STATEWIDE LOAD IMPACT EVALUATION OF CALIFORNIA CAPACITY BIDDING PROGRAMS

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Energy solutions. Delivered.

AGENDA

- Program Descriptions
- Confidentiality
- Ex-Post Impacts
- Ex-Ante Impacts
- Key Findings

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- M.S. Statistics and B.A. Applied Mathematics
- 10 years in the industry

Program Descriptions

PROGRAM DESCRIPTION
Capacity Bidding Program

Program Basics

- Statewide aggregator-managed DR program
- Offered by PG&E, SCE, and SDG&E
- Operates May-Oct (PG&E and SDG&E) or year-round (SCE)

Participant Eligibility

- Participants must meet eligibility requirements.
- Dual enrollment is allowed in energy-only program with a different notification type.

Capacity Payments

- Participants receive monthly capacity payments based on nominated load + energy payments based on kWh reductions during events.
- Capacity payments may be adjusted based on performance.
- Participants receive the full monthly capacity payment according to their nomination if no events called for that month.

PROGRAM DESCRIPTION
Events & Products – PG&E

Product	Event Duration Options	Operating Hours Options	Price Threshold
Prescribed DA	1-4 Hours 2-6 Hours	11am – 7pm	PG&E sets the CAISO market bid price
Elect DA	1-4 Hours 2-6 Hours 1-8 Hours	11am – 7pm 1pm – 9pm	Aggregator sets the CAISO market bid price
Elect+ DA	1-4 Hours 2-6 Hours 1-24 Hours	11am – 7pm 1pm – 9pm	Aggregator sets the CAISO market bid price

Characteristics Unique to PG&E

- Only day ahead notice is offered.
- Events may be called on non-holiday weekdays during May through October with a maximum of 30 hours per month; Elect+ aggregators can participate in additional hours outside the min. specified hours.
- All participants are enrolled through a third-party aggregator; no participants are direct-enrolled.
- Events are determined by CAISO market awards.

Future Program Changes (effective March 3, 2020)

- Added language specific to Residential participants on prohibited resources and a pilot electronic enrollment process.
- Removed the LSE requirement to qualify as a 100-kW resource.
- Removed operating hours 11am–7pm to better align with the RA window.

PROGRAM DESCRIPTION
Events & Products – SCE

Notice Type	Event Duration	Operating Hours
Day Ahead	1-6 Hours	1pm – 7pm
Day Of	1-6 Hours	1pm – 7pm

Characteristics Unique to SCE

- Events may be called on non-holiday weekdays year-round with a <u>maximum of 30 hours per month</u>.
- Events are determined by CAISO market awards.

Future Program Changes

- Effective January 19, 2020, the dispatch window is set to 3pm – 9pm to better align with the RA window.
- SCE will either be filing for (1) Residential CBP as a pilot-only program or (2) open CBP to Residential.

PROGRAM DESCRIPTION
Events & Products – SDG&E

Notice Type	Event Duration	Operating Hours	Price Threshold	Price Threshold Type
Day Ahead	2-4 Hours	11am – 7pm	$80/MWh	Day-ahead market price
	2-4 Hours	1pm – 9pm	$80/MWh	
Day Of	2-4 Hours	11am – 7pm	$95/MWh	Real time market price
	2-4 Hours	1pm – 9pm	$110/MWh	

Characteristics Unique to SDG&E

- Events may be called on non-holiday weekdays during May through October with a <u>maximum of 24 hours per month</u>.
- Events are triggered when the market price hits the threshold above (appropriate by product) or as utility system conditions warrant.
- Dual enrollment is not allowed unless previously grandfathered in.

Future Program Changes

- SDG&E is proposing updates to price triggers and notification times during the DR mid-cycle 2020.
- Also in mid-cycle 2020, SDG&E plans on filing an advice letter to add on Residential CBP as a pilot.

CONFIDENTIALITY

- A lot of the impacts for PG&E and SCE continue to be confidential.

