

SDG&E ELRP PY 2024 EVALUATION DRMEC PRESENTATION

MAY 13, 2025



Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS



OUTLINE

1. Program Overview

- Program description
- PY 2024 events

2. Ex Post Impact Estimates

- Methodology
- Impacts by group

3. Ex Ante Forecast

- Model inputs
- Projections by group

4. Conclusion & Recommendations



PROGRAM OVERVIEW

EMERGENCY LOAD REDUCTION PROGRAM (ELRP) OVERVIEW

- Rolled out in 2021 upon direction by the CPUC to expand the state's portfolio of emergency resources beyond those available in CAISO capacity markets and utility specific emergency resources (e.g. CPP)
- Participants incentive via baseline performance settlements (\$2/kWh, no penalties)

Program-at-a-Glance

Program Duration	Non-residential 2021 - 2027 Residential 2022 - 2025
Program Compensation	\$2 per kWh for non-residential \$1 per kWh for residential
Program Eligibility	Commercial and Residential Customers served by PG&E, SCE, or SDG&E
Program Availability	May – October; seven days a week; 4 p.m. – 9 p.m.
Program Trigger	All program triggers relate to the CAISO EEA Watch or Emergency (Stage 1, 2, or 3) , but the triggers can vary slightly depending on whether notice is provided in the Day Ahead or Day Of timeframe
Event Duration	1-hour minimum; 5-hour maximum



THERE WERE 10 EVENT DAYS DISPATCHED IN 2024

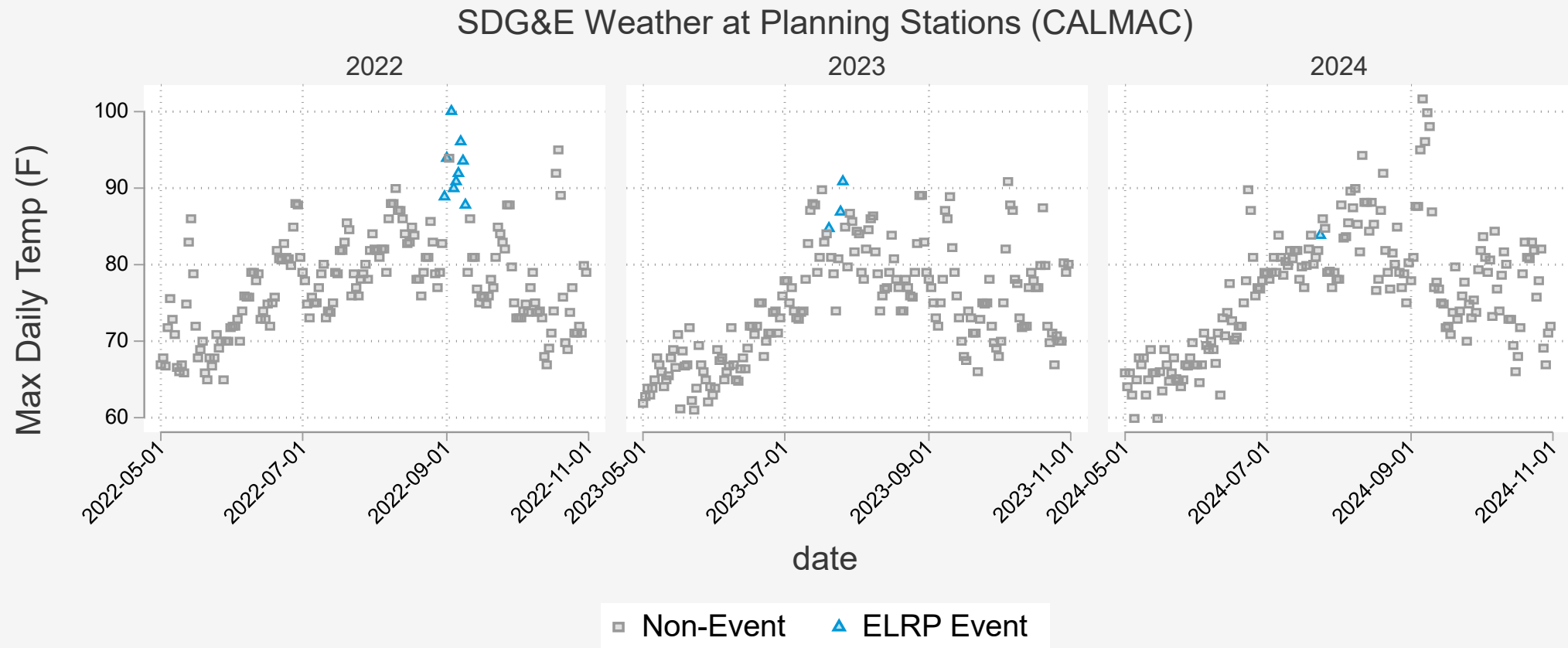
Event date	Day of week	Max SDG&E system load (MW)	Event window	A.1	A.2	A.4	A.5	A.6	B.2
7/10/2024	Wednesday	3,063	6 to 9 pm				✓		
7/11/2024	Thursday	3,045	6 to 9 pm				✓		
7/24/2024	Wednesday	3,664	5 to 9 pm	✓	✓				✓
7/24/2024	Wednesday	3,664	6 to 9 pm				✓		
8/20/2024	Tuesday	3,969	5 to 8 pm		✓	✓	✓		
9/4/2024	Wednesday	4,057	5 to 8 pm			✓	✓		
9/5/2024	Thursday	4,633	5 to 8 pm			✓	✓		
9/5/2024	Thursday	4,633	5 to 9 pm		✓				
9/6/2024	Friday	4,381	5 to 8 pm			✓	✓		
9/9/2024	Monday	4,698	5 to 8 pm				✓		
9/9/2024	Monday	4,698	6 to 8 pm			✓			
10/6/2024	Sunday	2,900	5 to 8 pm				✓		
10/7/2024	Monday	3,194	5 to 8 pm				✓		

