2017 SDG&E Residential SCTD Evaluation

5/4/2018

PROGRAM OVERVIEW - SCTD

» Free programmable communicating thermostats (PCTs) with DR-enabling technology

- Began in 2014

» Bring Your Own Thermostat (BYOT)

- Began in December 2016

- $75 total incentive

- Nest or ecobee thermostat

» Dual enrollment in PTR program encouraged, but not required in order to receive DR incentive ($1.25/kWh)

» 2 p.m. – 6 p.m.

» 4 degree thermostat setback only

Hours of Availability	Hours of Actual Use	No. of Available Dispatches	No. of Actual Dispatches
Maximum Event Length of 4 Hours	12 hours	No Maximum	3 times

METHODOLOGY

» Compared participant and reference hourly residential loads

» Reference loads calculated from matched control groups of non-program participants

» Control groups selected via Stratified Propensity Score Matching

  • One stage of matching using interval data

» Logistic regression model to estimate probability of participation
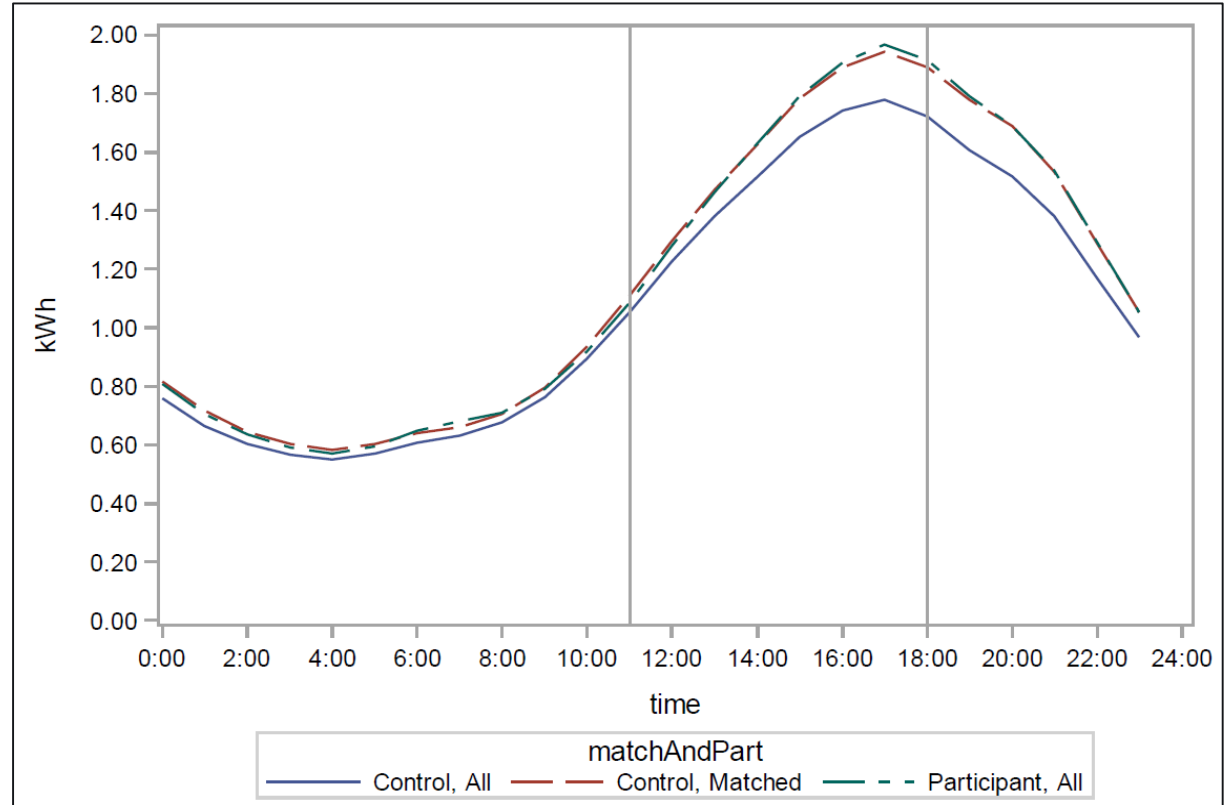
METHODOLOGY

» Impact models based on aggregate hourly residential loads for opt-in alert groups and matched controls

