CPUC Advanced Rate Design Forum

Designing and Implementation of Real-Time Pricing and Other Advanced Dynamic Rates

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Energy for What's Ahead℠

SOUTHERN CALIFORNIA EDISON®

SCE's RTP Customers Load Profile And Price Response

Program

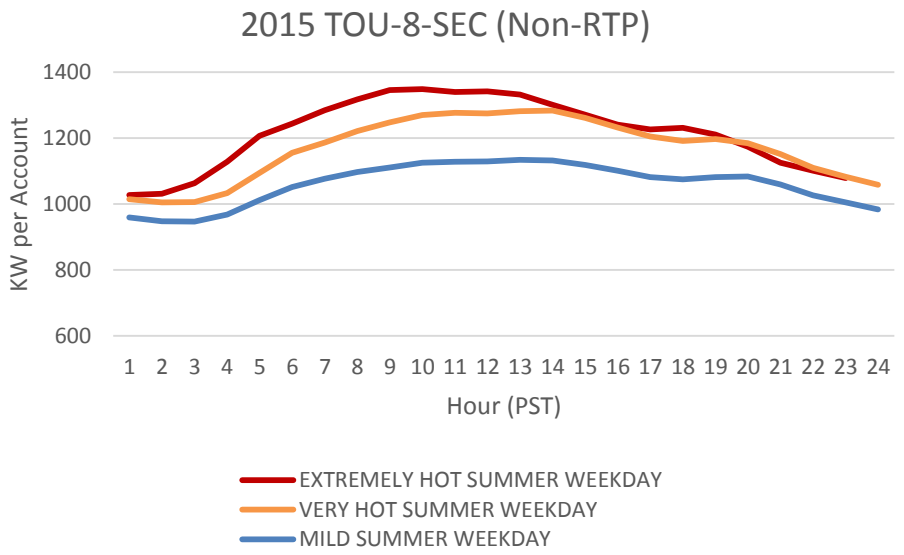
- RTP program opened in 1987
- 150 active participants today
- Available to C&I and Agricultural & Pumping customers

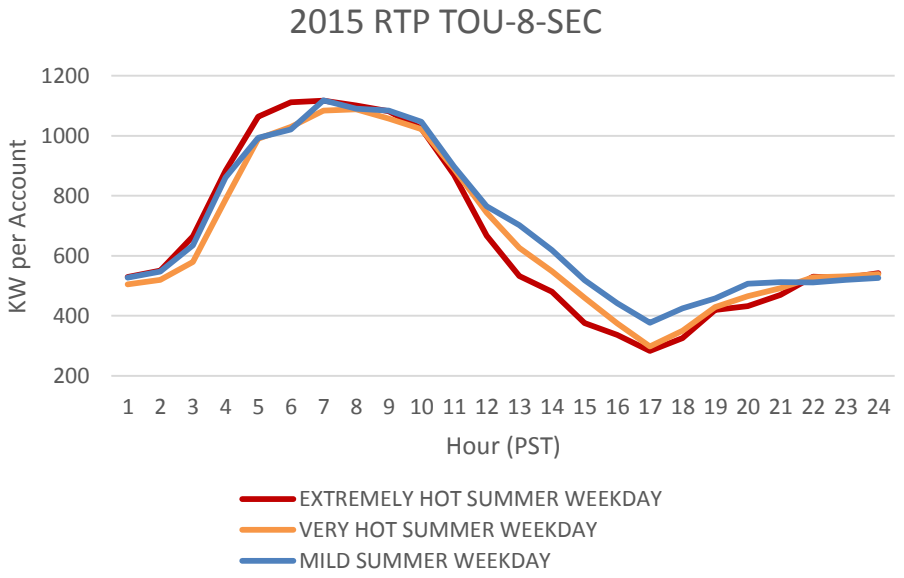
Rate Structure

- Hourly energy charges
  - Comprised of generation energy & capacity
  - Delivery charges are the same as the standard rate
- Temperature based triggers
  - Highly correlated with system load
  - Easy to understand
- Day-ahead "call"
  - Provides sufficient notice to respond
  - Standard temperature forecasts provide even greater planning period

Demand Response Performance

- Load impact
  - 48% on weekdays with temperature ⬅ 95➡F
  - 43% on weekdays with temperature 91➡F – 94➡F
  - By comparison, default CPP demonstrates load impacts of 5%
- Bill savings of 15% vs. standard rate
- The direct result of better alignment with costs