*Blue rows indicate dual program event days

- July 24th dispatched all groups except A.4 and A.6
- A.5 was the only group to dispatch after September
- A.6 was not dispatched in 2024
 - Last event was in 2022



2024 EVENTS ARE SIMILAR TO 2023, BUT COOLER THAN 2022



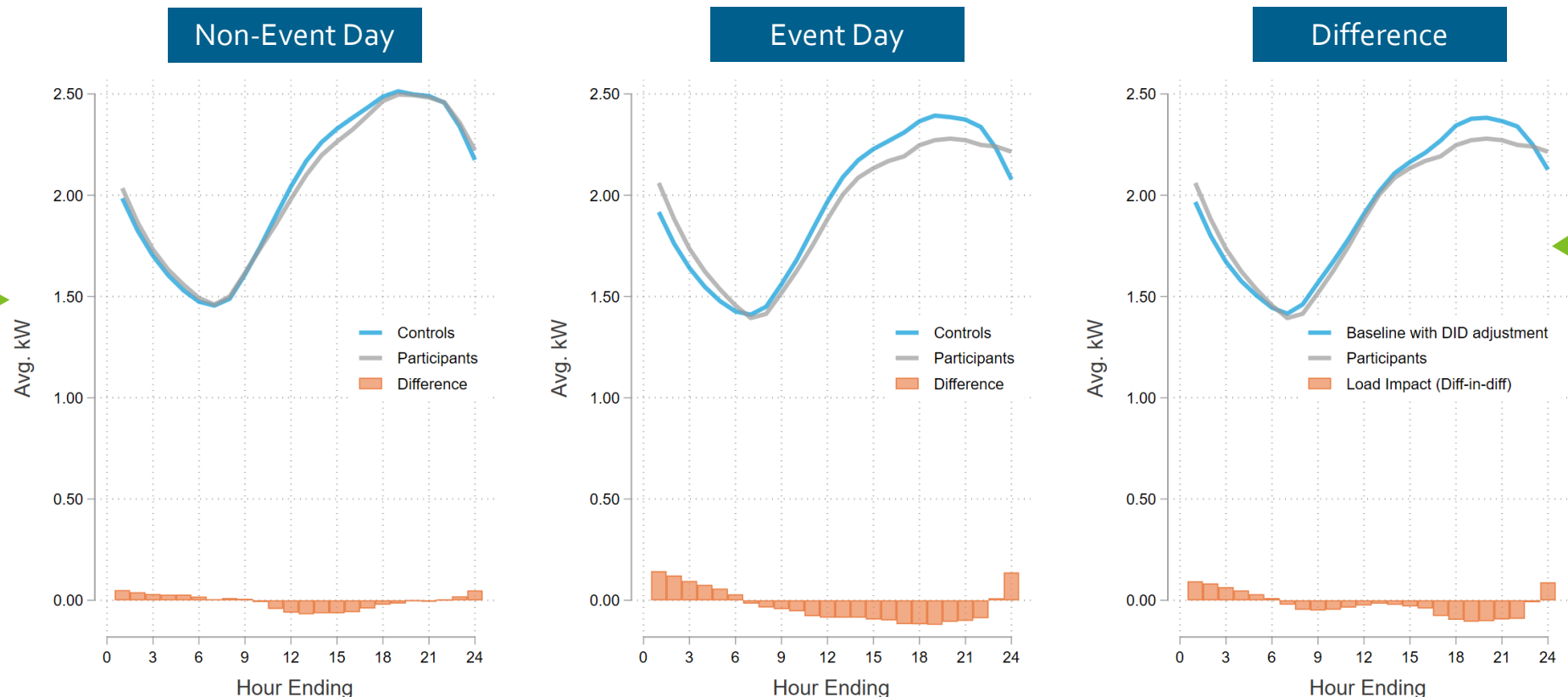
Graphs by year

EX POST METHODOLOGY

DIFFERENCES-IN-DIFFERENCES USED FOR MOST ESTIMATES

- Match each participant to a similar non-participant site $\Rightarrow$ Create a **matched control group** for comparison
- Compare hourly usage on event days to similar non-event days for both groups, take the difference:

$$(kWh_{ELRP,Event} - kWh_{ELRP,No\ Event}) - (kWh_{Control,Event} - kWh_{Control,No\ Event})$$