» Final model specifications included variables for hour, day of the week, month, cooling degree hours (CDH65), event indicators, enrollment status, and dummy variables for event days

$$
\begin{aligned}
kWh_t = \beta_0 &+ \sum_d \beta_1^d \times DOW_d + \sum_m \beta_2^m \times Month_m + \sum_h \beta_3^h \times Hour_h \\
&+ \sum_d \sum_h \beta_4^{h,d} \times Hour_h \times DOW_d + \sum_m \sum_h \beta_5^{h,m} \times Hour_h \times Month_m + \beta_6 \\
&\times CDH65 + \sum_h \beta_7^h \times Hour_h \times CDH65_h + \sum_{e=1,2,3} \sum_h \beta_{8,e}^h \times Hour_h \times Event_e \\
&+ \sum_{e=1,2,3} \sum_h \beta_{9,e}^h \times Hour_h \times Event_e \times InactivePart \\
&+ \sum_{e=1,2,3} \sum_h \beta_{10,e}^h \times Hour_h \times Event_e \times ActivePart + \varepsilon_t
\end{aligned}
$$

RESULTS – SCTD

Event Date	Mean Active Participants	Mean Reference Load (kW)	Mean Observed Load (kW)	Mean Impact (kW)	% Load Reduction	Aggregate Load Reduction (MW)	Mean °F
Thursday, August 31st, 2017	17,588	1.87	1.26	0.61	32.8%	10.79	91.1
Friday, September 1st, 2017	17,645	2.22	1.60	0.62	27.8%	10.87	96.0
Saturday, September 2nd, 2017*	12,948	2.44	2.06	0.38	15.7%	4.98	95.1
Average 2017 Event**	**17,617**	**2.05**	**1.43**	**0.62**	**30.1%**	**10.84**	**93.6**

* One BYOT contractor did not signal this event.

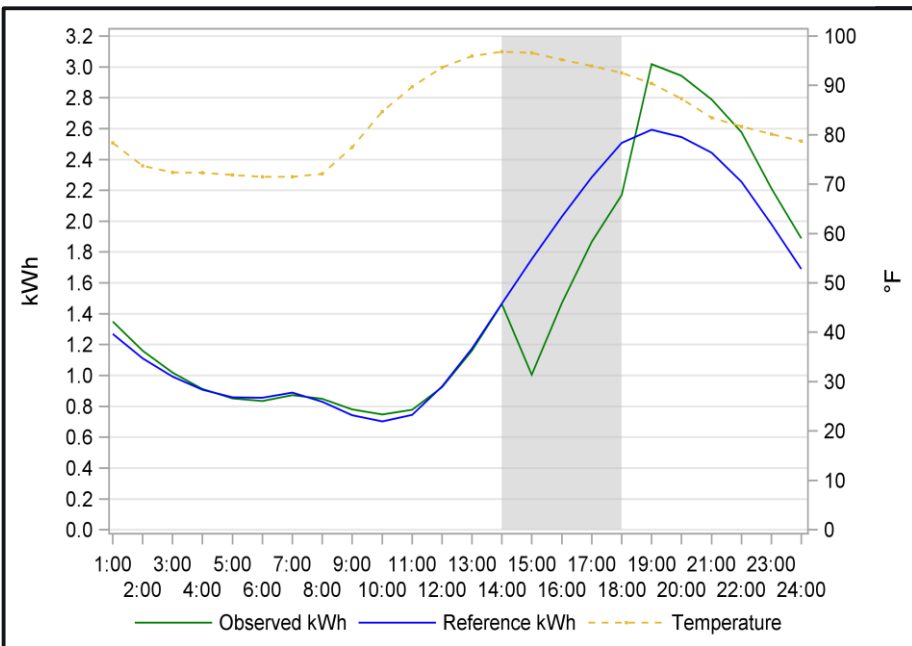**An average of 2017 weekday events only.

