SDG&E PY 25 ELECTRIC VEHICLE RATE EVALUATION

Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

DRMEC PRESENTATION MAY 6, 2026

PRESENTATION OVERVIEW

- Overview and introduction
- Participation, rates, and system conditions
- Ex-post load reductions
- Ex-ante load reductions
- Key findings and recommendations

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KEY RESEARCH QUESTIONS

1. What were the ex-post load reductions due to electric vehicle (EV) time of use (TOU) rates?
2. How do load reductions differ by system conditions and weather?
3. How do load reductions differ for different types of customers?
4. What is the ex-ante load reduction capability for 1-in-2 and 1-in-10 weather conditions?
5. How do ex-ante reductions compare with ex-post results and prior ex-ante forecasts?

PREVIEW OF RESULTS

1. What were the load reductions due to electric vehicle (EV) time of use (TOU) rates?
   0.3 kW per home, on average, over the 4-9 PM peak period on Aug. monthly worst day (10% of the household load, for 23.5 MW of peak demand reductions across 79k accounts)

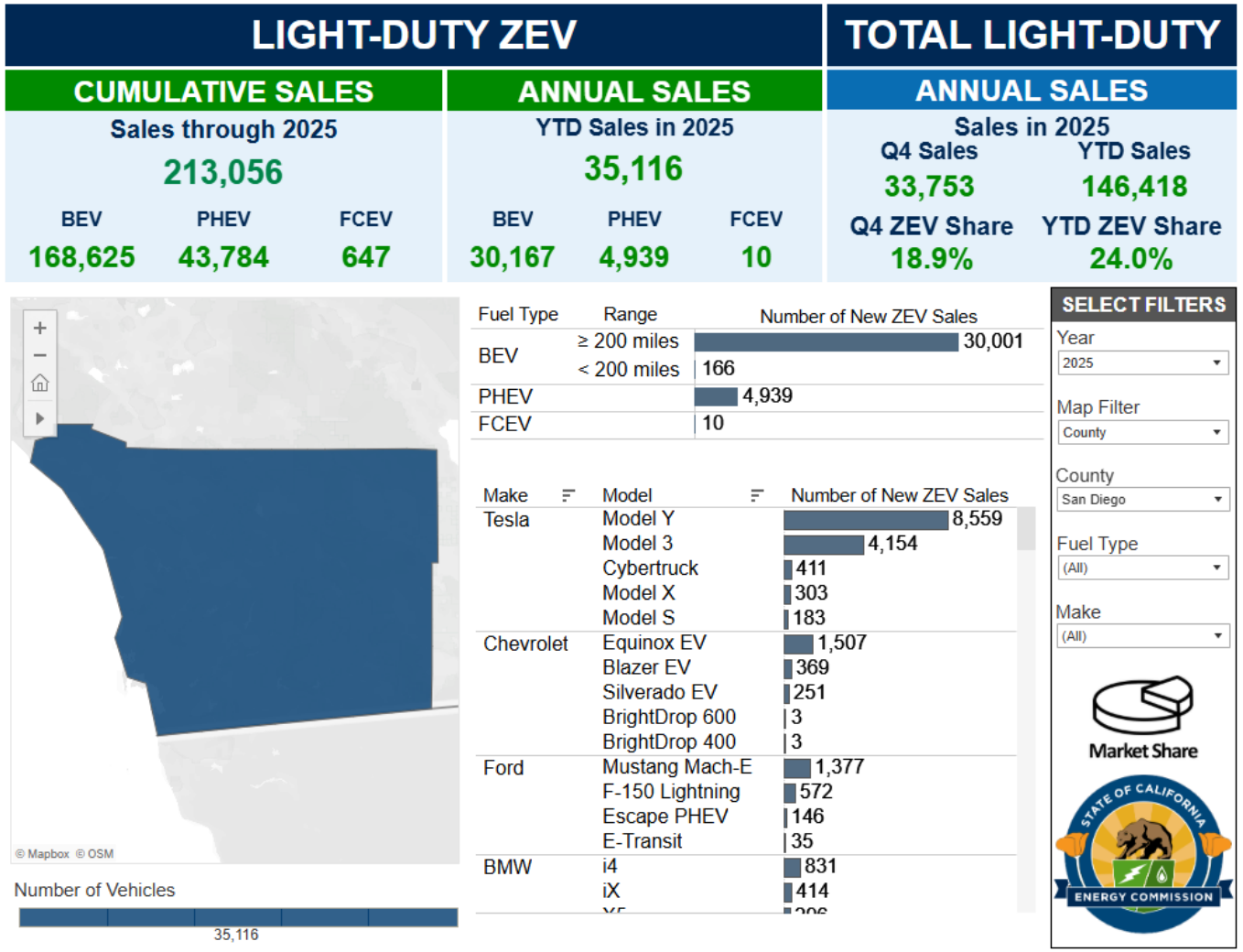
2. How do load reductions differ by system conditions and weather?
   Similar across systems, slightly weather sensitive

3. How do load reductions differ for different types of customers?
   Quite consistent, but NEM customers deliver larger reductions

4. What is the ex-ante load reduction capability for 1-in-2 and 1-in-10 weather conditions?
   0.31 and 0.33 kW per home, respectively, on 1-in-2 and 1-in-10 Aug. monthly worst day for CAISO system

5. How do ex-ante reductions compare with ex-post results and prior ex-ante forecasts?
   Slightly higher than 2024 but within the range of the previous five years

EVS IN SDG&E TERRITORY



EVs made up 24% of new vehicle sales in San Diego County in 2025.

- Over 80,000 homes on EV rates in SDG&E territory
- SDG&E has developed four EV rates:
  - EVTOU – legacy rate with end use metering
  - EVTOU2 – stronger price signals than default TOU, peak, off peak, and super off-peak periods
  - EVTOU5 – lowest volumetric rates during super off-peak period, with a higher fixed charge (nonvolumetric)
  - TOU-ELEC – newest rate for qualifying technology with a higher fixed charge and smaller price difference between off peak and super off-peak periods

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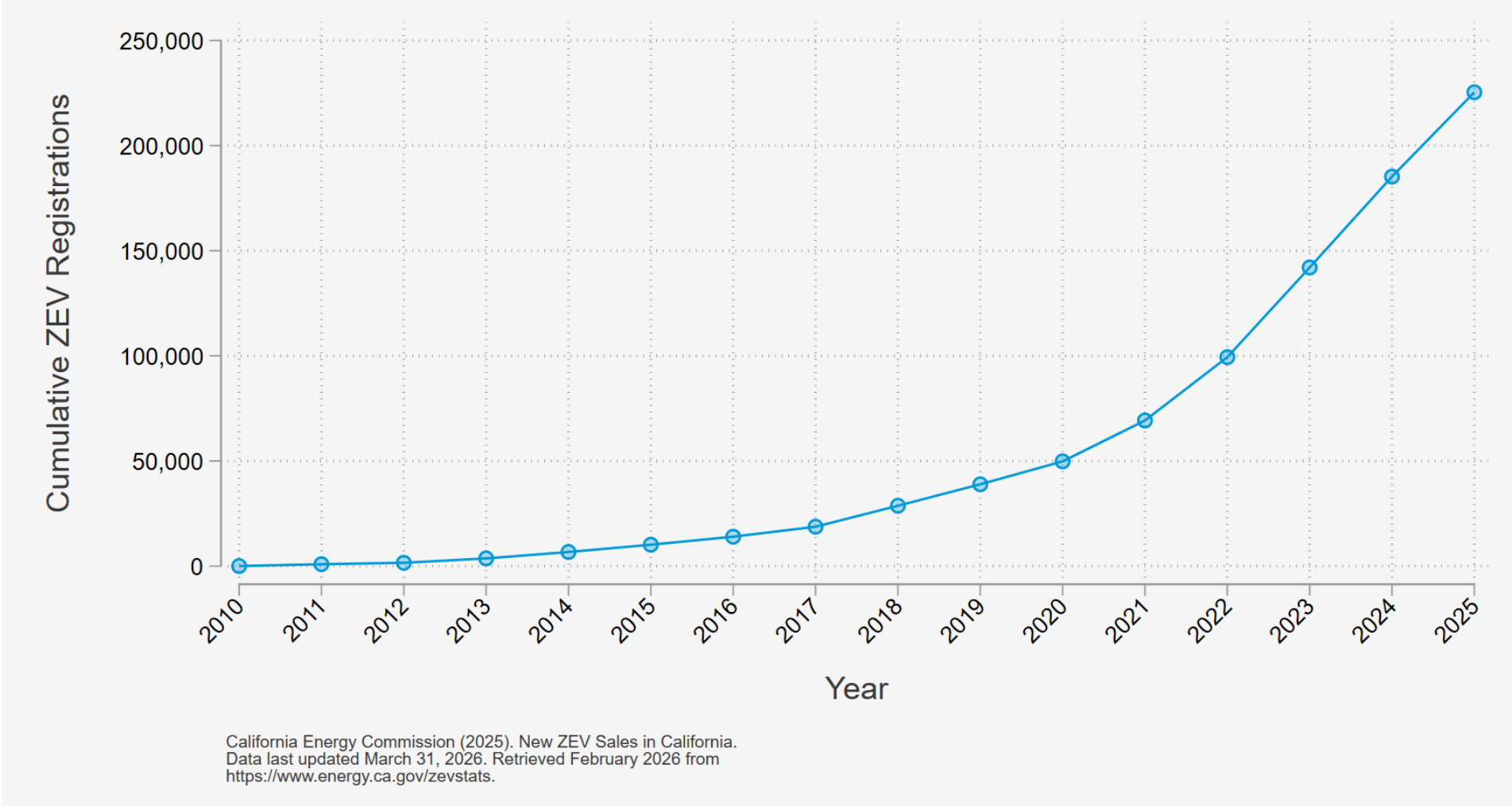
EV PENETRATION IN SDG&E SERVICE TERRITORY IS GROWING



California Energy Commission (2025). New ZEV Sales in California. Data last updated March 31, 2026. Retrieved February 2026 from https://www.energy.ca.gov/zevstats.

ESTIMATING EV RATE IMPACTS: CHALLENGES

- The fundamental challenge: we don't observe what EV rate customers' consumption would have been if they had stayed on their previous rate
  - Some customers enroll because their charging behavior was favorable
  - We cannot simply compare avg. participant to avg. non-participant because of these selection effects

- There are several potential effects that can be confounded with EV rate impacts:
  - Arrival of new electric vehicle often coincides with rate change
  - Solar or battery installation that coincides with the EV rate enrollment

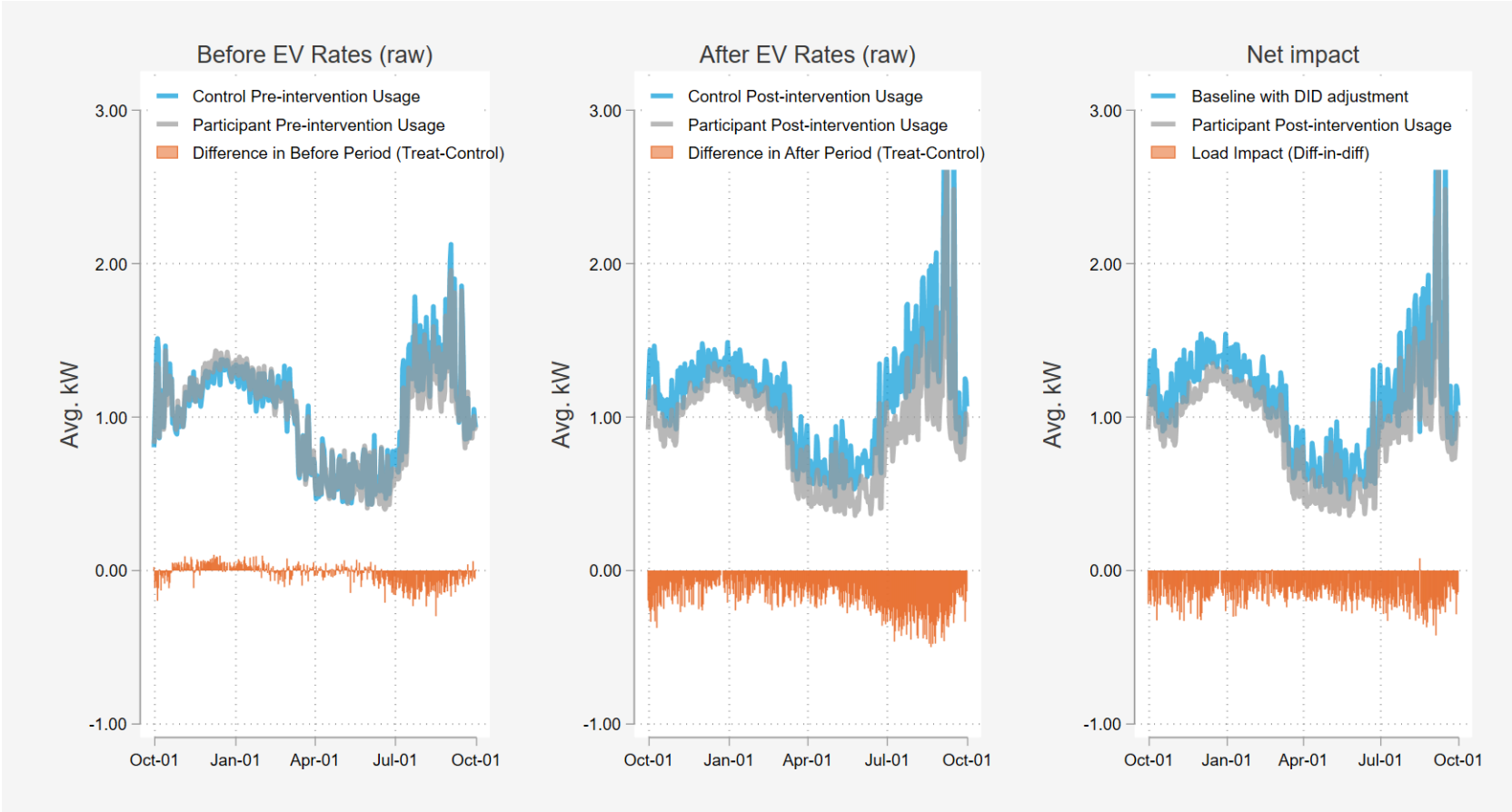
- Estimating precise calendar month effects requires a large sample of panel data