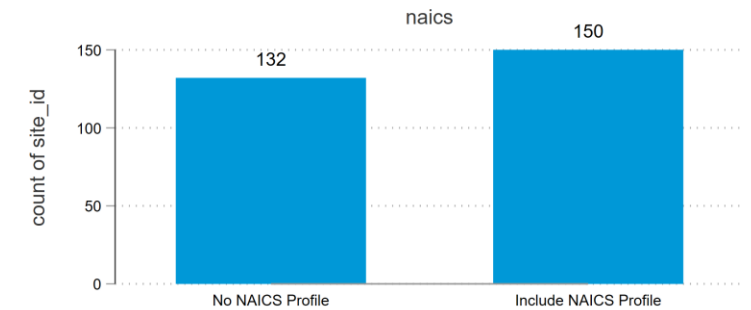
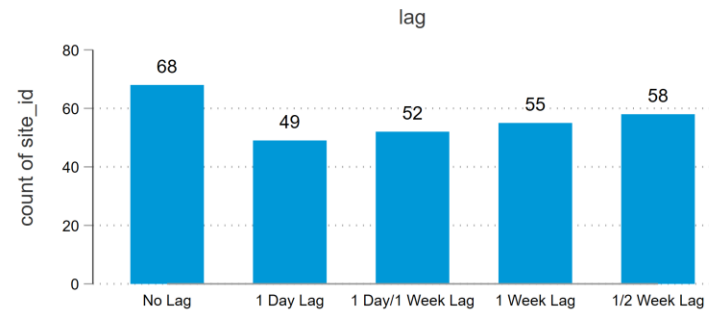
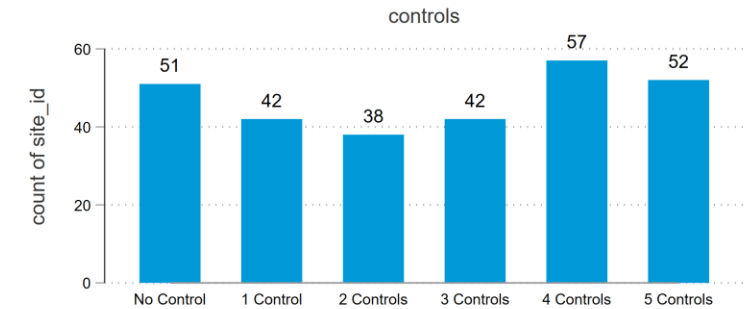
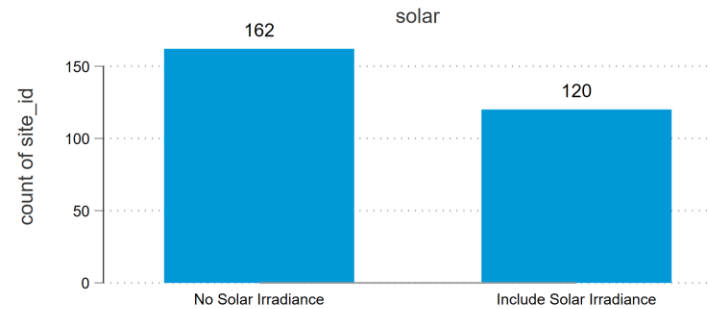


Participants & the matched control group should have similar loads on non-event days

Impacts are the differences in Panel 2 ("Event Day"), minus any differences between the groups on non-event days

INDIVIDUAL REGRESSIONS USED FOR LARGE, NOISY SITES AND GROUPS WITH SMALL SAMPLE SIZE

- Diff-in-diff relies on good comparison group, but not all participants have good comp.'s
- Model usage based on observable data for these remaining sites
 - Temperature, day of week, hour
- Tournament to determine best model by site
 - Variables included in best models by site shown in figure



EX POST IMPACT ESTIMATES

SUMMARY OF EX POST IMPACTS

Group	Sites	Load without DR (MW)	Load reduction (MW)	% Reduction	Significant (90% CI)	Significant (95% CI)
A.1: Non-Res Customers	708					
A.2: Non-Res Customers						
A.4: Virtual Power Plants (VPPs)	632	0.19	1.90	1028.9%	Yes	Yes
A.5: Vehicle-Grid-Integration (VGI) Aggregators						
A.6: Residential Customers	535,621	N/A	N/A	N/A	N/A	N/A
B.2: IOU Capacity Bidding Programs (CBPs)						
Total Customers Dispatched	1,346	225.69	7.39	3.3%	No	No

- A.4 delivers consistent, significant impacts
- A.2, A.5, and B.2 groups are small
 - Lots of variance and noisy estimates