- Redactions are compliant with the 15/15 Rule *(PUC § 583 D. 14-05-016).*
  - Fewer than 15 customers in a group or subgroup
  - One customer makes up more than 15% of the total load in a group or subgroup

- Information is also redacted if there is only one aggregator in the group or subgroup *(General Order 66-C, Section 2.2(b) D. 06-06-066)*

- The purpose of the redactions is to protect customer and/or aggregator confidentiality.

- SDG&E shows all program level impacts.
  - This is a result of guidance from SDG&E attorneys concluding that program level impacts are not confidential.

Ex-Post Load Impacts

EX POST IMPACTS
Program Dispatch and Event Summary

Utility	Day Ahead			Day Of		
	Number of event days	Hours of Availability	Actual Hours of Use	Number of event days	Hours of Availability	Actual Hours of Use
PG&E	14	180	22	-	-	-
SCE*	21	180	32	24	180	35
SDG&E	22	144	49	16	144	40

*Counts shown for summer months May through October

PG&E
- Events decreased in number compared to 2018.
- Many events were dispatched for a subset of all the Sub-LAPs.

SCE
- Events decreased in number for both DA and DO programs compared to 2018.

SDG&E
- DA events are comparable to 2018.
- DO events increased compared to 2018.

EX POST IMPACTS
Nomination and Participation

Utility	Day Ahead		Day Of	
	Maximum Monthly Nomination Count	**Average Event Participation Count**	**Maximum Monthly Nomination Count**	**Average Event Participation Count**
PG&E	843 (Oct)	241	-	-
SCE*	336 (Sep)	262	204 (Sep)	151
SDG&E	12 (Jul)	15**	185 (May)	185

*Counts shown for summer months May through October

**Average participation counts are calculated at the product level.

Customer retention has improved since the PY2018 program revamping.

PG&E
- Events were dispatched by Sub-LAP, covering 1 – 806 participants.

SCE
- Event participation ranging 79 – 336 (DA) and 30 – 204 (DO)
- Called mostly system-level events; the variation in participation counts is attributed to fluctuations in monthly nomination (caused by CPP defaulting).

SDG&E
- Event participation ranging 2 – 12 (DA) and 90 – 184 (DO)
- Called mostly system-level events; the variation in participation counts is attributed to calling one or both products within each notification type.

EX-POST IMPACTS
Average Summer Event (HE19)

| Utility	Day Ahead			Day Of		
	Aggregate Impact (MW)	Nominated Capacity (MW)	Event Temp (˚F)	Aggregate Impact (MW)	Nominated Capacity (MW)	Event Temp (˚F)
PG&E	**9.8**	**9.2**	85	-	-	
SCE	2.7	3.8	86	*Confidential*		
SDG&E	0.4	0.7	76	**3.6**	**3.6**	77

On average, only <u>PG&E DA</u> and <u>SDG&E DO</u> aggregate impacts met/exceeded nominated capacity.

*Note that the average event day is calculated using all events regardless of participant count and event timing. The results shown are for the common event hour HE19 or 6 PM – 7 PM, which is the hour wherein all events overlap.

EX-POST IMPACTS
PG&E – Day Ahead

|	Date & Time	Accounts	Aggregate Impact (MW)	Event Temp (°F)
Average Event Day	(HE19)	241	9.8 (13%)	85
Highest Impact	7/24/2019 (HE19)	588	21.5 (17%)	91
Utility System Peak	8/15/2019 (HE19)	84	2.1 (3%)	89
CAISO/Statewide System Peak	8/15/2019 (HE18)	84	0.3 (0.4%)	91

