

Southern California Edison's Charge Ready Demand Response Pilot

October 2nd, 2019

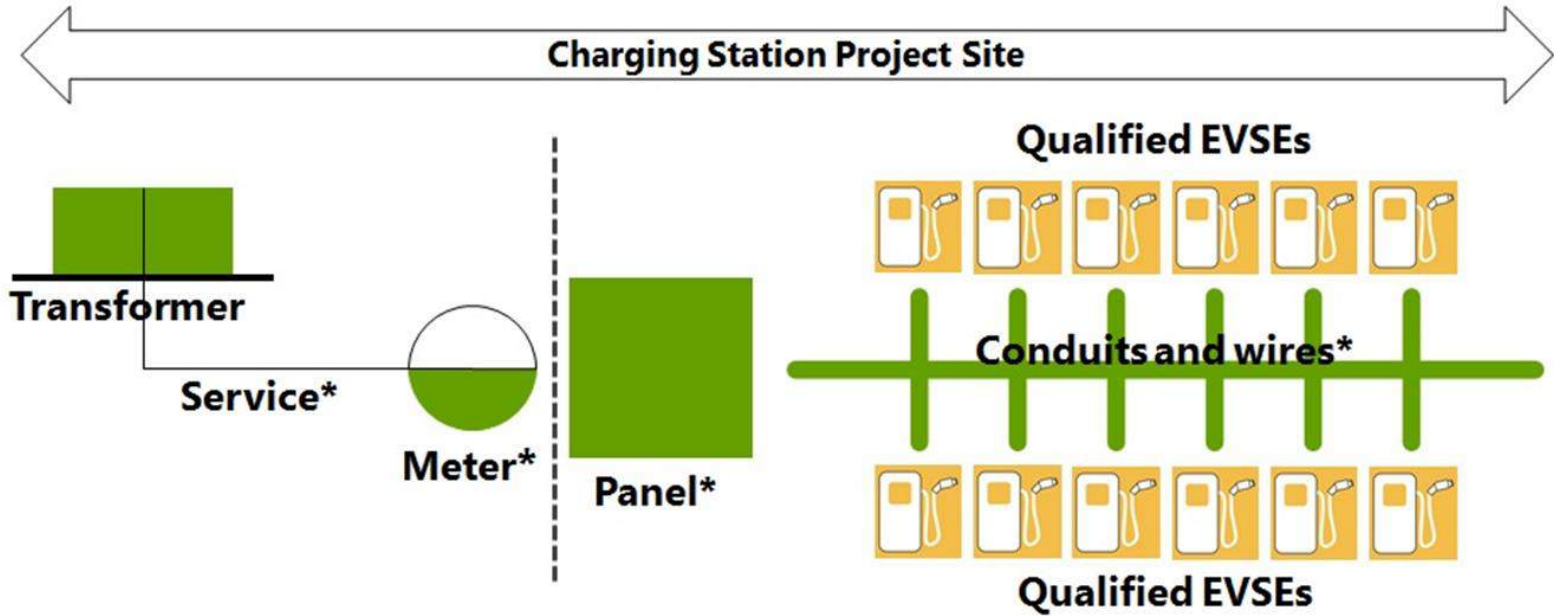
Carl Besaw

Senior Project Manager

SCE Charge Ready

- \$22 million pilot project that seeks to accelerate the installation of Electric Vehicle (EV) charging stations for non-residential customers
- Install up to 1,500 EV Level 1 or 2 charge ports (EVSEs) in four different long dwell segments: Workplaces, Destination Centers, Fleets, Multi-Unit Dwellings
- SCE will install and maintain the supporting electrical infrastructure at no cost to participants
- Program participants, or site hosts, will receive rebates to purchase chargers and will own operate and maintain them

