysis steps that are common among all or many of the ELRP subgroups. These steps are detailed here.

Non-Residential Customer Weather Sensitivity

As described above, ELRP A.1, A.2 and B.2 participants make up a wide variety of non-residential customers. The loads of non-residential customers are frequently found to have no relationship to outdoor air temperatures, particularly in larger and more industrial segments. To determine participant weather sensitivity, Verdant applied a simple regression analysis to assess the relationship between load and outdoor temperature. The results were used to determine whether the candidate models for estimating impacts came from a group with various weather variables or from a group based on variables unassociated with weather. Additional details on model groupings are presented below.

Using the interval load and weather data for months in the ELRP event season (May through October), the analysis used regression models of consumption on different thresholds of cooling-degree hours for each participant. If any of these models resulted in a parameter estimate with a probability (“p value”) less than .05, the participant was deemed to be weather sensitive for that day type. Table 3-5 shows the count and share of participants who exhibited weather sensitivity by relevant non-residential ELRP subgroups. For the residential participants (A.4 VPP and A.6 Residential) weather is always included in impact baseline modeling. As a result, there is no weather sensitivity analysis conducted for subgroups with only residential participants.

TABLE 3-5: COUNT AND SHARE OF PARTICPANTS EXIHIBITING WEATHER SENSITIVITY BY SUBGROUP

Subgroup	Count	Share
A.1	542	60%
A.2 Non-BIP	1	20%
B.2 CBP Aggregator	13	93%

Ex Post Model Groupings and Candidate Models

ELRP non-residential participants and residential segmentations were placed into one of four modeling groups based on their weather sensitivity and NEM solar status. These groups are:

- **Weather Sensitive and NEM:** ELRP participants that exhibit weather sensitivity and are NEM customers; or residential segments that are comprised of NEM customers.
- **Weather Sensitive and Non-NEM:** ELRP participants that exhibit weather sensitivity and are not NEM customers; or residential segments that not comprised of NEM customers.
- **Non-Weather Sensitive and NEM:** Non-Residential participants that do not exhibit weather sensitivity and are NEM customers. Residential customers (A.4 VPP and A.6 Residential) never receive this assignment.
- **Non-Weather Sensitive and Non-NEM:** Non-Residential participants that do not exhibit weather sensitivity and are not NEM customers. Residential customers (A.4 VPP and A.6 Residential) never receive this assignment.

Individual ELRP participants and participant segments in each model group are tested on a similar set of candidate models which include independent variables that are intended to help control for specific characteristics of these participants. For example, the weather-sensitive and non-NEM customers are tested on a set of candidate models that contain various specifications that include variables to account for weather effects on energy consumption. Conversely, non-weather sensitive participants select from a set of candidate models that do not include weather variables in the model specification. An additional feature of these groupings is the inclusion of NEM status. All solar NEM participants have the option to select a model that has weather station irradiance included as an independent variable. The idea is to capture the variability in net energy consumption and delivered load as a result of solar PV production, using irradiance as a proxy for PV production. However, NEM customers are also given the option of selecting models without solar irradiance. Table 3-6 presents the types of variables included in at least one candidate model specification by modeling group.

TABLE 3-6: VARIABLE TYPES INCLUDED IN CANDIDATE SPECIFICATION MODELING GROUPS

		Model Group			
		Non-Residential Customers and Residential Segments		Non-Residential Customers Only	
Variable Type	Variable Examples	Weather Sensitive and NEM	Weather Sensitive and Non-NEM	Non-Weather Sensitive and NEM	Non-Weather Sensitive and Non-NEM
Weather	Cooling Degree Hours	✓	✓		
Irradiance	Global Horizontal Irradiance	✓		✓	
Calendar Effects	Month, Day of Week	✓	✓	✓	✓
Baseline Adjustment	Average Morning Load	✓	✓	✓	✓

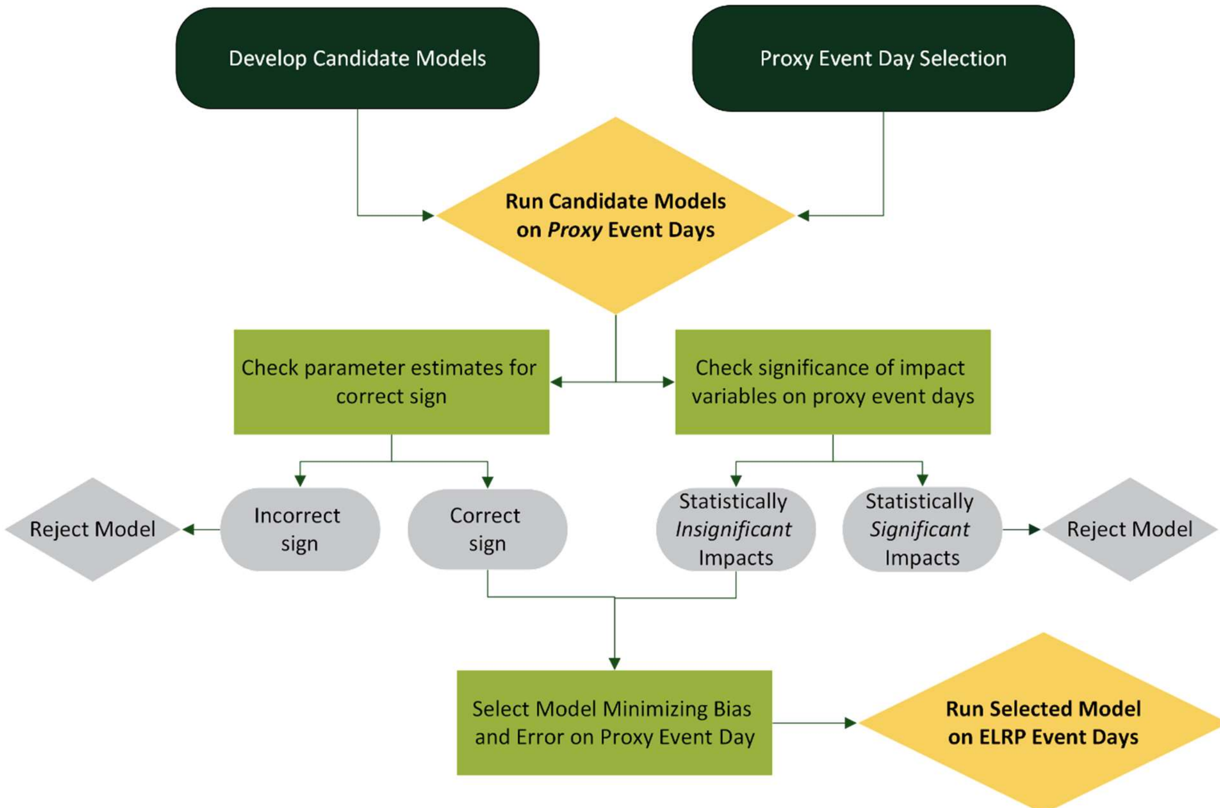
Proxy Event Day Selection

The assessment of candidate model performance relies on the comparison between actual and predicted model performance on a set of days with event-like conditions. These selected days are referred to as proxy event days. For most demand response programs with events coinciding with extreme temperature events, proxy event days are typically the remaining hot non-event days near events. However, some candidate model specifications also have solar irradiance included in the specification. As a result, proxy event days were also selected based on irradiance for non-weather sensitive NEM participants. Five weekdays and three weekend days were selected as proxy event days for each participant based on the maximum average temperatures between 1:00 pm and 11:00 pm. For non-weather sensitive NEM participants, five weekdays and three weekend days were selected based on the average maximum solar irradiance between 1:00 pm and 11:00 pm. For subgroups utilizing some form of panel model (A.4 VPP and A.6 Residential), proxy days represent the five most frequently selected weekdays and the three most frequently selected weekdays for participants in each respective modeling segment.

Impact Model Selection

Each set of candidate models was tested on proxy event days and assessed under several conditions. This process is depicted graphically in Figure 3-3. As presented, the model selection process begins with the development of a catalog of candidate model specifications and the selection of a set of proxy event days (discussed above). The candidate models are estimated using the proxy event days with presumed event hours to assess whether a model generates statistically significant parameters. If it does, the model specification is rejected because the models should not be finding impacts for events that did not occur (although there are cases where a selected model did produce statistically significant impacts due to a high degree of load volatility). Next, Verdant's arbitration routine assesses the model coefficients for anticipated sign. A parameter designed to capture temperature effects, for example, should not be negative. Finally, the candidate models are estimated again, this time using the proxy event days as holdout days, which are used to assess the accuracy and bias of the model predictions out of sample. These metrics are used to select a final model from the candidates.

FIGURE 3-3: EX POST IMPACT MODEL ARBITRATION



3.2.5 Impact Estimation for Subgroups A.1, A.2 and B.2

The estimation of ex post models for subgroups A.1, A.2 Non-BIP and B.2 CBP Aggregators relies on individual customer specific regression models. Equation 3-1 presents the general model specification used to estimate ex post impacts.

EQUATION 3-1: SUBGROUPS A.1, A.2 AND B.2 GENERAL MODEL SPECIFICATION

$$kWh_{e,d,h} = \beta_0 + \beta_{1e,h}EventDay_eHour_h + \beta_2Temp_h + \beta_3Irr_h + \beta_{4,h}Hour_h + \beta_{5,m}Month_m + \beta_{6,d}Wday_d + \beta_{7,h}OtherEventHour_h + \varepsilon$$

Where:

$kW\mathrm{h}_{\mathrm{e,d,h}}$	The net load on day *d* in hour *h* during event *e*
β_0	The intercept of the regression model

$EventDay_e Hour_h$	The interaction between the event day dummy and hour. Its coefficient, $\beta_{1e,h}$, yields the impact of an event on event day *e* during hour *h*
$Temp_h$	A temperature variable in hour *h*.
Irr_h	A solar irradiance variable in hour *h*.
$Hour_h$	A dummy variable for each hour *h*
$Month_m$	A dummy variable for each month *m*
$Wday_d$	A dummy variable indicating the day of the week *d*
$OtherEventHour_h$	A dummy variable indicating whether hour *h* is an event hour for a participant in another demand response program
ε	An error term

The interaction between $EventDay_e Hour_h$ results in a set of 24 $\beta_{1e,h}$ estimates that capture event day specific impacts. These sets of 24 estimates are used to establish program impacts during the event window and capture any other event day effects, such as precooling, battery charging, or snapback, for hours outside of the event window. In essence, $\beta_{1e,h}$captures the difference between actual event day load and the estimated baseline. For the ex post analysis, $\beta_{1e,h}$ estimates over the event window provide the impact estimates of interest.

Incremental Load Reductions for Dually Enrolled A.1, A.2 and B.2 Participants

The ELRP contains many dually enrolled participants. This is especially true for B.2 CBP aggregators which are comprised entirely of CBP participants. Additionally, the A.1 subgroup contains 165 participants that are enrolled in AP-I, BIP, CPP, and SDP. To accurately estimate incremental load reduction (ILR) impacts, dual participation needs to be accounted for in estimation of event day baselines.

OVERLAPPING BIP AND ELRP EVENT HOURS

As described in Equation 3-1 above, the coefficient $\beta_{7,h}$ is intended to capture other DR program impacts. Since BIP program events only occur on ELRP event days all $\beta_{1e,h}$ coefficients are autocorrelated with $\beta_{7,h}$ for BIP customers. As a result, all impacts in those hours are captured by $\beta_{7,h}$ and $\beta_{1e,h}$ estimates are set to zero. In other words, all impacts during overlapping program event hours are attributed to BIP participation in the modeling of ELRP impacts.

However, the ILR for BIP participants, as defined by program rules, is any load reduction beyond the BIP firm service level (FSL) commitment. The FSL represents a participant's BIP committed level of load reduction. Since the BIP program does not credit BIP participants for load reductions beyond their FSL, any load reductions beyond FSL commitments should be attributed to ELRP participation. As a result, a dually enrolled BIP participant's ELRP baseline during overlapping BIP event hours is the maximum value of the FSL and observed load in that hour. In other words, the ILR is set to the load reductions beyond the FSL or zero if the BIP FSL is not achieved. Additionally, the uncertainly (impact estimate variance) is set to zero during overlapping BIP event hours as the impacts are not estimated, but rather determined with certainty given stated FSLs and observed load.

OVERLAPPING NON-API, NON-SDP AND ELRP EVENT HOURS

In contrast with BIP participants, AP-I participants are not compensated for load reductions during overlapping event hours. Additionally, SCE does not have the ability to establish ILR for SDP participants on dual event days. As a result, the impacts during overlapping event hours are set to zero. All impacts during AP-I and SDP event hours are attributed to API and SDP.

DUAL PARTICIPATION IN NON-BIP, NON-AP-I, AND NON-SDP DR AND ELRP EVENTS

For the estimation of ILR impacts for other DR programs, there is no systematic issue of autocorrelation between $\beta_{7,h}$ and $\beta_{1e,h}$ estimators as with BIP participation. This is because there is DR participation in other programs (CBP and CPP for example) on days outside of ELRP event days. As a result, other program impacts are captured by $\beta_{7,h}$ and allow for $\beta_{1e,h}$ to represent the ELRP participation effect. When developing the baselines for these participants, only $\beta_{1e,h}$ is added back into the observed load, excluding the typical DR program response from the estimated baseline.

3.2.6 Impact Estimation for Subgroup A.4

The impact estimation approach for A.4 VPP follows closely to the equation used for subgroups A.1, A.2 and B.2. There is one significant difference in the model specification, however, the inclusion of participant fixed effects (α_i). The purpose of fixed effects it to capture the individual customer's average consumption. Equation 3-2 presents the general model specification used to estimate ex post impacts.

EQUATION 3-2: SUBGROUP A.4 VPP GENERAL MODEL SPECIFICATION

$$kWh_{e,d,h,i} = \beta_0 + \beta_{1e,h}EventDay_eHour_h + \beta_2Temp_h + \beta_3Irr_h + \beta_{4,h}Hour_h + \beta_{5,m}Month_m \\ + \beta_{6,d}Wday_d + \beta_{7,h}OtherEventHour_h + \alpha_i + \varepsilon$$

Where:

$kWh_{e,d,h,i}$	The net load on day *d* in hour *h* during event *e* for participant *i*
β_0	The intercept of the regression model
$EventDay_eHour_h$	The interaction between the event day dummy and hour. Its coefficient, $\beta_{1e,\mathrm{h}}$, yields the impact of an event on event day *e* during hour *h*
$Temp_{\mathrm{h}}$	A temperature variable in hour *h*.
Irr_{h}	A solar irradiance variable in hour *h*.
$Hour_{\mathrm{h}}$	A dummy variable for each hour *h*
$Month_m$	A dummy variable for each month *m*
$Wday_d$	A dummy variable indicating the day of the week *d*

$OtherEventHour_h$	A dummy variable indicating whether hour *h* is an event hour for a participant in another demand response program
α_i	The fixed effect for participant *i* that captures the participant level heterogeneity.
ε	An error term

3.2.7 Impact Estimation for Subgroups A.6

The impact estimation approach for A.6 Residential customers differs in several ways compared to other ELRP subgroups. These include:

- **Estimating each event day hour individually.** Rather than estimating all event hours and impacts together, each hour of the day is modeled separately for A.6 customers. This is done for two reasons. The first is processing time; the sheer volume of participants and matched control groups customers within in each segment results in substantial run times. Estimating each hour individually reduces the amount of time needed for modeling each segment. The second reason is to eliminate the potential for autocorrelation in hour-to-hour load estimates of residential loads.

- **Inclusion of Flex Alert impacts.** The A.6 model specifications include Flex Alert impacts that would be observed in both the ELRP participant population and in the matched control group. Since all A.6 Residential ELRP events are Flex Alert days, we would expect to see load reductions in some portion of the matched control group. For purposes of reporting impacts, the reported total load reduction results are from the combined ELRP and Flex Alert impacts.

Equation 3-3 presents the general model specification used to estimate ex post impacts for subgroup A.6 Residential.