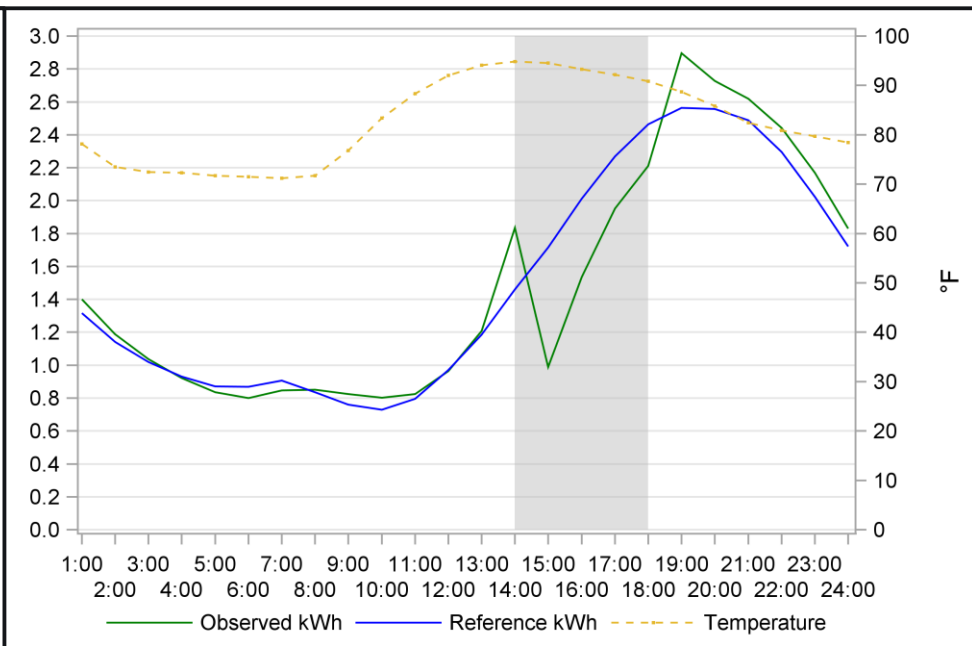# RESULTS – SCTD
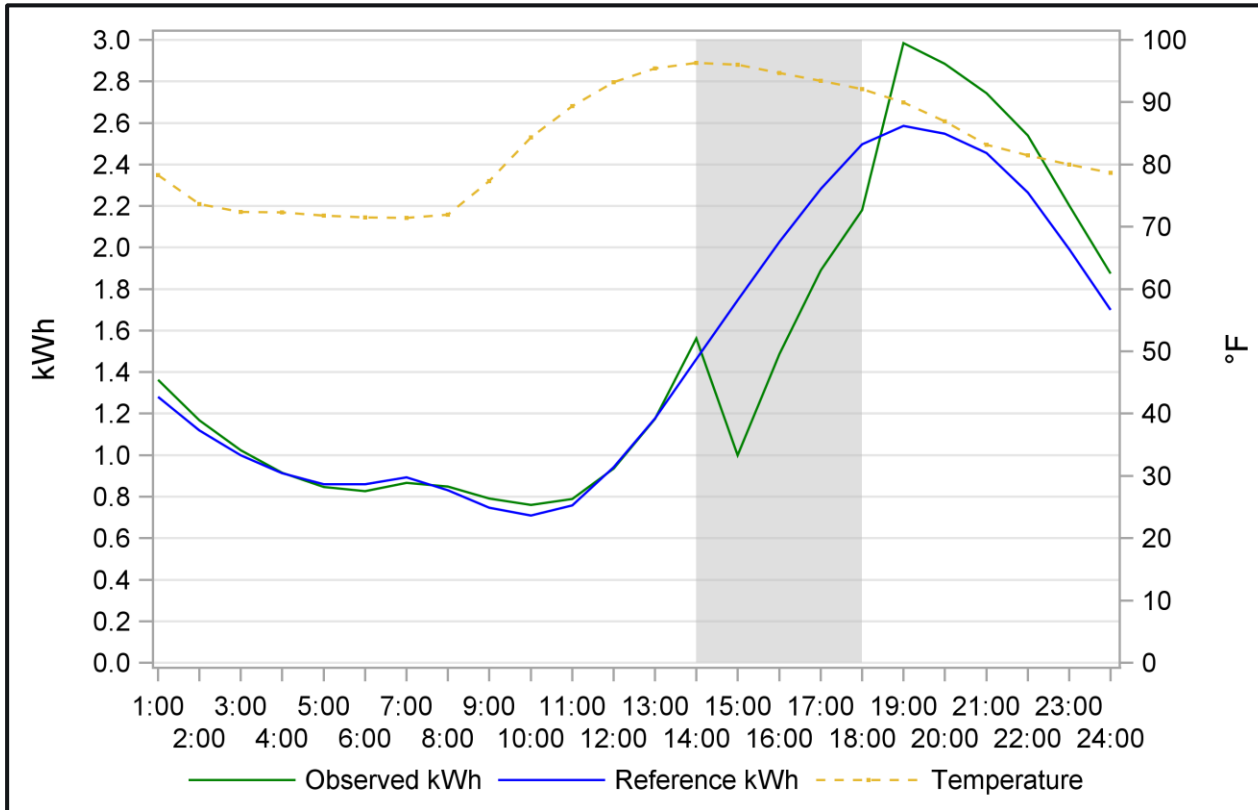