Charge Ready Infrastructure



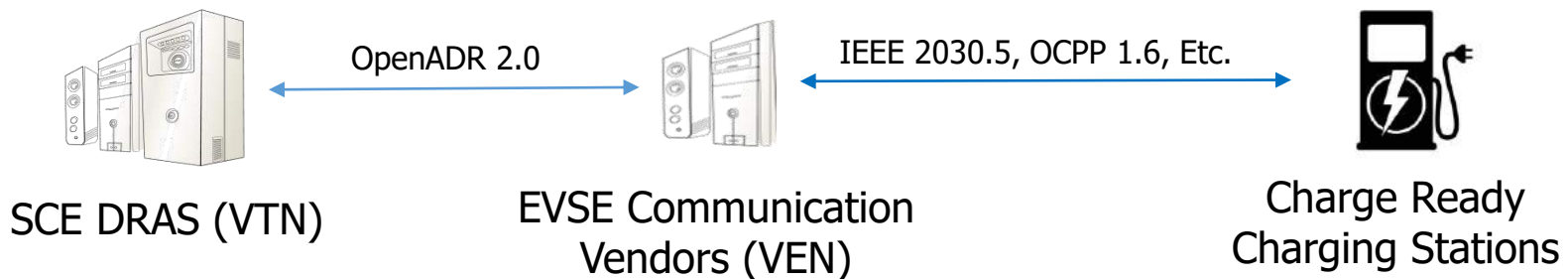
*Service drop, meter, panel, and circuit dedicated to EV charging

■ Infrastructure deployed by SCE (all costs covered by the Program)

■ Owned and operated by participating customers (rebate against hardware and installation costs)

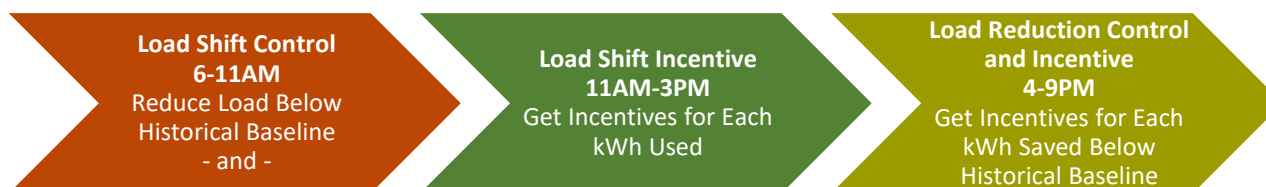
OpenADR in Charge Ready

- OpenADR 2.0 required for participation in Charge Ready
- Event parameters scheduled day ahead
- Five EVSE Communication Vendors currently participating in pilot
- Load Control signals call for 50% reduction



CR DR Pilot Design

Load Shift and Reduction Timeline



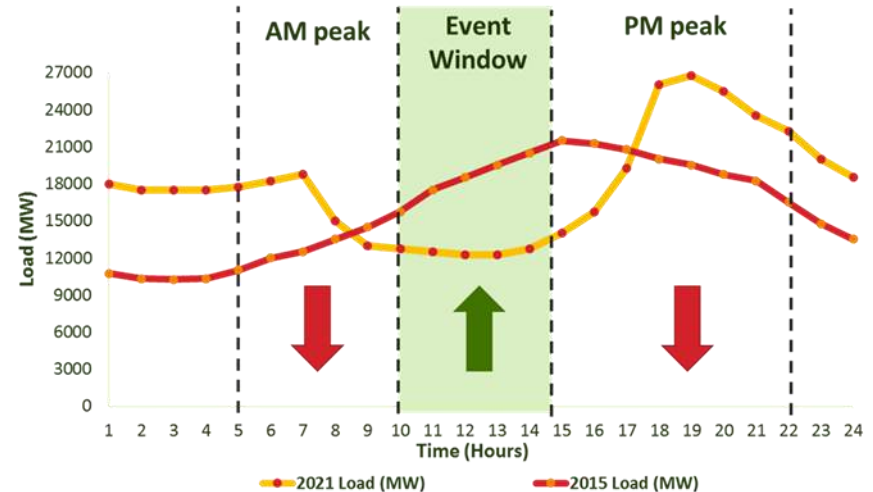
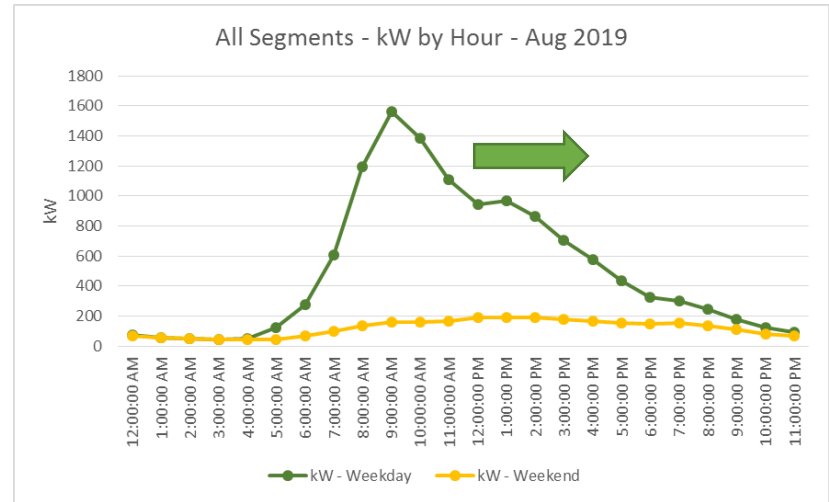
Load Shift and Reduction Details