EQUATION 3-3: SUBGROUP A.6 RESIDENTIAL GENERAL MODEL SPECIFICATION

$$kWh_{e,h,i} = \beta_0 + \beta_{1e,h}EventDay_e * Trt_i + \beta_{2e,h}FlexAlert_e + \beta_3Temp_h + \beta_4Irr_h + \beta_{5,m}Month_m + \beta_{6,d}Wday_d + \beta_{7,d}OtherEventDay_d + \alpha_i + \varepsilon$$

Where:

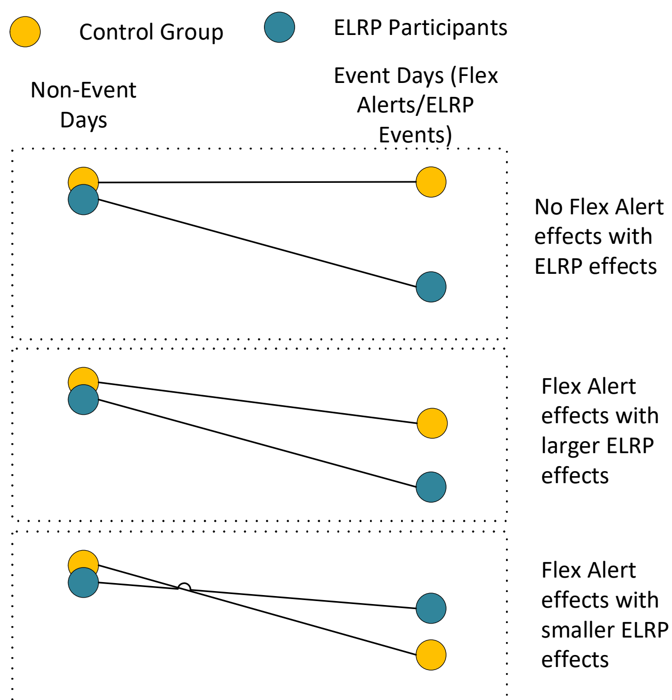
$kWh_{e,d,h,i}$	The net load on day *d* in hour *h* during event *e* for participant *i*
β_0	The intercept of the regression model
$EventDay_e$	The interaction between the event day dummy and a ELRP treatment dummy. Its coefficient, $\beta_{1e,\mathrm{h}}$, yields the ELRP effect on impact of an event on event day *e* during hour *h*
$FlexAlert_e$	A dummy variable indicating that day *e* is a Flex Alert Day. Its coefficient, $\beta_{2e,h}$, yields the Flex Alert portion of the ELRP impact
$Temp_\mathrm{h}$	A temperature variable in hour *h*.
Irr_h	A solar irradiance variable in hour *h*.
$Hour_\mathrm{h}$	A dummy variable for each hour *h*
$Month_m$	A dummy variable for each month *m*

$Wday_d$	A dummy variable indicating the day of the week *d*
$OtherEventDay_d$	A dummy variable indicating that day *d* is an event day for a dually enrolled participant
α_i	The fixed effect for participant *i* that captures the participant level heterogeneity.
ε	An error term

Residential A.6 Hypothetical Impact Modeling Outcomes and ELRP A.6 Impacts

Given the necessity to control for Flex Alert impacts in A.6 modeling, the resulting approach presents three scenarios for relative load reductions as presented in Figure 3-4. These scenarios depict the relative load reductions between the control group Flex Alert load reductions and the ELRP participant load reductions. As presented, these scenarios are No Flex Alert effects with ELRP effects (top), Flex Alert effects with larger ELRP effects (middle) and Flex Alert impacts with smaller ELRP effects (bottom).

FIGURE 3-4: SUBGROUP A.6 RESIDENTIAL MODELING OUTCOMES



The most common scenario that presents itself (especially for the auto-enrolled segments) in the ex post estimation is the third (bottom) scenario of Flex Alert effects with smaller ELRP effects. The interpretation of this outcome is that ELRP participants reduce their load during the joint ELRP/Flex Alert days, however, they reduce their load to a lesser degree than the control group. This results in a positive value (load increase) for the ELRP coefficient $\beta_{1e,h}$ and a negative value (load decrease) for $\beta_{2e,h}$. Given that the ELRP is intended to compensate participants for Flex Alert load reductions (rather than provide incremental reductions to the Flex Alerts), the ELRP program impacts are the summation of $\beta_{1e,h}$ and $\beta_{2e,h}$.

3.3 EX ANTE IMPACT METHODOLOGY

The goal of the ex ante impact analysis is to estimate program impacts for future years under varying 1-in-10 and 1-in-2 weather scenarios across the ELRP event window (4:00 pm to 9:00 pm).[10] Given that the ELRP is a pilot program, the ex ante analysis seeks to provide ex ante estimates for program years 2023 through 2025. The ex ante analysis only seeks to estimate impacts for subgroups that actively participated in events in PY 2022. The primary reason is that there was no event participation for Groups A.3 and A.5 for SCE. As a result, there are no ex post impacts to inform a LIP-based ex ante analysis.

Ex ante impacts are estimated in two ways. These include program level ex ante impacts and the portfolio adjusted ex ante impacts. The program level ex ante impacts represent forecasted program impacts on ELRP-only event days and only include impacts from the ex post analysis in which there is no other DR participation on that day for dually enrolled participants. Conversely, portfolio adjusted ex ante impacts represent ex ante impacts that are incremental to the entire portfolio of SCE's DR programs and represent ILR impacts. Compensation structures differ for dually enrolled participants and there is no mechanism or penalty structure that ensures reliable participation in ELRP. As a result, there may be cases where the portfolio adjusted impacts are larger than the program level impacts.

3.3.1 Ex Ante Impacts - Non.A.6

The ex ante impacts are derived from the weather-normalized ex post impacts and follow the standard practice outlined in the Load Impact Protocols. However, the results from the ex post analysis required some modifications to produce bottom-up ex ante analysis. The ex post analysis estimates weekend and weekday event impacts separately for non-residential subgroups (non-A.6 Residential and non-A.4 VPP). However, in the ex ante impacts model, the weekend and weekday impacts were estimated together which necessitates a slight modification to the individual participant weekday models used for ex post estimation. These adjustments include:

- The ex post model term $\beta_{1e,h}EventDay_eHour_h$ impact estimator was altered to $\beta_1EventHour$ for non-weather sensitive customers and to $\beta_1EventHour + \beta_2CDH65 * EventHour$ for weather sensitive participants, where the $EventHour$ is the dummy variable indicating an event hour and $CDH65$ is a seasonal weather variable. For summer cooling sensitive customers, the CDH65 term allows for ex ante impacts to "adjust" accordingly in each weather scenario. Additionally, the

[10] The 1-in-2 and 1-in-10 weather scenarios include a typical event day, monthly IOU system peak and monthly IOU CAISO system peak and vary for SCE.

$\beta_1 EventHour$ parameters were interacted with event hour to address ELRP participant fatigue through the five-hour ELRP event window.

- Weekday dummy variables ($Wday_d$) were set to 0.142 when producing ex ante estimates of baseline load. This value represents the average weekday dummy value (1 divided by 7) for each day of the week. For model specifications that do not include dummy variables for the day of the week a $Weekend_d$ dummy variable was added to the regression to control for changes in load between weekday and weekend days.

- Additionally, the model specification differs from the ex post model specification by interacting the event hour coefficient with the fixed effects that represent the n^{th} hour of an event. The goal of this is to attribute event fatigue to event impacts throughout the five-hour resource adequacy (RA) window.

After development of weather normalized impacts, the impacts are then weighted by the ex ante participant forecasts provided by SCE to account for the distributions of forecasted ELRP participants. More specifically, participants are weighted based the forecasted distributions of customer size, Local Capacity Area and SubLAP.

3.3.2 Ex Ante Impacts A.6

For the A.6 subgroup, the ex ante impact methodology largely followed that of the other groups, but there were several differences. First, two aspects made the overall approach less complicated. First, all A.6 events occurred during the same 4:00 PM to 9:00 PM window, eliminating any ambiguity related to modeling events where the start and end times vary. Second, while a weekend variable was included in the model, the load profiles and impacts did not vary in any meaningful way, so the ex ante estimates assumed that the events would occur on a weekday.

In addition to the above simplifications to the approach, another change was the exclusion of up to four if the hottest event days for a subset of SubLAPs for modeling. The justification for this was that 2022's weather was atypical, particularly for certain coastal areas that had atypically hot days, all of which fell on ELRP events. In the ex post modeling, with no hot non-event days, the unfortunate result of this was that in the absence meaningful curtailment among the auto-enrolled populations, the regression models captured the temperature effects in the impact variables. Since these increases are not "real," but rather byproducts of the anomalous weather, the evaluators deemed that it was best to simply exclude these hotter days from the ex ante modeling so as to not mischaracterize the impacts.

Finally, event fatigue was not explicitly modeled. This analysis was not necessary given the single event window, which would allow any fatigue to be ascertained from the event hour results. In the words, to assess fatigue, one can see how the impacts later in the event compare to the early hours.

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3.3.3 Ex Ante Forecasts

SCE provided their participant enrollment forecasts which are presented in Table 3-7. Verdant took these forecasts and proportionally allocated them to bins based on observed PY 2022 distributions of customer size, LCA and SubLAP for estimating the ex ante impacts. There is slight increase in participation for A.1 and A.4 from PY 2023 through PY2025 and a slight decrease in participation for A.6 across the same period

TABLE 3-7: SCE EX ANTE PARTICIPANT ENROLLMENT FORECAST BY YEAR SUBGROUP

Subgroup	PY 2023	PY 2024	PY 2025
A.1	906	915	924
A.2	7	7	7
A.3	0	0	0
A.4	1,318	1,384	1,453
A.5	0	10	10
A.6	1,920,122	1,900,921	1,881,912
B.2	14	14	14

3.4 UNCERTAINTY ADJUSTED IMPACTS

Both the ex post and ex ante analyses require estimation of uncertainty-adjusted load impacts at the 10th, 30th, 70th, and 90th percentiles. The uncertainty adjustments for both ex post and ex ante analysis result from the variances surrounding the impact estimators in the regressions described above. The variances are then summed across participants in each level of aggregation and hour for each event and the average event day. Verdant assumed that the variances were normally distributed and converted the sum of the variances into standard deviations that were then used to provide uncertainty adjusted impacts for the required percentiles. While these adjustments are largely not discussed in this report, they are presented in both the ex post and ex ante table generators (Appendix A).

3.5 USE OF NET AND DELIVERED LOAD

The ELRP evaluation stands out compared to other DR load impacts evaluations in its use of net load and delivered load rather than only delivered load. The reason for the use of net load is that multiple subgroups allow or require the use of net load for participant compensation. Subgroups A.1 and B.2 allow for participants to elect to use NEM resources for participation and to be compensated via net load reductions. Additionally, A.4 requires the use of net load. Although A.2 allows NEM, there are no PY 2022 enrolled customers with NEM. As a result, all segments are evaluated using net load with the addition of impacts also being estimated using delivered load for A.6.

3.6 MODELING CHALLENGES

Every load impact evaluation has a distinctive set of challenges when modeling impacts. The analysis of A.6 Residential has an exceptional set of challenges that are worth noting. These challenges include weather, auto-enrollment, availability of customers for a matched control group, and Flex Alerts.

Typically, matched control group customers are identified through some sort of matching methodology. However, the ELRP auto-enrolled all CARE, FERA, and High-Use customers into the ELRP. As a result, there are no CARE, FERA or High-Use non-ELRP customers of a reasonable sample size to use as a matched control group. While the evaluation was able to find suitable candidates for matched control groups from the general residential customer population, these matches are based on historical energy consumption, NEM status, and customer size. The matched control groups cannot account for behavioral or household characteristics of CARE, FERA or High-Use that may influence the way in which these participants interact with ELRP and Flex Alert events. The analysis would benefit from the inclusion of non-ELRP CARE, FERA and High-Use customers to help account for these behavioral changes. These customers, however, do not exist due to the autoenrollment of these entire populations.

Additionally, the existence and response to Flex Alerts in the participant and matched control group requires that Flex Alerts be accounted for in the modeling of A.6 residential impacts. Typically, matched control groups help control for extreme weather and idiosyncratic events that affect the overall utility customer population (such as a flex alert). In a sense, the matched control group helps solidify the counterfactual baseline and ensures impacts are solely a result of DR interventions. However, for 2022, except for one Flex Alert event, all ELRP and Flex Alert events occurred on the same days. This reduced the ability of the control group to capture weather effects on ELRP event days because the control group and ELRP participants were subject to similar influences. Stated succinctly, there were few days with extreme temperatures where the control group was not subject to a Flex Alert event, which limited the ability to estimate baseline sensitivity to high temperatures. To help account for this, Verdant excluded days from the analysis that were not sufficiently hot enough to provide useful information into the regression analysis.

Weather Challenges – September 9th, 2022

On September 9th, 2022, the SCE service territory experienced extreme tropical storm-like rainfall and rapid temperature decreases that coincided with the start on an ELRP event. Additionally, there were no other days like this in the analysis period. This results in auto-correlation issues in the modeling that cannot be controlled for without the inclusion of a matched control group. Although the A.6 Residential analysis included a matched control group, the inclusion of Flex Alert impacts in the non-participant population greatly reduced the ability to control for these events in the A.6 modeling. As a result, the 9/9/2022 event day impacts are usually the largest of any event day. However, the increase in impacts are primarily driven by weather, especially for weather sensitive participants and the residential segments. As a result, the 9/9 event day is not included in ex ante modeling or in the ex post average event day and should not be taken as reflective of typical event load reductions.

4 EX POST RESULTS

The primary objective of the ex post analysis is to provide estimates of event day load reductions and for an average event day. There were ten event days for SCE with varying event hours for non-A.6 subgroups. The average event day for SCE subgroups A.1, A.2 Non-BIP, A.4 VPP and B.2 CBP aggregators includes the average hourly impacts and participation across all event days with at least three hours in duration. These events make up the majority of ELRP events and minimize the dilution of average event day impacts by limiting the number of non-event hours represented in the average event day. The event hours for subgroup A.6 residential are always from 4 to 9 pm by program design, as a result the average event day includes all event days.

While all subgroup A.1 BIP participants were notified of each ELRP event, they are only compensated for participation during overlapping BIP event hours. As a result, it would be reasonable to only expect load reductions on event days with overlapping BIP event hours. Therefore, the average event day for A.1 BIP only includes dual BIP event days (September 5th, 6th, and 7th).

This section discusses each ELRP subgroup individually. First, we present the average event day load shapes, then we address hourly averages of per capita and aggregate event day impacts, the average by subgroup, and then applicable special topics for each subgroup. ELRP impacts are estimated using net load for all segments with the addition of delivered load for subgroup A.6 Residential.

As discussed previously, on September 9th, 2022, the SCE service territory experienced extreme tropical storm-like rainfall and rapid temperature decreases that coincided with the start on an ELRP event. Additionally, modeling was not able to remove the effect this rapid decrease in temperatures. Therefore, the 9/9/2022 event day is presented with an asterisk and should not be considered typical for ELRP events as much of those load reductions, especially for weather sensitive participants, are driven by weather events that would also be present in the general population of customers.

Interpreting Average Event Day Load Shapes

Visually representing event day load shapes and estimated baselines is a powerful tool for understanding event day activity and for framing impact estimates. For this reason, this report first presents event day load shapes for each subgroup's average event day before discussing the impacts for separate events. Given that events occurred on varying hours across event days, the density of the shaded areas relates to the frequency of event days where a given hour was an event hour. The opaquer the shading on an event hour, the more frequently that hour was an event hour.

Additionally, ELRP impacts represent ILR for dually enrolled participants. As a result, the ex post baseline includes other DR program impacts, which presents visually as a kink in the ELRP baseline. This is most noticeable in the A.1-All, A.1 AP-1 and A.1 BIP load shapes (Figure 4-1, Figure 4-3, and Figure 4-4).

4.1 SUBGROUP A.1 EVENT DAY IMPACTS

Figure 4-1 presents the average event day aggregate impact load shape for all subgroup A.1 participants. The A.1 participants are largely ELRP-only participants, however, there are roughly 165 participants dually enrolled in various DR programs (AP-I, BIP, CPP, and SDP). As presented in the figure below and described in Table 4-1, impacts in this customer segment were an average hourly load impact of [redacted] MWh ([redacted] kWh per capita) and an average hourly percent load reduction of [redacted] %.

FIGURE 4-1: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 ALL

[redacted]

Table 4-1 further details the event day specific average hourly impacts for A.1 participants. The average hourly percent load reductions ranged from [redacted] % to [redacted] % across event days (excluding the results from September 9th), with the largest impacts occurring on September 7th and the smallest impacts occurring on September 1st.

TABLE 4-1: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.1 ALL

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022*	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Extreme rainfall event

4.1.1 Subgroup A.1 General Event Day Impacts

Figure 4-2 below presents the average event day aggregate load shape for subgroup A.1 General, which is composed of A.1 customers who are not enrolled in other DR programs. As presented in the figure below the average impacts are modest. The average hourly impacts in this customer segment were 1 [redacted] MWh ([redacted] kWh per capita), with an average hourly percent load reduction of [redacted] % of average baseline reference load (see Table 4-2).

FIGURE 4-2: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 GENERAL

[redacted]

Table 4-2 presents the event day specific average hourly impacts for A.1 General participants. The average hourly percent load reductions ranged from [redacted] % to [redacted] % across event days (excluding the results from September 9th), with the largest impacts occurring on September 7th and the smallest impacts occurring on September 1st.

TABLE 4-2: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.1 GENERAL

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022*	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Extreme rainfall event

4.1.2 Subgroup A.1 AP-I Event Day Impacts

Figure 4-3 presents the average event day aggregate load shape for subgroup A.1 AP-I, which reflects the incremental load reduction for the 54 customers dually enrolled in ELRP and AP-I. SCE, however, does not have the ability to establish ILR for AP-I, therefore during AP-I event hours all ELRP ILR impacts are set to zero on September 5th, 6th, and 7th are dual ELRP event hours.

As presented in the figure below the average impacts are very small. The average hourly impacts in this customer segment were [redacted] MWh ([redacted] kWh per capita), with an average hourly percent load reduction of [redacted] % of average baseline reference load (see Table 4-2).

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FIGURE 4-3: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 AP-I

[redacted]

Table 4-3 presents the event day specific average hourly impacts for the subgroup of A.1 participants dual enrolled in ELRP and AP-I. The average hourly percent load reductions ranged from [redacted] % to [redacted] % across event days (excluding the results from September 9th), with the largest impacts occurring on August 31st and the smallest impacts occurring on September 3rd and 5th.

TABLE 4-3: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.1 AP-I

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022†	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022*	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

† Dual Event Day; *Extreme rainfall event.

4.1.3 Subgroup A.1 BIP Event Day Impacts

Figure 4-4 presents the average event day aggregate load shape for subgroup A.1 BIP. As a reminder, the ELRP baseline during dual BIP and ELRP event hours is the incremental reduction exceeding a BIP participant's FSL (the maximum value of the participant's observed load and the FSL). For ELRP-only hours, the baseline is the estimated regression baseline. As presented in the figure below the average ELPR impacts are modest, but observable. The average hourly impacts in this customer segment were [redacted] MWh ([redacted] kWh per capita), with an average hourly ELRP percent load reduction of [redacted]% of average baseline reference load (see Table 4-4).