A.2, A.5, B.2 redacted due to small participant count



AVERAGE SITE IMPACTS FOR A₄ ARE TYPICALLY ~9KWH

Event Date	Event Window	Avg Event Temp (F)	Sites Enrolled	Reductions (Ex Post)		Significant (90% CI)	Significant (95% CI)
				Aggregate (MW)	Average Site (kW)		
8/20/2024	5 to 8 pm	75.6	631	2.1	3.3	Yes	Yes
9/4/2024	5 to 8 pm	74.3	631	1.9	3.1	Yes	Yes
9/5/2024	5 to 8 pm	77.7	632	1.9	3.0	Yes	Yes
9/6/2024	5 to 8 pm	76.4	632	1.9	3.1	Yes	Yes
9/9/2024	6 to 8 pm	79.3	632	3.1	4.9	Yes	Yes
Avg Weekday 5-8 pm	5 to 8 pm	76.0	632	2.0	3.1	Yes	Yes
Avg Weekday (any)	5 to 8 pm	76.9	632	1.9	3.0	Yes	Yes

Only event w/ a 2 hour duration

Other events are 3 hours
(consistent results)

COMPARISON OF A₄ EVENT DURATION

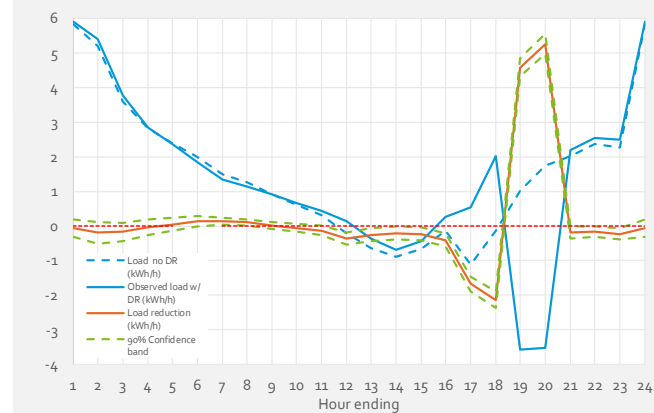
2 Hour Events (N=1)

Table 1a: Menu options

Type of results	Average Customer
ELRP Group	A ₄
Category	All
Subcategory	All
Event date	9/9/2024
Type of impact	Incremental
Hour Ending View	HE (Prevailing Time)

Table 1: Event day information

ELRP Event start, HE (Prevailing Time)	6:00 PM
ELRP Event end, HE (Prevailing Time)	8:00 PM
Total enrolled accounts	632
Load reduction (Event Window, kWh/h)	4.92
% load reduction (Event Window)	356.4%
Reduction significant (95% confidence level)	Yes



Hour ending	Load no DR (kWh/h)	Observed load w/ DR (kWh/h)	Load reduction (kWh/h)	Avg temp (F, site weighted)
1	5.83	5.89	-0.06	80.0
2	5.21	5.41	-0.20	77.5
3	3.60	3.78	-0.17	76.5
4	2.81	2.84	-0.03	76.2
5	2.40	2.36	0.05	76.4
6	1.98	1.85	0.14	76.3
7	1.48	1.35	0.13	80.5
8	1.25	1.15	0.11	83.4
9	0.93	0.90	0.02	86.0
10	0.61	0.67	-0.05	87.8
11	0.31	0.44	-0.13	89.0
12	-0.21	0.15	-0.36	89.1
13	-0.63	-0.37	-0.26	92.5
14	-0.89	-0.68	-0.21	90.0
15	-0.66	-0.43	-0.23	89.3
16	-0.14	0.26	-0.40	89.1
17	-1.13	0.55	-1.68	85.8
18	-0.13	2.01	-2.14	82.0
19	1.02	-3.56	4.58	79.9
20	1.74	-3.52	5.26	78.6
21	2.02	2.21	-0.19	77.0
22	2.37	2.54	-0.16	75.2
23	2.26	2.48	-0.23	74.1
24	5.83	5.89	-0.06	80.0
	Reference load (kWh/h)	Estimated load w/ DR (kWh/h)	Load reduction (kWh/h)	Weighted temp (F)
Event Window	1.38	-3.54	4.92	79.3

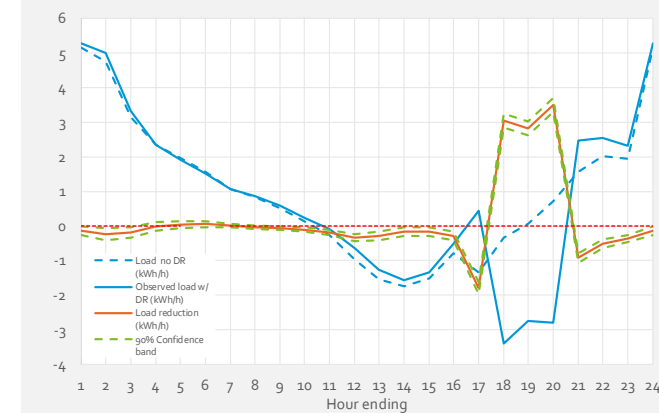
3 Hour Event (N=4)

