2016 Statewide BIP Load Impact Evaluation

DRMEC Spring 2017 Load Impacts Evaluation Workshop

Prepared by:
Candice Potter
Adriana Ciccone
May 8, 2017

◊ Nexant
Reimagine tomorrow.

◊ Nexant

Agenda

- Program overview
- Methodology
- Ex post results by utility
- Ex ante results by utility

ᗧ Nexant

BIP is a statewide emergency demand response program

- BIP is the Base Interruptible Program – an emergency demand response program offered by all three electric IOUs

- BIP is tariff-based and is activated by the IOUs in the event of a CAISO or local system emergency

- Participants receive incentive payments in return for their obligation to reduce electricity usage to a certain level – the Firm Service Level – when BIP events are called

- Participants who fail to reduce load down to or below their FSL are subject to a financial penalty assessed on a per kWh basis

2

ᗧ Nexant
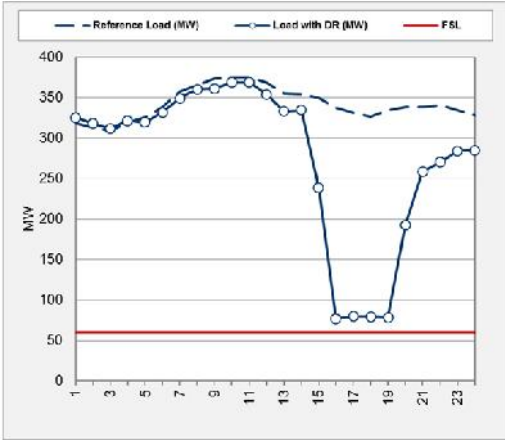
BIP as implemented across the three electric IOUs

- Available to both IOU customers and aggregators

- Participation requires a minimum load drop of 100 kW, where the load drop is at least 15% of maximum demand

- PG&E and SDG&E provide at least 30 minutes' notice of events, SCE has an option for 15-minute notification

- The maximum event length at PG&E and SDG&E is 4 hours and 6 hours at SCE

- All BIP tariffs provide for at least one annual test event where penalties can apply

- Incentives and penalties can vary by size of load drop, service voltage and season

Example participant receiving service at 2 kV that drops 500 kW with 30-minute notice during a summer event

| Incentive/Penalty	PG&E	SCE	SDG&E
Monthly Incentive (per kW per month)	$8.00	$21.09	$12.00
Excess Energy Charge (per kWh)	$6.00	$13.98	$7.80

3

Our methodology choice is informed by the combination of program and customer characteristics unique to BIP

- Reference loads are modeled using individual customer regressions and out-of-sample testing

- BIP customers are typically very large and have complex industrial business processes
  - Baselines would be a poor choice for many BIP customers with business processes that depend on month and day of week.
  - Targeting the hottest days out of the recent past is also a poor choice because BIP participants' load is not very weather sensitive

- BIP event-like days aren't hard to find
  - Unlike a program like CPP where event days are special, there are many days of the year available to inform what BIP participants' load would have been on event day. Within-subjects analysis such as individual customer regressions can perform well is this case

- But BIP-like customers could be hard to find
  - Selecting a control group for this DR program that includes some of the biggest customers in each IOU's service territory would be difficult

4

## PG&E's system-wide test event was called on July 26th from 3 to 7PM

- 247 customers were enrolled in the BIP program at PG&E on the event day

- PG&E's BIP customers delivered 253.8MW of load reduction

- On average PG&E BIP customers achieved 93% FSL compliance

- The program was not called on PG&E's system peak day (7/27) or on the CAISO peak day (7/27), so no impacts were observed during those events

5

3

Nexant
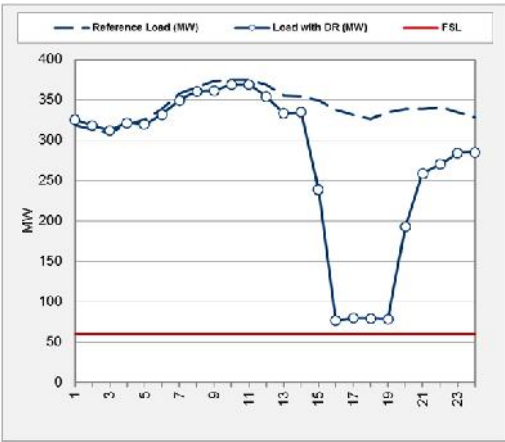
SCE's test event was on October 19th from 1 to 4PM