ESTIMATING EV RATE IMPACTS: METHODOLOGY AND MOTIVATION

Methodology	Motivation
Identify sites with EVs who were not on EV rates using a pool of ~250k sites (oversampling areas with high EV penetration)	Avoids confounding EV load with rate effect
Use a matched control group focused on identifying sites with EVs but not on EV rates	Controls for observable characteristics related to treatment status e.g. EV ownership, pre-treatment load, etc.
Use a full year of pre- and post-EV rate data	Enables estimation of monthly effects
Identify and screen out sites with changes in EV status, solar, or battery status during the analysis period	Avoids confounding changes in load with rate effect
Impacts estimated using difference-in-differences with matched controls	Allows for differences between participants and matched non-participants that are constant over time

ESTIMATING EV RATE IMPACTS: ROBUSTNESS CHECKS

- If EV rates leads to peak reductions, we should observe:
  - Similar load patterns when neither participants nor controls are on the rate
  - A decrease in peak demand for customers who enroll on EV rates
  - An increase in super off-peak demand for customers who enroll on EV rates
  - No similar change for the control group
  - The timing of the change should coincide with the enrollment on the EV rate



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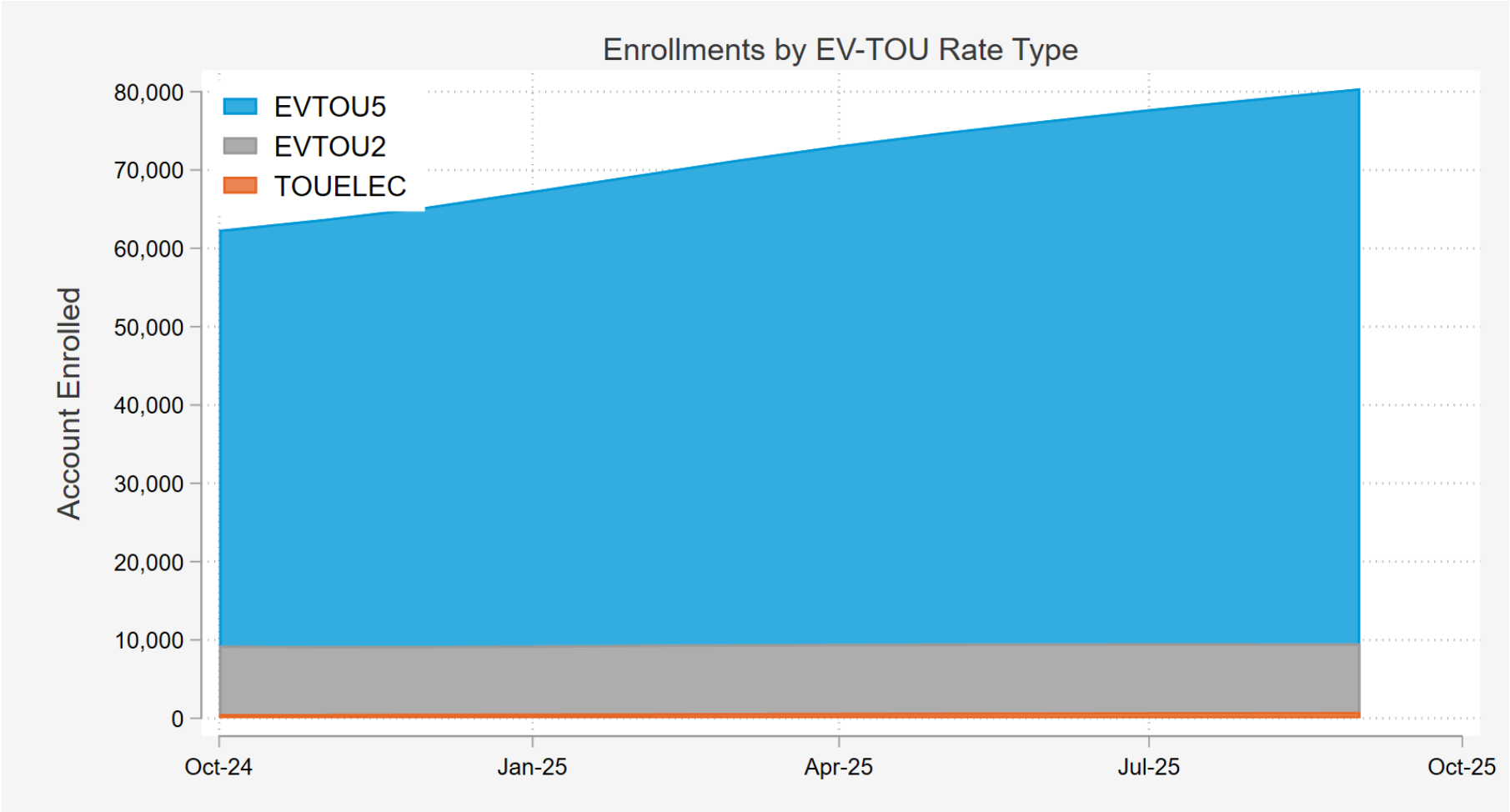
PARTICIPATION, RATES, AND SYSTEM CONDITIONS

SDG&E HAS ENROLLED OVER 80K EVS ON EV TOU RATES



- Most growth is in EVTOU5
- TOUELEC has very few customers

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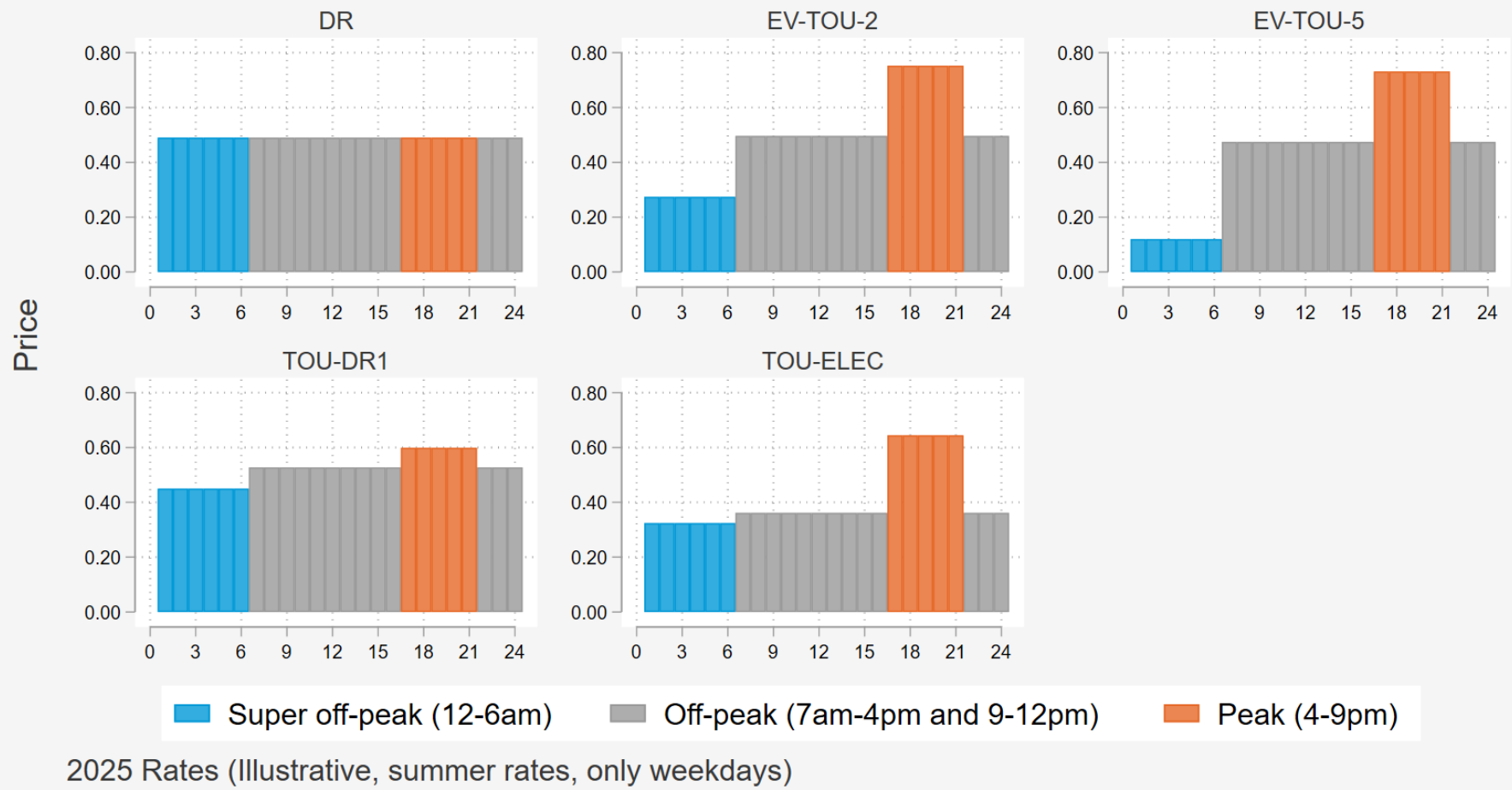
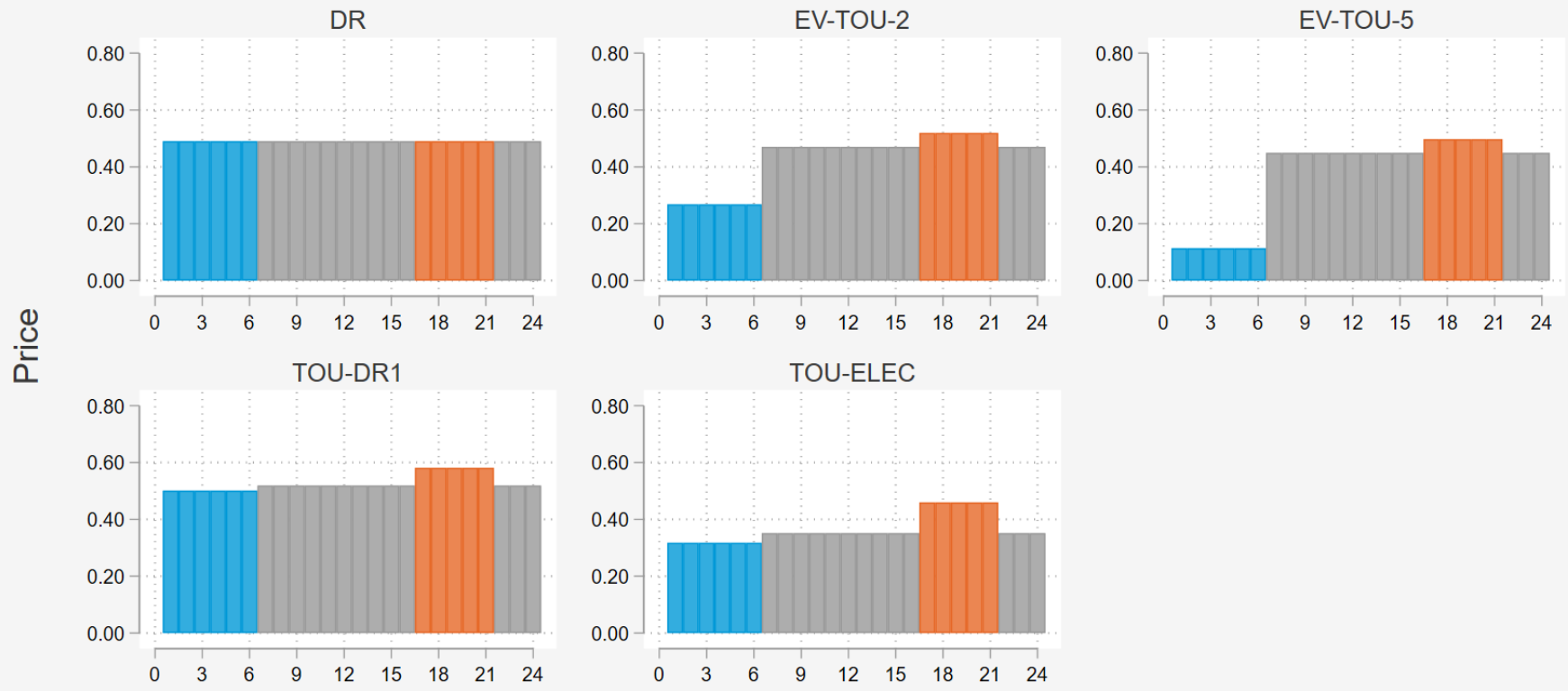
SUMMER RATE COMPARISON