SCE's RTP Hourly Generation Rate Example - $/kWh

CURRENT

HOUR ENDING @ PST	EXTREMELY HOT SUMMER WEEKDAY (>=95)	VERY HOT SUMMER WEEKDAY (91-94)	HOT SUMMER WEEKDAY (85-90)	MODERATE SUMMER WEEKDAY (81-84)	MILD SUMMER WEEKDAY (<=80)	HIGH COST WINTER WEEKDAY (>90)	LOW COST WINTER WEEKDAY (<=90)	HIGH COST WEEKEND (>=78)	LOW COST WEEKEND (<78)
1 a.m.	0.040	0.032	0.028	0.026	0.025	0.043	0.032	0.034	0.030
2 a.m.	0.035	0.027	0.023	0.022	0.022	0.041	0.029	0.030	0.026
3 a.m.	0.029	0.023	0.019	0.018	0.019	0.035	0.027	0.026	0.024
4 a.m.	0.026	0.021	0.018	0.017	0.017	0.037	0.027	0.025	0.022
5 a.m.	0.027	0.023	0.020	0.018	0.019	0.040	0.029	0.025	0.022
6 a.m.	0.037	0.029	0.025	0.023	0.023	0.050	0.036	0.026	0.024
7 a.m.	0.038	0.031	0.028	0.025	0.025	0.058	0.041	0.025	0.022
8 a.m.	0.041	0.035	0.032	0.029	0.029	0.060	0.044	0.028	0.023
9 a.m.	0.046	0.049	0.035	0.034	0.033	0.058	0.044	0.033	0.029
10 a.m.	0.085	0.075	0.040	0.039	0.038	0.066	0.046	0.037	0.033
11 a.m.	0.196	0.160	0.053	0.043	0.042	0.094	0.047	0.040	0.037
12 noon	0.430	0.255	0.060	0.046	0.044	0.120	0.047	0.043	0.038
1 p.m.	0.702	0.372	0.081	0.047	0.045	0.146	0.046	0.044	0.037
2 p.m.	1.223	0.602	0.200	0.053	0.047	0.202	0.046	0.044	0.035
3 p.m.	1.771	0.779	0.322	0.068	0.052	0.252	0.046	0.047	0.036
4 p.m.	2.487	1.005	0.419	0.087	0.057	0.288	0.046	0.049	0.036
5 p.m.	2.488	0.923	0.426	0.080	0.056	0.246	0.047	0.053	0.038
6 p.m.	1.839	0.699	0.269	0.061	0.048	0.160	0.050	0.057	0.040
7 p.m.	1.151	0.355	0.149	0.055	0.046	0.137	0.052	0.055	0.041
8 p.m.	0.811	0.239	0.102	0.046	0.043	0.141	0.052	0.054	0.044
9 p.m.	0.894	0.389	0.101	0.048	0.045	0.143	0.050	0.059	0.045
10 p.m.	0.179	0.151	0.053	0.044	0.042	0.074	0.046	0.048	0.042
11 p.m.	0.050	0.063	0.039	0.039	0.038	0.052	0.042	0.041	0.036
Midnight	0.044	0.037	0.034	0.032	0.031	0.048	0.035	0.035	0.030
# of Days	4	7	16	23	36	7	168	47	57

SCE's RTP rate proposal reflects duck curve pricing and ramping effects

PROPOSED

HOUR ENDING @ PST	HOT SUMMER WEEKDAY (>=91)	MODERATE SUMMER WEEKDAY (81-90)	MILD SUMMER WEEKDAY (<=80)	HIGH COST WINTER WEEKDAY (>90)	LOW COST WINTER WEEKDAY (<=90)	HIGH COST WEEKEND (>=78)	LOW COST WEEKEND (<78)
1 a.m.	0.047	0.048	0.046	0.046	0.047	0.047	0.048
2 a.m.	0.047	0.047	0.046	0.045	0.047	0.047	0.048
3 a.m.	0.047	0.048	0.046	0.046	0.047	0.047	0.048
4 a.m.	0.048	0.049	0.047	0.046	0.048	0.048	0.048
5 a.m.	0.051	0.052	0.050	0.049	0.050	0.049	0.049
6 a.m.	0.056	0.056	0.049	0.054	0.054	0.049	0.050
7 a.m.	0.048	0.048	0.045	0.051	0.055	0.045	0.048
8 a.m.	0.044	0.045	0.041	0.045	0.050	0.036	0.040
9 a.m.	0.042	0.043	0.039	0.041	0.043	0.023	0.030
10 a.m.	0.040	0.043	0.038	0.037	0.038	0.017	0.020
11 a.m.	0.040	0.043	0.040	0.029	0.035	0.015	0.014
12 noon	0.040	0.044	0.040	0.019	0.032	0.018	0.012
1 p.m.	0.042	0.046	0.042	0.021	0.032	0.022	0.012
2 p.m.	0.045	0.059	0.046	0.025	0.036	0.030	0.022
3 p.m.	0.046	0.051	0.046	0.036	0.041	0.036	0.034
4 p.m.	0.049	0.054	0.048	0.044	0.045	0.045	0.043
5 p.m.	0.090	0.057	0.051	0.047	0.052	0.049	0.053
6 p.m.	4.164	0.092	0.055	0.069	0.066	0.604	0.077
7 p.m.	4.062	0.169	0.073	0.106	0.073	1.120	0.118
8 p.m.	1.049	0.119	0.075	0.073	0.065	0.082	0.063
9 p.m.	0.083	0.065	0.066	0.061	0.060	0.060	0.057
10 p.m.	0.057	0.060	0.061	0.056	0.058	0.057	0.055
11 p.m.	0.050	0.052	0.050	0.050	0.053	0.050	0.052
Midnight	0.048	0.049	0.048	0.048	0.049	0.048	0.048
# of Days	10	47	30	6	163	54	55