Table 1a: Menu options

Type of results	Average Customer
ELRP Group	A ₄
Category	All
Subcategory	All
Event date	Avg Weekday 5-8 pm
Type of impact	Incremental
Hour Ending View	HE (Prevailing Time)

Table 1: Event day information

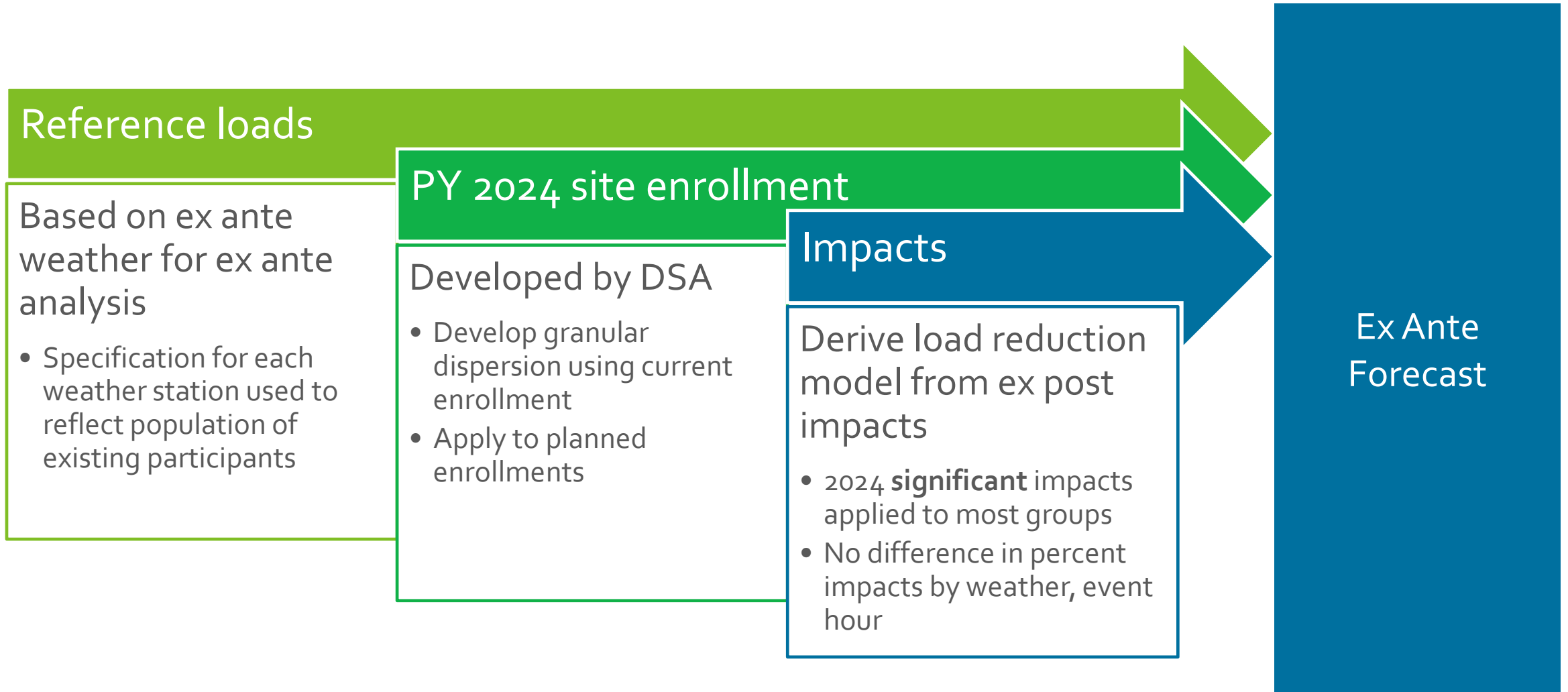
ELRP Event start, HE (Prevailing Time)	5:00 PM
ELRP Event end, HE (Prevailing Time)	8:00 PM
Total enrolled accounts	632
Load reduction (Event Window, kWh/h)	3.12
% load reduction (Event Window)	2137.5%
Reduction significant (95% confidence level)	Yes