FIGURE 4-4: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 BIP

[redacted]

Table 4-4 presents the event day specific average hourly impacts for the subgroup of A.1 participants dually enrolled in ELRP and BIP. The average hourly percent load reductions ranged from [redacted] % to [redacted] 3% across event days (excluding the results from September 9th), with the largest impacts occurring on September 8th and the smallest impacts occurring on August 31st. Note September 8th is not a BIP event day and ELRP load reductions are not compensated on non-BIP event days for subgroup A.1 BIP participants. These results suggest that BIP customer reduce their load for ELRP-only days despite the lack of compensation.

TABLE 4-4: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.1 BIP

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022†	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022*	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

† Dual Event Day; *Extreme rainfall event.

4.1.4 Subgroup A.1 CPP Event Day Impacts

Figure 4-5 presents the average event day aggregate load shape for subgroup A.1 CPP. Given that it is possible to estimate the ILR of CPP, Figure 4-5 and Table 4-5 present the ILR from customers dually enrolled in subgroup A.1 ELRP and CPP. As presented in the figure below the average ELPR impacts are very modest and difficult to observe. The average hourly impacts in this customer segment were [redacted] MWh ([redacted] kWh per capita), with an average hourly ELRP percent load reduction of [redacted] % of average baseline reference load.

FIGURE 4-5: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 CPP

[redacted]

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Table 4-5 presents the event day specific average hourly impacts for the subgroup of A.1 participants dually enrolled in ELRP and CPP. The average hourly percent load reductions ranged from -6.1% to 13% across event days, with the largest impacts occurring on September 4th and 3rd and the smallest impacts occurring on September 1st. Note September 1st was a CPP day and September 3rd and 4th were not. These results suggest that CPP customers reduce their load for ELRP-only days but make very modest or no reductions on dual ELRP/CPP days.

TABLE 4-5: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.1 CPP

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022†	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022†	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022*	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

† Dual Event Day; *Extreme rainfall event.

4.1.5 Subgroup A.1 SDP Event Day Impacts

Figure 4-6 presents the average event day aggregate load shape for subgroup A.1 SDP. It is possible to estimate the ILR of SDP and ELRP, therefore, Figure 4-6 and Table 4-6 present the ILR from customers dually enrolled in subgroup A.1 ELRP and SDP. As presented in the figure below the average ELPR impacts are very modest. The average hourly impacts in this customer segment were [redacted] MWh ([redacted] kWh per capita), with an average hourly ELRP percent load reduction of [redacted] % of average baseline reference load.

FIGURE 4-6: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.1 SDP

[redacted]

Table 4-6 presents the event day specific average hourly impacts for the subgroup of A.1 participants dually enrolled in ELRP and SDP. The average hourly percent load reductions ranged from [redacted] % to [redacted] % across event days (excluding September 9th), with the largest impacts occurring on September 1st and the smallest impacts occurring on August 31st.

TABLE 4-6: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.1 SDP

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022†	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022†	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022*	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

† Dual Event Day; *Extreme rainfall event.

4.1.6 Subgroup A.1 - All Average Event Day Impacts by Domain

Next, A.1 impacts by the varying domains of interest are presented in Table 4-7 (geography) and Table 4-8 (participant characteristics). In Table 4-7, the results show that the largest share of impacts are from participants in the climate zone 14 ([redacted] MWh of the [redacted] MWh average hourly event day impact). In Table 4-8 customers with a size of 200 kW or greater provide the largest share of load impacts despite having a smaller share of the participant population. Larger customers curtail a smaller percentage of their load but tend to provide larger per capita impacts.

TABLE 4-7: SCE SUBGROUP A.1 AVERAGE EVENT DAY IMPACTS BY GEOGRAPHY DOMAINS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Climate Zone	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	13	194	93.0	2.4	3%	0.5	103.0
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Local Capacity Area	Big Creek/Ventura	276	123.2	3.9	3%	1.1	99.1
	LA Basin	383	359.1	6.3	2%	2.4	91.0
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SubLAP	SCEC	172	618.6	32.6	5%	5.6	95.8
	SCEN	244	117.2	16.8	14%	4.1	102.0
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-8: SCE SUBGROUP A.1 AVERAGE EVENT DAY IMPACTS BY PARTICPANT CHARACTERISTICS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Size	20KW TO 199.99 KW	255	52.7	2.6	4.8%	0.7	95.5
	GREATER THAN 200 KW	386	924.9	49.7	5.4%	19.2	92.4
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NAICS Description	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Agriculture, Forestry, Fishing and Hunting	197	60.7	5.8	9.5%	1.1	101.8
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NEM Status	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Technology Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.2 SUBGROUP A.2 NON-BIP EVENT DAY IMPACTS

Figure 4-7 below presents the average event day aggregate load shape for subgroup A.2 Non-BIP. As presented there are no load reductions on the average event day for this subgroup.

FIGURE 4-7: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.2 NON-BIP

[redacted]

Table 4-9 provides the average event hour impacts for each event day for SCE Subgroup A.2 Non-BIP. On average, Subgroup A.2 BIP participants provided an average of [redacted] MWh of load reduction. Given that September 9th is not incorporated in average hourly load reductions, subgroup A.2 BIP participants did not, on average, provide load reduction. On September 7th and 8th the A.2 BIP participants provided an average [redacted] MWh of load reduction, or a load [redacted].

TABLE 4-9: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.2 NON-BIP

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
9/7/2022*	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Indicates a dual CPP and ELRP Event Day

4.2.1 Subgroup A.2 Non-BIP Average Event Day Impacts by Domain

A.2 NON-BIP IMPACTS BY THE VARYING DOMAINS OF INTEREST ARE PRESENTED IN TABLE 4-10 AND

Table 4-11 below for geography and participant characteristics respectively. By geographic domain, all impacts are located in climate zone [redacted]. No geographic or participant characteristic domain is associated with an ELRP incremental average aggregate load reduction.

TABLE 4-10: SCE SUBGROUP A.2 NON-BIP AVERAGE EVENT DAY IMPACTS BY GEOGRAPHY DOMAINS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Climate Zone	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Local Capacity Area	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SubLAP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-11: SCE SUBGROUP A.2 NON-BIP AVERAGE EVENT DAY IMPACTS BY PARTICPANT CHARACTERISTICS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Size	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dually Enrolled	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NAICS Description	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NEM Status	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Technology Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.3 SUBGROUP A.4 VPP EVENT DAY IMPACTS

Figure 4-8 presents the average event day aggregate impact load shape for subgroup A.4 VPP. Given that all A.4 VPP participate have battery storage, and the vast majority of participant's batteries are paired with solar, it is worth discussing the average event load shape as it differs from more traditional DR resource types.

There are two distinct deviations from the baseline reference load. The first deviation occurs between hours ending 9 and 17, where load is increased relative to the baseline load. This load increase is the result of battery charging from solar PV in a way that is not typical on non-event days. Battery charging prior to the event in the solar production window occurs on nearly all event days.

The second deviation is the actual load curtailment. Typically, A.4 participants dispatched their load for only two hours (most commonly hours ending 19 and 20) regardless of the length of the event window. This curtailment behavior is also discussed in Section 4.3.1.

FIGURE 4-8: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.4 VPP

[redacted]

4.3.1 Subgroup A.4 Event Day Load Reduction Behaviors

Before discussing event day A.4 VPP impacts, this section first discusses event day battery charging and event dispatch behaviors to provide greater context for reported numbers. Event day dispatch is discussed followed by event day battery charging.

As previously discussed, the A.4 VPP participants are generally all dispatched over the same hours. However, impacts are never sustained for more than two to three hours, regardless of the ELRP event duration. Figure 4-9 presents four individual ELRP event days of varying duration. The events are one, three, four, and five hours in duration, respectively. As seen in the figure, full levels of load curtailments last only for a maximum of two hours and then severely dissipate in the third hour. Given that the ELRP is a no penalty program, there is not an incentive to provide impacts that can be sustained across the entire event window. Rather the battery appears to completely discharge in the first two to three hours of curtailment to provide maximum load reductions in those hours.[11] Given that there is also some level of pre-curtailment battery charging on event days and snapback after full curtailment, the load reductions across the event window, on average, are smaller for events with longer event durations.

FIGURE 4-9: SCE SUBGROUP A.4 VPP EVENT DAY DISPATCH BEHAVIORS

[redacted]

4.3.2 Subgroup A.4 VPP Event Day Load Impacts

Now that A.4 event participation behaviors have been outlined, the average event hour impacts can be put into greater context. Table 4-12 presents the event day impacts for A.4 VPP. Given that impacts and

[11] The level of battery discharge and capacity cannot actually be known without battery telemetry data. It is the evaluator's hypothesis that batteries are fully discharged after two hours of the event.

baselines are derived from net load, and they cross positive and negative values of load, average percent load reduction are not intuitive and are excluded.

As anticipated, the event days with the largest impacts are one or two hours in duration. The event days with the largest impacts include September 1st and September 3rd with [redacted] and [redacted] MWh of load reduction in the average event hour in aggregate, respectively. The average event day load reduction is [redacted] MWh, however this average day is largely made up of days that are exclusively three hours or longer. As a result, the impacts on the average event day are a mix of curtailed load and load increasing behaviors.

TABLE 4-12: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.4 VPP

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022	16:00-18:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.3.3 Subgroup A.4 Average Event Day Impacts by Domain

Table 4-13 and Table 4-14 present the average event day impacts by geographic domains and participant characteristics, respectively. As seen in Table 4-13, participants located in the [redacted] provide the largest load reduction per capita and in aggregate.

TABLE 4-13: SCE SUBGROUP A.4 VPP AVERAGE EVENT DAY IMPACTS BY GEOGRAPHY DOMAINS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Local Capacity Area	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SubLAP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-14: SCE SUBGROUP A.4 VPP AVERAGE EVENT DAY IMPACTS BY PARTICIPANT CHARACTERISTICS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Aggregator	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Size	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dually Enrolled	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.4 SUBGROUP A.6 RESIDENTIAL EVENT DAY IMPACTS

Residential A.6 participants represent the largest ELRP participant population with slightly less than 2 million participants enrolled in the program for PY 2022 events. There are four enrollment pathways into the A.6 Residential subgroup. These include CARE auto-enrollment, FERA auto-enrollment, High-Use auto-enrollment and self-enrollment. Impacts are explored for each enrollment group and at the overall participant population level.

Figure 4-10 presents the average event day load shape for residential A.6 customers. The average event is presented using both net and delivered load. Unlike other ELRP subgroups, the average event day for A.6 residential participants is the average of all event days as a result of a constant 4 pm to 9 pm event window. As seen, the average event impact is very modest when examined visually. From a percentage of load perspective, the reduction is small with an average hourly load reduction of 0.9% of delivered load or net load. However, the sheer volume of participants resulted in average event hourly reduction of 39.1 MWh in delivered and 37.0 MWh in net load.

FIGURE 4-10: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP A.6 RESIDENTIAL

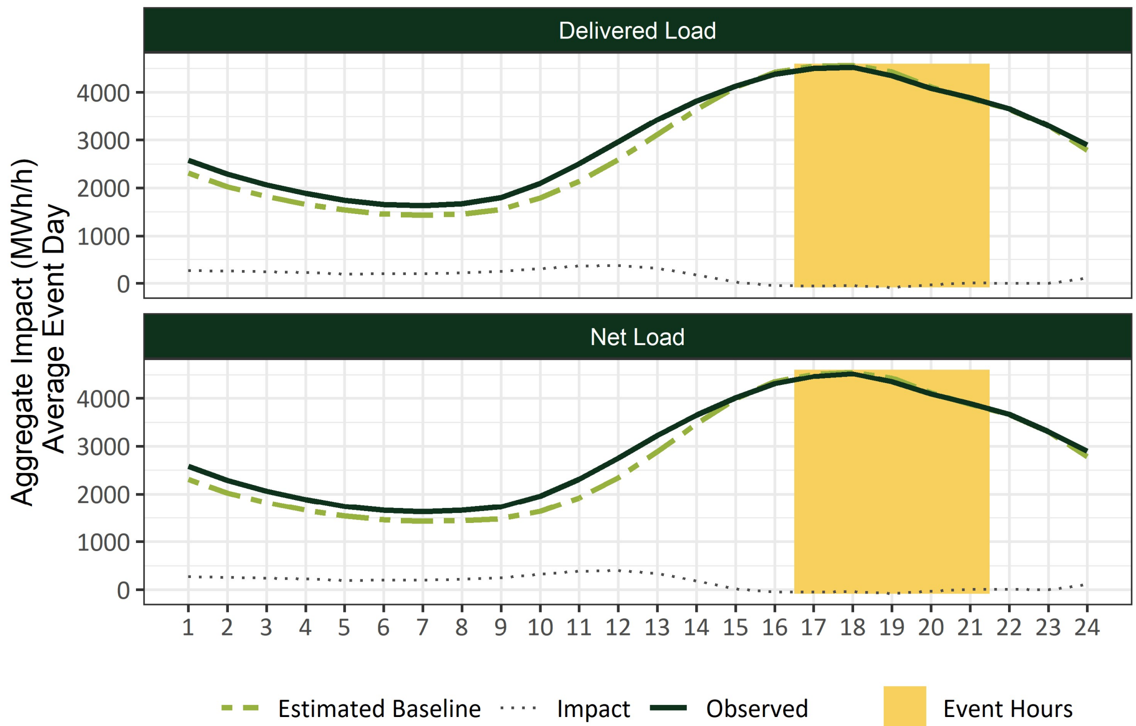


Table 4-15 and Table 4-16 present the event day average hourly load reduction for each A.6 Residential event and the average event day for delivered and net load respectively. As seen, load reductions as a percentage of load ranged from -3.0% to 2.1% of delivered load and -3.1 to 2.1% of net load, with the event with the largest load reduction occurring on September 8th. The September 9th event is not considered in this discussion due to the unique rain/tropical storm event that occurred.

The evaluation team explored whether load reductions (per capita and in aggregate) were correlated with temperature, however, the ex post impacts did not find that PY 2022 events trended positively or negatively with temperature in a meaningful way (when excluding September, 9th). This is not too surprising given the behavioral nature of the ELRP and the quantity of auto-enrolled customers.

TABLE 4-15: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.6 RESIDENTIAL – DELIVERED LOAD

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/17/2022	16:00-21:00	1,828,038	2.02	-0.03	-1.4%	-52.1	86.3
9/1/2022	16:00-21:00	1,828,573	2.32	-0.07	-3.0%	-126.9	91.7
9/2/2022	16:00-21:00	1,830,920	2.35	0.01	0.5%	21.1	91.7
9/3/2022	16:00-21:00	1,830,905	2.47	0.01	0.4%	19.7	93.5
9/4/2022	16:00-21:00	1,832,205	2.48	0.05	2.0%	89.2	90.8
9/5/2022	16:00-21:00	1,832,261	2.62	-0.06	-2.4%	-116.0	95.3
9/6/2022	16:00-21:00	1,832,257	2.44	-0.05	-2.0%	-89.1	93.1
9/7/2022	16:00-21:00	1,834,878	2.43	-0.02	-0.8%	-37.9	92.9
9/8/2022	16:00-21:00	1,834,893	2.29	0.05	2.1%	88.4	94.0
9/9/2022	16:00-21:00	1,837,282	1.91	0.32	17.0%	594.6	83.1
Avg. Event	16:00-21:00	1,832,221	2.33	0.02	0.9%	39.1	91.2

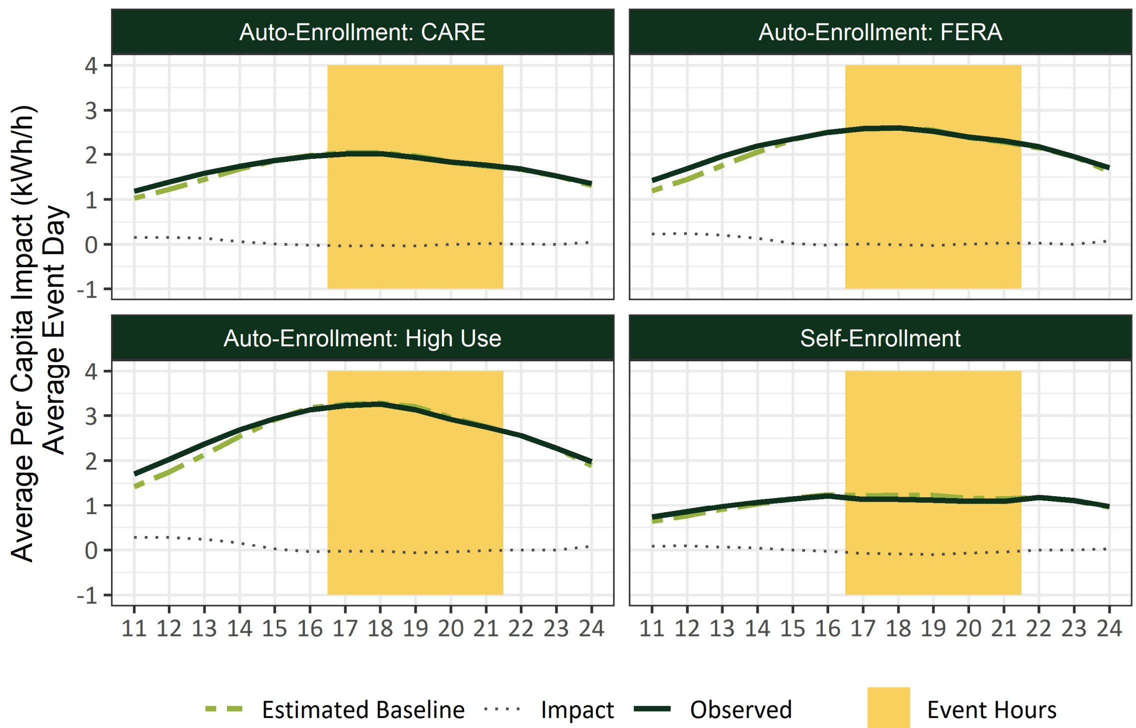
TABLE 4-16: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP A.6 RESIDENTIAL – NET LOAD

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/17/2022	16:00-21:00	1,828,038	2.00	-0.03	-1.4%	-53.1	86.3
9/1/2022	16:00-21:00	1,828,573	2.31	-0.07	-3.1%	-130.1	91.7
9/2/2022	16:00-21:00	1,830,920	2.34	0.01	0.4%	18.4	91.7
9/3/2022	16:00-21:00	1,830,905	2.46	0.01	0.4%	19.1	93.5
9/4/2022	16:00-21:00	1,832,205	2.47	0.05	1.9%	85.9	90.8
9/5/2022	16:00-21:00	1,832,261	2.61	-0.06	-2.4%	-114.8	95.3
9/6/2022	16:00-21:00	1,832,257	2.43	-0.05	-2.0%	-91.0	93.1
9/7/2022	16:00-21:00	1,834,878	2.43	-0.02	-0.9%	-39.3	92.9
9/8/2022	16:00-21:00	1,834,893	2.28	0.05	2.1%	86.0	94.0
9/9/2022	16:00-21:00	1,837,282	1.90	0.32	16.9%	589.4	83.1
Avg. Event	16:00-21:00	1,832,221	2.32	0.02	0.9%	37.0	91.2

4.4.1 Subgroup A.6 Residential Average Event Day Impacts by Enrollment Group

As mentioned previously, there are four enrollment pathways into the A.6 Residential; these include CARE auto-enrollment, FERA auto-enrollment, High-Use auto-enrollment and self-enrollment. Figure 4-11 below presents the average event day per capita load shapes by these enrollment groups for delivered load. Given that the difference between delivered and net load is visually imperceptible only delivered load is presented for brevity.