PG&E Day Ahead: Average Event Day
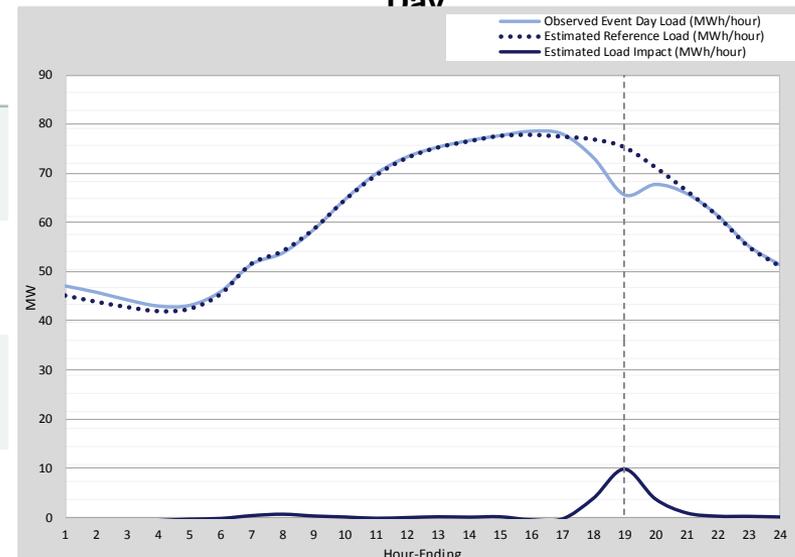
- Average event day includes:
  - 1-14 Sub-LAPs
  - 1-806 Participants
  - Events between 4 pm and 8 pm

- Highest impact achieved was not a system-level event (called 588 participants out of the 726 July nominations)

- PG&E called on only 3 Sub-LAPs during the PG&E and CAISO system peak hours

EX-POST IMPACTS
SCE – Day Ahead & Day Of

	Date & Time	Accounts	Aggregate Impact (MW)	Event Temp (˚F)
Day Ahead				
Average Event Day	(HE19)	262	2.7 (12%)	86
Highest Impact	9/5/2019 (HE17)	336	4.9 (16%)	93
Utility System Peak*	9/4/2019 (HE16)	336	0.6 (2%)	97
CAISO/Statewide System Peak*	8/15/2019 (HE18)	333	0.1 (0.4%)	92
Day Of				
Average Event Day	(HE19)		*Confidential*	
Highest Impact	9/5/2019 (HE17)		*Confidential*	
Utility System Peak*	9/4/2019 (HE16)		*Confidential*	
CAISO/Statewide System Peak*	8/15/2019 (HE18)	159	-0.8 (-6%)	92

* No CBP Event was called.

SCE Day Ahead: Average Event Day

Legend:
- Observed Event Day Load (MWh/hour)
- Estimated Reference Load (MWh/hour)
- Estimated Load Impact (MWh/hour)
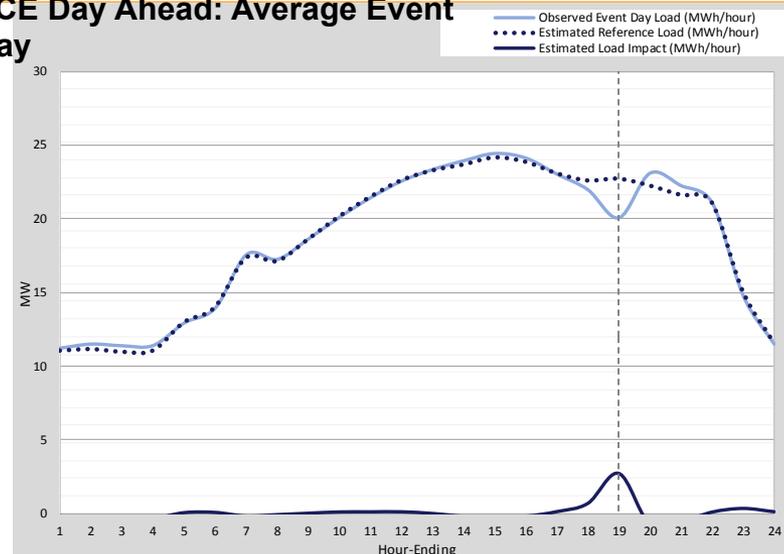
SCE Day Of: Average Event Day *Confidential*