- EV rates have lower charges from 12-6 AM and higher charges from 4-9 PM
- EV-TOU-5 has a very low super off-peak charge, and a higher fixed charge

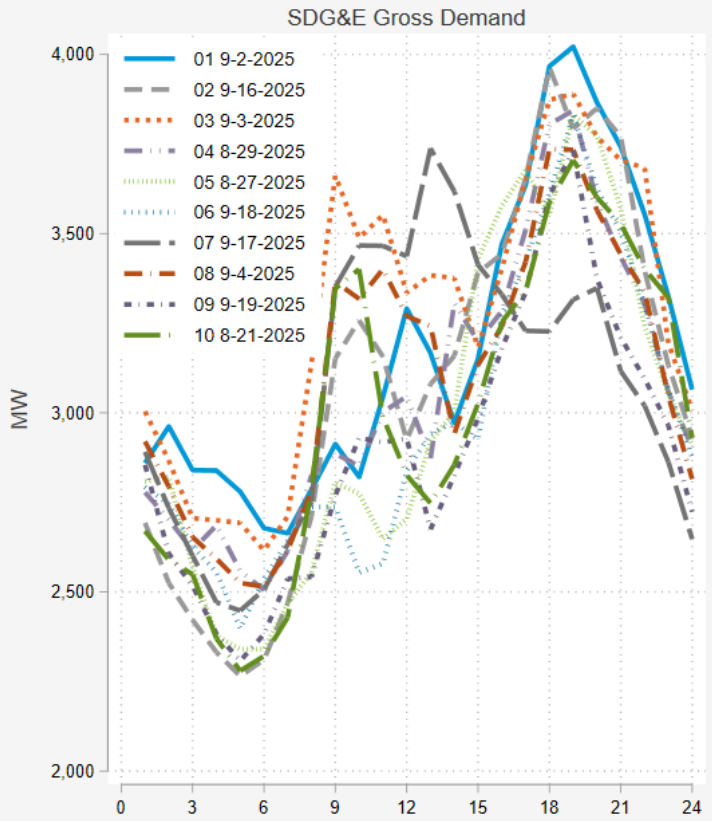
WINTER RATE COMPARISON

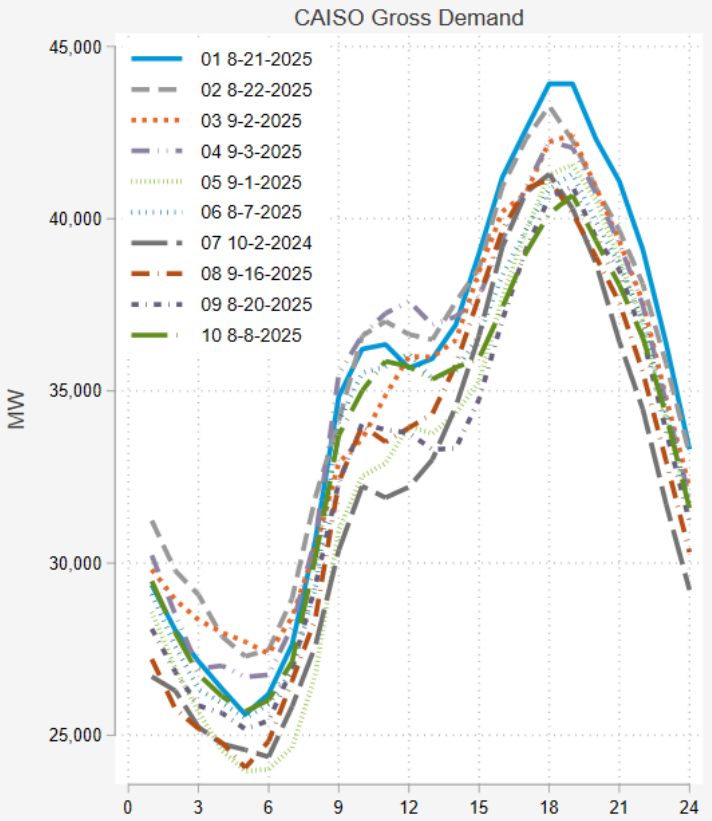


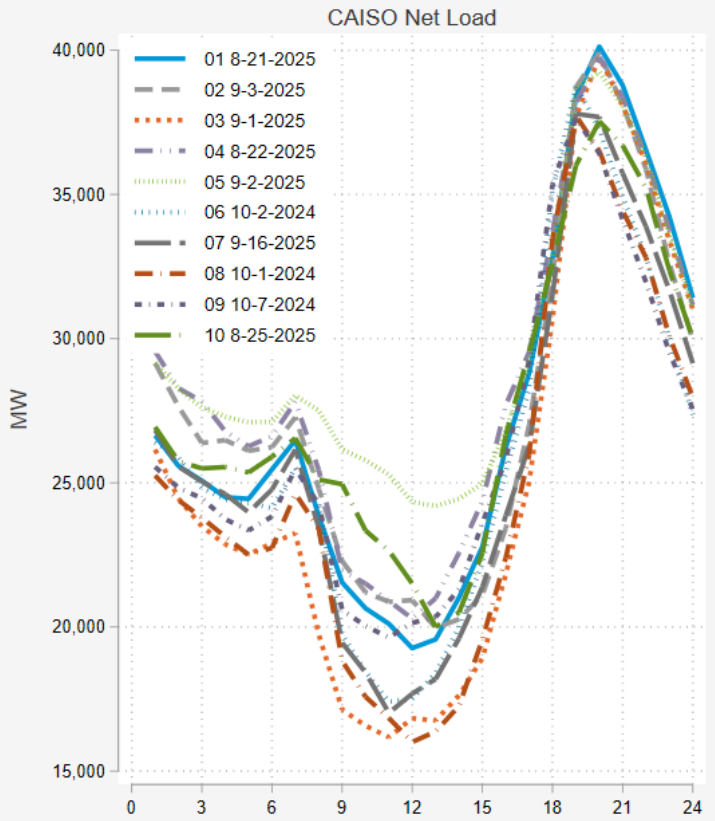
2025 Rates (Illustrative, winter rates, only weekdays. March and April have exceptions)

- Winter EV rates have a smaller peak to super off-peak ratio
- TOU-ELEC, with a higher fixed charge, is lower than TOU-DR1 in every period

OVERALL SYSTEM LOAD PEAKS IN 2025

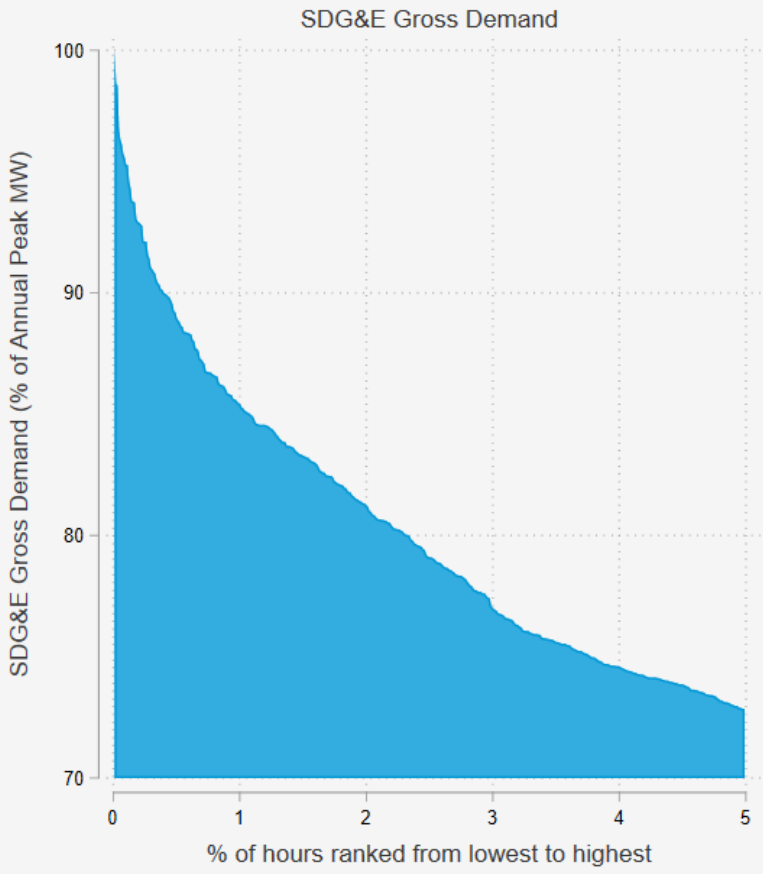


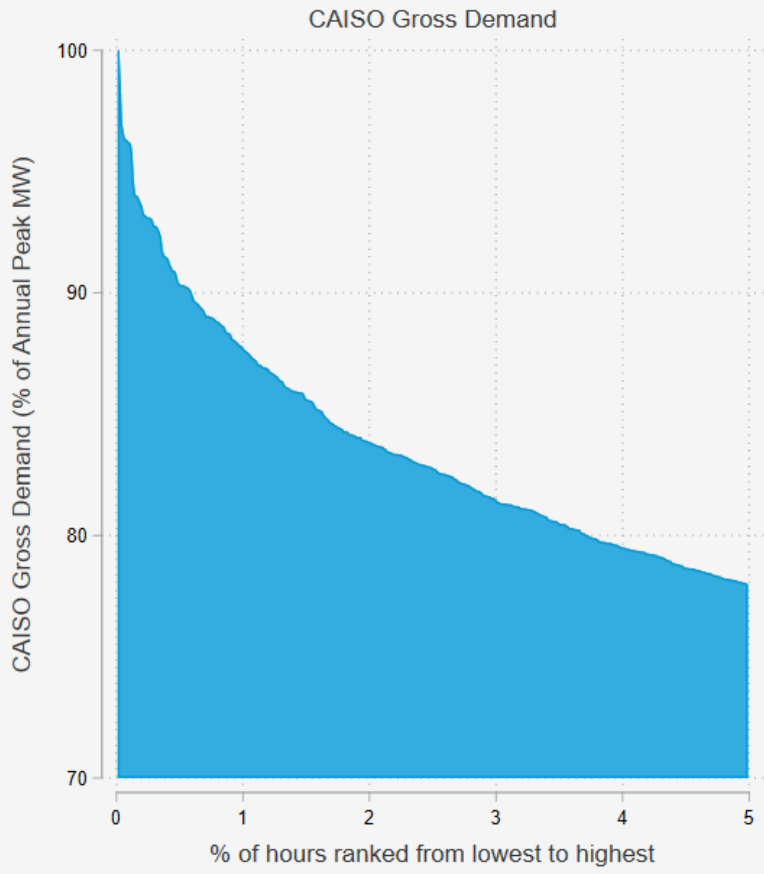


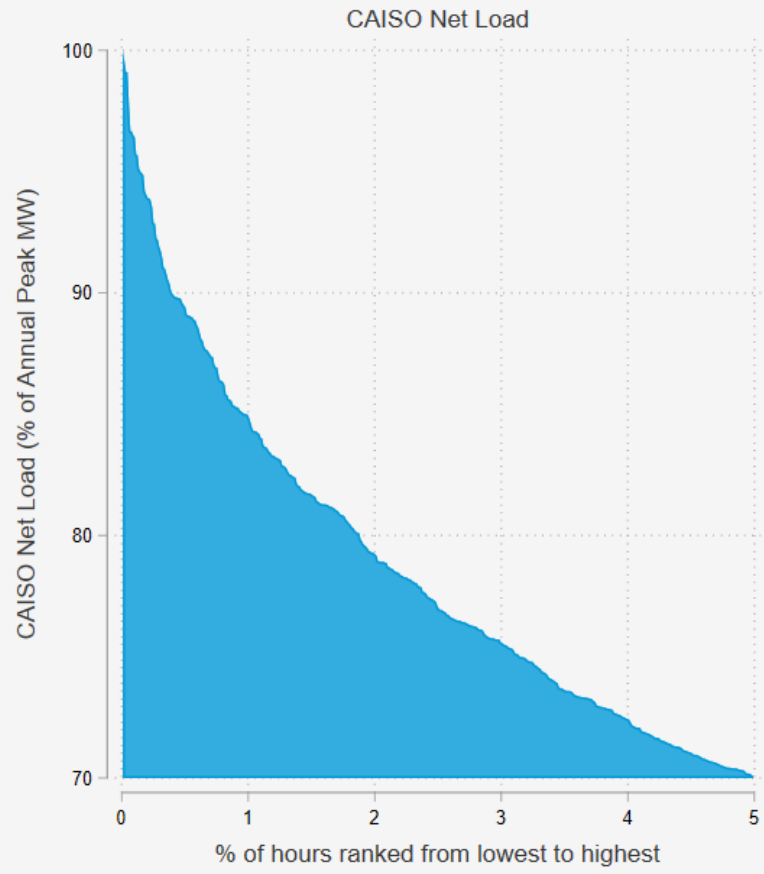


- SDG&E system reached an all-time peak of 4,022 MW on Tuesday September 2nd
- 8-21, 9-3, and 9-16 are shared peak days across systems