FIGURE 4-11: SCE AVERAGE EVENT DAY PER CAPITA LOAD IMPACT BY A.6 RESIDNTIAL ENROLLMENT GROUP – DELIVERED LOAD



As seen in the figure above and in Table 4-17 below, the enrollment group that provides the greatest level of curtailment as a percentage of load is the self-enrolled participants population (6.4% of delivered load and 6.3% of net load). This is expected as these participants elected to participate in the ELRP and are fully aware of their participation.

In general, FERA participants provided the lowest level of curtailment with an hourly average of -0.1% of delivered and net load. Auto-enrolled CARE and High-Use participants provide relatively similar load reductions in terms of percent load reductions with 0.7% and 1.1% of load reductions in delivered load, respectively, and 0.7% and 1.0% of net load.

Although the auto-enrolled participant segments do not provide nearly as much reduction compared to the self-enrolled in terms of per capita load predictions, they do provide the largest share or aggregate impacts due the substantially higher volume of participants in these groups.

TABLE 4-17: SCE SUBGROUP A.6 RESIDENTIAL AVERAGE EVENT DAY IMPACTS BY ENROLLMENT GROUP AND LOAD TYPE

Load Type	Enrollment Group	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
Delivered Load	Auto-Enrollment: CARE	1,124,344	1.93	0.01	0.7%	16.2	91.2
	Auto-Enrollment: FERA	24,489	2.45	0.00	-0.1%	0.0	91.1
	Auto-Enrollment: High-Use	667,638	3.03	0.03	1.1%	21.8	91.5
	Self-Enrollment	15,751	1.21	0.08	6.4%	1.2	87.0
	All A.6	**1,832,221**	**2.33**	**0.02**	**0.9%**	**39.1**	**91.2**
Net Load	Auto-Enrollment: CARE	1,124,344	1.93	0.01	0.7%	15.1	91.2
	Auto-Enrollment: FERA	24,489	2.44	0.00	-0.1%	-0.1	91.1
	Auto-Enrollment: High-Use	667,638	3.01	0.03	1.0%	20.8	91.5
	Self-Enrollment	15,751	1.20	0.08	6.3%	1.2	87.0
	All A.6	**1,832,221**	**2.32**	**0.02**	**0.9%**	**37.0**	**91.2**

4.4.2 Subgroup A.6 Residential Flex Alert vs. ELRP Load Reduction Contributions

The matched control groups used for estimating load impacts allow for the determination of relative ELRP load reduction compared with Flex Alert impacts in the general population of residential non-ELRP participants. Since all ELRP A.6 Residential event days are Flex Alert days, it was anticipated that there would be load reduction associated with Flex Alters and requests from the California State Government and SCE marketing to curtail load. Given the impacts are small in terms of percent load reductions, incorporating Flex Alerts into modeling was required to account for similar load reductions in the non-participant population.

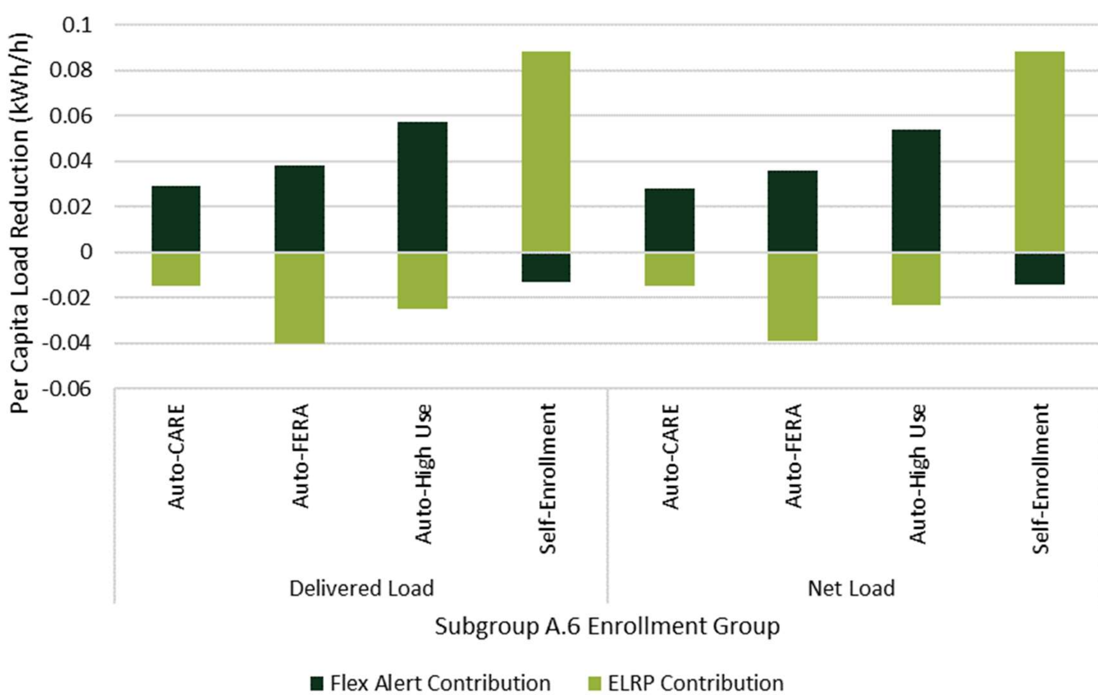
The goal of the ELRP is to compensate participation in Flex Alerts rather than provide incremental load reductions to Flex Alerts. As a result, the impacts associated to A.6 Residential are the combined effects of Flex Alerts and ELRP participation. Table 4-18 and Figure 4-12 present the relative contributions to overall reported impacts. As seen, ELRP contribution, relative to Flex Alters, is small and negative (small load increases) for the auto-enrolled subgroups. That is to say, relative to the general population's response to Flex Alerts, the auto-enrolled CARE, FERA and High-Use customers in the ELRP provided less load reduction than the general population, leading the negative ILR from ELRP. The negative ILR for the auto-enrolled subgroups is illustrated in Figure 4-12 by the negative, below zero ELRP bars.

TABLE 4-18: SCE SUBGROUP A.6 RESIDENTIAL AVERAGE EVENT DAY PER CAPITA LOAD IMPACTS CONTRIBUTION – FLEX ALERT VS. ELRP

Load Type	Enrollment Group	Avg. Per Capita Flex Alert Impact Contribution (kWh/h)	Avg. Per Capita ELRP Impact Contribution (kWh/h)	Avg. Per Capita Combined Impact (A.6 Reported Impact) (kWh/h)
Delivered Load	Auto-Enrollment: CARE	0.029	-0.015	0.014
	Auto-Enrollment: FERA	0.038	-0.04	-0.002
	Auto-Enrollment: High-Use	0.057	-0.025	0.032
	Self-Enrollment	-0.013	0.088	0.075
Net Load	Auto-Enrollment: CARE	0.028	-0.015	0.013
	Auto-Enrollment: FERA	0.036	-0.039	-0.003
	Auto-Enrollment: High-Use	0.054	-0.023	0.031
	Self-Enrollment	-0.014	0.088	0.074

Note: Flex Alert and ELRP impact contributions may not sum to combined impacts due to rounding

FIGURE 4-12: SCE SUBGROUP A.6 RESIDENTIAL AVERAGE EVENT DAY PER CAPITA LOAD IMPACTS CONTRIBUTION – FLEX ALERT VS. ELRP



The incremental impact of auto-enrolled participants, on average, ranges from -0.015 to -0.04 kWh depending on auto-enrollment group and load type. An important take-away from this finding is that for auto-enrolled customers, the ELRP is not leading to incremental load reductions. An important caveat, however, is that auto-enrolled participants are matched with a control group that does not include CARE, FERA, or High-Use customers due to the lack non-ELRP customers in these groups.

Self-enrolled customers, however, do have incremental load reductions associated with ELRP participation.

4.5 SUBGROUP B.2 CBP AGGREGATOR EVENT DAY IMPACTS

The PY 2022 ELRP saw one CBP aggregators participate in the ELRP through subgroup B.2. Due to the nature of this group, all participants are dually enrolled and impacts represent ILR to CBP participation. Figure 4-13 below presents the average event day load impact. As seen in the load shape and in Table 4-19, load reductions were generally small ([redacted] % of load) with an average per capita load reduction of [redacted] kWh.

FIGURE 4-13: SCE AVERAGE EVENT DAY AGGREGATE LOAD IMPACT – SUBGROUP B.2 CBP AGGREGATOR

[redacted]

Comparing the non-CBP days of September 3rd and 5th with CBP days, aggregators appear to be equally responsive to CBP and non-CBP days. A limitation of the analysis for this segment is the inability to account for participant level contributions to CBP market bids. Rather, the typical CBP response is captured to account for ILR to CBP.

TABLE 4-19: SCE PY 2022 ELRP AVERAGE EVENT HOUR IMPACT – SUBGROUP B.2 CBP AGGREGATORS

Event Date	Event Window	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
8/31/2022*	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/1/2022*	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/3/2022	18:00-19:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/4/2022*	18:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/5/2022	17:00-20:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/6/2022*	17:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/7/2022*	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/8/2022*	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9/9/2022	16:00-21:00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avg. Event	--	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Indicates a dual CBP and ELRP event day for all or a portion of B.2 CBP aggregators.

Subgroup B.2 CBP Aggregator Average Event Day Impacts by Subgroup

Table 4-20 and Table 4-21 present the average event day impacts by geographic domains and participant characteristics respectively. These results show that the largest impacts are occurring in the Ventura/Big Creek local capacity area.

TABLE 4-20: SCE SUBGROUP B.2 CBP AGGREGATOR AVERAGE EVENT DAY IMPACTS BY GEOGRAPHY DOMAINS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Climate Zone	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Local Capacity Area	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SubLAP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-21: SCE SUBGROUP B.2 CBP AGGREGATOR AVERAGE EVENT DAY IMPACTS BY PARTCIPANT CHARACTERISTICS

Domain	Sub-Domain	Num. of Customers	Avg. Per Capita Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. Percent Load Reduction	Avg. Aggregate MW Impact Reduction (MWh/h)	Avg. Temp (F)
All	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Size	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Customer Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dually Enrolled	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NAICS Description	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NEM Status	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Technology Type	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.6 AVERAGE EVENT DAY AGGREGATE IMPACTS BY HOUR

Table 4-22 through Table 4-27 present the aggregate hourly load impacts for each ELRP subgroup's average event day as presented in the ex post table generator and allow for hour to hour comparisons of even day load reductions. The highlighted hours represent event hours.

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TABLE 4-22: SCE PY 2022 AGGREGATE HOURLY LOAD IMPACTS FOR THE AVERAGE EVENT DAY – GROUP A.1 ALL

Hour-Ending	Estimated Reference Load (MWh)	Observed Event Day Load (MWh)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

By Period:	Estimated Reference Load (MWh/h)	Observed Event Day Load (MWh/h)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh/h)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
Daily	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Average Event Hour	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-23: SCE PY 2022 AGGREGATE HOURLY LOAD IMPACTS FOR THE AVERAGE EVENT DAY – GROUP A.2 NON-BIP

Hour-Ending	Estimated Reference Load (MWh)	Observed Event Day Load (MWh)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
By Period:	Estimated Reference Load (MWh/h)	Observed Event Day Load (MWh/h)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh/h)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
Daily	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Average Event Hour	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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TABLE 4-24: SCE PY 2022 AGGREGATE HOURLY LOAD IMPACTS FOR THE AVERAGE EVENT DAY – GROUP A.4 VPP

Hour-Ending	Estimated Reference Load (MWh)	Observed Event Day Load (MWh)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
By Period:	**Estimated Reference Load (MWh/h)**	**Observed Event Day Load (MWh/h)**	**Estimated Load Impact (MWh/h)**	**Average Temperature (Deg F)**	**Uncertainty Adjusted Impact (MWh/h)- Percentiles**				
					10th%ile	**30th%ile**	**50th%ile**	**70th%ile**	**90th%ile**
Daily	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Average Event Hour	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-25: SCE PY 2022 AGGREGATE HOURLY LOAD IMPACTS FOR THE AVERAGE EVENT DAY – GROUP A.6 RESIDENTIAL NET LOAD

Hour-Ending	Estimated Reference Load (MWh)	Observed Event Day Load (MWh)	Estimated Load Impact (MWh)	Average Temperature (deg F)	Uncertainty Adjusted Impact (MWh)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
1	2,310.4	2,580.4	-270.0	80.8	-322.7	-322.7	-270.0	-217.3	-217.3
2	2,025.2	2,284.5	-259.3	79.8	-309.4	-309.4	-259.3	-209.2	-209.2
3	1,822.0	2,062.0	-240.0	79.0	-286.5	-286.5	-240.0	-193.6	-193.6
4	1,658.4	1,887.1	-228.7	78.2	-272.3	-272.3	-228.7	-185.0	-185.0
5	1,544.0	1,740.5	-196.5	77.7	-238.2	-238.2	-196.5	-154.8	-154.8
6	1,457.1	1,658.2	-201.1	77.1	-239.4	-239.4	-201.1	-162.8	-162.8
7	1,427.6	1,632.6	-205.0	76.6	-241.6	-241.6	-205.0	-168.4	-168.4
8	1,438.7	1,657.7	-219.0	76.4	-259.3	-259.3	-219.0	-178.8	-178.8
9	1,481.0	1,734.0	-253.0	78.2	-299.6	-299.6	-253.0	-206.4	-206.4
10	1,638.7	1,958.8	-320.1	81.8	-372.9	-372.9	-320.1	-267.2	-267.2
11	1,917.8	2,307.3	-389.5	85.7	-448.2	-448.2	-389.5	-330.8	-330.8
12	2,342.3	2,748.1	-405.7	89.2	-467.1	-467.1	-405.7	-344.4	-344.4
13	2,886.2	3,224.4	-338.2	92.0	-398.7	-398.7	-338.2	-277.7	-277.7
14	3,468.3	3,651.3	-183.0	93.6	-235.3	-235.3	-183.0	-130.7	-130.7
15	3,989.3	4,009.3	-20.0	94.6	-48.2	-48.2	-20.0	8.2	8.2
16	4,349.1	4,303.5	45.5	94.9	16.3	16.3	45.5	74.8	74.8
17	4,507.2	4,461.3	45.9	94.7	-8.2	-8.2	45.9	100.0	100.0
18	4,550.1	4,511.1	39.0	93.8	-21.5	-21.5	39.0	99.5	99.5
19	4,429.8	4,347.4	82.4	92.1	21.0	21.0	82.4	143.8	143.8
20	4,117.5	4,087.0	30.5	89.4	-29.9	-29.9	30.5	90.8	90.8
21	3,877.0	3,889.5	-12.5	86.3	-66.0	-66.0	-12.5	40.9	40.9
22	3,654.7	3,661.4	-6.7	83.9	-51.1	-51.1	-6.7	37.7	37.7
23	3,300.6	3,300.6	0.0	82.3	0.0	0.0	0.0	0.0	0.0
24	2,786.9	2,893.9	-106.9	81.0	-146.8	-146.8	-106.9	-67.0	-67.0
By Period:	**Estimated Reference Load (MWh/h)**	**Observed Event Day Load (MWh/h)**	**Estimated Load Impact (MWh/h)**	**Average Temperature (Deg F)**	**Uncertainty Adjusted Impact (MWh/r)- Percentiles**				
					10th%ile	**30th%ile**	**50th%ile**	**70th%ile**	**90th%ile**
Daily	2,790.8	2,941.3	-150.5	85.0	n/a	n/a	n/a	n/a	n/a
Avg. Event Hour	4,296.3	4,259.3	37.0	91.2	-20.9	-20.9	37.0	95.0	95.0