	Load Reduction	Load Shift
Incentive Period	4 PM to 9 PM M-F, except holidays	11 AM to 3 PM M-F, except holidays
Control and Baseline Period	4 PM to 9 PM	6 AM to 11 AM
Months	June through September	March through May and October through December
Number of events per day	Single one-to-five hour control event	Single one-to-five hour control event
Number of events	Up to 10 each year	Up to 10 each year
Shift or Reduction	Up to 50%	Up to 50%
Credits	\$0.10 per kWh reduced during Control/Incentive Periods	\$0.05 per kWh used during the Incentive Period
Notification	Day ahead	Day ahead

These parameters could change at any time during the pilot - for the latest information please see the Charge Ready DR Pilot tariff at: <https://www.sce.com/NR/sc3/tm2/pdf/ce397.pdf>

Charge Ready DR – Load Shifting

- The average weekday load shape for sites participating in Charge Ready peaks at 9am.
- During a load shift event the goal is to move or shift that usage to later in the day when more renewable generation is available (shown by the green arrows)
- In addition to offering incentives for increasing load between 11am and 3pm, control signals are sent to charging stations to reduce their charging capacity during morning hours in an attempt to shift that charging into the 11am to 3pm load shift event window

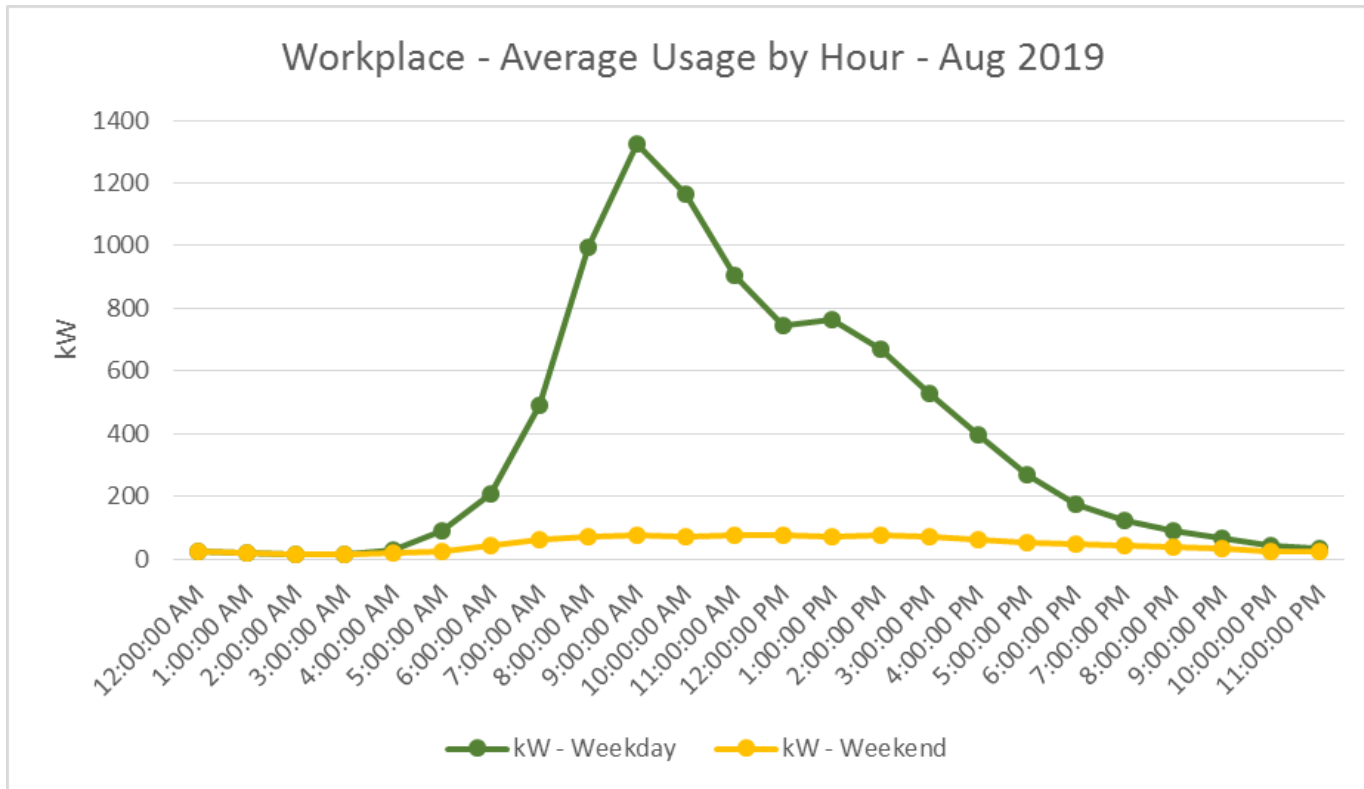


Data Collection & Analysis: Workplace (42 Sites/767 Ports)

Usage peaks at 9am then drops off dramatically by 2pm and continues to taper off. Negligible weekend use