- 593 customers were enrolled on BIP on the event day

- SCE's BIP customers delivered 627.5MW of load reduction during the full 3 hours of the test event
  - Impacts for hour ending 14 include time during which customers were being notified (either the 15 or 30 minute notification option)
  - Excluding the first hour, customers provided 662.2MW of load drop

- On average SCE BIP customers achieved 87.2% FSL compliance (or 93% in hours 2-4PM)

- Program was not called on the utility or CAISO system peak day

6

Nexant
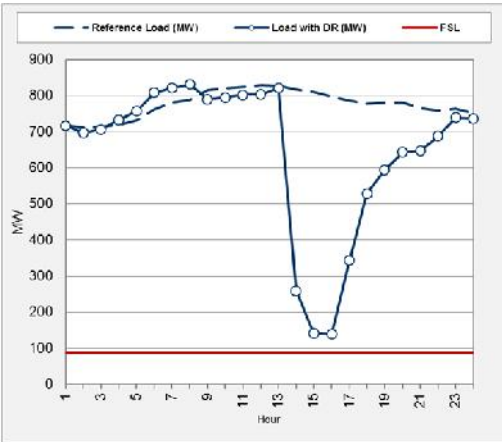
SDG&E's test event was on September 26 from 1 to 5 PM
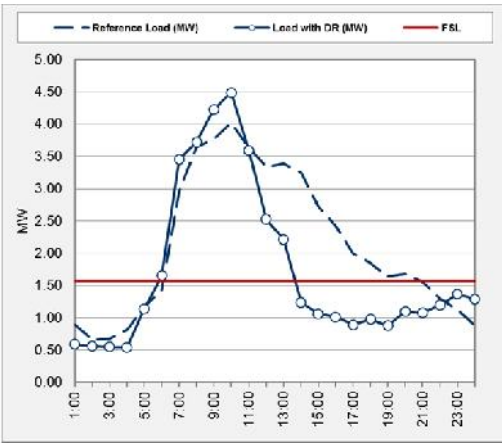
- SDG&E's BIP customers delivered 1.5 MW of load reduction

- On average SDG&E BIP customers achieved 151% FSL compliance

- Aggregate impacts for the utility system peak (9/26 in hour ending 6PM) were 0.9MW
  - BIP was dispatched only until 5PM, but statistically significant impacts persisted after the event

- Event was not called on the CAISO system peak day

7

Ex ante estimation requires estimating over/under performance relative to the FSL

- Most DR programs require applying ex post load impacts to reference load predicted for ex ante weather conditions
  - Two years of data used to estimate reference loads (one for SCE, which out-of-sample testing revealed to be more accurate)
- For BIP, we must apply performance relative to the FSL to ex ante reference load
- We calculate FSL performance at the industry level separately for each IOU

8
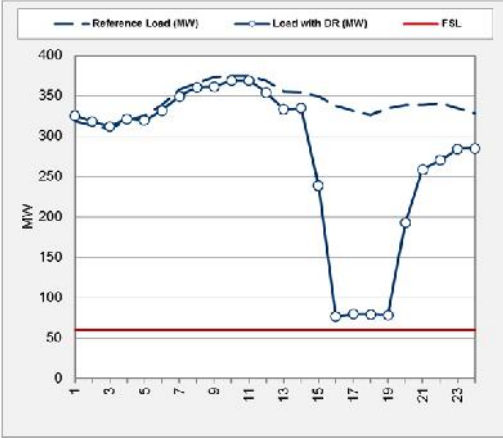
BIP is forecast to deliver 971 MW of load impact for a 1-in-2 weather August system peak day in 2018

- Ex ante aggregate impacts are driven primarily by forecasted customer enrollment
  - PG&E forecast is flat, SDG&E assumes an increase of one customer per year from 2018-2022, plus one large customer's enrollment in 2018. SCE assumes an increase in 2017 compared to 2016 due to the enrollment of 50 aggregated customers, but a slight decline over time
- Customers are not particularly weather sensitive
- SCE, with 64% of BIP customers, contributes to 68-69% of aggregate impacts

Ex Ante Enrollment			
Forecast Year	PG&E	SCE	SDG&E
2016 Ex Post	247	593	7
2017	330	630	6
2018	330	619	8
2019	330	607	9
2020	330	596	10
2021	330	585	11
2022	330	575	12
2023	330	575	12
2024	330	575	12
2025	330	575	12
2026	330	575	12
2027	330	575	12