EX-POST IMPACTS
SDG&E – Day Ahead & Day Of

	Date & Time	Accounts	Aggregate Impact (MW)	Event Temp (°F)
Day Ahead				
Average Event Day	(HE19)	15	0.4 (6%)	76
Highest Impact	7/23/2019 (HE18)	12	0.6 (20%)	83
Utility System Peak	9/3/2019 (HE18)		-	
CAISO/Statewide System Peak	8/15/2019 (HE18)	10	0.7 (34%)	80
Day Of				
Average Event Day	(HE19)	185	3.6 (16%)	77
Highest Impact	9/24/2019 (HE19)	184	3.7 (17%)	75
Utility System Peak	9/3/2019 (HE18)		-	
CAISO/Statewide System Peak*	8/15/2019 (HE18)	90	-0.2 (-1%)	76

* No CBP Event was called

SDG&E Day Ahead: Average Event Day
Observed Event Day Load (MWh/hour)
Estimated Reference Load (MWh/hour)
Estimated Load Impact (MWh/hour)

SDG&E Day Of: Average Event Day
Observed Event Day Load (MWh/hour)
Estimated Reference Load (MWh/hour)
Estimated Load Impact (MWh/hour)
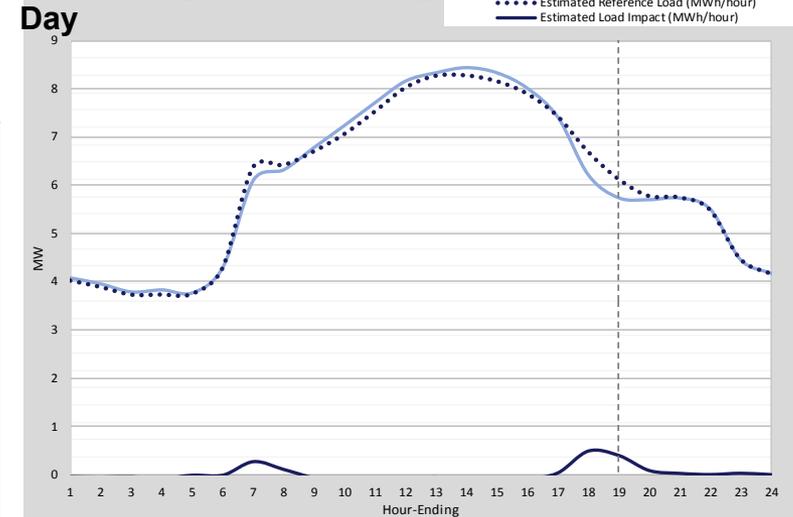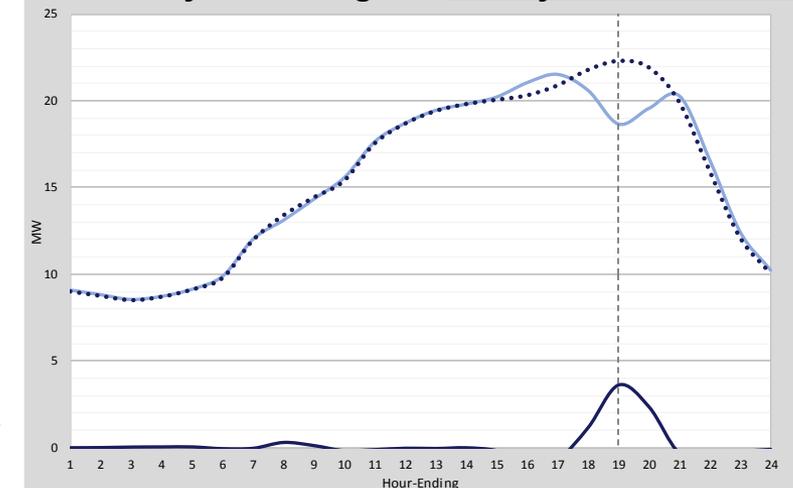
EX-POST IMPACTS
Statewide System Peak Hour – August 15, 2019 (HE18)

Utility	Day Ahead		Day Of	
	Aggregate Impact (MW)	Event Temp (˚F)	Aggregate Impact (MW)	Event Temp (˚F)
PG&E	0.3	91	-	-
SCE	-	-	-	-
SDG&E	0.7	80	-	-

- Only PG&E's and SDG&E's DA programs called events during the CAISO peak hour
- SDG&E's DA program has the highest impact at 0.7 MW

Ex-Ante Load Impacts

EX-ANTE IMPACTS
Methodology

Use customer-specific regression models from ex-post analysis

- Predict per-customer weather-adjusted reference loads for all subgroups; apply Utility and CAISO weather scenarios.
- Predict per-customer impacts using most prevalent event hour called for each customer (HE19)

Use enrollment forecasts from IOUs to forecast aggregate impacts

- Enrollment was derived based on:
  - 2019 ex-post per-customer impacts,
  - Contractual MW, and
  - Historical performance.