Hour ending	Load no DR (kWh/h)	Observed load w/ DR (kWh/h)	Load reduction (kWh/h)	Avg temp (F, site weighted)
1	5.14	5.28	-0.13	71.4
2	4.76	5.00	-0.24	70.9
3	3.14	3.32	-0.18	70.2
4	2.33	2.34	-0.01	69.3
5	1.96	1.91	0.05	68.5
6	1.56	1.51	0.05	68.9
7	1.07	1.06	0.01	72.5
8	0.83	0.87	-0.03	76.6
9	0.52	0.59	-0.07	80.3
10	0.14	0.25	-0.10	83.1
11	-0.27	-0.08	-0.19	83.5
12	-0.96	-0.63	-0.33	84.3
13	-1.55	-1.26	-0.29	86.9
14	-1.73	-1.57	-0.16	86.1
15	-1.51	-1.34	-0.17	86.0
16	-0.80	-0.51	-0.29	83.8
17	-1.35	0.44	-1.79	81.2
18	-0.35	-3.39	3.05	78.5
19	0.07	-2.75	2.82	75.5
20	0.71	-2.79	3.50	74.1
21	1.56	2.48	-0.92	72.8
22	2.03	2.54	-0.51	71.9
23	1.94	2.31	-0.37	71.7
24	5.14	5.28	-0.13	71.4
	Reference load (kWh/h)	Estimated load w/ DR (kWh/h)	Load reduction (kWh/h)	Weighted temp (F)
Event Window	0.15	-2.98	3.12	76.0

EX ANTE METHODOLOGY

EX ANTE METHODOLOGY OVERVIEW



IMPACT ASSUMPTIONS FOR EX ANTE BY SUBGROUP

A1, A2, B2

- Ex Post applies significant PY24 impacts
 - A1 applies NEM and non-NEM customer separately
- Use the model to predict the percent impact
 - Impacts zeroed out for hours outside of the RA window

A4, A5

- Convert the PY24 impacts to the available battery capacity (kWh) by multiplying by the event duration
 - Take average kWh across events to calculate avg kW per hour
 - 3 hour window, 3 hour event
 - Also apply 2-hour post-event snap back (if significant), otherwise zero out for hours outside of the RA window

3-hour window new ED LIP
guidance for PY 2024

A6

- Apply the PY22 impacts from the previous table generators (no PY23 or PY24 events for A6)
 - Read in impacts based on enrollment group (e.g. CARE, large customers, opt-in)
 - Convert to percent of load
 - Use the model to predict the percent impact

TEMPERATURES AND EVENT HOURS IN EX ANTE MODELLING

- For ex ante impact models, we are not including separate:
 - **Weather Effects**
 - **Event-Hour Effects**
- But there can still be variation by temperature, hour in the TTM's
 - Loads still vary by hour, temperature $\Rightarrow$ A 1% impact would imply different MWh reductions at different times, temperatures

EX ANTE FORECAST

EX ANTE FORECASTS THROUGH 2027 (AUGUST WORST DAY, SDG&E 1-IN-2 WEATHER)

Enrollments

Year	A.1	A.2	A.4	A.5	A.6	B.2	Total
2024	700		631		531,948		533,285
2025	739		927	606	509,080		511,355
2026	784		1,224	1,211	0		3,222
2027	835		1,518	3,923	0		6,279

A1 increases
at current
rate

Substantial growth
expected for A4, A5
(new aggregators)

Impacts – Portfolio

Year	A.1	A.2	A.4	A.5	A.6	B.2	Total
2024	6.4		1.5		9.5		17.2
2025	6.7		2.2	1.3	9.2		18.8
2026	7.1		2.9	2.4	0.0		11.4
2027	7.5		3.6	7.4	0.0		16.4

Most impacts
come from A1,
A4, A5

3 hour
window for
A4, A5



EX ANTE IMPACT DETAIL – BEHAVIORAL (PORTFOLIO)

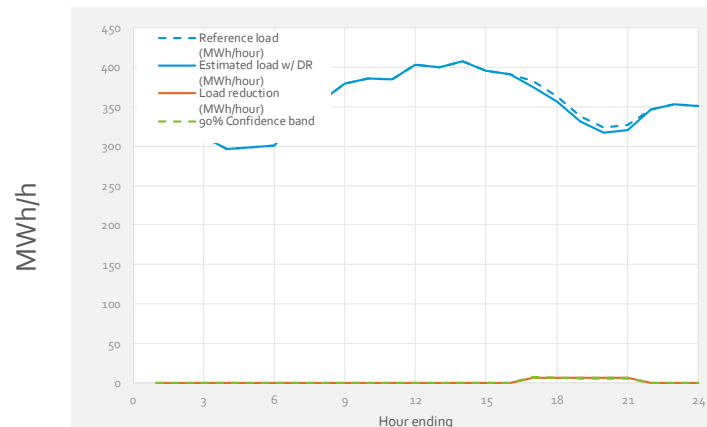
A1

Table 1: Menu options

Type of results	Aggregate
Program	A1
Category	All
Subcategory	All
Measurement Hours	5
Portfolio	Portfolio
Electric System	SDG&E
Day Type	WORST DAY
Weather Year	1-in-2
Forecast Year	2024
Month	August
Hour Ending View	HE (Prevailing Time)

Table 2: Event day information

Total enrolled accounts	700
Load reduction - 4 to 9 pm (MWh/hour)	6.42
% Load reduction - 4 to 9 pm	1.9%
Reduction significant (95% confidence level)	Yes



- Using PY 2024 exclusively for modelling impact estimates for ex ante

- Evolving participant mix
- Events in recent years are being called with short notice
- CPUC has directed us to focus on 1-in-2 impacts (not 1-in-10)
 - Since ELRP is an emergency program, we included PY 2022 impacts in PY 2023, since it better reflected emergency conditions.