Could be leveraged to shift morning load to times of high renewable generation

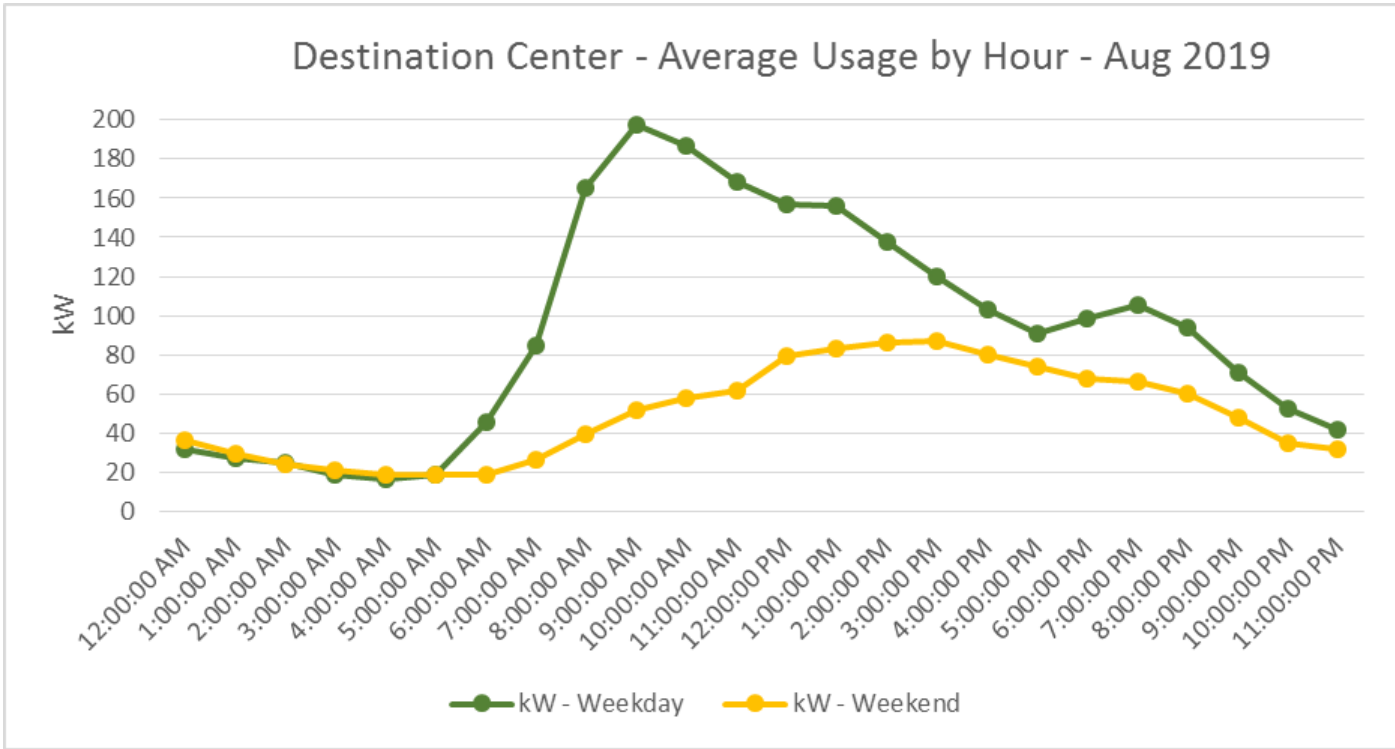


Data Collection & Analysis: Destination Center (24 Sites/262 Ports)

Usage peaks at 9am on weekdays, but shows consistent use into the evening on weekdays and weekends