EX-ANTE IMPACTS
Enrollment Forecast, Month of August

Number of Service Accounts

Utility	Customer Class	Notice	2019		2020		2021		2022	2023-2040 (each year)
PG&E	Res	DA	-		5,000	+500%	25,000	+220%	55,000	55,000
	Non-Res	DA	797	+88%	1,503	+6%	1,586	+5%	1,670	1,670
SCE	Non-Res	DA	334	+15%	384					384
		DO	203	+15%	233					233
SDG&E	Non-Res	DA	11	+2%	11	+2%	11	+2%	12	12
		DO	182	+3%	188	+3%	191	+3%	195	195

PG&E
- Forecasts considerably growth in enrollment in both residential and non-residential programs.

SCE
- Forecasts a moderate 15% increase in enrollment for CBP DO and DA in 2020, then held constant through the forecast horizon.

SDG&E
- Forecasts CBP DA and DO enrollment will increase 2% and 3% per year (2020-2022), respectively, due to program improvements then held constant starting through the forecast horizon.

EX-ANTE IMPACTS
Comparison of current and previous non-residential forecast

| Utility | Notice | Previous Forecast, 2019 | | Current Forecast, 2020 | |
		Accounts	Aggregate Impact (MW)	Accounts	Aggregate Impact (MW)
PG&E	DA	693	27.9	**1,503**	**36.0**
SCE	DA	90	*Confidential*	**384**	***Confidential***
	DO	800	*Confidential*	**233**	***Confidential***
SDG&E	DA	65	0.2	**11**	**0.2**
	DO	191	2.7	**190**	**3.2**

Results are average RA window impacts for August peak day in 2018; Utility Peak 1-in-2 weather conditions.

PG&E
- MW forecast increase – increased enrollment but lower per-customer impacts

SCE
- (DA) increased enrollment
- (DO) decreased enrollment

SDG&E
- (DA) MW forecast same – decreased enrollment but higher per-customer impacts
- (DO) MW forecast increase – slight decrease in enrollment but higher per-customer impacts

Key Findings

KEY FINDINGS
Event Calling

- For all IOUs, CBP continues to be a **time-targeted DR** program, calling events determined by CAISO market awards.

- **PG&E** still highly utilizes geographically targeted events, calling Sub-LAPs as needed.

- **SCE** and **SDG&E** called more system-level events. The variation in event participation is caused by fluctuations in monthly nominations (SCE) or number of products called in each event (SDG&E).

KEY FINDINGS
Program Success

- Each IOU's product offerings earned <u>mixed results</u> in meeting/exceeding their capacity nominations.

  - **PG&E's DA program is the largest contributor** and, also, successfully exceeded its average nominated capacity.

  - SCE's CBP programs did not succeed in meeting its nominated capacity, on average, attributed to aggregators struggling with deliveries through the course of the PY.

  - **SDG&E's DO program successfully met its nominated capacity**, on average. The DA program delivered consistent results but was not able to meet nominations.

KEY FINDINGS
Customer Retention

- Customer retention has improved since the PY2018 program revamping.

  - This suggests that aggregators and participants have adjusted to majority of the program changes

  - PG&E's monthly nominations picked up through the 2019 season, starting at 427 participants with 18.6 MW in May and ending at 843 participants with 27.5 in October.

  - SCE also successfully retained PY2018 customers, with the drop in mid-year nominations attributed to the Critical Peak Pricing rate defaulting and the CPP opt-out process required to re-enroll back into CBP.

  - SDG&E also exhibited participant retention from PY2018, with small growth in the DA program (6 participants in October 2018 to 10-12 participants in 2019).

Questions?

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