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Average
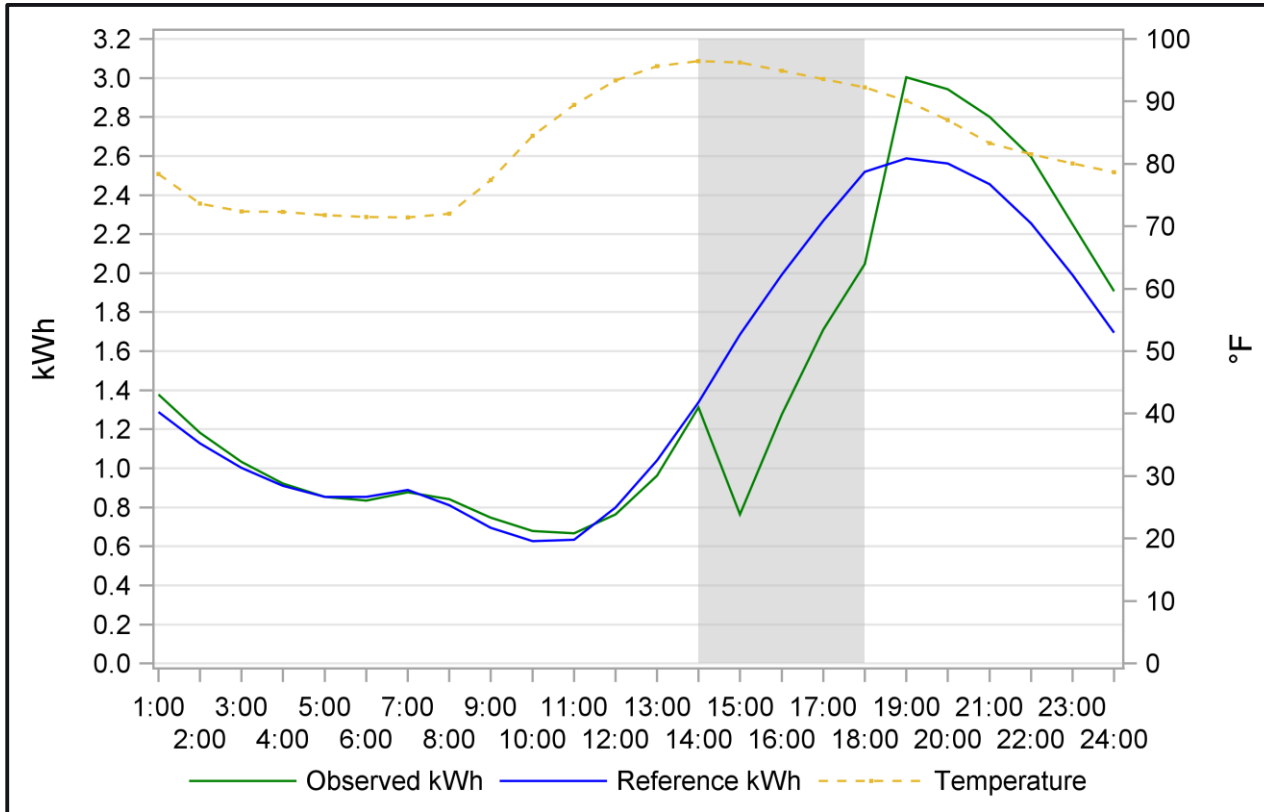
RESULTS – SCTD BY THERMOSTAT SOURCE