TABLE 4-26: SCE PY 2022 AGGREGATE HOURLY LOAD IMPACTS FOR THE AVERAGE EVENT DAY – GROUP A.6 RESIDENTIAL DELIVERED LOAD

Hour-Ending	Estimated Reference Load (MWh)	Observed Event Day Load (MWh)	Estimated Load Impact (MWh)	Average Temperature (deg F)	Uncertainty Adjusted Impact (MWh)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
1	2,310.4	2,580.5	-270.1	80.8	-322.8	-322.8	-270.1	-217.4	-217.4
2	2,025.3	2,284.6	-259.4	79.8	-309.5	-309.5	-259.4	-209.3	-209.3
3	1,822.0	2,062.1	-240.1	79.0	-286.5	-286.5	-240.1	-193.6	-193.6
4	1,658.5	1,887.2	-228.7	78.2	-272.3	-272.3	-228.7	-185.0	-185.0
5	1,544.0	1,740.6	-196.6	77.7	-238.3	-238.3	-196.6	-154.8	-154.8
6	1,457.1	1,658.2	-201.1	77.1	-239.4	-239.4	-201.1	-162.8	-162.8
7	1,427.3	1,632.8	-205.5	76.6	-241.9	-241.9	-205.5	-169.0	-169.0
8	1,452.2	1,669.6	-217.5	76.4	-255.7	-255.7	-217.5	-179.2	-179.2
9	1,549.1	1,798.1	-249.1	78.2	-289.7	-289.7	-249.1	-208.4	-208.4
10	1,790.6	2,097.1	-306.5	81.8	-349.1	-349.1	-306.5	-264.0	-264.0
11	2,138.9	2,504.7	-365.9	85.7	-410.3	-410.3	-365.9	-321.4	-321.4
12	2,591.8	2,963.0	-371.2	89.2	-416.9	-416.9	-371.2	-325.5	-325.5
13	3,110.6	3,428.0	-317.5	92.0	-364.0	-364.0	-317.5	-270.9	-270.9
14	3,644.4	3,820.4	-176.0	93.6	-220.3	-220.3	-176.0	-131.8	-131.8
15	4,107.2	4,133.3	-26.1	94.6	-59.4	-59.4	-26.1	7.2	7.2
16	4,422.5	4,379.1	43.5	94.9	11.0	11.0	43.5	76.0	76.0
17	4,551.1	4,499.9	51.1	94.7	1.3	1.3	51.1	101.0	101.0
18	4,566.9	4,523.9	43.0	93.8	-14.5	-14.5	43.0	100.4	100.4
19	4,432.4	4,349.0	83.5	92.1	22.9	22.9	83.5	144.0	144.0
20	4,117.6	4,087.2	30.5	89.4	-29.8	-29.8	30.5	90.7	90.7
21	3,877.2	3,889.7	-12.5	86.3	-65.9	-65.9	-12.5	41.0	41.0
22	3,654.9	3,661.5	-6.7	83.9	-51.1	-51.1	-6.7	37.7	37.7
23	3,300.8	3,300.7	0.0	82.3	-0.3	-0.3	0.0	0.3	0.3
24	2,787.0	2,894.0	-107.0	81.0	-146.9	-146.9	-107.0	-67.0	-67.0
By Period:	Estimated Reference Load (MWh/h)	Observed Event Day Load (MWh/h)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh/r)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
Daily	2,847.5	2,993.6	-146.1	85.0	n/a	n/a	n/a	n/a	n/a
Avg. Event Hour	4,309.0	4,269.9	39.1	91.2	-17.2	-17.2	39.1	95.4	95.4

TABLE 4-27: SCE PY 2022 AGGREGATE HOURLY LOAD IMPACTS FOR THE AVERAGE EVENT DAY – GROUP B.2 CBP AGGREGATOR

Hour-Ending	Estimated Reference Load (MWh)	Observed Event Day Load (MWh)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
11	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
15	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
16	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
17	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
18	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
23	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
By Period:	Estimated Reference Load (MWh/h)	Observed Event Day Load (MWh/h)	Estimated Load Impact (MWh/h)	Average Temperature (Deg F)	Uncertainty Adjusted Impact (MWh/h)- Percentiles				
					10th%ile	30th%ile	50th%ile	70th%ile	90th%ile
Daily	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Average Event Hour	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.7 ELRP NOMINATIONS VERSUS EX POST IMPACTS

ELRP participants and aggregators provide stated levels of nominated load reductions when enrolling into the program. For SCE's subgroup A.1, A.2 Non-BIP, A.4 VPP and B.2 CBP Aggregator participants, Figure 4-14 through Figure 4-17 provide a comparison of the nominated load reductions along with the estimated ex post impacts for each event day. This figures only show comparison from the first start date of nominated load regardless of whether a particular group had event day activity, as a result B.2 CBP Aggregators have less event information than what is included in the overall ex post analysis.

FIGURE 4-14: SCE PY 2022 GROUP A.1 ALL NOMINATIONS VS. EX POST IMPACTS

[redacted]

FIGURE 4-15: SCE PY 2022 GROUP A.2 NON-BIP NOMINATIONS VS. EX POST IMPACTS

[redacted]

FIGURE 4-16: SCE PY 2022 GROUP A.4 VPP NOMINATIONS VS. EX POST IMPACTS

[redacted]

FIGURE 4-17: SCE PY 2022 GROUP B.2 CBP AGGREGATOR NOMINATIONS VS. EX POST IMPACTS

[redacted]

While demand response evaluations do not typically explore realization rates, the ELRP evaluation explored the realization of nominations for Non-A.6 customers to highlight the differences between stated and realized load reductions. The ELRP does not currently have a mechanism that holds participants to their stated nominations. As a result, understanding the realization rates may help inform expectations for future load reductions. The nomination realization rates were calculated for ELRP events as the ex post evaluated MW divided by the nominated MW. This results in a value that represents the share of nominations achieved for each event. A value of 100% indicates that all the nominations were achieved during a given event, above 100% indicates an event that exceeded nominations and below 100%

represents an event day where nominations were not achieved. The nominations' realization rate for events are presented in Table 4-28.

TABLE 4-28 SCE GROUP A.1 NOMINATION REALIZATION RATES BY EVENT

	Event Date								
Subgroup	**8/17**	**8/31**	**9/1**	**9/3**	**9/4**	**9/5**	**9/6**	**9/7**	**9/8**
A.1 All	13.7%	5.5%	16.9%	26.6%	14.9%	13.2%	27.0%	33.8%	58.2%
A.2 Non-BIP	--	--	--	--	--	--	0.0%	0.0%	18.2%
A.4 VPP	45.0%	68.3%	73.3%	30.0%	28.3%	16.7%	18.3%	19.7%	6.6%
B.2 CBP Aggregator	--	--	--	--	--	50.0%	100.0%	0.0%	250.0%

5 EX ANTE IMPACTS

This section presents results from the ex ante impact analysis. The goal of the ex ante impact analysis is to estimate program impacts for future years under varying 1-in-10 and 1-in-2 weather scenarios across the ELRP event window (4:00 pm to 9:00 pm).[12] Given that the ELRP is a pilot program, the ex ante analysis seeks to provide ex ante estimates for program years 2023 through 2025. The ex ante analysis only seeks to estimate impacts for subgroups that actively participated in events in PY 2022. There was no event participation for Groups A.3 and A.5 for SCE. As a result, there are no ex post impacts to inform a LIP-based ex ante analysis.

Ex ante impacts are estimated in two ways. These include program level ex ante impacts and the portfolio adjusted ex ante impacts. The program level ex ante impacts represent forecasted program impacts on ELRP-only event days and only include impacts from the ex post analysis in which there is no other DR participation on that day for dually enrolled participants. Conversely, portfolio adjusted ex ante impacts represent ex ante impacts that are incremental to the entire portfolio of SCE's DR programs and represent ILR impacts. Compensation structures differ for dually enrolled participants and there is no mechanism or penalty structure that ensures reliable participation in ELRP.

5.1 SCE EX ANTE IMPACTS A.1 ALL

Figure 5-1 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroup A.1 participants. While most participants are non-dually enrolled (only enrolled in the ELRP, i.e. subgroup A.1 General), there is a substantial difference between portfolio adjusted and program level ex ante impacts as detailed in Figure 5-1 and Table 5-1. The program level ex ante impacts are larger than the portfolio adjusted due to the larger A.1 BIP program impacts (see Figure 5-4 and Table 5-4 below) relative to their portfolio adjusted results. Both the portfolio adjusted and program specific ex ante impacts are weather adjusted and account for participant fatigue.

[12] The 1-in-2 and 1-in-10 weather scenarios include a typical event day, monthly IOU system peak and monthly IOU CAISO system peak and vary for SCE.

FIGURE 5-1: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.1 ALL

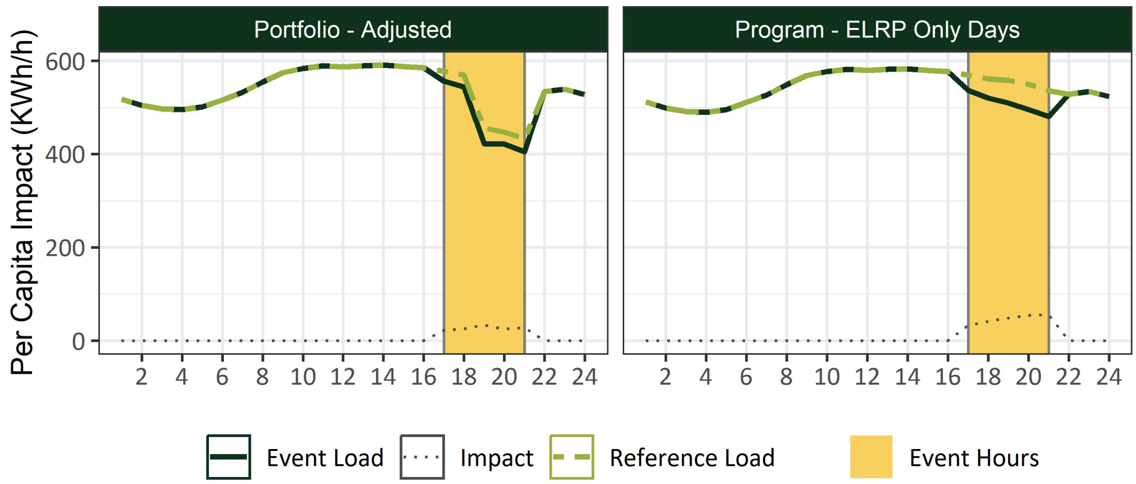

Table 5-1 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. For the Utility 1-in-2 typical event day, the ex ante average impact reduction associated with ILR are 24.3 MWh and 41.9 MWh for portfolio adjusted and program specific impacts respectively.

TABLE 5-1: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.1 ALL

			Portfolio Adjusted			Program Level		
Day Type	Month	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
Monthly System Peak	May	906	489.9	36.4	33.0	549.5	59.1	53.5
	June	906	499.4	27.9	25.3	558.9	48.0	43.5
	July	906	498.4	27.3	24.7	557	45.0	40.7
	August	906	496.2	27.2	24.6	555	47.0	42.5
	September	906	491.1	28.6	25.9	549.3	49.0	44.4
	October	906	497.9	38.3	34.7	557.4	61.4	55.6
Typical Event Day	August	906	496.5	26.8	24.3	555.3	46.3	41.9

5.1.1 SCE Ex Ante Impacts by A.1 Groups

Figure 5-2 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for the subgroup A.1 General participants (non-dually enrolled subgroup A.1 participants). These customers are not dually enrolled in other DR programs, therefore, the portfolio adjusted and the program level ex ante impacts are identical. Both the portfolio adjusted and program specific ex ante impacts are weather adjusted and account for participant fatigue.

FIGURE 5-2: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.1 GENERAL

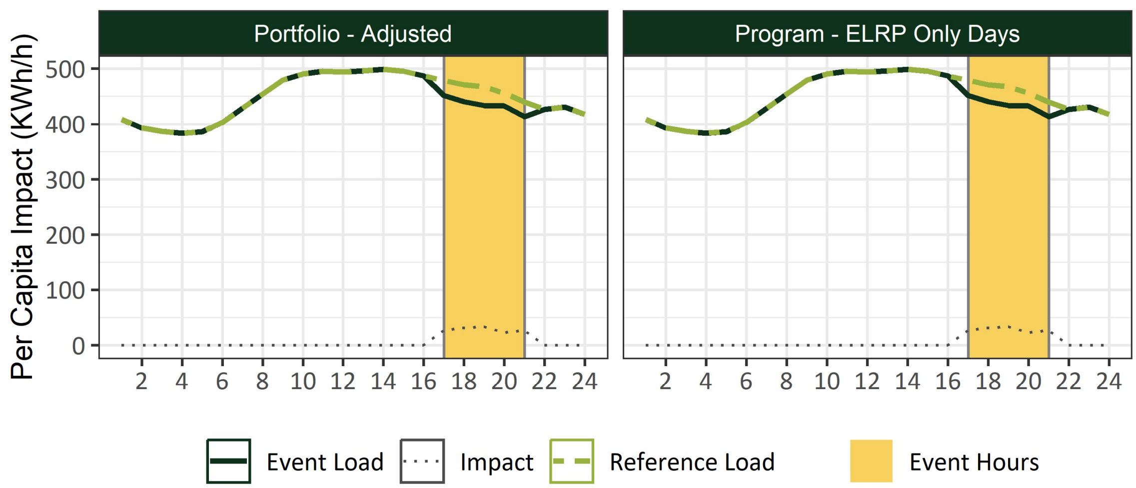

Table 5-2 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. For the Utility 1-in-2 typical event day, the ex ante impacts associated with ILR for A.1 General are 20.4 MWh for portfolio adjusted and program specific impacts.

TABLE 5-2: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.1 GENERAL

			Portfolio Adjusted			Program Level		
Day Type	Month	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
Monthly System Peak	May	729	456.1	40.0	29.2	456.1	40.0	29.2
	June	729	465.6	29.4	21.5	465.6	29.4	21.5
	July	729	466	28.6	20.9	466	28.6	20.9
	August	729	462.8	28.5	20.8	462.8	28.5	20.8
	September	729	459.8	30.2	22	459.8	30.2	22
	October	729	470.8	42.3	30.9	470.8	42.3	30.9
Typical Event Day	August	729	462.7	28.0	20.4	462.7	28.0	20.4

Figure 5-3 and Table 5-3 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroup A.1 AP-I participants. For A.1 AP-I participants, there are no impacts associated with the ELRP on dual program days, therefor the portfolio adjusted ex ante impacts are zero for this subgroup. Given the findings from the ex post evaluation, the program level ex ante impacts are modest. The program specific ex ante impacts are weather adjusted and account for participant fatigue.

FIGURE 5-3: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.1 AP-I

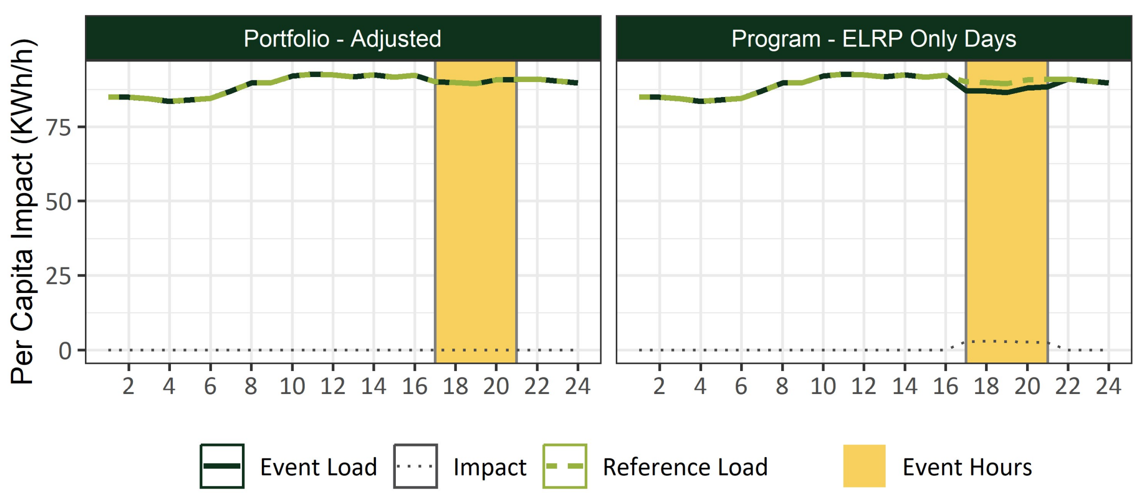

Table 5-3 presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. The PY 2023 1-in-2 program level per capita ex ante impacts tend to be smaller than the PY 2022 per capita average event day impacts for A.1 AP-I participants due to the extreme heat of the PY 2022 event days. For the Utility 1-in-2 typical event day, the ex ante impacts associated with ILR are 0 MWh and 0.2 MWh for portfolio adjusted and program specific impacts respectively.

TABLE 5-3: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.1 AP-I

			Portfolio Adjusted			Program Level		
Day Type	Month	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
Monthly System Peak	May	59	88.2	0.0	0.0	88.2	2.0	0.1
	June	59	92.1	0.0	0.0	92.1	2.9	0.2
	July	59	90.9	0.0	0.0	90.9	2.6	0.2
	August	59	90.3	0.0	0.0	90.3	2.9	0.2
	September	59	84.3	0.0	0.0	84.3	2.7	0.2
	October	59	81.6	0.0	0.0	81.6	1.7	0.1
Typical Event Day	August	59	90.1	0.0	0.0	90.1	2.8	0.2

Figure 5-4 and Table 5-4 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroup A.1 BIP participants. A.1 BIP participants are compensated for ILR beyond the FSL on BIP event days. These customers do not receive compensation for ELRP load reduction on non-BIP event days. Given the program compensation structure for dually enrolled ELRP and BIP participants, it was surprising to find the substantial average reduction in load observed on non-BIP ELRP event days (see Figure 5-4 Program ELRP Only Days graph). The ILR beyond the FSL on BIP event days is substantially smaller than the non-compensated ELRP load reduction on non-BIP event days.