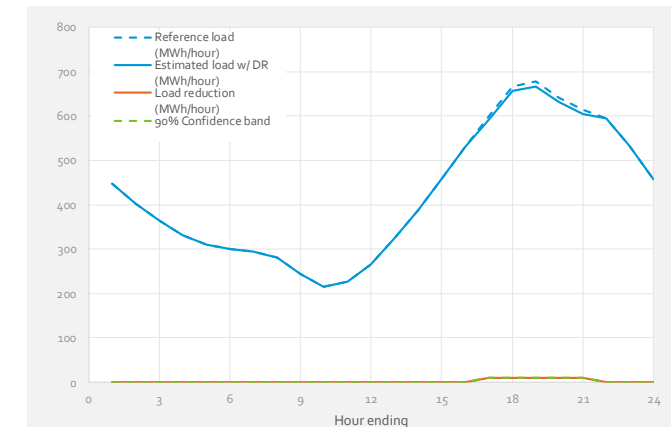
A6

Table 1: Menu options

Type of results	Aggregate
Program	A6
Category	All
Subcategory	All
Measurement Hours	5
Portfolio	Portfolio
Electric System	SDG&E
Day Type	WORST DAY
Weather Year	1-in-2
Forecast Year	2024
Month	August
Hour Ending View	HE (Prevailing Time)

Table 2: Event day information

Total enrolled accounts	531,946
Load reduction - 4 to 9 pm (MWh/hour)	9.50
% Load reduction - 4 to 9 pm	1.5%
Reduction significant (95% confidence level)	Yes



EX ANTE IMPACT DETAIL – TECHNOLOGY-ENABLED (PORTFOLIO)

A₄

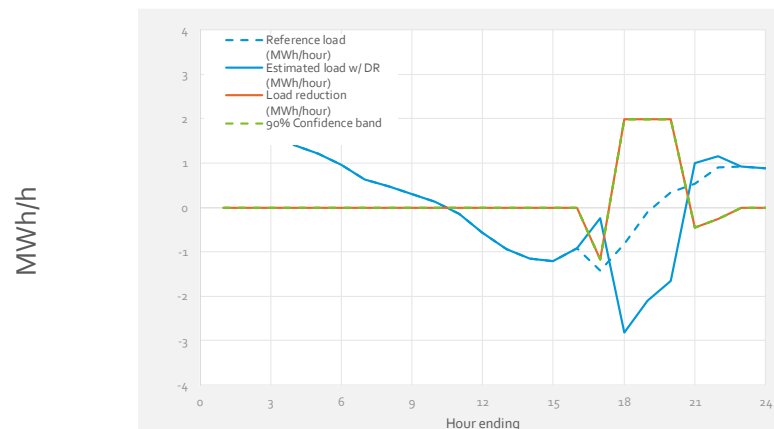
A₅

Table 1: Menu options

Type of results	Aggregate
Program	A ₄
Category	All
Subcategory	All
Measurement Hours	3
Portfolio	Portfolio
Electric System	SDG&E
Day Type	WORST DAY
Weather Year	1-in-2
Forecast Year	2024
Month	August
Hour Ending View	HE (Prevailing Time)

Table 2: Event day information

Total enrolled accounts	631
Load reduction - 4 to 9 pm (MWh/hour)	1.99
% Load reduction - 4 to 9 pm	N/A
Reduction significant (95% confidence level)	Yes



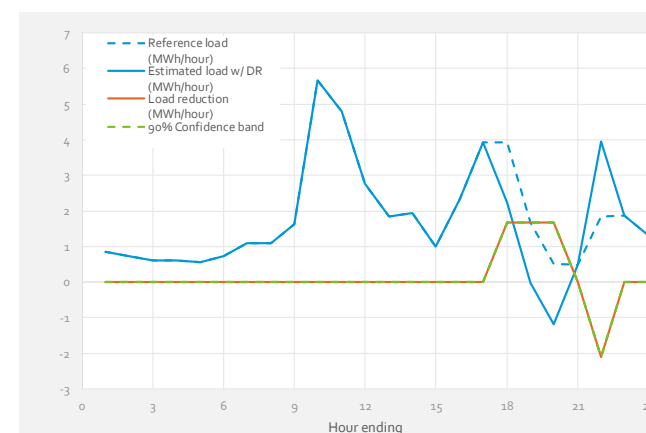
3 hour window

Table 1: Menu options

Type of results	Aggregate
Program	A ₅
Category	All
Subcategory	All
Measurement Hours	3
Portfolio	Portfolio
Electric System	SDG&E
Day Type	WORST DAY
Weather Year	1-in-2
Forecast Year	2025
Month	August
Hour Ending View	HE (Prevailing Time)