Free Thermostats — BYOTs

RESULTS – SCTD DUALLY ENROLLED IN PTR

2017 Average

8,179 participants

SCTD
0.67 kW
(31.5%)

PTR
0.05 kW
(4.5%)

# EX ANTE METHODOLOGY

» Data sources

- 2017 ex post regression model results

- 10-year enrollment forecast

- SDG&E and CAISO weather scenarios

1. Calculate per participant average reference loads, observed loads, and load impacts

2. Combine results for the different weather scenarios with forecast of enrolled participants to generate the total program impacts

EX ANTE ENROLLMENT FORECAST
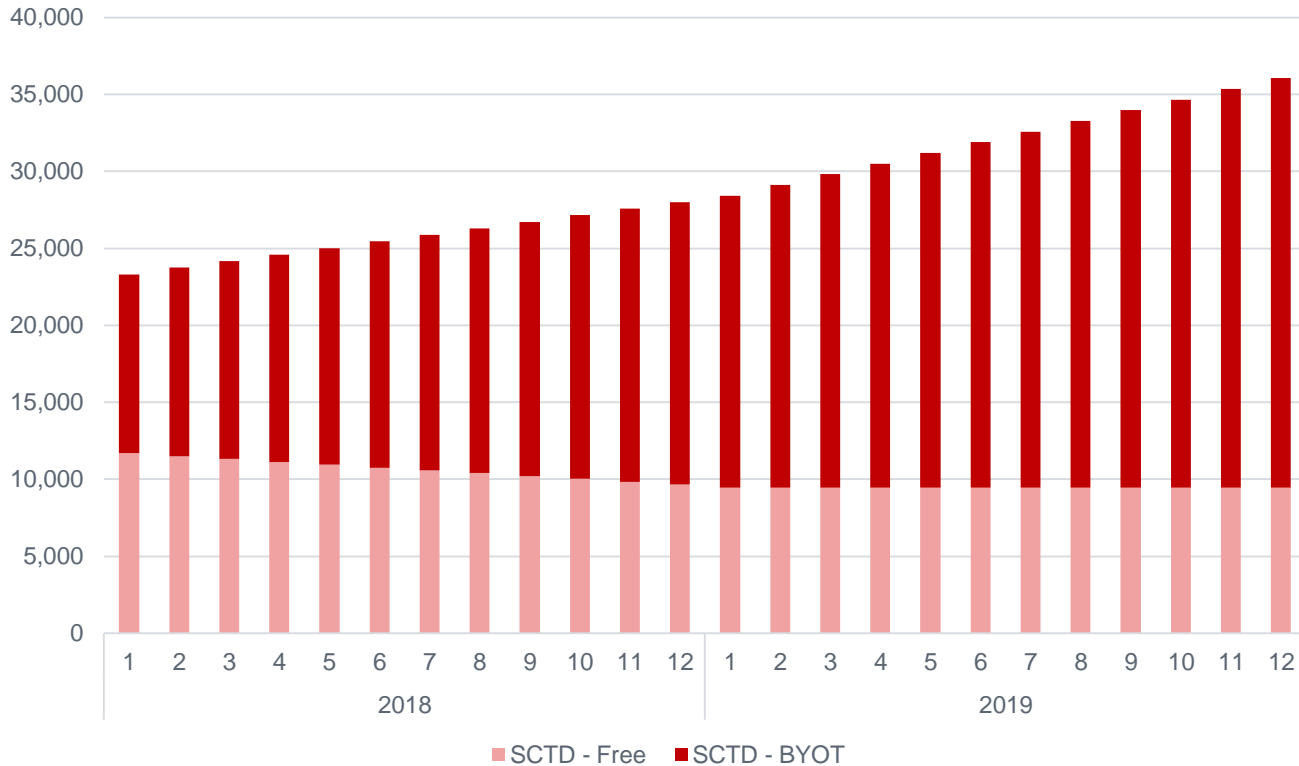
EX ANTE – SCTD

Control Strategy	Day / Type	Month	1-in-2					
			Avg. Hourly Reference Load (kWh)	Avg. Hourly Observed Load (kWh)	Avg. Hourly Impact (kWh)	Percent Load Reduction	Enrollment Forecast	Avg. Total Hourly Impact (MWh)
BYOT	Typical Event Day	Aug 2018	1.86	1.22	0.65	34.8%	6,949	4.5
		Aug 2027	1.89	1.29	0.60	31.2%	18,479	11.1
Free	Typical Event Day	Aug 2018	1.81	1.34	0.47	25.8%	19,355	9.1
		Aug 2027	1.83	1.45	0.38	20.8%	37,909	14.4
All	Typical Event Day	Aug 2018	1.82	1.31	0.52	28.3%	26,304	13.6
		Aug 2027	1.85	1.40	0.45	24.3%	56,388	25.4

EX ANTE / EX POST COMPARISON – SCTD

Participant Segment	Control Strategy	Weather Year	Day / Type	Average Hourly Reference Load (kW)	Average Hourly Observed Load (kW)	Average Hourly Impact (kW)	Percent Load Reduction	Average °F
SCTD - All	BYOT	1-In-2	August System Peak Day	2.01	1.34	0.67	33.4%	88.9
		Ex Post	Ex Post Average Event Day	2.36	1.67	0.69	29.2%	92.7
	Free	1-In-2	August System Peak Day	1.98	1.49	0.49	24.7%	90.8
		Ex Post	Ex Post Average Event Day	2.15	1.63	0.52	24.2%	94.6
	ALL	1-In-2	August System Peak Day	1.99	1.45	0.54	27.1%	90.3
		Ex Post	Ex Post Average Event Day	2.18	1.64	0.54	24.7%	93.6

THANK YOU

Itron