Weather Year	Day Type	Peak Period	2017	2018	2027
PG&E 1-in-2	August Peak	1 to 6 PM	300.1	300.1	300.1
PG&E 1-in-10	August Peak	1 to 6 PM	300.1	300.1	300.1

Weather Year	Day Type	Peak Period	2017	2018	2027
SCE 1-in-2	August Peak	1 to 6 PM	670.6	665.0	609.3
SCE 1-in-10	August Peak	1 to 6 PM	684.2	672.4	616.2

Weather Year	Day Type	Peak Period	2017	2018	2027
SDG&E 1-in-2	August Peak	1 to 6 PM	0.7	6.1	6.5
SDG&E 1-in-10	August Peak	1 to 6 PM	0.7	6.0	6.3

9

ↄ Nexant

BIP ex post and ex ante impacts enjoy a direct connection

Result Type	Weather Year / Date	Number of Customers	FSL (kW)	Reference Load (kW)	Performance (%)	Agg. Load Reduction (MW)	Daily Total CDH
Ex Ante (2018)	PG&E 1-in-2, July Monthly Peak	330	265.1	1,139.4	100%	290.0	346
Ex Ante (2018)	PG&E 1-in-10, July Monthly Peak	330	265.1	1,139.4	100%	290.0	346
Ex Post (2016)	7/26/2016	217	242.6	1,346.6	93%	253.8	289

Result Type	Weather Year / Date	Number of Customers	FSL (kW)	Reference Load (kW)	Performance (%)	Agg. Load Reduction (MW)	Daily Total CDH
Ex Ante (2018)	SCE 1-in-2, October Monthly Peak	617	108.3	1,351.5	90%	654.7	174
Ex Ante (2018)	SCE 1-in-10, October Monthly Peak	617	108.3	1,363.8	90%	661.5	213
Ex Post (2016)	10/19/2016	595	148.1	1,361.6	92%	627.5	162

| Result Type	Weather Year / Date	Number of Customers	FSL (kW)	Reference Load (kW)	Performance (%)	Agg. Load Reduction (MW)	Daily Total CDH
Ex Ante (2018)	SDG&E 1 in 2, September Monthly Peak	8	405.8	758.2	93%	2.8	220
Ex Ante (2018)	SDG&E 1 in 10, September Monthly Peak	8	405.8	738.2	93%	2.6	370
ExPost (2016)	9/26/2016	7	225.1	371.4	151%	1.5	341

10

ↄ Nexant

Customer mix, enrollment and FSL compliance drive the differences between 2015 and 2016 ex ante estimates for 1-in-2 utility weather impact estimates 2018

Utility	Weather Year	Enrolled	Per-Customer Reference Load (kW)	Aggregate Reference Load (MW)	FSL Compliance	Aggregate Impact	% Impact
PG&E	2016 Ex Ante	330	1171.5	386.6	100.3%	300.1	77.6%
	2015 Ex Ante	208	1458.2	303.3	100.6%	255.1	84.1%

Utility	Weather Year	Enrolled	Per-Customer Reference Load (kW)	Aggregate Reference Load (MW)	FSL Compliance	Aggregate Impact	% Impact
SCE	2016 Ex Ante	619	1306.5	808.7	89.6%	665.0	80.3%
	2015 Ex Ante	544	1436.2	781.3	91.1%	637.0	81.5%

Utility	Weather Year	Enrolled	Per-Customer Reference Load (kW)	Aggregate Reference Load (MW)	FSL Compliance	Aggregate Impact	% Impact
SDG&E	2016 Ex Ante	8	1150.0	9.2	102.0%	6.1	66.3%
	2015 Ex Ante	7	471.4	3.3	107.0%	1.4	42.7%

11

Nexant
Reimagine tomorrow.
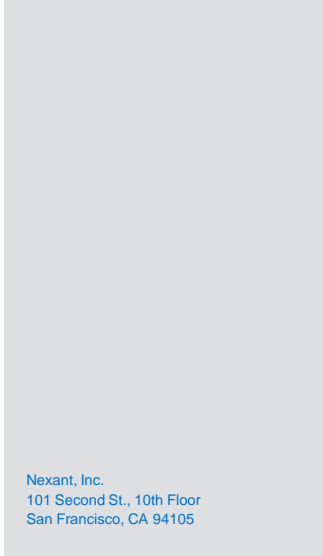
For comments or questions, contact:

Candice Potter
Managing Consultant
cpotter@nexant.com

Adriana Ciccone
Consultant
aciccone@nexant.com

Nexant, Inc.
101 Second St., 10th Floor
San Francisco, CA 94105

12