Table 2: Event day information

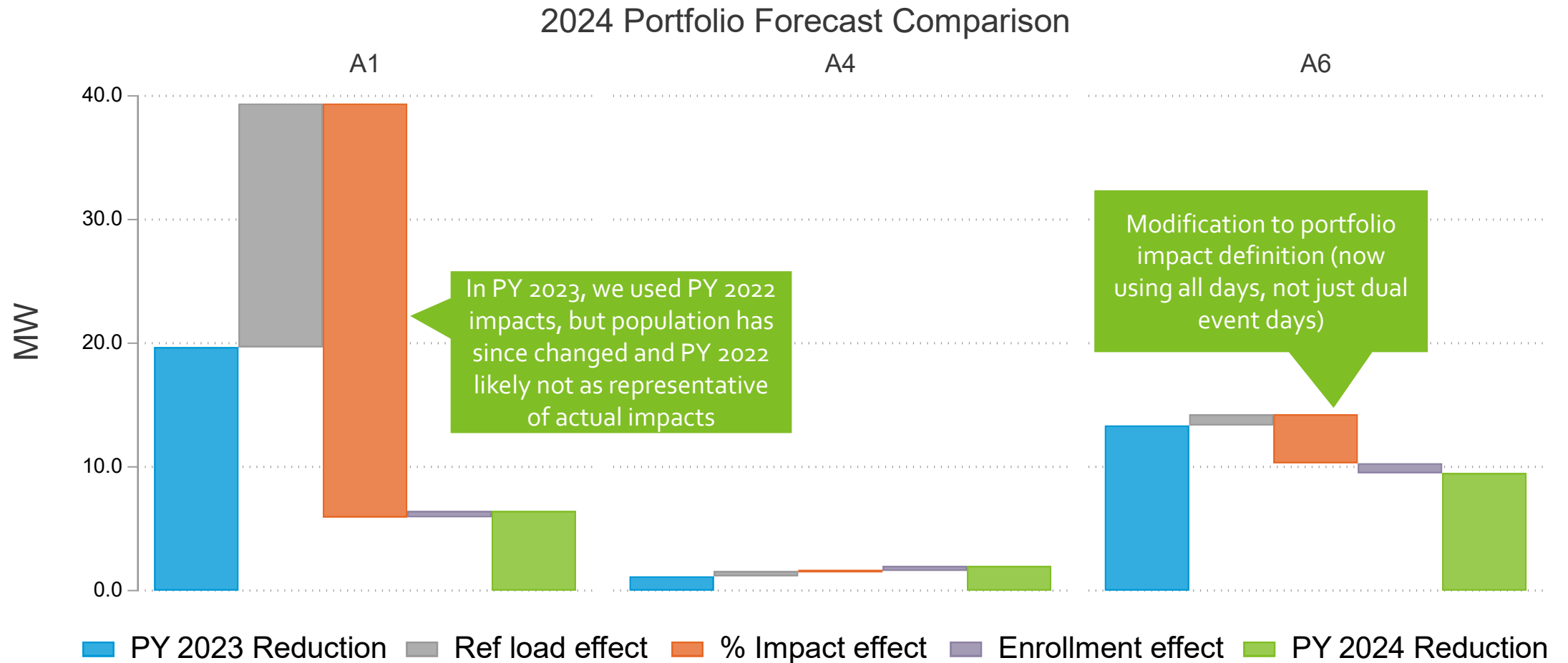
Total enrolled accounts	606
Load reduction - 4 to 9 pm (MWh/hour)	1.68
% Load reduction - 4 to 9 pm	82.7%
Reduction significant (95% confidence level)	Yes



2025 forecast

Forecasted enrollments after 2024 include residential customers, in addition to the current C&I participants

A1 IMPACTS LOWER THAN PY 2023 FORECAST MOST DUE TO LOWER PERCENT REDUCTIONS



CONCLUSION & RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The non-residential ELRP pilots did not deliver statistically significant demand reductions in PY 2024
 - Small groups, noisy loads
2. A4 ELRP pilot delivered consistent, statistically significant demand reductions in PY2024
 - Per-participant impacts of ~9kWh
3. No clear trends in impacts by subgroup (industries, geographic areas, etc.)
 - Except A1 NEM & non-NEM
4. The A6 pilot is approved through the end of the year
 - The remaining subgroups are approved through 2027

Recommendations

- Segment PY 2025 A1 awareness survey by NEM to understand the success for that group
- Reserve ELRP dispatch for clear emergency conditions
 - Significant load reductions were observed for PY 2022 but not for PY 2023 or PY 2024 events
 - Inform CAISO of effect of notification time on reductions
- Improve advance notice
 - Earlier advance notice, ideally day ahead, is likely to improve response to ELRP event notifications
- Evaluate event notifications
 - Participants can opt-in to notifications via app., could track impacts by receipt of messages



QUESTIONS?



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