FIGURE 5-4: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.1 BIP

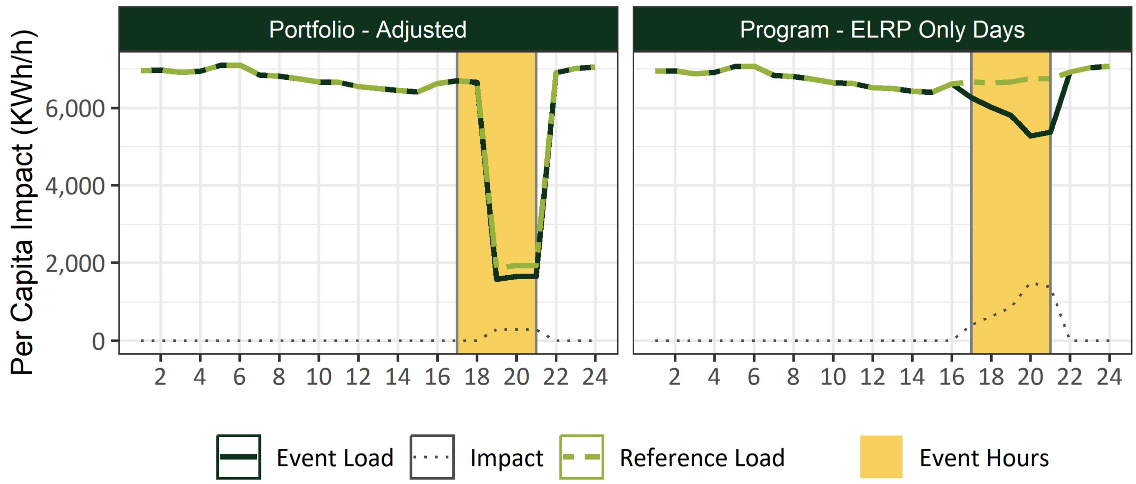

Table 5-4 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. The portfolio adjusted impacts are smaller than the program level (ELRP-only day) ex ante impacts. As describe above, this is surprising given that BIP participants are only compensated for load reductions on overlapping BIP event hours. For the Utility 1-in-2 typical event day, the ex ante impacts associated with ILR are 3.5 MWh and 19.7 MWh for portfolio adjusted and program specific impacts respectively.

TABLE 5-4: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.1-BIP

			Portfolio Adjusted			Program Level		
Day Type	**Month**	**Num. of Parts.**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**
Monthly System Peak	May	21	3,937.0	169.3	3.5	6,812.3	1,088.0	22.5
	June	21	3,897.1	169.3	3.5	6,774.2	972.0	20.1
	July	21	3,787.3	169.3	3.5	6,662.1	877.7	18.2
	August	21	3,810.8	169.3	3.5	6,693.3	968.0	20.1
	September	21	3,737.4	169.3	3.5	6,593.1	992.3	20.6
	October	21	3,741.8	169.3	3.5	6,623.7	1,126.3	23.3
Typical Event Day	August	21	3,814.0	169.3	3.5	6,696.6	952.5	19.7

Figure 5-5 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for the subgroup A.1 participants dually enrolled in CPP. The portfolio adjusted typical event day average per capita ex ante forecast of impacts is 3.7 kWh while the program level forecast of impacts is 7.7 kWh. Both the portfolio adjusted and program specific ex ante impacts are weather adjusted and account for participant fatigue.

FIGURE 5-5: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.1 CPP

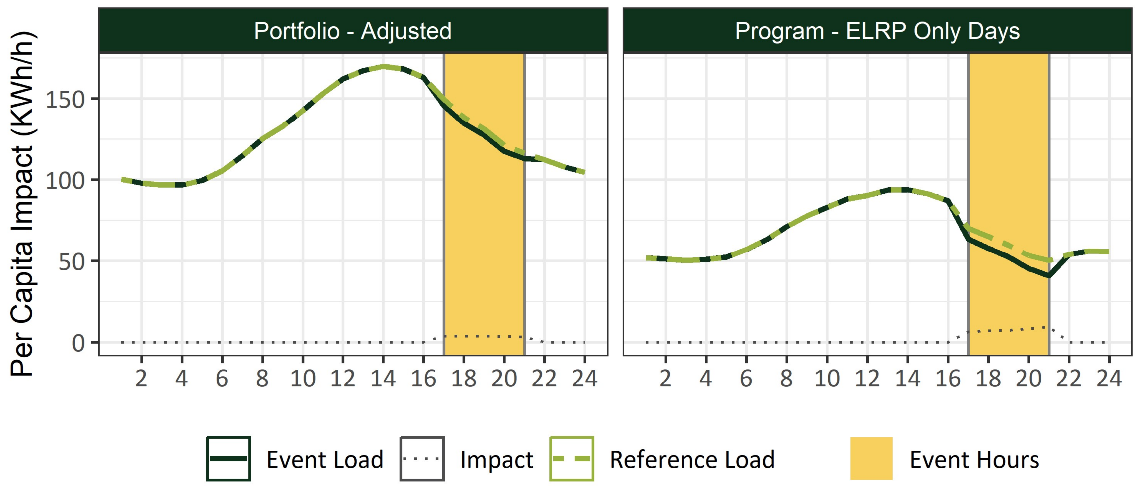

Table 5-5 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day for subgroup A.1 CPP participants. The PY 2022 events were extremely hot and the temperatures in those events more closely align with 1-in-10 weather scenarios given the weather normalization of impacts. The 1-in-2 average per capita impacts tend to be smaller than the PY 2022 average event day per capita impacts for A.1 CPP participants. For the Utility 1-in-2 typical event day, the ex ante impacts associated with ILR are 0.3 MWh for portfolio adjusted impacts and 0.7 MWh program specific impacts.

TABLE 5-5: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.1 CPP

			Portfolio Adjusted			Program Level		
Day Type	**Month**	**Num. of Parts.**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**
Monthly System Peak	May	89	118.6	3.1	0.3	56.4	12.2	1.1
	June	89	125.2	3.6	0.3	60.8	8.5	0.8
	July	89	130.9	3.7	0.3	58.5	6.0	0.5
	August	89	131.4	3.7	0.3	59.4	8.1	0.7
	September	89	131.4	3.7	0.3	59.7	9.4	0.8
	October	89	120.4	3.4	0.3	56.4	9.1	0.8
Typical Event Day	August	89	131.3	3.7	0.3	59.6	7.7	0.7

Similar to the subgroup A.1 AP-I, for customers dually enrolled in ELRP and SDP, impacts are solely attributed SDP event days, therefore the portfolio adjust ex ante impacts are set to zero from this subgroup (see Figure 5-3 and Table 5-3 below). The program level ex ante per capita impact, for dually enrolled ELRP A.1 and SDP customers, for a Utility 1-in-2 Typical Event Day is presented below. For A.1 SDP the typical program level event day average per capita ex ante impact is 116.6 kWh. The program specific ex ante impacts are weather adjusted and account for participant fatigue.

FIGURE 5-6: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.1 SDP

[redacted]

Table 5-6 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. The portfolio adjusted impacts are all set to zero The PY 2022 events were extremely hot and the temperatures in those events more closely align with 1-in-10 weather scenarios given the weather normalization of impacts. The 1-in-2 average per capita impacts tend to be larger than the PY 2022 average event day per capita impacts for A.1 SDP participants. For the Utility 1-in-2 typical event day, the ex ante impacts associated are [redacted] MWh for program specific impacts.

TABLE 5-6: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.1 SDP

			Portfolio Adjusted			Program Level		
Day Type	**Month**	**Num. of Parts.**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**
Monthly System Peak	May	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	June	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	July	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	August	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	September	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	October	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Typical Event Day	August	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

5.2 SCE EX ANTE IMPACTS A.2 NON-BIP

Figure 5-7 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroup A.2 Non-BIP participants. The A.2 non-BIP ex post average event hour impacts were slightly negative, therefore, the ex ante impacts have been set to zero for both the portfolio adjusted and the program level ex ante estimates. The impact load shape for this subgroup presents a zero impact.

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FIGURE 5-7: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.2 NON-BIP-DELIVERED LOAD

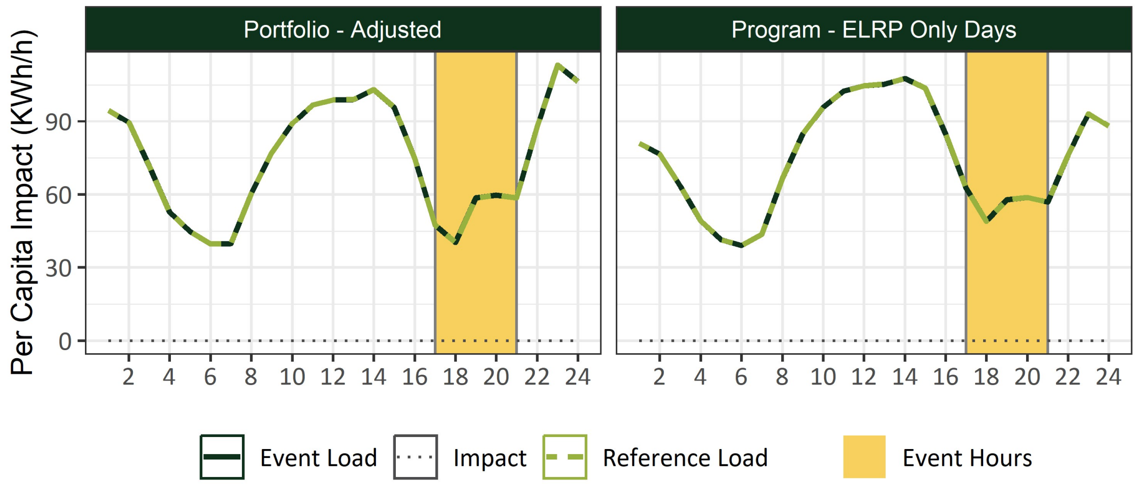

Table 5-7 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. Given the ex post average event hour estimate increase in load, the ex ante impact have been set to zero.

TABLE 5-7: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.2 NON-BIP

			Portfolio Adjusted			Program Level		
Day Type	**Month**	**Num. of Parts.**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**	**Avg. Reference Load (kWh/h)**	**Avg. Per Capita Impact (kWh/h)**	**Avg. MW Impact Reduction (MWh/h)**
Monthly System Peak	May	7	62.1	0.0	0.0	55.6	0.0	0.0
	June	7	64.1	0.0	0.0	61.0	0.0	0.0
	July	7	19.7	0.0	0.0	29.5	0.0	0.0
	August	7	53.0	0.0	0.0	57.1	0.0	0.0
	September	7	65.5	0.0	0.0	64.1	0.0	0.0
	October	7	94.4	0.0	0.0	78.2	0.0	0.0
Typical Event Day	August	7	53.0	0.0	0.0	57.1	0.0	0.0

5.3 SCE EX ANTE IMPACTS A.4 VPP

Figure 5-8 presents the portfolio adjusted and program level ex ante impacts for subgroup A.4 VPP participants. Unlike other ELRP subgroups, there are load increases prior to event curtailment and impacts are only assumed for two hours of the RA window (hours ending 19 and 20). This is done to capture the typical event response and incorporate event day pre-charging and dispatch behaviors discussed in Section 4.3.1. Additionally, there is no dual enrollment in the ex ante participant forecasts for subgroup A.4. As a result, the portfolio adjusted and program level ex ante impacts are identical.

FIGURE 5-8: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.4 VPP

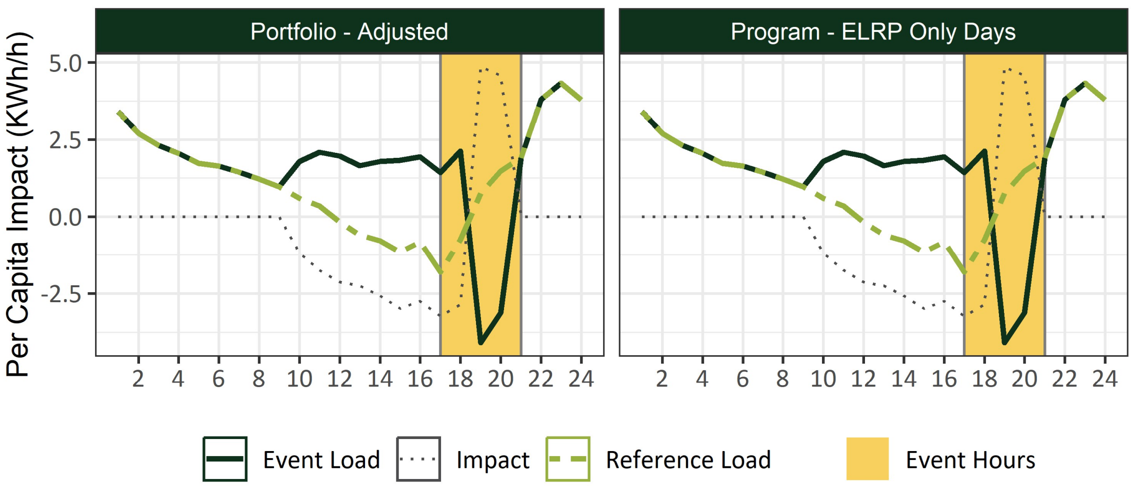

Table 5-8 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. The portfolio adjusted and program level ex ante impacts are identical due to the absence of dual participation in A.4 VPP. The Utility 1-in-2 typical event day ex ante impacts are 0.9 MWh in aggregate for portfolio adjusted and program specific ex ante.

TABLE 5-8: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.4 VPP

			Portfolio Adjusted			Program Level		
Day Type	Month	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
Monthly System Peak	May	1,318	-0.5	0.3	0.3	-0.5	0.3	0.3
	June	1,318	-0.2	0.6	0.8	-0.2	0.6	0.8
	July	1,318	0.0	0.6	0.8	0.0	0.6	0.8
	August	1,318	0.3	0.7	0.9	0.3	0.7	0.9
	September	1,318	0.2	0.8	1.0	0.2	0.8	1.0
	October	1,318	0.3	0.6	0.8	0.3	0.6	0.8
Typical Event Day	August	1,318	0.3	0.7	0.9	0.3	0.7	0.9

5.4 SCE EX ANTE IMPACTS A.6 RESIDENTIAL

Figure 5-9 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroup A.6 Residential participants based on delivered and net load. Given that most participants are non-dually enrolled (only enrolled in the ELRP), there is not a substantial difference between portfolio adjusted and program level ex ante impacts as detailed in Table 5-9. Both the portfolio adjusted, and program specific ex ante impacts are weather adjusted and account for participant fatigue.

FIGURE 5-9: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.6 RESIDENTIAL

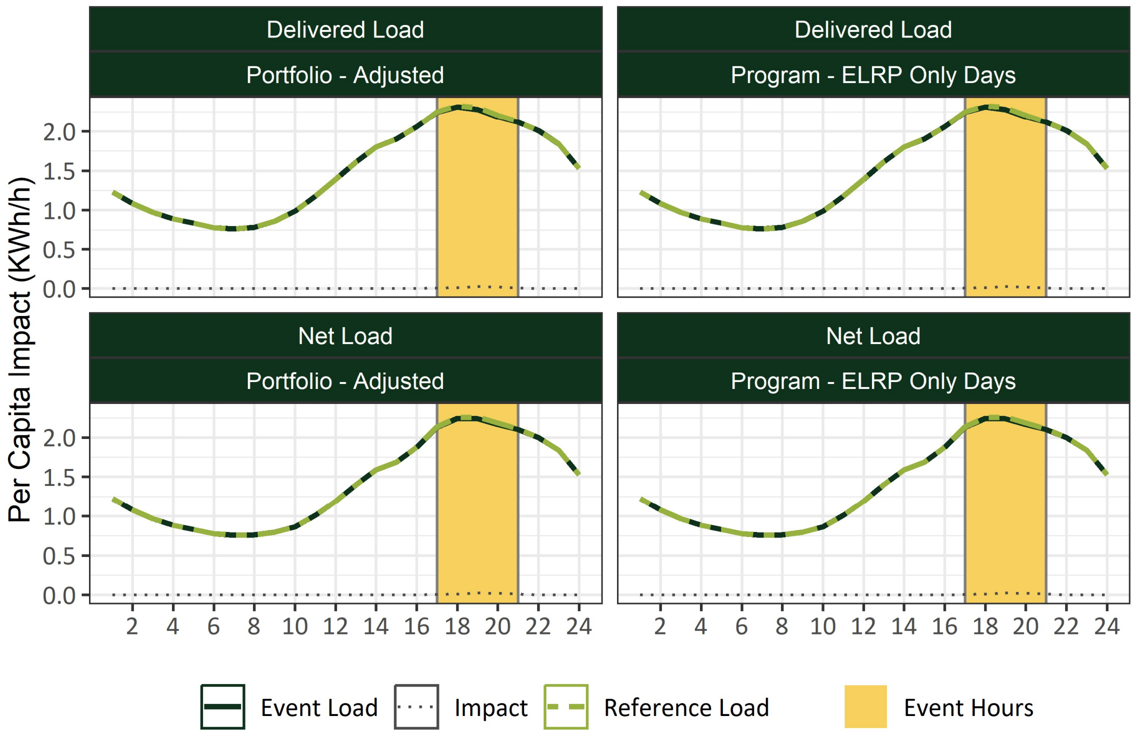

Table 5-9 below presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. The PY 2022 events were extremely hot and the temperatures in those events more closely align with 1-in-10 weather scenarios given the weather normalization of impacts. The 1-in-2 average per capita impacts tend to be smaller (0.01 kWh versus 0.02 kWh for ex post impacts) than the PY 2022 average event day per capita impacts for A.6 residential participants. For the Utility 1-in-2 typical event day, the ex ante impacts associated with ILR are 26.7 MWh for portfolio adjusted and program specific impacts.