Could be leveraged for both shifting morning load and reducing evening peaks

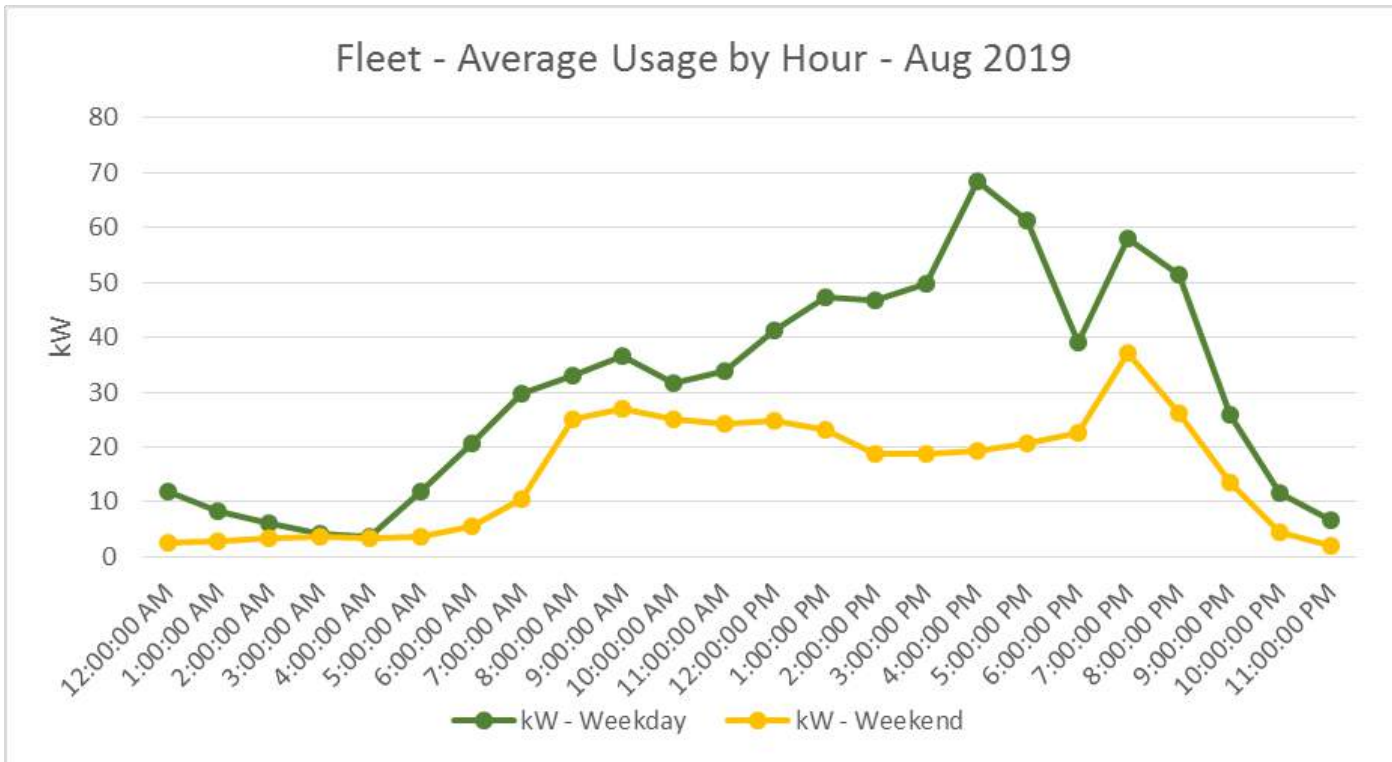


Data Collection & Analysis: Fleet (8 Sites/118 Ports)

Usage peaks at 4pm on weekdays, significant load available in afternoon and evening hours