PEAK LOADS REMAIN HIGHLY CONCENTRATED ACROSS BOTH SDG&E AND CAISO







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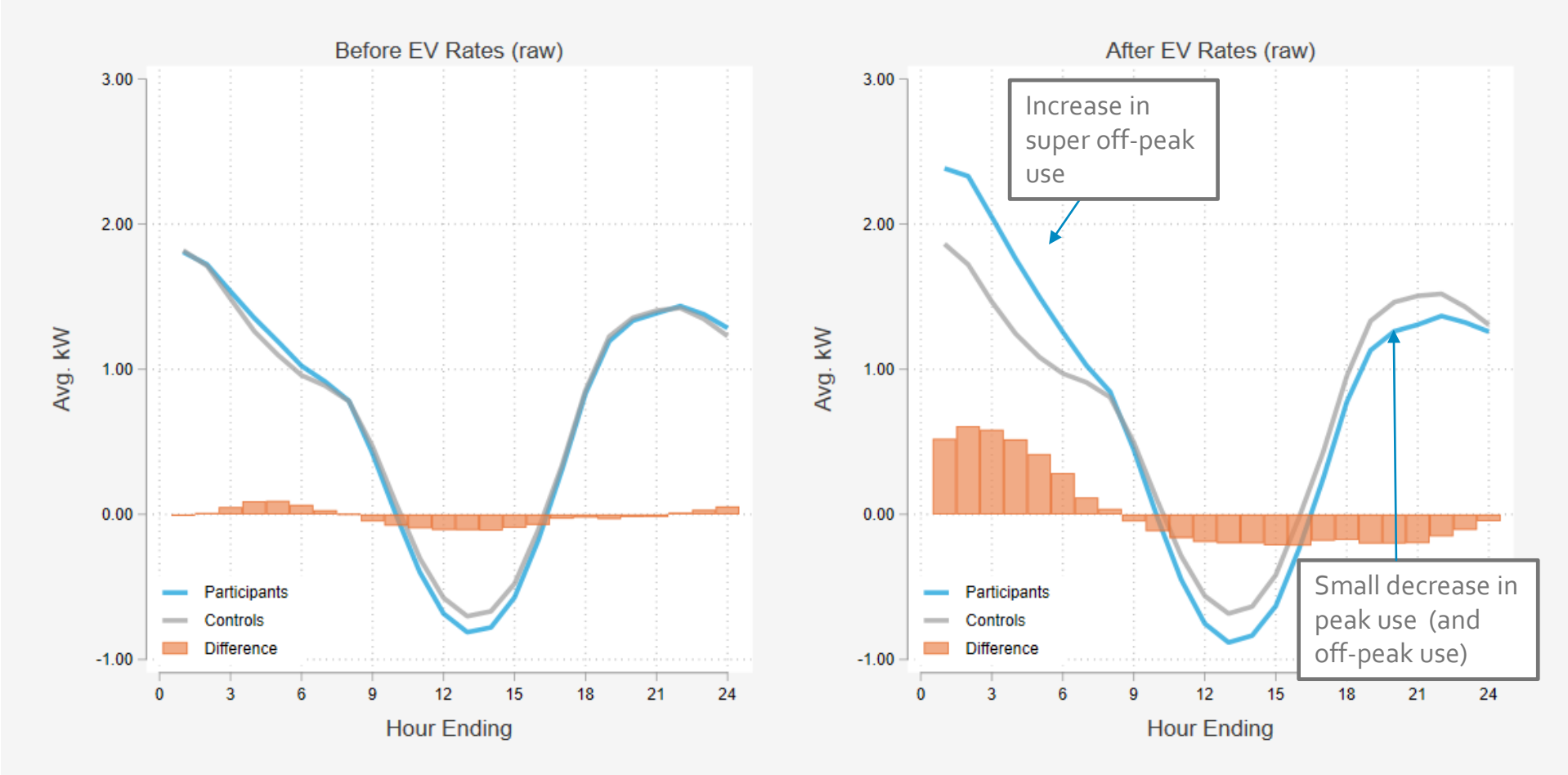
EX-POST LOAD IMPACTS

WE CAN SEE A CHANGE IN ENERGY WITHOUT ANY MODELING BY COMPARING HOURLY LOAD SHAPES THE YEAR BEFORE AND AFTER EV RATES



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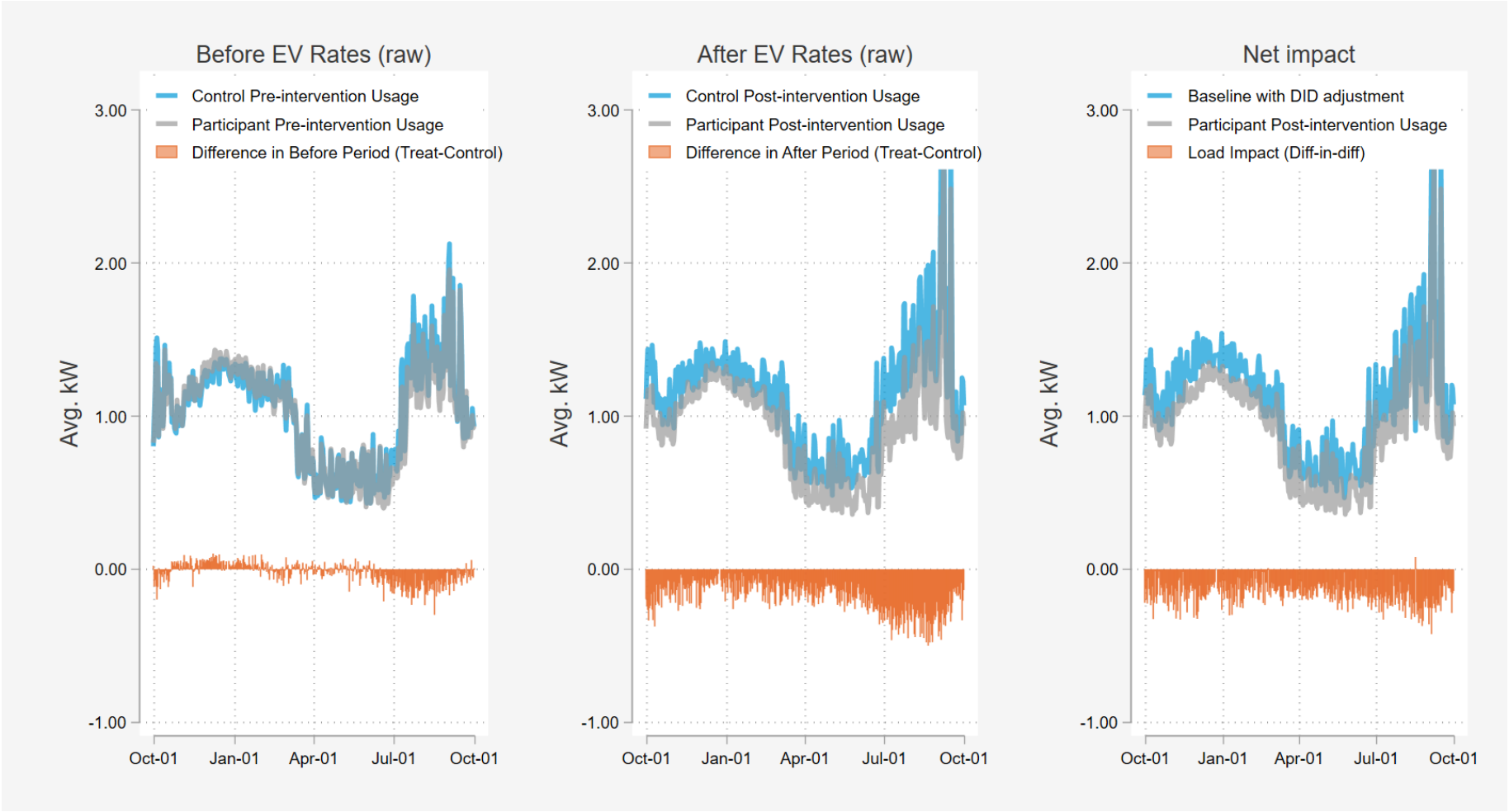
THE RAW DATA SHOWS A DECREASE IN PEAK USE WHEN THE RATE IS INTRODUCED (NO MODELING)



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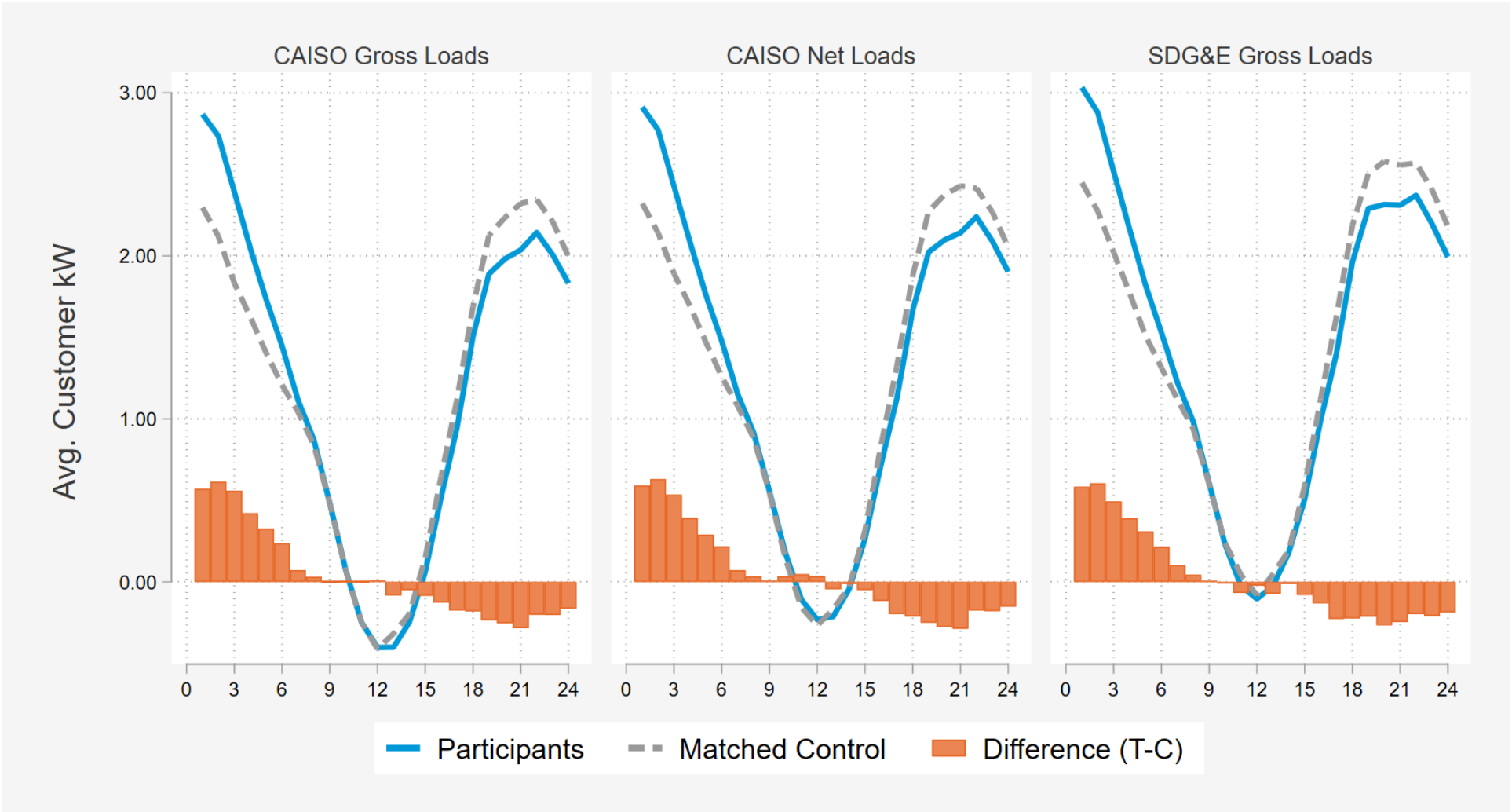
THE LOAD REDUCTIONS ON THE TOP TEN HIGHEST SYSTEM LOAD DAYS WERE CONSISTENT



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System	Month	Sample[1]	New Accounts	Total Accounts	Daily avg. temp[2]	Avg. Customer (kW)			New Load Impact (MW)	Total Load Impact (MW)
						Reference Load	Load Impact	% Change		
CAISO Gross Loads	Top 05 load day(s)	2,965	22,378	80,440	80.2	2.3	-0.26	-11.4%	-5.8	-20.6
	Top 10 load day(s)	2,965	22,378	80,440	77.6	1.9	-0.23	-11.9%	-5.0	-18.2
	Top 20 load day(s)	2,965	22,378	80,440	76.9	1.8	-0.22	-12.2%	-4.9	-17.5
CAISO Net Loads	Top 05 load day(s)	2,965	22,378	80,440	81.5	2.4	-0.23	-9.5%	-5.2	-18.7
	Top 10 load day(s)	2,965	22,378	80,440	78.5	2.1	-0.24	-11.9%	-5.5	-19.7
	Top 20 load day(s)	2,965	22,378	80,440	76.5	1.8	-0.21	-11.7%	-4.7	-17.0
SDG&E Gross Loads	Top 05 load day(s)	2,965	22,378	80,440	83.8	2.6	-0.24	-9.0%	-5.3	-19.2
	Top 10 load day(s)	2,965	22,378	80,440	80.7	2.3	-0.24	-10.3%	-5.3	-18.9
	Top 20 load day(s)	2,965	22,378	80,440	78.6	2.0	-0.24	-12.0%	-5.4	-19.4

[1] Estimating sample is lower than populations because it excludes sites that whose transition to EV TOU_{WH} coincided with the arrival of the electric vehicle or with solar or battery installation.