TABLE 5-9: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP A.6 RESIDENTIAL

			Portfolio Adjusted			Program Level		
Day Type	Month	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
System Peak	May	1,919,790	1.8	0.01	23.3	1.8	0.01	23.3
	June	1,919,790	2.0	0.01	25.0	2.0	0.01	25.0
	July	1,919,790	2.1	0.02	32.4	2.1	0.02	32.4
	August	1,919,790	2.2	0.01	27.1	2.2	0.01	27.1
	September	1,919,790	2.3	0.01	27.5	2.3	0.01	27.5
	October	1,919,790	2.0	0.01	20.4	2.0	0.01	20.4
Typical Event Day	August	1,919,790	2.2	0.01	26.7	2.2	0.01	26.7

Figure 5-10 presents the program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroups A.6 Residential participants based on delivered load by enrollment status (auto-enrolled CARE, auto-enrolled FERA, auto-enrolled HEU, and self-enrolled). Minimal load impact is observed in these figures.

FIGURE 5-10: SCE PORTFOLIO ADJUSTED 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP A.6 RESIDENTIAL BY ENROLLMENT GROUP - DELIVERED LOAD

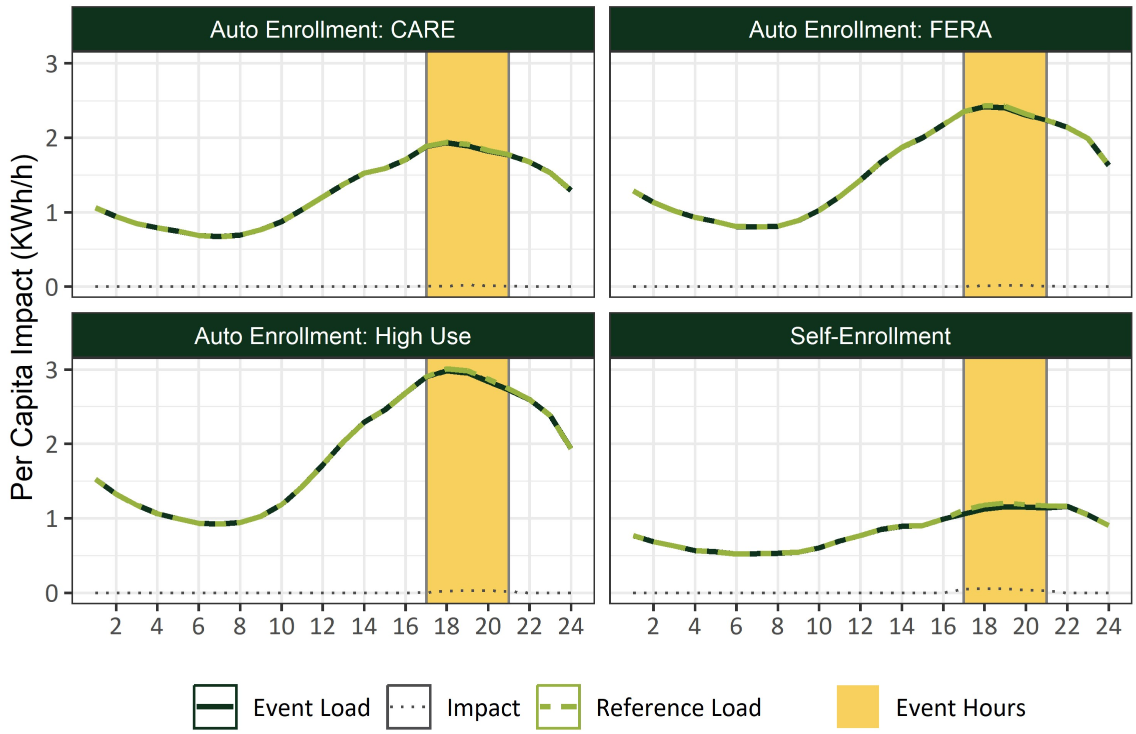

Table 5-10 presents Utility 1-in-2 Typical Event Day portfolio adjusted and program level by enrollment group for A.6 Residential participants. Both the portfolio adjusted and the program level per capita impacts show larger impacts for self-enrolled participants while the auto enrolled customers have larger aggregate impacts due to their larger participant population. For the Utility 1-in-2 typical event day, the ex ante per capita impacts for the self-enrolled population were 0.04 kWh, 0.01 kWh for auto-enrolled CARE and FERA participants, and 0.02 kWh for auto-enrolled high usage customers.

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TABLE 5-10: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY AND AUGUST SYSTEM PEAK EX ANTE IMPACTS – SUBGROUP A.6 RESIDENTIAL BY ENROLLMENT GROUP

			Portfolio Adjusted			Program Level		
Enrollment Group	Day Type	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
Auto-CARE	August System Peak	1,180,099	1.9	0.01	11.4	1.9	0.01	11.4
Auto-FERA		25,745	2.4	0.01	0.3	2.4	0.01	0.3
Auto-High-Use		696,334	2.9	0.02	14.7	2.9	0.02	14.7
Self-Enrollment		17,612	1.2	0.05	0.8	1.2	0.05	0.8
Auto-CARE	Typical Event Day	1,180,099	1.9	0.01	10.8	1.9	0.01	10.8
Auto-FERA		25,745	2.4	0.01	0.3	2.4	0.01	0.3
Auto-High-Use		696,334	2.9	0.02	14.9	2.9	0.02	14.9
Self-Enrollment		17,612	1.2	0.04	0.8	1.2	0.04	0.8

5.5 SCE EX ANTE IMPACTS B.2 CBP AGGREGATOR

Figure 5-11 presents the portfolio adjusted and program level ex ante per capita impact load shape for a Utility 1-in-2 Typical Event Day for subgroup B.2 CBP Aggregator participants. As seen in the portfolio adjusted impacts, there is a minimal load reduction from CBP Aggregators on joint CBP and ELRP event days. This results from the generally modest response from B.2 Aggregators in the ELRP on non-CBP event days.

FIGURE 5-11: SCE PORTFOLIO AND PROGRAM UTILITY 1-IN-2 TYPICAL EVENT DAY PER CAPITA LOAD SHAPE – SUBGROUP B.2 CBP AGGREGATOR

[redacted]

Table 5-11 presents the portfolio adjusted and program level per capita and aggregate ex ante impacts for the PY 2023 monthly system peak and the typical event day. The Utility 1-in-2 typical event day ex ante impacts associated with ILR are [redacted] MWh and [redacted] MWh for portfolio adjusted and program level ex ante impacts respectively.

TABLE 5-11: PY 2023 PORTFOLIO AND PROGRAM UTILITY 1-IN-2 EX ANTE IMPACTS – SUBGROUP B.2 CBP AGGREGATOR

			Portfolio Adjusted			Program Level		
Day Type	Month	Num. of Parts.	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)	Avg. Reference Load (kWh/h)	Avg. Per Capita Impact (kWh/h)	Avg. MW Impact Reduction (MWh/h)
Monthly System Peak	May	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	June	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	July	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	August	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	September	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	October	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Typical Event Day	August	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

5.6 SCE TOTAL ELRP EX ANTE FORECASTS PY 2023 THROUGH PY 2025

Table 5-12 and Table 5-13 provide the portfolio adjusted utility typical event day aggregate ex ante forecasts under 1-in-10 and 1-in-2 weather scenarios, respectively, by year. As seen the PY 2023 ex ante forecast under a 1-in-10 weather scenario is 82.8 MWh across all ELRP program segments covered in this evaluation and 52.2 MWh for 1-in-2 weather conditions. The substantial increase in ex ante forecast between the 1-in-2 and the 1-in-10 weather scenarios is due to the positive correlation between temperature and impact for the subgroup A.6 residential participants.

TABLE 5-12: UTILITY 1-IN-10 TYPICAL EVENT DAY EX ANTE AGGREGATE IMPACTS BY PROGRAM YEAR AND ELRP SUBGROUP – PORTFOLIO ADJUSTED

	Utility 1-in-10 Typical Event Day					
	PY 2023		PY 2024		PY 2025	
ELRP Subgroup	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**
A.1 - All	906	24.8	915	25.1	924	25.3
A.2 Non-BIP	7	0	7	0	7	0
A.4 VPP	1,318	1.3	1,384	1.3	1,453	1.4
A.6 Residential*	1,919,790	56.2	1,900,592	55.6	1,881,586	55.1
B.2 CBP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ELRP Total	1,922,035	82.8	1,902,912	82.5	1,883,984	82.3

*Indicates estimations based on Delivered Load

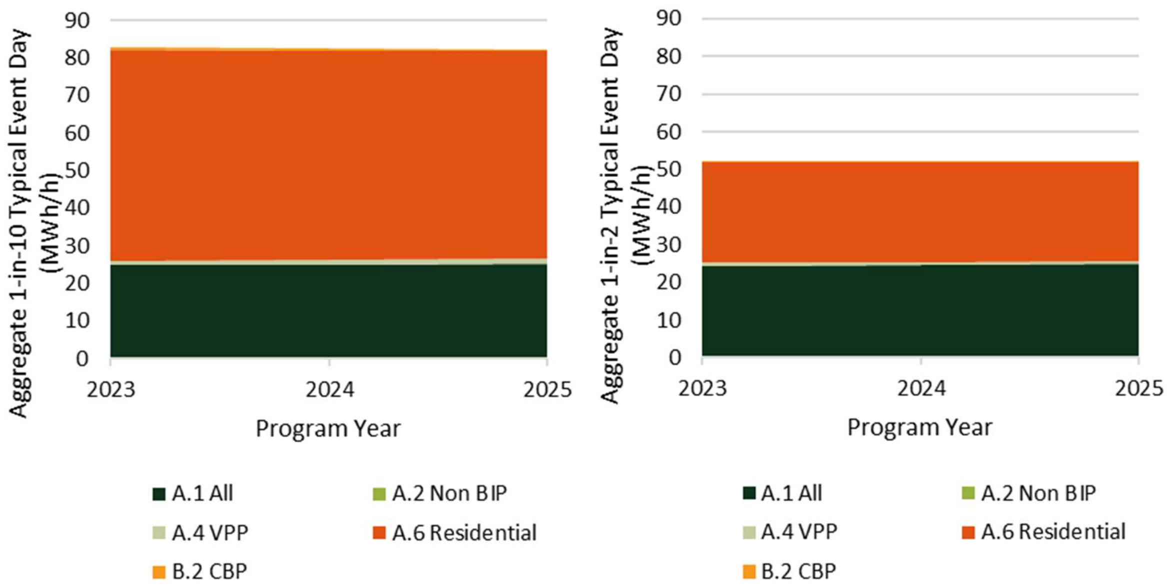
TABLE 5-13: UTILITY 1-IN-2 TYPICAL EVENT DAY EX ANTE AGGREGATE IMPACTS BY PROGRAM YEAR AND ELRP SUBGROUP – PORTFOLIO ADJUSTED

	Utility 1-in-2 Typical Event Day					
	PY 2023		PY 2024		PY 2025	
ELRP Subgroup	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**	**Num. of Parts**	**MWh Forecast**
A.1 - All	906	24.3	915	24.5	924	24.8
A.2 Non-BIP	7	0	7	0	7	0.0
A.4 VPP	1318	0.9	1384	0.9	1453	1.0
A.6 Residential*	1,919,790	26.7	1,900,592	26.4	1,881,586	26.2
B.2 CBP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ELRP Total	1,922,035	52.2	1,902,912	52.1	1,883,984	52.3

*Indicates estimations based on Delivered Load

Figure 5-12 presents the MWh ex ante forecasts by year visually. As seen the largest driver for differences between the 1-in-10 and 1-in-2 weather scenarios is driven by subgroup A.6 Residential. A.6 residential is substantially higher in the 1-in-10 ex ante compared to the 1-in-2 forecasts.

FIGURE 5-12: SCE 1-IN-10 (RIGHT) AND 1-IN-2 (LEFT) UTILITY TYPICAL EVENT DAY EX ANTE AGGREGATE IMPACTS BY PROGRAM YEAR AND ELRP SUBGROUP



6 EX POST AND EX ANTE COMPARISONS

This section presents comparisons between ex post and ex ante impacts. The Load Impact Protocols call for the following comparisons:

1) How the current ex post results differ from the prior year's ex post results;

2) How the current ex post results differ from last year's forecast;

3) How the current ex ante results differ from the prior year's forecast; and

4) How the current ex ante results differ from the current ex post results.

Given that PY 2022 is the first year with participation for many of the groups included in the ELRP, comparisons between the current year and prior year are not possible for all segments (comparisons 1 and 3). The ex ante forecasts for PY 2021 includes only A.1 non-BIP participants, as a result, comparisons are made against the PY 2022 A.1 General subgroup. For comparisons using PY 2022 ex ante, portfolio adjusted impacts are used (comparison 3 and 4).

6.1 PY 2022 EX POST VERSUS PY 2021 EX POST

Table 6-1 presents a comparison between the PY 2021 and PY 2022 ex post average event days for groups A.1 General.

TABLE 6-1: COMPARISON OF PY 2021 AND PY 2022 EX POST IMPACTS

Subgroup	Program Year and Analysis Type	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Customer Impact (kWh/h)	Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
A.1 General	2021 Ex Post Avg. Event*	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	2022 Ex Post Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Excludes participants contributing to load increases

The A.1 General participant group saw increased temperatures in PY2022 compared weather conditions observed in PY 2021. However, the per capita impacts were larger in PY 2022 compared with PY 2021 ([redacted] kWh in PY 2021 compared to [redacted] kWh in PY 2022). While this is a useful comparison that shows improvement within this participant group, the PY 2021 participant population is too small to draw any meaningful conclusions as to why there is a difference.

6.2 PY 2022 EX POST VERSUS PY 2021 EX ANTE FORECAST FOR 2022

Table 6-2 represents the comparison between the PY 2021 ex ante forecast for 2022 and the PY 2022 ex post average event day for A.1 General. There are a number of items contributing to differences the ex-ante forecasts. First, the incentive increased from $1 per kWh in PY 2021 to $2 per kWh in PY 2022. The PY 2021 forecasts for 2022 included a 20% increase in the ex ante load reductions to account for the increase in incentives. However, the per capita impacts on the PY 2022 average event day were lower than the PY 2021 ex ante forecast, even if the 20% increase had not been included. Additionally, the ex ante enrollment forecast used in PY 2021 were substantially lower than actual 2022 enrollments in subgroup A.1 General. As a result, the PY 2022 ex post impacts exceeded the PY 2021 ex ante aggregate impacts forecast.

TABLE 6-2: COMPARISON OF PY 2021 EX ANTE FORECAST FOR 2022 AND PY 2022 EX POST IMPACTS

Subgroup	Program Year and Analysis Type	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Customer Impact (kWh/h)	Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
A.1 General	1-in-2 Typical Event Day – PY 2021	211	803.3	32.9	4.1%	6.9	87.6
	1-in-10 Typical Event Day– PY 2021	211	805.3	36.7	4.6%	7.7	92.1
	2022 Ex Post Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

6.3 PY 2022 EX ANTE VERSUS PY 2021 EX ANTE – ESTIMATES FOR 2023

presents the PY 2021 and PY 2022 portfolio adjusted ex ante estimates for 2023 for the Utility Typical Event Day under 1-in-2 and 1-in-10 weather scenarios. In general, the current (PY 2022) per capita ex ante estimates are smaller than those estimated in PY 2021 but the average event days estimate are larger in aggregate for 2022. The drivers of this difference are the underlying participant forecasts used in each year and the weather adjusted impacts in observed in 2022 compared to those observed in 2021. The underlying per capita impacts informing the PY 2022 ex ante tend to be smaller compared to those seen in A.1 General in 2021. Additionally, the current enrollment forecast has a higher share of smaller customers (in PY 2022) compared to those seen in A.1 General in PY 2021. This largely has to do with a change in program rules for SCE that allows participation for customers with 100 kW or greater compared to 200 kW or greater in PY 2021.

Table 6-3 presents the PY 2021 and PY 2022 portfolio adjusted ex ante estimates for 2023 for the Utility Typical Event Day under 1-in-2 and 1-in-10 weather scenarios. In general, the current (PY 2022) per capita ex ante estimates are smaller than those estimated in PY 2021 but the average event days estimate are larger in aggregate for 2022. The drivers of this difference are the underlying participant forecasts used in each year and the weather adjusted impacts in observed in 2022 compared to those observed in 2021. The underlying per capita impacts informing the PY 2022 ex ante tend to be smaller compared to those seen in A.1 General in 2021. Additionally, the current enrollment forecast has a higher share of smaller customers (in PY 2022) compared to those seen in A.1 General in PY 2021. This largely has to do with a change in program rules for SCE that allows participation for customers with 100 kW or greater compared to 200 kW or greater in PY 2021.