- Shifting to a Duck Curve price profile moves SCE's RTP away from a purely "Top 100 Hour" based rate
- Energy and capacity charges include utility fixed costs (i.e., capital, programs, balancing accounts)
- RTP has flexibility to offer low cost pricing in periods of generation oversupply

Distribution of Energy & Capacity Charges - $/kWh

ENERGY

HOUR ENDING @ PST	HOT SUMMER WEEKDAY (>=91)	MODERATE SUMMER WEEKDAY (81-90)	MILD SUMMER WEEKDAY (<=80)	HIGH COST WINTER WEEKDAY (>90)	LOW COST WINTER WEEKDAY (<=90)	HIGH COST WEEKEND (>=78)	LOW COST WEEKEND (<78)
1 a.m.	0.036	0.037	0.035	0.035	0.036	0.036	0.037
2 a.m.	0.036	0.036	0.035	0.035	0.036	0.036	0.037
3 a.m.	0.036	0.037	0.036	0.035	0.036	0.036	0.037
4 a.m.	0.037	0.038	0.036	0.036	0.037	0.037	0.037
5 a.m.	0.039	0.040	0.039	0.038	0.038	0.038	0.038
6 a.m.	0.043	0.043	0.038	0.041	0.041	0.037	0.038
7 a.m.	0.037	0.037	0.035	0.039	0.042	0.034	0.037
8 a.m.	0.034	0.035	0.032	0.035	0.039	0.028	0.030
9 a.m.	0.032	0.033	0.030	0.032	0.033	0.018	0.023
10 a.m.	0.031	0.033	0.029	0.028	0.029	0.013	0.015
11 a.m.	0.031	0.033	0.031	0.022	0.027	0.012	0.011
12 noon	0.031	0.034	0.031	0.015	0.025	0.014	0.009
1 p.m.	0.032	0.036	0.032	0.016	0.025	0.017	0.009
2 p.m.	0.034	0.045	0.035	0.019	0.028	0.023	0.017
3 p.m.	0.036	0.039	0.036	0.027	0.032	0.027	0.026
4 p.m.	0.037	0.041	0.037	0.034	0.035	0.035	0.033
5 p.m.	0.040	0.044	0.039	0.036	0.040	0.037	0.039
6 p.m.	0.049	0.052	0.042	0.047	0.050	0.044	0.047
7 p.m.	0.059	0.064	0.055	0.060	0.054	0.053	0.051
8 p.m.	0.054	0.055	0.056	0.056	0.050	0.050	0.048
9 p.m.	0.047	0.049	0.051	0.047	0.046	0.046	0.044
10 p.m.	0.044	0.046	0.047	0.043	0.044	0.044	0.042
11 p.m.	0.038	0.040	0.039	0.039	0.041	0.038	0.040
Midnight	0.037	0.038	0.037	0.037	0.038	0.037	0.037

CAPACITY

HOUR ENDING @ PST	HOT SUMMER WEEKDAY (>=91)	MODERATE SUMMER WEEKDAY (81-90)	MILD SUMMER WEEKDAY (<=80)	HIGH COST WINTER WEEKDAY (>90)	LOW COST WINTER WEEKDAY (<=90)	HIGH COST WEEKEND (>=78)	LOW COST WEEKEND (<78)
1 a.m.							
2 a.m.							
3 a.m.							
4 a.m.							
5 a.m.							
6 a.m.							
7 a.m.							
8 a.m.							
9 a.m.							
10 a.m.							
11 a.m.							
12 noon							
1 p.m.							
2 p.m.							
3 p.m.	0.80						
4 p.m.	0.15						
5 p.m.	0.30	0.20	0.20	0.17		0.13	0.14
6 p.m.	3.16	0.19	0.50	0.59	0.99	0.42	0.13
7 p.m.	3.67	0.67	0.14	0.21	0.20	0.89	0.39
8 p.m.	0.75	0.37	0.20			0.13	0.18
9 p.m.	0.17	0.94	0.40			0.46	
10 p.m.	0.19						
11 p.m.							
Midnight							

- Generation capacity provides the strongest price signal to encourage demand response
  - Capacity allocated between ramp & peak charges (36% and 64% allocation, respectively)
  - Energy charges reflect generation oversupply periods – lowest charge in the winter midday
- Structural options in bifurcated market include:
  - Two-part RTP: Market based energy only RTP; capacity and fixed costs recovered through traditional TOU base rate
  - Block-plus margin: Distribution peak and generation energy & capacity recovered through hourly pricing; all other costs recovered through a fixed monthly charge