[2] Participant weighted average temperature. SDG&E maps all customers to eight distinct weather stations.

PEAK PERIOD LOAD REDUCTIONS ON HIGHEST SYSTEM LOAD DAYS

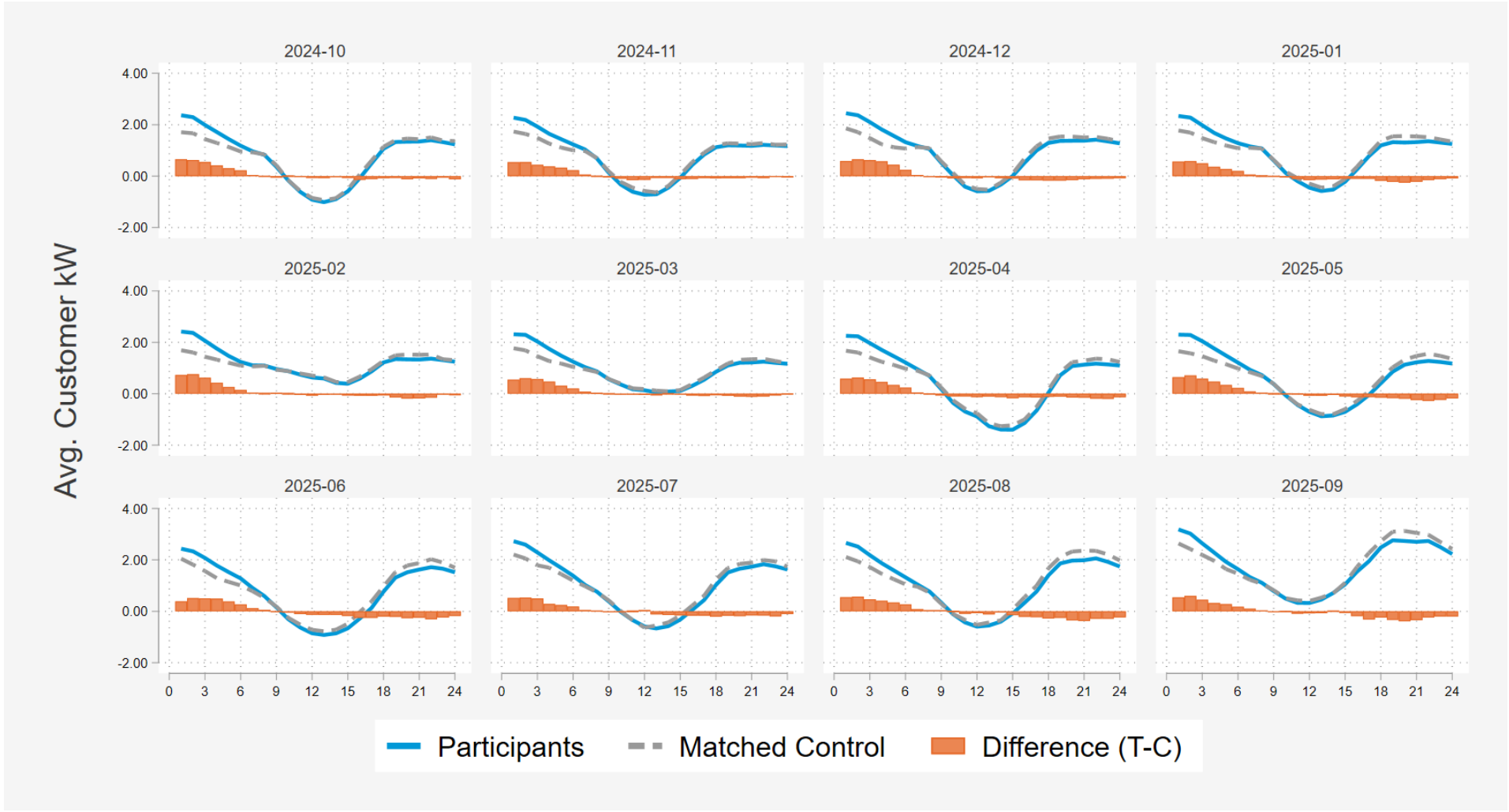
- 10%-12% Peak reduction on top days

Rate Period	Month	Total Accts	Daily avg. temp	Avg. Customers (kW)		Aggregate Incremental (MW)		% Change
				Reference Load	Load Reduction	Reference Load	Load Reduction	
Peak (4-9 PM)	2024-Oct	62,362	68.9	1.21	0.09	75.5	5.9	-7.8%
	2024-Nov	63,765	59.0	1.18	0.08	75.4	4.9	-6.4%
	2024-Dec	65,315	56.0	1.44	0.16	94.2	10.3	-10.9%
	2025-Jan	67,337	55.0	1.38	0.20	93.2	13.3	-14.2%
	2025-Feb	69,396	54.6	1.36	0.13	94.1	9.3	-9.8%
	2025-Mar	71,258	55.3	1.08	0.09	76.8	6.6	-8.6%
	2025-Apr	73,145	60.9	0.60	0.14	43.9	10.2	-23.2%
	2025-May	74,790	64.3	0.90	0.18	67.0	13.4	-20.1%
	2025-Jun	76,336	74.1	1.31	0.24	100.1	18.2	-18.2%
	2025-Jul	77,767	74.5	1.46	0.18	113.3	14.1	-12.4%
	2025-Aug	79,123	78.0	1.90	0.30	150.1	23.5	-15.7%
	2025-Sep	80,440	84.4	2.86	0.33	229.7	26.3	-11.4%

PEAK PERIOD LOAD REDUCTIONS ON MONTHLY WORST DAYS

- Reductions are largest in hot summer months
- Relative (%) reductions are largest in the spring

THE MONTHLY WORST DAY IMPACTS ARE HIGHEST IN THE SUMMER MONTHS



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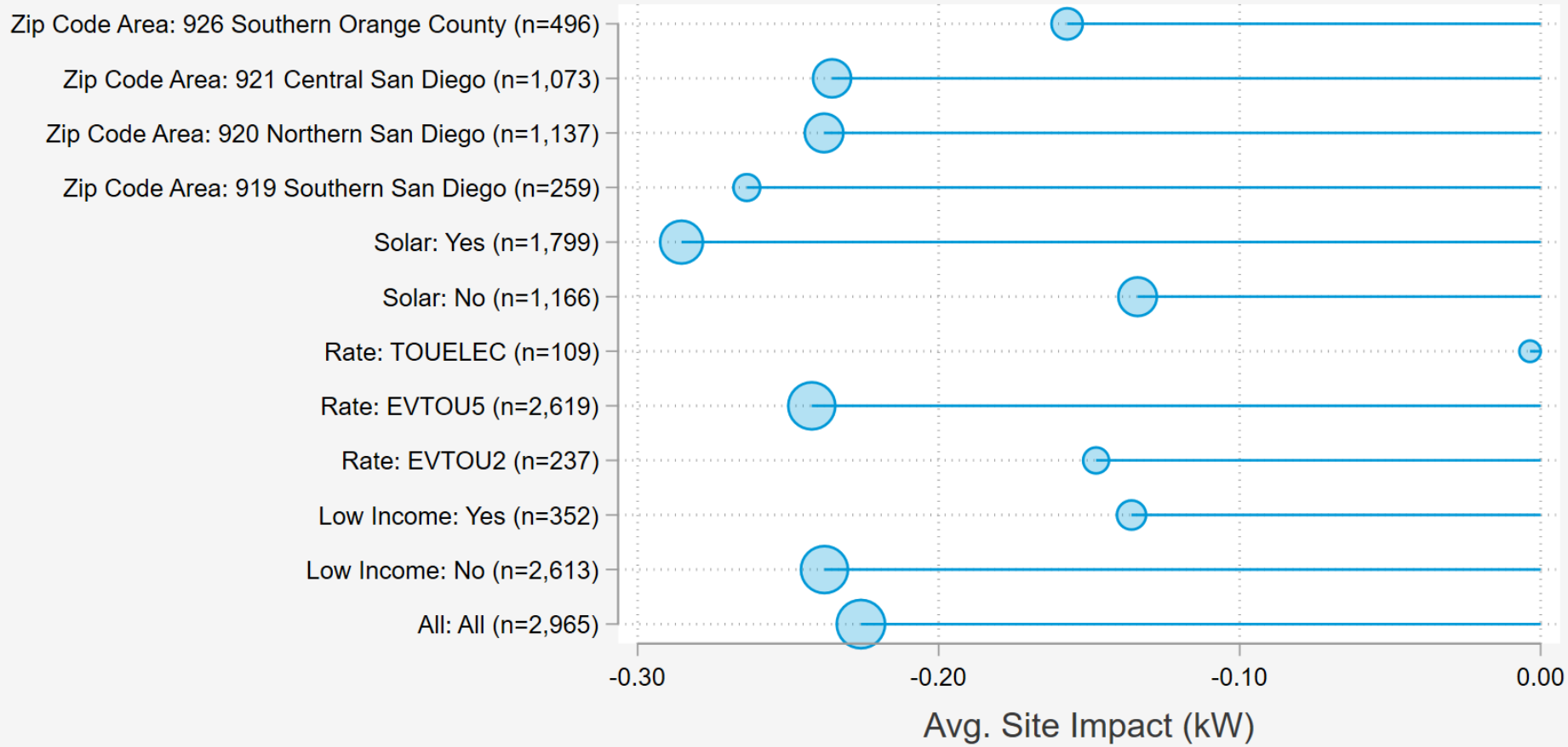
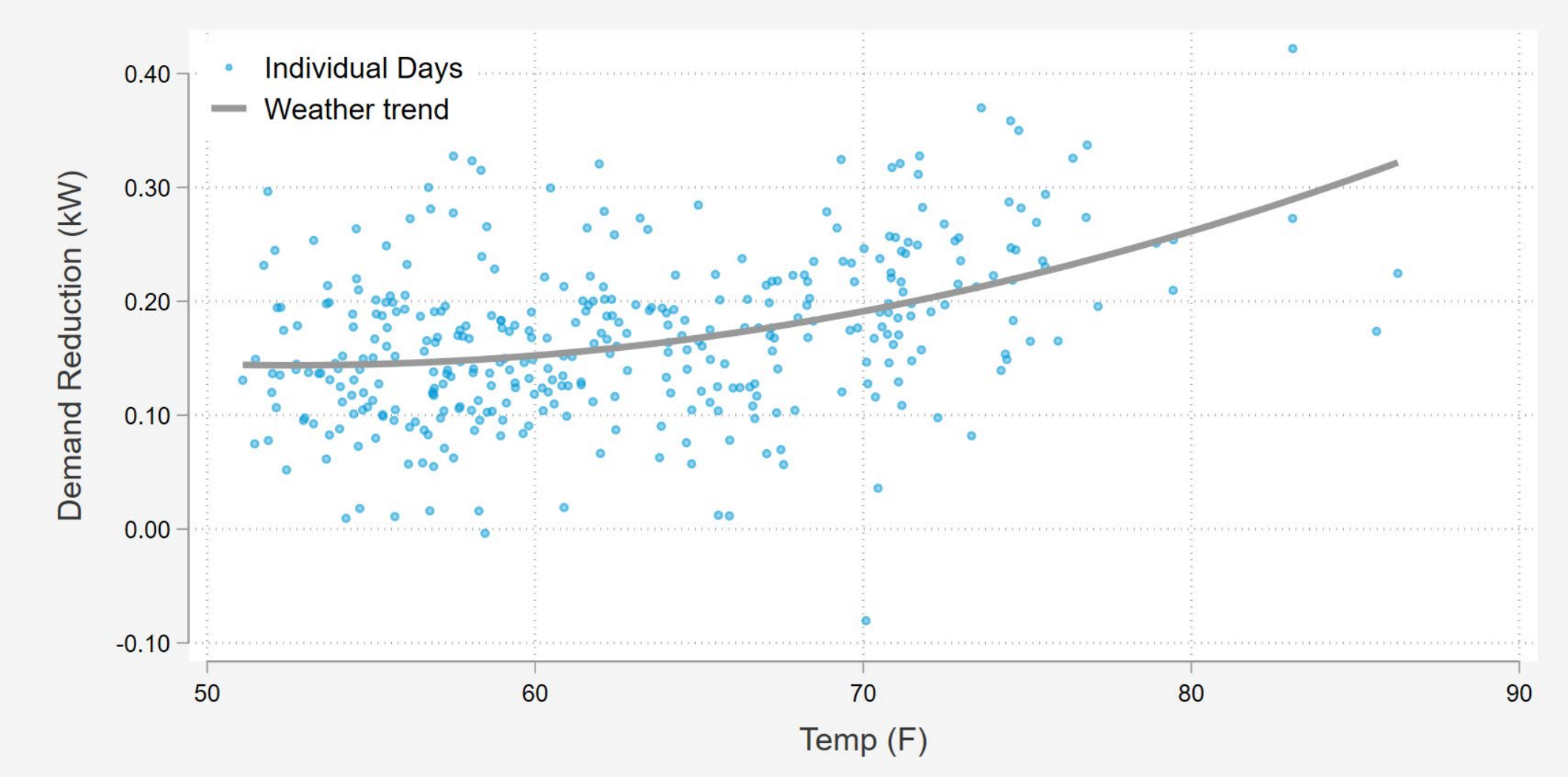
HOW DO LOAD IMPACTS VARY FOR KEY SEGMENTS?