Could be leveraged for evening ramp down on weekdays

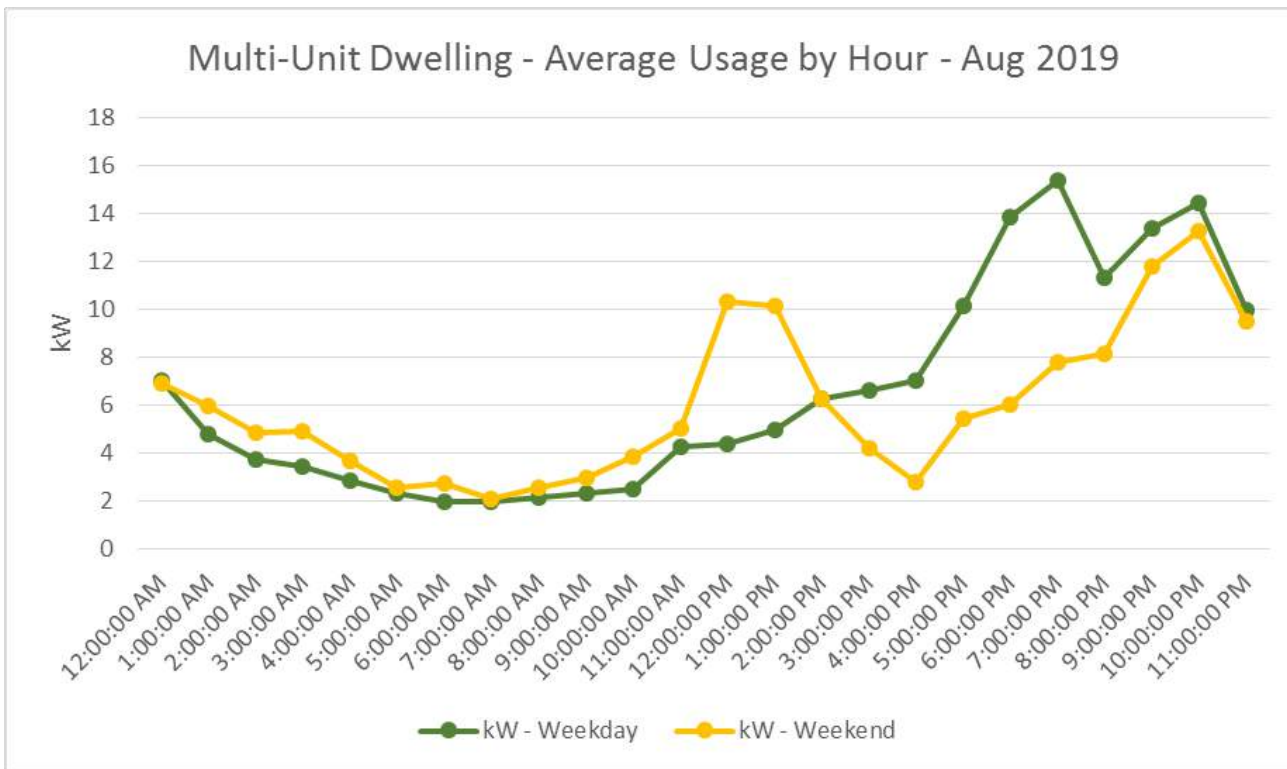


Data Collection & Analysis: Multi-Unit Dwelling (3 Sites/35 Ports)

Usage peaks at 7pm on weekdays. Weekday/weekend load primarily during evenings



Evening load available to reduce weekday evening ramp



2018 Load Shift Events

- Control Period from 6am – 11am
- AM load reduced by approximately 17% to 24%
- No load shift to increase load from 11am – 3pm
- Load decreased from 11am – 3pm
- Control Period may have been too long, allowing vehicles to fully charge even with a 50% reduction in charging capacity

Event Date	Sites	Ports	Control Period 6am-11am			Incentive Period 11am-3pm			Compared to Baseline		Event Day
			Baseline	Event	Reduction	Baseline	Event	Shift	% Reduction	% Shift	% Shift
10/16/2019	68	1020	4023	3357	666	2919	2626	-293	16.55%	-10.04%	-43.99%
10/30/2018	68	1020	4107	3250	857	2959	2706	-253	20.87%	-8.55%	-29.52%
11/14/2018	68	1020	4090	3124	966	2639	2603	-36	23.62%	-1.36%	-3.73%
11/28/2018	68	1020	4104	3417	687	2839	2699	-140	16.74%	-4.93%	-20.38%

2019 Load Shift Events

- Control Period from 9am – 11am
- AM load reduced by approximately 19% to 35%
- Load shift of approximately 1% to 8%