TABLE 6-3: COMPARISON OF PY 2021 EX ANTE IMPACTS AND PY 2022 EX ANTE ESTIMATES FOR PY 2023

Subgroup	Program Year and Analysis Type	Num. of Customers	Avg. Reference Load (kWh/h)	Avg. Per Customer Impact (kWh/h)	Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
A.1 General	1-in-2 Typical Event Day – PY 2021	243	803.3	32.9	4.1%	8.0	87.6
	1-in-10 Typical Event Day– PY 2021	243	805.3	36.7	4.6%	8.9	92.1
	1-in-2 Typical Event Day – PY 2022	729	462.7	28.0	6.1%	20.4	88.8
	1-in-10 Typical Event Day– PY 2022	729	467.7	28.7	6.1%	20.9	93.9

6.4 PY 2022 EX ANTE VERSUS PY 2022 EX POST

Table 6-4 presents comparisons between the ex post impacts and portfolio adjusted ex ante impacts on the typical event day under utility 1-in-2 and 1-in-10 weather conditions.

Below we present key observations for each subgroup:

- **A.1**: Differences between the ex post average event day and the ex ante scenarios is largely driven by the accounting of dual participation in the ex ante portfolio adjusted impacts. AP-I and SDP participants do not provide any level of contribution to the ex ante impacts, however, there are impact contributions included in the average event day. Despite this, the average per capita impacts are similar between the ex post and ex ante impacts..
- **A.2 Non-BIP:** There were no positive load impacts (load decreases) on the average event day. As a result, the ex ante impacts for A.2 Non-BIP is zero.
- **A.4 VPP**: Ex post and ex ante per capita impacts are nearly identical across weather scenarios. This is generally intuitive given that participation with battery storage is expected to generally insensitive to weather. The difference in the aggregate impacts is driven by increases in the number of enrolled A.4 participants.
- **A.4 Residential**: The differences in ex ante and ex post impacts are largely driven by weather. The ex post event average temperature lies between the 1-in-2 and 1-in-10 weather scenarios, as do the per capita and aggregate impacts.

- **B.2 CBP Aggregator**: The ex ante impacts for B.2 CBP participants are larger than the average event day impacts observed in 2022. This results from the inclusion of only dual program days in the portfolio adjusted ex ante impacts. Typically, CBP curtailments were lower in on ELRP-only event days, which are included in the ex post average event day.

TABLE 6-4: COMPARISON OF PY 2022 EX ANTE IMPACTS AND PY 2022 EX POST IMPACTS - UTILITY TYPICAL EVENT DAY

Subgroup	Program Year and Analysis Type	Num. of Customers	Avg. Per Customer Impact (kWh/h)	Percent Load Reduction	Avg. MW Impact Reduction (MWh/h)	Avg. Temp (F)
A.1 All	Ex Post Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	1-in-2 Typical Event	906	26.8	5.4%	24.3	89.4
	1-in-10 Typical Event	906	27.4	5.5%	24.8	94.3
A.2 Non-BIP	Ex Post Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	1-in-2 Typical Event	7	0.0	0.0%	0.0	77.0
	1-in-10 Typical Event	7	0.0	0.0%	0.0	81.4
A.4 VPP	Ex Post Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	1-in-2 Typical Event	1,318	0.7	--	0.9	88.1
	1-in-10 Typical Event	1,318	1.0	--	1.3	94.9
A.6 Residential*	Ex Post Avg. Event	1,832,221	0.02	0.9%	39.1	91.2
	1-in-2 Typical Event	1,919,790	0.01	0.6%	26.7	89.4
	1-in-10 Typical Event	1,919,790	0.03	1.2%	56.2	95.9
B.2 CBP Aggregator	Ex Post Avg. Event	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	1-in-2 Typical Event	14	23.6	2.5%	0.3	84.4
	1-in-10 Typical Event	14	35.1	3.6%	0.5	90.6

7 FINDINGS AND RECOMMENDATIONS

This section presents the findings and recommendations from the PY 2022 SCE ELRP Load Impact Evaluation.

- **Finding 1**: All A.6 ELRP event days were dual ELRP/Flex Alert days. The reported ELRP ex post impacts are the sum of the incremental ELRP and Flex Alert impacts. The analysis of load reductions for A.6 residential enrollment status (CARE auto-enrolled, FERA auto-enrolled, High-Use auto-enrolled, and self-enrolled), found that the reported ex post impacts for the auto-enrolled subgroups were largely Flex Alerts impacts with no or negative incremental ELRP load reduction. The self-enrolled ELRP participants, however, reduced their reference baseline load by an average of 6.4% during ELRP event hours and all of the average load reduction was incremental ELRP impacts.
  - **Recommendation 1**: Program managers should attempt to increase the number of self-enrolled ELRP participants to increase the ELRP incremental load reduction.
  - **Recommendation 2**: If the goal of the ELRP is to compensate participation in Flex Alerts rather than provide incremental load reductions to Flex Alerts, then ELRP should continue to auto-enroll participants. If the goal of the ELRP is to compensate customers for incremental load reduction, then ELRP should consider discontinuing auto-enrollment of customers.
- **Finding 2**: For Group A.4 VPP participants, the full level of load curtailment lasts for only a maximum of two hours and then severely dissipates in the third hour. During longer duration events, the participants' batteries are often charging during the early and/or late event hours, reducing the average hourly load reduction during those events.
  - **Recommendation 3**: Work with VPP aggregators to discourage battery charging during event windows and shorten A.4 event windows to strategically target two to three hours of the RA window.
  - **Recommendation 4**: If load reduction is needed over a longer duration, SCE should work with the VPP aggregators to distribute the battery discharge over the duration of the event window.
- **Finding 3**: As in PY 2021, ELRP participant nominations were overstated compared with evaluated ex post load reductions. Given that the ELRP provides incentives for load reductions without any penalties for missing stated load reductions, there is no mechanism in the ELRP that holds participants to their stated nominations.
  - **Recommendation 5**: Participant nominations are a useful way of understanding how much curtailable load is available as a DR resource. However, the program design of the ELRP does not hold participants accountable for nominated load reductions. Program managers should attempt to track how settlement load reductions compare with ELRP participants' stated nominations over

the course of the ELRP event season to help inform expectations of load reductions for upcoming events.

- **Finding 4**: The ex post analysis found that there were additional load reductions for A.1 BIP customers outside of dual program days. This suggests that there may be a willingness for BIP participants individually enrolled in the ELRP to curtail on ELRP only days.
  - **Recommendation 6**: The ELRP should consider compensating BIP participants for all ELRP program event days, not just overlapping BIP event hours.

APPENDIX A TABLE GENERATORS

One of the key deliverables is the table generators, which are Excel files that allow interested stakeholders to observe the impacts for varying domains of interest, including industry type, size, event day or weather scenario. These are provided in the following separate files:

- Appendix A-1: *SCE_PY2022_ELRP_Ex_Post_Table_Generator_Subgroups_A.1_A.2_A.4_and_B.2_ PUBLIC.xlsx*
- Appendix A-2: *SCE_PY2022_ELRP_Ex_Post_Table_Generator_Subgroup_A.6_ PUBLIC.xlsx*
- Appendix A-3: *SCE_PY2022_ELRP_Ex_Ante_Table_Generator_Subgroups_A.1_A.2_A.4_and_B.2_ PUBLIC xlsx*
- Appendix A-4: *SCE_PY2022_ELRP_Ex_Ante_Table_Generator_Subgroup_A.6_ PUBLIC.xlsx*

APPENDIX B PROXY DAY TESTING PERFORMANCE

The selection of models for each participant was based on assessing performance on a set of proxy event days, which are non-event days that have event-like weather conditions. The assessment of these different models is concerned primarily with accuracy and precision. Accuracy represents how closely on average the calculated baseline matches the observed load. A component of measuring accuracy is bias, which indicates the extent to which the calculated baseline over or underestimates the load. In contrast, precision indicates how reliably a baseline is close to the 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 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 underestimates the load with high consistency. Of course, a baseline can also be neither accurate nor precise.

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.

The preference for these metrics was based primarily on a shortcoming of the MAPE and MPE when it comes dealing with observed values of zero, which will result in division by zero error and the loss of the data point. Table B-1 presents descriptions and the equations for two metrics calculated for accuracy and the three calculated for precision. One thing to note is that for the NMBE and NMAE, the formulas 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, so 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.

TABLE B-1: 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.	$NMBE = \frac{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)}{\bar{y}}$
Precision	Mean Absolute Percent Error	Represents the average of the absolute errors in the calculated baselines as a percentage of the observed load.	$MAPE = \frac{1}{n}\sum_{i=1}^{n}\left\lvert\frac{y_i - \hat{y}_i}{y_i}\right\rvert$
	Normalized Mean Absolute Error (NMAE)	Represents that 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.	$CV(RMSE) = \frac{\sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}}{\bar{y}}$

Table B-2 through Table B-6 present summaries of the model performance metrics on proxy event days. For non-residential subgroups these metrics are show by NAICs description. For A.4 and A.6 these metrics are presented by SubLAP and by NEM status and enrollment groups respectively Overall, the models have good performance, with some expected variability based on industry type. The more industrial participants have poorer model performance, which is expected given the volatile load associated with many of these customers.

B.1 PERFORMANCE METRICS

TABLE B-2: SPECIFICATION TEST RESULTS FOR PROXY DAY TESTING - SCE SUBGROUP A.1 ALL

NAICS	Num. of Customers	CV RMSE	NMBE	NMAE	Adjusted R^2
Accommodation and Food Services	26	0.0034	-0.0001	0.0026	0.8975
Administrative and Support and Waste Management and Remediation Services	8	0.0095	0.0005	0.0071	0.6870
Agriculture, Forestry, Fishing and Hunting	194	0.6353	0.1240	0.5123	0.7765
Arts, Entertainment, and Recreation	9	0.0116	0.0000	0.0079	0.7167
Construction	43	0.3230	0.2168	0.2270	0.7961
Educational Services	140	0.0072	-0.0027	0.0057	0.9401
Health Care and Social Assistance	29	0.0140	-0.0032	0.0104	0.8425
Information	8	0.0035	0.0004	0.0025	0.9244
Manufacturing	80	0.0143	0.0003	0.0105	0.8393
Mining, Quarrying, and Oil and Gas Extraction	16	0.0017	0.0000	0.0013	0.7871
Other Services (except Public Administration)	19	0.0124	-0.0005	0.0088	0.8858
Professional, Scientific, and Technical Services	9	0.0052	0.0003	0.0039	0.8135
Public Administration (not covered in economic census)	30	0.0041	0.0000	0.0033	0.8008
Real Estate and Rental and Leasing	23	0.0051	0.0007	0.0038	0.9107
Retail Trade	30	0.0089	0.0006	0.0067	0.8124
Transportation and Warehousing	16	0.0820	0.0290	0.0594	0.8120
Utilities	70	0.0448	0.0147	0.0328	0.6636
Wholesale Trade	10	0.2785	0.0337	0.1547	0.8346
Unknown	84	0.0683	0.0025	0.0536	0.8110

TABLE B-3: SPECIFICATION TEST RESULTS FOR PROXY DAY TESTING - SCE SUBGROUP A.2 BIP

NAICS	Num. of Customers	CV RMSE	NMBE	NMAE	Adjusted R^2
Utilities	5	0.0264	-0.0012	0.0204	0.6310

TABLE B-4: SPECIFICATION TEST RESULTS FOR PROXY DAY TESTING - SCE SUBGROUP A.4 VPP BY SUBLAP SEGMENTATION

Local Capacity Area	Num. of Segments	CV RMSE	NMBE	NMAE
SCEC	17	0.055	-0.010	0.041
SCEN	5	-0.079	-0.575	0.458
SCEW	13	0.070	-0.003	0.049
SCHD	6	0.114	-0.046	0.068
SCLD	5	0.016	-0.004	0.010
SCNW	7	0.008	-0.046	0.001
Unknown	13	0.043	0.000	0.032

TABLE B-5: SPECIFICATION TEST RESULTS FOR PROXY DAY TESTING - SCE SUBGROUP A.4 VPP BY SEGMENT

NEM Status	Enrollment Group	Num. of Customers	CV RMSE	NMBE	NMAE	Adjusted R^2
NEM	Auto-enrollment CARE	3,159	0.066	0.021	0.050	0.670
NEM	Auto-enrollment FERA	1,108	0.106	0.009	0.089	0.590
NEM	Auto-enrollment HEU	3,354	0.093	0.028	0.076	0.572
NEM	Self-Enrollment	799	0.286	-0.178	0.219	0.529
Non-NEM	Auto-enrollment CARE	5,505	0.027	-0.008	0.021	0.759
Non-NEM	Auto-enrollment FERA	3,786	0.032	0.002	0.025	0.733
Non-NEM	Auto-enrollment HEU	5,166	0.037	0.009	0.029	0.721
Non-NEM	Self-Enrollment	2,158	0.048	-0.006	0.038	0.743

TABLE B-6: SPECIFICATION TEST RESULTS FOR PROXY DAY TESTING - SCE SUBGROUP B.2 CBP AGGREGATOR BY SEGMENT

NAICS	Num. of Customers	CV RMSE	NMBE	NMAE	Adjusted R^2
Accommodation and Food Services	13	0.0017	0.0002	0.0013	0.9105
Educational Services	1	0.0011	-0.0001	0.0009	0.9358

B.2 ACTUAL VS PREDICTED PROXY DAY LOAD SHAPES

As a means of visually assessing how well the statistical models predicted usage, Figure B-1 through Figure B-5 show the average actual and predicted load on proxy event days for ELRP subgroup. In general, these figures show good model fits. However, these us some level of deviation from predicted loads across subgroups.

FIGURE B-1: SCE MODELED PROXY DAY ACTUAL VS. PREDICTED LOAD – A.1 ALL

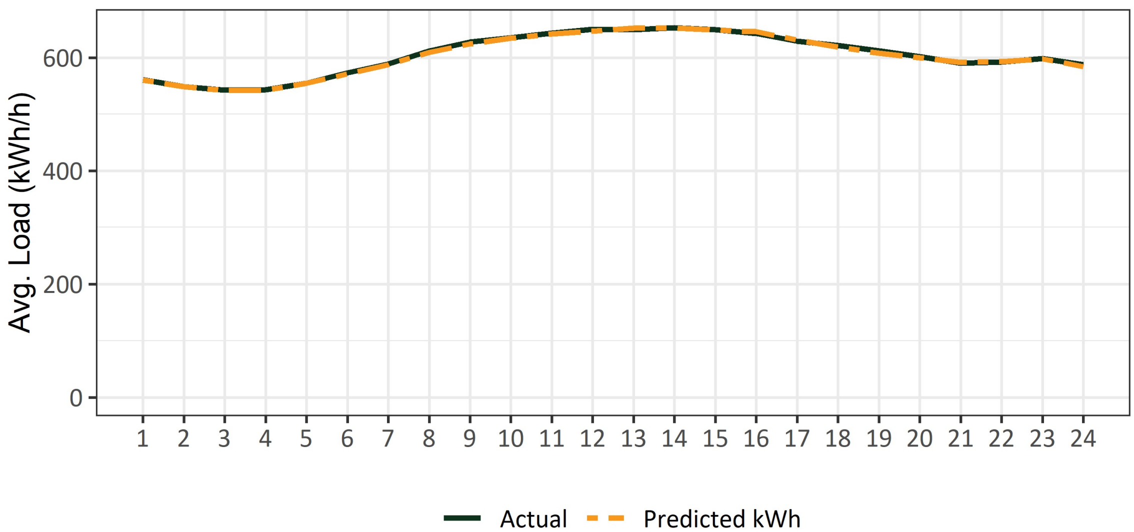


FIGURE B-2: SCE MODELED PROXY DAY ACTUAL VS. PREDICTED LOAD – A.2 NON BIP

[redacted]

FIGURE B-3: SCE MODELED PROXY DAY ACTUAL VS. PREDICTED LOAD – A.4 VPP

[redacted]

FIGURE B-4: SCE MODELED PROXY DAY ACTUAL VS. PREDICTED LOAD NEM (RIGHT) AND NON-NEM (LEFT) – A.6 RESIDENTIAL

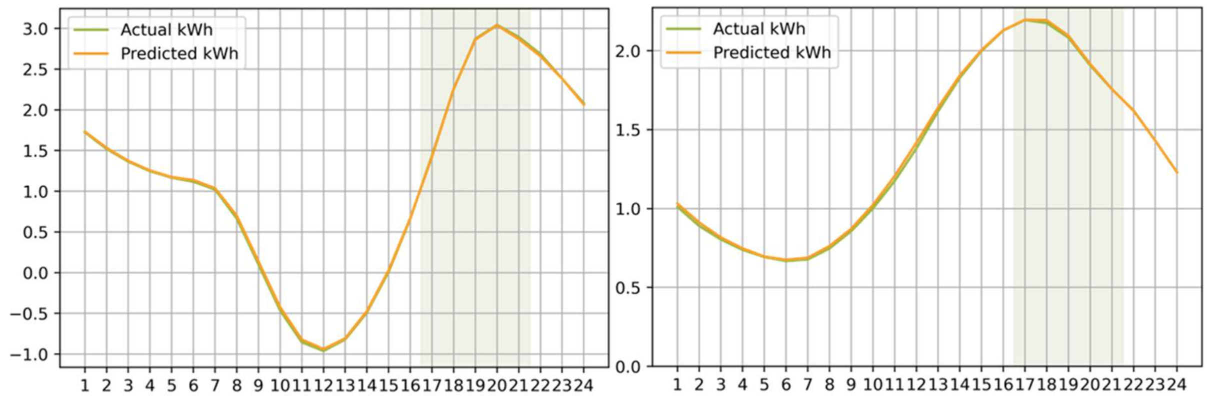


FIGURE B-5: SCE MODELED PROXY DAY ACTUAL VS. PREDICTED LOAD – B.2 CBP AGGREGATOR

[redacted]