Peak period (4-9 PM) on 10 highest CAISO load days
Bubble size is proportional to the sample size

ARE EV RATE LOAD REDUCTIONS WEATHER SENSITIVE?



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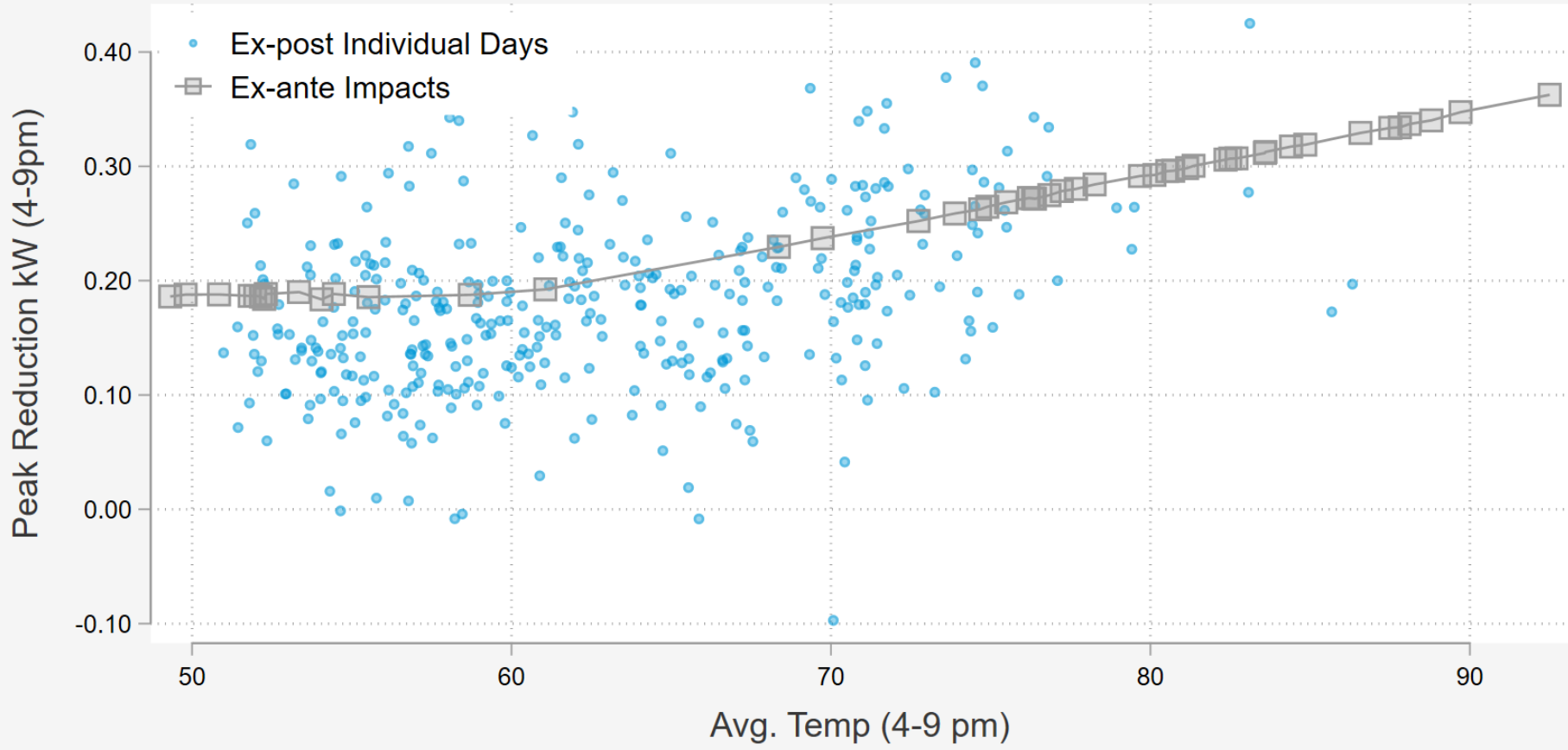
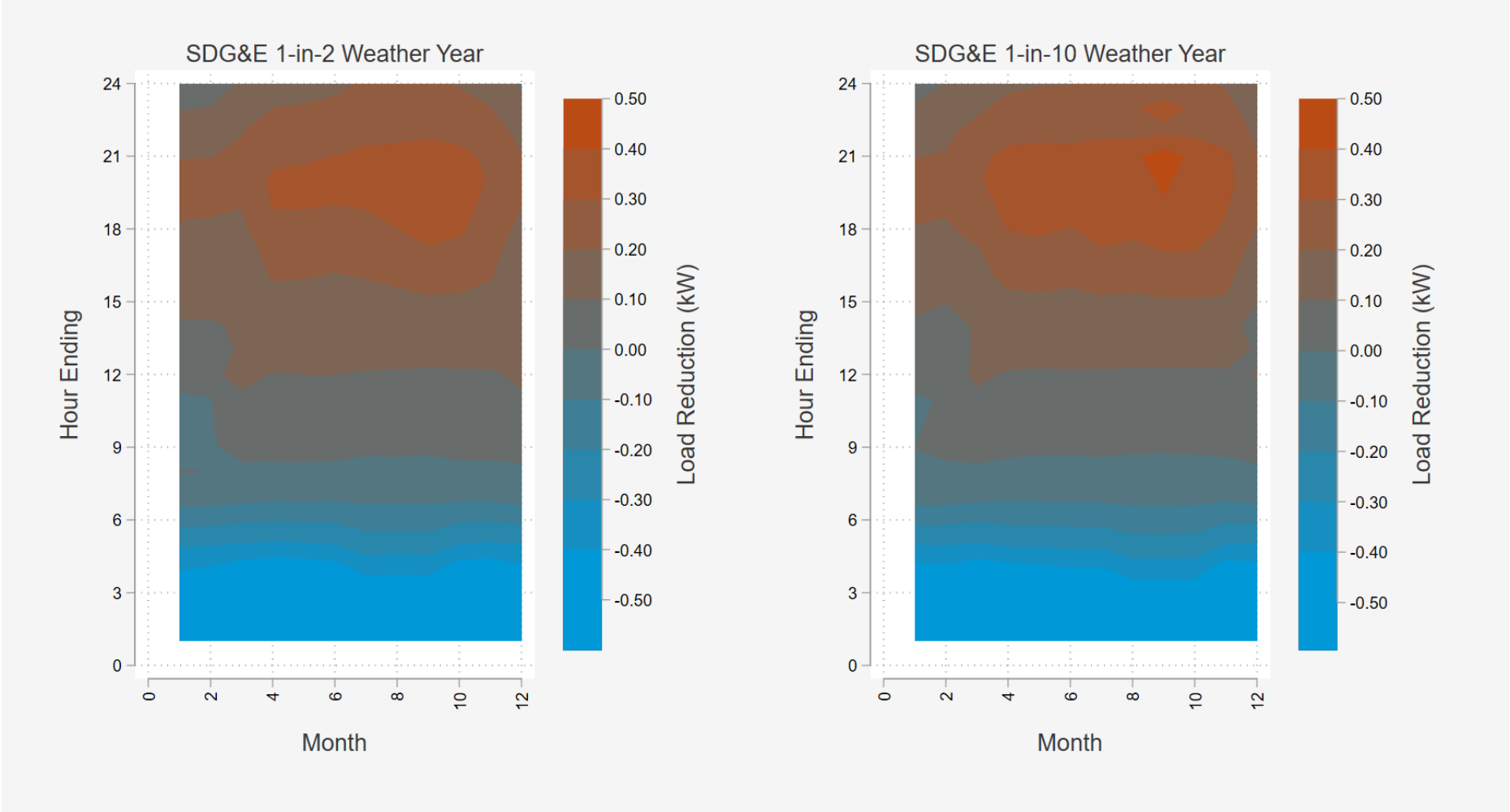
EX-ANTE LOAD IMPACTS

EX-ANTE REDUCTIONS ARE BASED ON EX-POST WEATHER SENSITIVITY



Size of bubble is proportional to the estimating sample. Per customer impacts reflect the mix of the estimating sample.
Ex-ante impact include monthly peak days for CAISO, SDG&E and for 1-in-2 and 1-in-10 weather years

MONTHLY WORST DAY EX-ANTE LOAD REDUCTIONS PER PREMISE HEAT MAP



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PER HOME EX ANTE LOAD REDUCTIONS

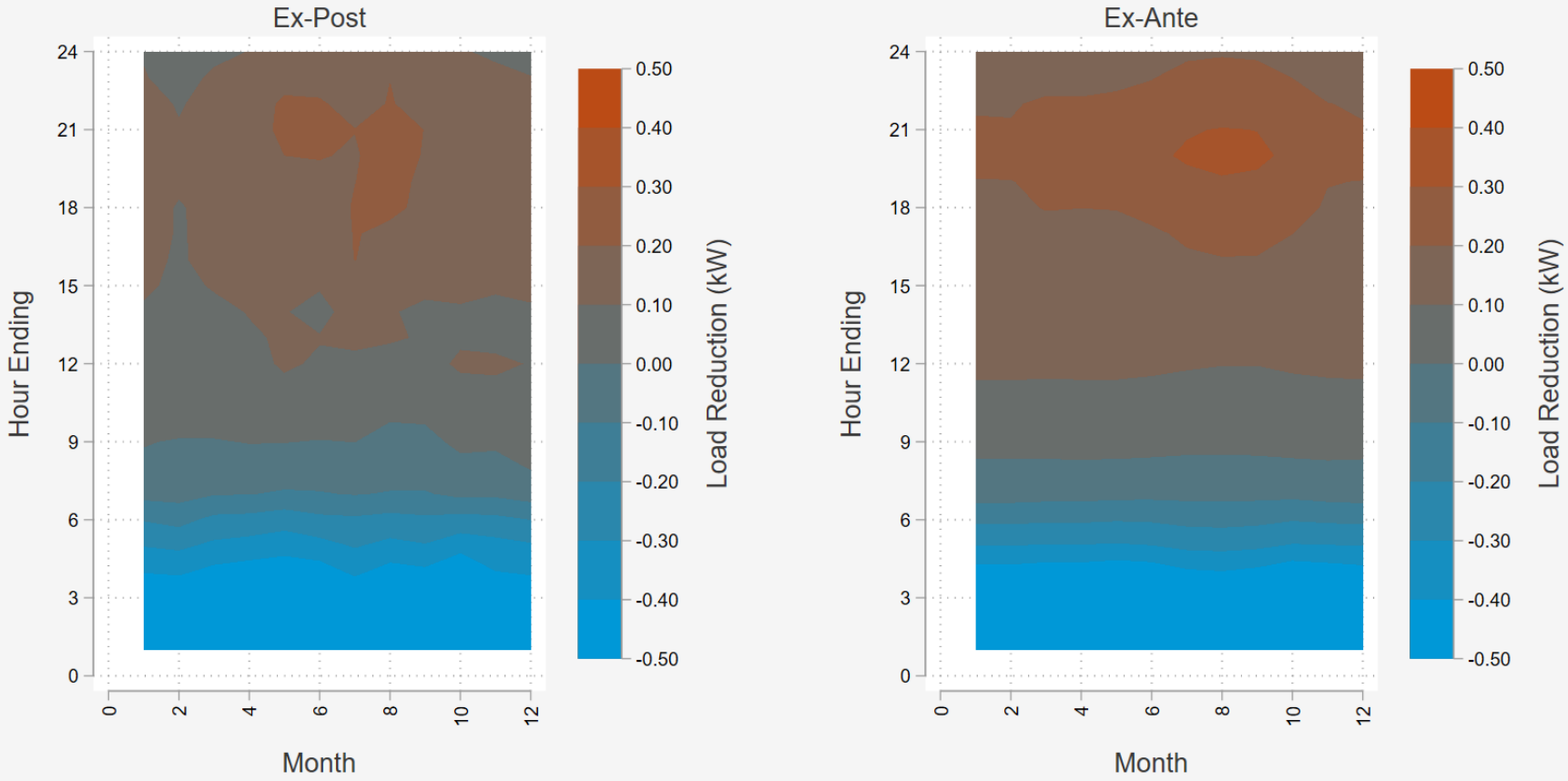
Day Type	Month	SDG&E		CAISO	
		1-in-2	1-in-10	1-in-2	1-in-10
AVERAGE WEEKDAY	05 May	0.22	0.24	0.22	0.24
	06 Jun	0.24	0.26	0.25	0.26
	07 Jul	0.27	0.29	0.27	0.29
	08 Aug	0.28	0.29	0.28	0.29
	09 Sep	0.28	0.29	0.28	0.28
	10 Oct	0.25	0.27	0.25	0.27
MONTHLY SYSTEM PEAK DAY	05 May	0.28	0.33	0.24	0.31
	06 Jun	0.28	0.32	0.27	0.29
	07 Jul	0.30	0.35	0.29	0.30
	08 Aug	0.32	0.34	0.31	0.33
	09 Sep	0.35	0.38	0.31	0.36
	10 Oct	0.32	0.35	0.32	0.35