- Approximately 5% to 36% of load reduced during the event control period shifted to the event incentive period
- Shorter control periods contributed to load shifting
- Additional testing and analysis is ongoing

Event Date	Sites	Ports	Control Period 9am-11am			Incentive Period 11am-3pm			Compared to Baseline		Event Day
			Baseline	Event	Reduction	Baseline	Event	Shift	% Reduction	% Shift	% Shift
3/28/2019	69	1038	2670	2165	505	2879	3057	178	18.91%	6.18%	35.25%
4/11/2019	70	1057	2530	1929	601	2769	2986	217	23.75%	7.84%	36.11%
4/18/2019	70	1057	2673	1967	706	3000	3033	33	26.41%	1.10%	4.67%
4/25/2019	70	1057	2675	1734	941	3065	3189	124	35.18%	4.05%	13.18%
5/20/2019	70	1057	2830	1966	864	3488	3717	229	30.53%	6.57%	26.50%
5/31/2019	70	1057	2766	1889	877	3221	3267	46	31.71%	1.43%	5.25%

2019 Load Reduction Events

- Control and Incentive Period from 4pm – 9pm
- Load reduced by approximately 16% to 23%
- Some sites reporting no load were excluded from the calculation
- Additional testing and analysis is ongoing

Date	Sites	Ports	Baseline	Event	Reduction	Avg Reduction per Site	Avg Reduction per Port	Total % Reduction
8/14/2019	62	948	1899	1602	297	4.79	0.31	15.64%
8/29/2019	61	942	2301	1775	526	8.62	0.56	22.86%