

Cautions from a System Planner on Designing Time-of-Use Periods



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On behalf of:
The Utility Reform Network

To:
CPUC TOU Periods Rulemaking (R.15-12-012)
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Two Cautions

Do not try to manage Greenhouse Gas (GHG) emissions using Time-of-Use (TOU) periods and rates.

Consider effects of other responses to changing “net load” shapes when considering TOU periods and rates.

Greenhouse Gases and Time-of-Use Periods

Correlation among loads and GHGs is muddled.

The CAISO analysis does not consider GHG emissions in recommending TOU periods – just loads.

The Commission has no basis to conclude that any given set of TOU periods or rates will have a positive impact on GHG emissions. ^{1/}

^{1/} Decision 15-07-001, pp. 76-81 and 311 (Findings of Fact 33 and 34).

Estimated 2020 Incremental WECC-Wide CO2 Emission Rates by Hour by Month ^{2/}

Hour Ending	Annual Average	Delta CO2 (lbs/MWh) by Month											
		Jan	Feb	Mar	Aor	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1,027	950	919	977	1,423	1,450	1,123	969	868	888	816	998	943
2	1,036	972	999	1,019	1,318	1,417	1,187	985	863	927	830	970	953
3	1,028	890	957	1,031	1,397	1,310	1,130	997	885	891	897	994	959
4	1,014	926	994	990	1,302	1,363	1,199	974	841	869	875	998	845
5	899	720	1,004	841	762	1,110	1,322	957	797	878	840	894	680
6	921	893	887	834	960	1,075	1,036	955	875	912	930	804	894
7	938	917	1,060	961	1,097	1,180	822	829	843	873	909	908	860
8	943	894	1,031	1,029	1,068	924	909	977	940	917	872	864	896
9	961	994	1,062	1,020	1,078	877	884	998	926	986	907	894	912
10	988	993	1,066	955	1,109	992	907	1,086	1,020	988	925	887	927
11	998	1,009	1,051	949	1,099	1,015	947	1,086	1,046	979	955	901	941
12	1,003	994	1,069	1,002	1,059	966	958	1,181	1,044	965	937	948	918
13	981	1,008	1,073	943	1,039	966	892	934	1,090	949	973	959	945
14	985	1,020	1,037	949	1,027	852	945	1,066	1,103	964	939	935	980
15	979	1,020	1,078	906	1,086	941	924	997	1,034	1,000	919	934	916
16	958	1,017	1,044	951	998	907	900	930	993	982	957	888	928
17	965	990	997	909	1,020	896	929	1,124	1,101	994	885	896	841
18	942	942	988	934	837	898	884	1,137	1,040	969	873	911	895
19	942	1,032	942	1,010	884	888	870	1,022	1,023	926	897	941	869
20	961	1,049	1,014	994	1,020	874	829	1,004	1,001	975	916	971	890
21	949	1,041	1,014	1,017	1,002	899	866	981	976	887	888	929	894
22	878	946	1,002	912	864	885	824	888	915	767	831	795	907
23	894	797	849	864	976	1,236	1,008	754	848	836	811	831	915
24	916	920	829	915	1,004	1,177	1,015	826	843	784	797	893	987

Note: Data do not distinguish between weekdays and weekends/holidays.

^{2/} Appendix D (PGandE 2020 Study) to Opening Testimony of Kevin Woodruff on Behalf of The Utility Reform Network, Rulemaking 12-06-013 (Residential Rate Design), September 15, 2014, Page D-1 of D-6. Annotated for Feb. 26, 2016 workshop.

Estimated 2024 Incremental WECC-Wide CO2 Emission Rates by Hour by Month ^{3/}

Hour Ending	Annual Average	Delta CO2 (lbs/MWh) by Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	960	891	798	989	993	924	1,133	993	940	1,259	716	985	903
2	895	878	783	907	865	804	1,003	893	964	1,191	690	932	832
3	895	882	935	821	810	748	1,002	919	968	1,184	705	920	862
4	873	883	837	789	818	722	916	843	959	1,092	731	943	951
5	867	922	950	752	752	614	893	811	1,084	1,083	705	970	882
6	891	1,017	976	790	660	634	822	973	1,112	990	832	953	934
7	1,049	1,002	1,222	1,027	1,001	638	891	1,100	1,170	1,125	1,237	1,205	984
8	968	999	981	960	762	791	846	1,030	1,148	1,115	883	1,017	1,077
9	896	957	816	830	726	784	815	1,177	1,046	950	791	876	980
10	848	911	738	632	767	830	892	865	1,014	939	882	827	874
11	818	843	742	652	720	812	879	987	948	875	652	850	850
12	802	855	844	650	710	856	853	781	965	889	568	865	792
13	821	777	1,035	639	785	928	841	911	832	983	639	791	707
14	804	829	762	704	876	916	883	940	779	866	653	733	707
15	861	857	873	785	1,008	982	1,018	984	691	790	601	909	849
16	911	882	850	864	863	1,096	1,007	1,012	865	996	919	753	812
17	954	838	883	960	1,108	893	1,022	1,085	949	965	864	1,018	859
18	984	1,012	906	884	973	974	954	1,021	999	895	1,131	1,097	960
19	1,015	972	1,063	890	1,034	1,004	1,039	1,047	947	1,008	1,137	1,087	958
20	1,035	966	996	1,017	1,092	1,073	1,023	1,040	899	922	1,394	1,082	913
21	1,017	904	996	1,044	1,091	1,090	1,010	1,123	931	926	1,109	1,040	934
22	1,000	905	908	1,091	1,152	1,067	1,064	1,107	840	1,034	896	1,039	900
23	987	855	1,042	983	1,075	1,154	1,014	1,061	876	1,110	763	1,083	835
24	999	813	694	1,029	1,111	1,104	1,224	1,020	938	1,318	971	943	822

Note: Data do not distinguish between weekdays and weekends/holidays.

3/ Appendix F (CAISO 2024 Study) to Opening Testimony of Kevin Woodruff on Behalf of The Utility Reform Network, Rulemaking 12-06-013 (Residential Rate Design), September 15, 2014, Page F-1 of F-6. Annotated for Feb. 26, 2016 workshop.

Other Responses to Changing Load Shapes

Several other means have been proposed to manage over-generation and steep “net load” ramps.

For example, in addition to TOU rates, the CAISO has suggested: ^{4/}

- modifying renewable contract curtailment provisions,
- increasing storage, Demand Response and Energy Efficiency,
- increasing transportation electrification and managed charging,
- increasing fleet flexibility, and
- “deeper regional coordination with other balancing authorities”.

^{4/} CAISO *ex parte* notices in R.13-12-010, Dec. 8, 2014.

Potential Impact of Regional Coordination

As an example, the CAISO's "SB 350 Study" of "regional integration" is assuming that exports from the CAISO can be increased from zero to:

- 2,000 to 8,000 MW *without* creating region-wide ISO, and
- 8,000 MW with region-wide ISO. ^{5/}

Exports of this magnitude could address many of the "duck curve" challenges *without* changing TOU periods or rates.

^{5/} Draft Renewable Portfolios for CAISO SB 350 Study, E3, Feb. 8, 2015