AS EV ADOPTION GROWS, THE DAILY PEAK LOAD REDUCTION IS EXPECTED TO GROW TO ALMOST 200 MW

Forecast Year	Enrollment Forecast	SDG&E Weather		CAISO Weather	
		1-in-2	1-in-10	1-in-2	1-in-10
2025	105,985	33.8	36.3	32.6	35.0
2026	128,664	41.1	44.2	39.7	42.6
2027	156,905	50.3	53.9	48.5	52.0
2028	190,208	61.1	65.5	58.9	63.1
2029	228,548	73.5	78.7	70.9	75.9
2030	278,306	89.6	96.0	86.4	92.6
2031	331,656	106.8	114.4	103.1	110.4
2032	390,228	125.8	134.7	121.4	130.0
2033	452,325	145.9	156.2	140.8	150.7
2034	521,253	168.2	180.1	162.4	173.8
2035	587,487	189.7	203.0	183.1	195.9

August Monthly Worst Day Results

EX-POST TO EX-ANTE COMPARISON (AVG. WEEKDAY)



Average weekday impacts (2025)

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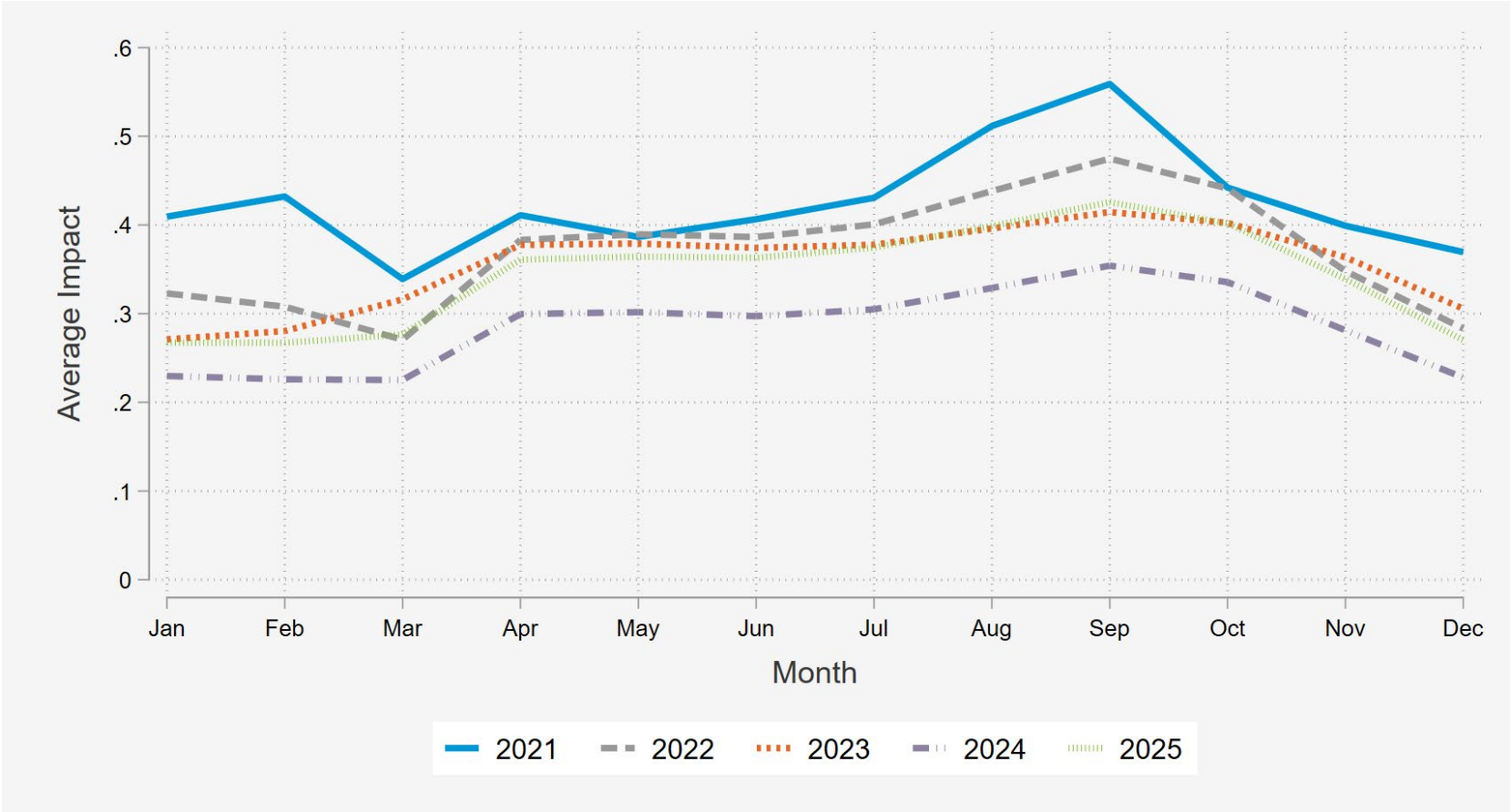
COMPARISON TO PRIOR YEAR EVALUATION – MONTHLY WORST DAY

	PY24 Evaluation				PY25 Evaluation			
	EVTOU5		EVTOU2		EVTOU5		EVTOU2	
	1-in-2	1-in-10	1-in-2	1-in-10	1-in-2	1-in-10	1-in-2	1-in-10
May	0.23	0.26	0.18	0.27	0.29	0.34	0.21	0.28
June	0.22	0.25	0.17	0.24	0.29	0.32	0.21	0.26
July	0.23	0.27	0.19	0.31	0.30	0.35	0.23	0.31
August	0.25	0.27	0.25	0.29	0.32	0.35	0.26	0.30
September	0.27	0.29	0.30	0.36	0.35	0.38	0.31	0.36
October	0.26	0.28	0.26	0.31	0.33	0.36	0.27	0.32

*Per Customer impacts for 2025

COMPARISON TO PRIOR YEAR EVALUATION

Average load Impact during Peak Hours by Month, 2021-2025



- EVTOU-5 customers with solar (reflects profile expected for future participants)
- 1-in-2 weather conditions
- 2025 results closely align with historical performance
- 2021 results higher than others

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KEY FINDINGS AND RECOMMENDATIONS

KEY FINDINGS

1. As of December 2025, there over 200,000 EVs registered in SDG&E territory, and over 80,000 households on EV rates. Most new enrollment is occurring on the EV-TOU-5 rate.

2. Customers who enroll on EV TOU rates decrease demand when prices are higher usage when the prices are lowest. Moreover, the change in load patterns coincides with the enrollment on TOU rates for electric vehicles

3. On top 5 highest CAISO gross, CAISO net, and SDG&E system load days over the study period, customers reduced demand by 0.24 kW per home, on average, over the 4-9 PM peak period. This amounted to reduction in demand between 9%-11% of the household load, and over 18 MW of peak demand reductions

4. On Aug. monthly worst day for the CAISO system, ex ante load reductions are 0.31 and 0.33 kW per home, respectively, for 1-in-2 and 1-in-10 weather

5. Peak demand reductions are generally larger when weather is hotter

EVALUATION RECOMMENDATIONS

1. Study the persistence of impacts and cohort effects.

2. Assess whether SDG&E can incorporate California Department of Motor Vehicle (DMV) registration data to identify non-participant sites with EVs.

3. Consider modifying the building blocks used for ex-ante impacts.

QUESTIONS?

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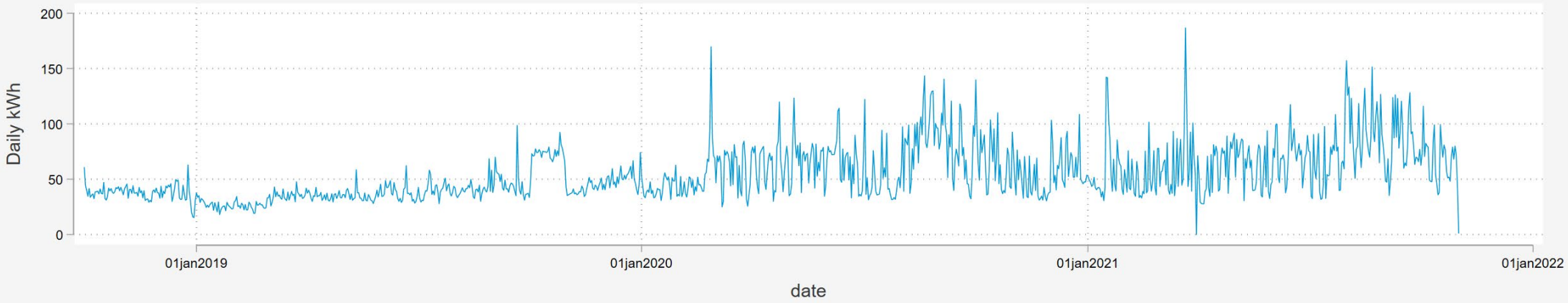
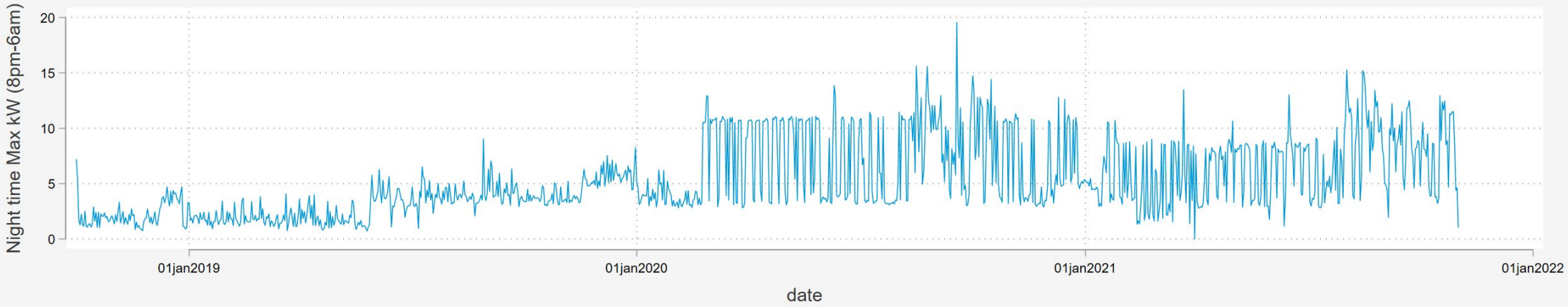
IDENTIFYING SITES WITH EVS BUT NOT ON EV RATES

WHEN AN EV IS INTRODUCED, IT CHANGES USAGE AND MAX DEMAND PATTERNS





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IDENTIFYING SITES WITH EVS (WHO WERE NOT ON EV RATES)

Input Data

1. SDG&E Data:
   - ~80,000 customers on EV rates
   - ~240,000 customer not on EV rates, oversampling zips with high EV rates
   - AMI data for all site
   - Customer characteristics (e.g., solar status, CARE, locations, etc.)

2. California DMV
Most recent data on vehicle penetration by fuel type and zip code

3. US Census Bureau
Zip code level demographics

4. CALMAC weather data (include solar irradiance)

Analysis

1. Narrow AMI data to 2024 and temperate days
(Avg. Temp <70 & Max Temp <90 F)

2. Calculate AMI summary metrics for all hour and night hours only (e.g. max night time kWh, volatility, etc.)

3. Combine summary AMI data with other customer/area characteristics

4. Exploratory data analysis to identify strongest predictors

5. Run tournament to identify the best predictive model

6. Apply model to full population and identify sites with high likelihood of EVs

Outputs

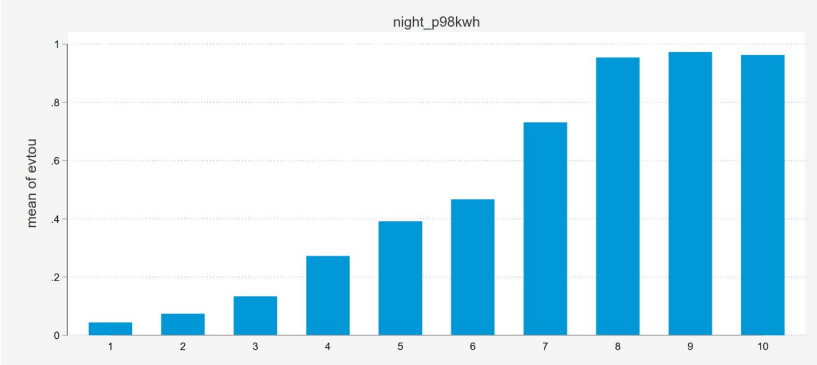
1. EV likelihood for all ~265,000 sites

2. Detection of when EV was adopted (if adopted over time frame)

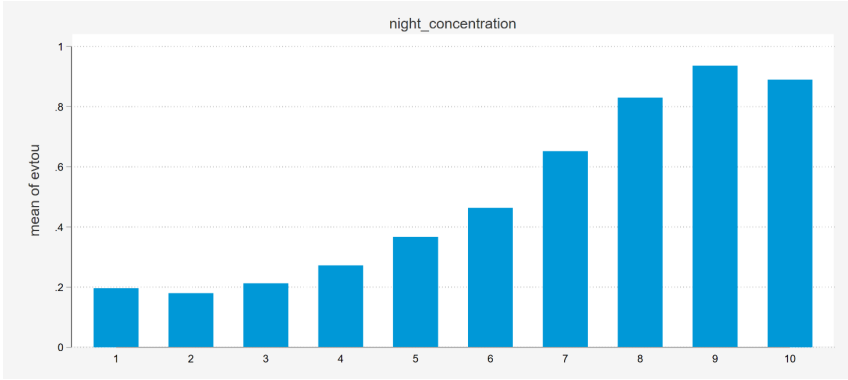
KEY PREDICTORS OF EVS

We consider over 40 variables. Here are some of the best predictors:

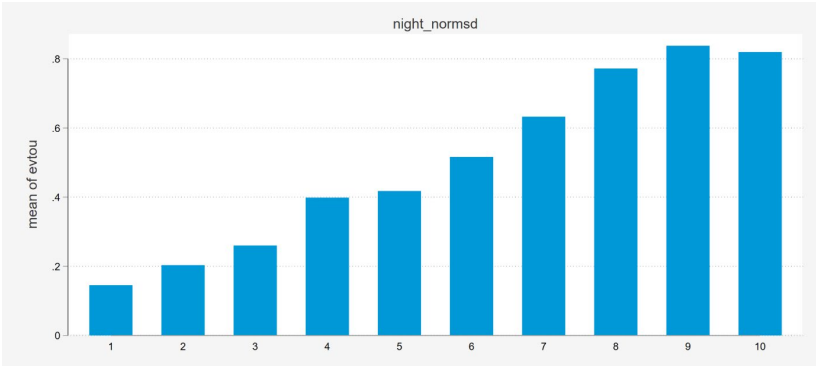
Night time Demand p98 (8pm6am)



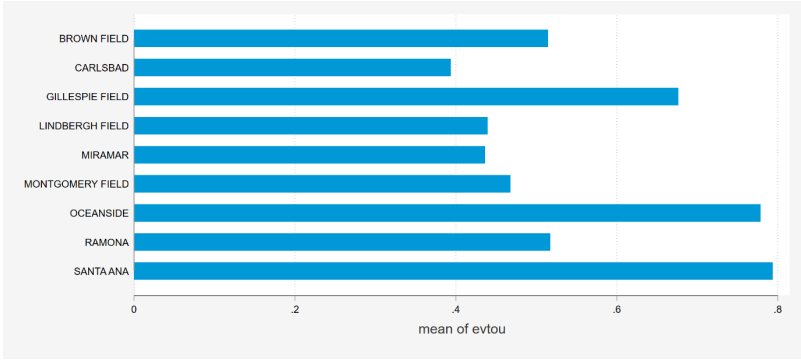
Little drop off in night time load duration (p98/max)



Volatility in nighttime load (Norm SD)



Location
(based on weather station mapping)

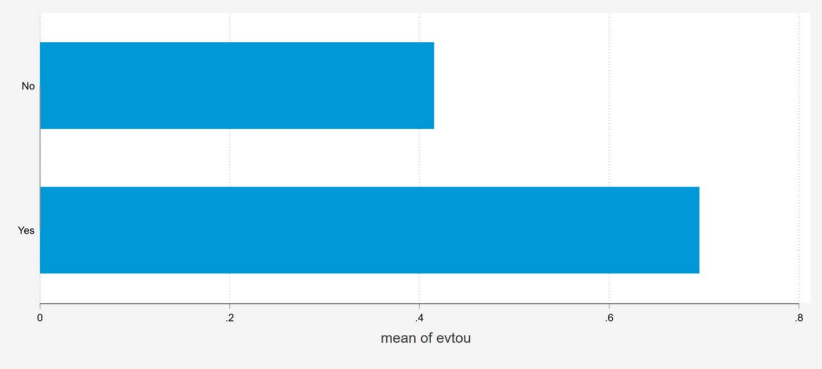


Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

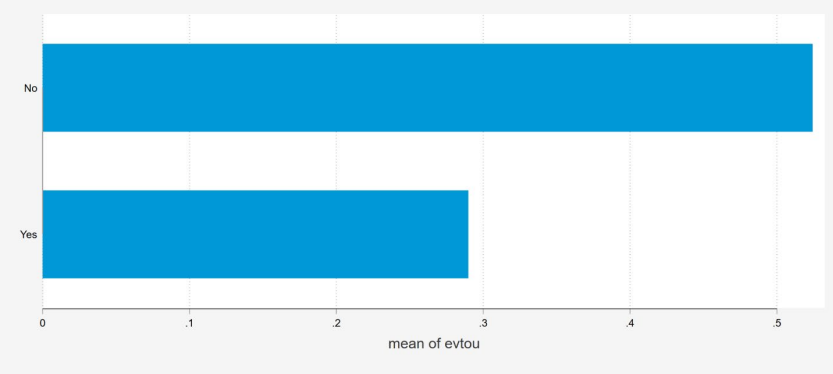
KEY PREDICTORS OF EVS

We consider over 40 variables. Here are some of the best predictors:

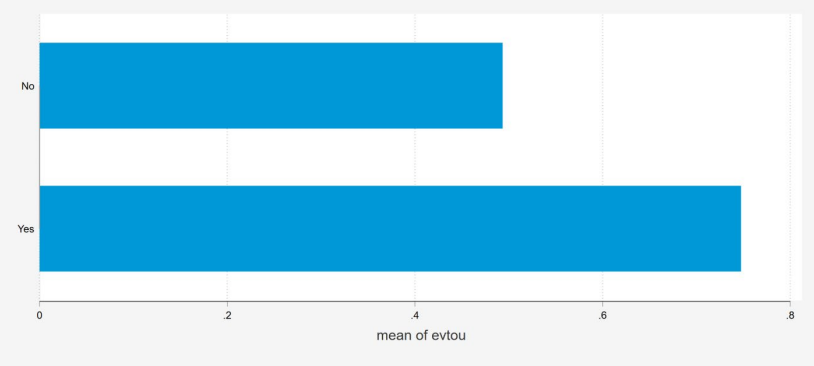
Solar



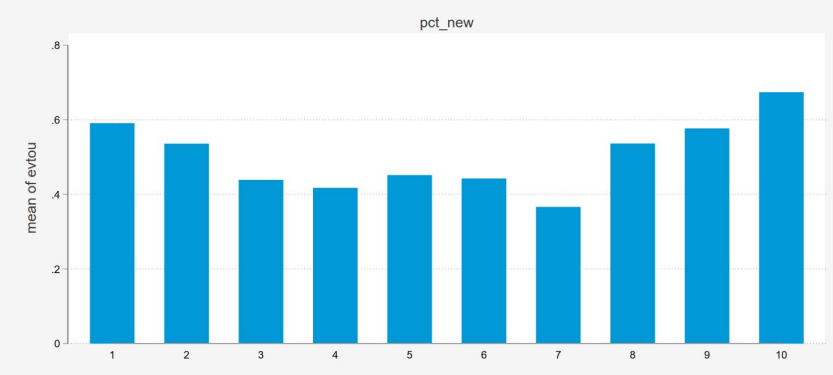
Low Income (CARE)



Battery Storage



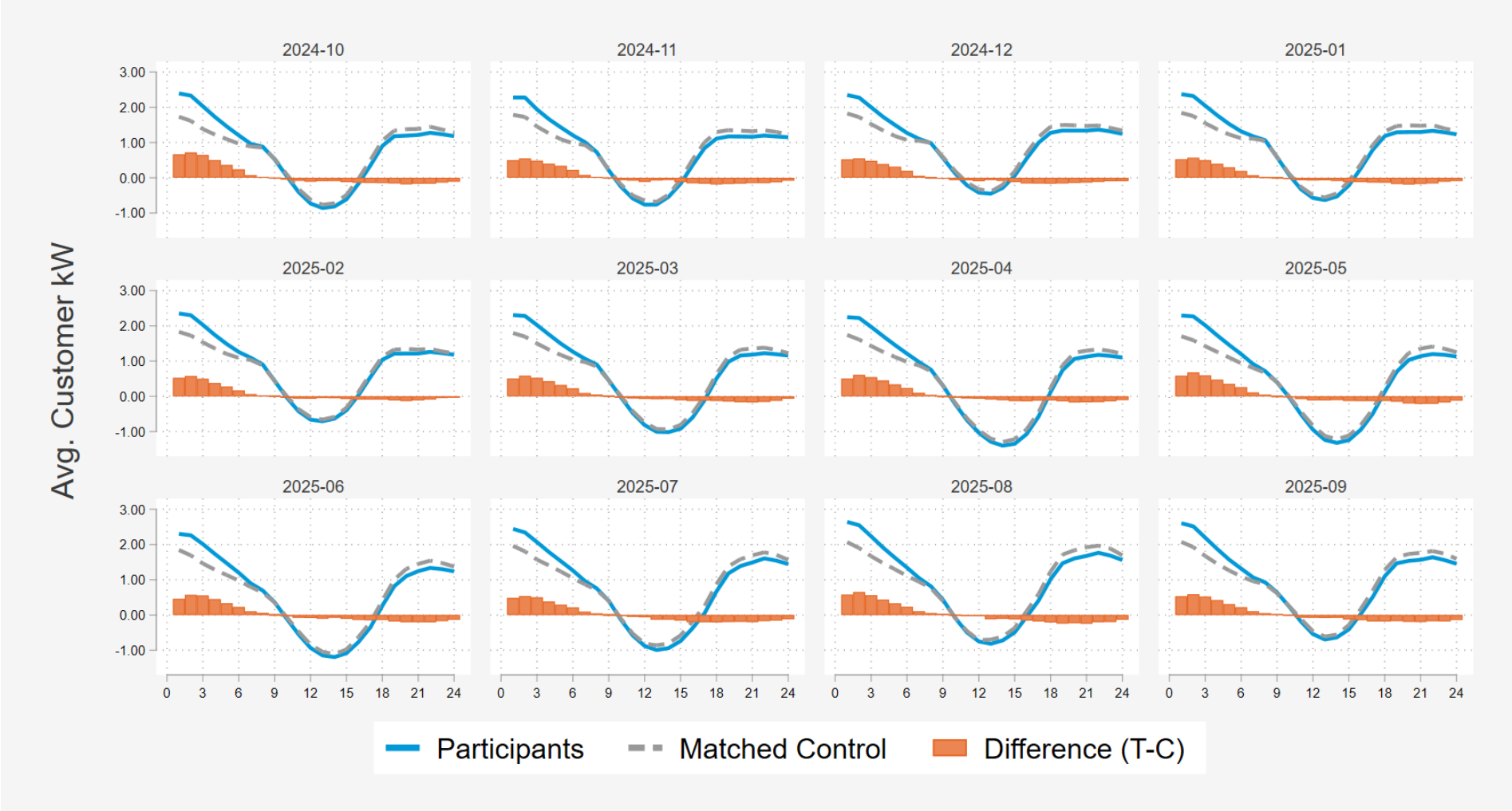
% of Newer Vehicles (3 years or newer)



Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

MONTHLY AVG. DAY EX-POST RESULTS

MONTHLY AVERAGE DAY REDUCTIONS SHOW THE SAME PATTERN BUT ARE MORE STABLE



Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

MONTHLY AVERAGE DAY EX POST PEAK PERIOD REDUCTIONS

Rate Period	Month	Total Accts	Daily avg. temp	Avg. Customers (kW)		Aggregate Incremental (MW)		% Change
				Reference Load	Load Reduction	Reference Load	Load Reduction	
Peak (4-9 PM)	2024-Oct	62,362	66.2	1.13	0.16	26.4	3.8	-14.4%
	2024-Nov	63,765	58.2	1.26	0.17	29.3	3.9	-13.5%
	2024-Dec	65,315	55.2	1.42	0.16	32.7	3.6	-11.0%
	2025-Jan	67,337	54.0	1.34	0.16	30.8	3.8	-12.2%
	2025-Feb	69,396	56.1	1.16	0.11	26.6	2.5	-9.4%
	2025-Mar	71,258	57.0	0.89	0.15	20.5	3.4	-16.4%
	2025-Apr	73,145	59.8	0.64	0.14	14.7	3.3	-22.3%
	2025-May	74,790	62.2	0.67	0.16	15.2	3.8	-24.7%
	2025-Jun	76,336	67.2	0.79	0.18	17.9	4.0	-22.2%
	2025-Jul	77,767	71.5	1.16	0.20	26.2	4.6	-17.4%
	2025-Aug	79,123	73.7	1.46	0.22	32.9	5.0	-15.4%
	2025-Sep	80,440	70.9	1.42	0.19	31.9	4.2	-13.1%