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WPTF Comments on IEPR Workshop

Additional submitted attachment is included below.

August 13, 2024

California Energy Commission
Docket Unit, MS-4
715 P Street
Sacramento, CA 95814
Via docket submission

Re: Docket No. 24-IEPR-3 - Comments on July 30 IEPR Commissioner Workshop on Energy Demand Forecast Methodology Updates

Dear Chair Hochschild and Vice Chair Gunda,

Western Power Trading Forum (WPTF) appreciates the California Energy Commission (CEC) putting extensive effort, in collaboration with other state agencies and academic institutions, into updating load forecast modeling inputs, specifically climate and weather, into the Integrated Energy Policy Report (IEPR) process. The IEPR load forecast is the foundation for a range of planning and reliability elements of the California electricity system. After the noteworthy decrease to the load forecast in the 2023 IEPR compared with the previous IEPR reports, which WPTF found surprising, we initiated a CEC specific committee to more actively participate in the IEPR load forecasting proceeding.

WPTF appreciates the multi-agency Commissioner-led workshop held by the CEC on Tuesday, July 30. We acknowledge the temperature and load extremes we are experiencing because of climate change present immense new challenges in the load forecasting space. The presentations were highly informative. We observe that an unprecedented effort is underway in California to better predict and understand climate and weather impacts on load forecasting, and we anticipate that these efforts will have a positive effect on modeling moving forward.

Overview of WPTF Analysis of Forecast vs Actual Load

WPTF likes to look at data when we can, so we pulled together IEPR forecasts and actual load data to see how the forecasts have been performing. We appreciate that the foundational methodology of the IEPR forecast is evolving so a backward-looking analysis cannot be directly applied to future forecasts. Yet, we wanted to share some trends that we believe are important to contribute to the conversation and should frame how important it is for the efforts to develop a more climate-informed methodology to continue. WPTF looked at 2020 to 2023 pulling together data at the utility/IOU and CAISO system level to compare how the IEPR forecast performed against actual load data. Because the IEPR load forecast is offset by a few years, we matched the IEPR forecast that would have been applied to the actual load year. For example, the 2021 IEPR was published in December of 2021. This means it is applied in fall of 2022 for the

planning and compliance year 2023. The table below shows which IEPR forecast was used against each year of actual CAISO Energy Management System (EMS) hourly load data.

IEPR Vintage (Coincident Peak Forecast)	EMS Load data
2019 IEPR	2020
2019 IEPR	2021
2020 IEPR	2022
2021 IEPR	2023

Observation: Trend Towards Under-Forecasting

WPTF started with a simple look at how frequently load was under-forecast at the hourly level across each year and utility. The table below shows the percent of hours across the year that load was under-forecast in the IEPR. We would expect hours to be under-forecast and over-forecast, but the concerning trend across the years 2020 to 2023 is an increasing trend of under-forecasting load across hours.

Percent of under-forecast load hours across the year

	2020	2021	2022	2023
PG&E	50%	58%	62%	61%
SCE	25%	32%	69%	43%
SDG&E	37%	40%	70%	58%
CAISO	35%	44%	69%	54%

Mid-Day Trends in Under-Forecasting

To understand if there were any themes to *which hours* load was being under-forecast, we dug into the number of hours across each utility and each year that were being under-forecast. The tables below show PG&E, SCE, and SDG&E for 2023. The tables show each month and the *count of days* across the month for which each hour was under-forecast across Hour Ending (HE) 1 to HE 24. HE 1 to HE 24 are at the top of the table. The yellow highlighted regions show concerning times of day where large numbers of days across the month were under-forecast in that hour. The orange highlights show that every day of that month was under-forecast for the corresponding hour on the top of the table. The bottom row of each table shows the average percent of under-forecasting across the year for each hour across a 24-hour day.

WESTERN POWER TRADING FORUM

<u>Tables Reflect Count of Hours Under-Forecast Across 2023 for each IOU Area</u>

PG&E 2023	Days per month	Hour Ending 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	20	29	30	31	29	26	17	16	19	24	25	28	29	28	25	23	14	2	1	1	1	2	7	19
Feb	28	26	28	28	28	28	28	27	22	24	24	21	24	22	21	19	17	15	10	3	1	2	8	16	21
Mar	31	31	30	31	31	30	21	18	30	30	28	29	30	30	29	22	17	14	7	3	4	10	25	30	30
April	30	28	28	29	27	23	10	17	28	30	30	30	30	30	25	22	13	6	4	3	3	6	19	29	27
May	31	24	26	25	22	15	13	19	30	31	31	29	29	28	27	23	16	13	9	8	7	9	17	23	19
Jun	30	15	19	15	7	3	3	6	21	26	25	21	18	17	11	9	8	5	2	1	2	2	5	9	10
Jul	31	24	26	27	23	13	9	12	25	28	28	26	22	17	16	12	12	12	12	12	14	14	19	21	22
Aug	31	28	28	27	25	18	6	10	27	30	30	29	28	27	23	17	13	11	10	13	13	13	24	28	27
Sep	30	24	24	25	25	8	1	4	19	26	26	25	23	19	10	6	3	2	1	1	1	1	6	15	16
Oct	31	30	31	31	29	21	7	6	25	31	31	31	30	26	25	19	13	9	7	7	9	9	22	29	30
Nov	30	21	28	30	30	30	27	19	19	23	26	27	29	29	29	27	20	9	1	1	1	1	4	8	11
Dec	31	9	21	27	30	26	25	12	11	16	26	26	29	30	29	27	20	7	0	0	0	0	0	2	3
Total	365	281	318	325	308	244	176	167	273	314	329	319	320	304	273	228	175	117	65	53	56	68	151	217	235
% of hours underforecast		77%	87%	89%	84%	67%	48%	46%	75%	86%	90%	87%	88%	83%	75%	62%	48%	32%	18%	15%	15%	19%	41%	59%	64%

SCE 2023	Days per month	Hour Ending 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	3	8	11	13	13	15	11	13	24	30	31	31	31	28	22	13	4	1	1	1	1	1	2	3
Feb	28	12	14	17	18	16	16	15	15	18	20	26	25	21	19	13	7	5	4	3	2	4	3	6	9
Mar	31	21	27	28	22	10	7	11	26	31	29	30	29	26	21	16	12	4	0	0	0	2	9	16	16
April	30	14	18	19	11	4	3	7	11	22	22	22	25	17	14	9	6	2	2	0	0	0	7	15	15
May	31	12	14	17	9	4	6	6	14	22	24	26	25	18	17	12	10	9	7	4	2	4	9	11	12
Jun	30	5	4	3	0	0	0	2	2	12	13	13	12	9	4	2	0	0	0	0	0	0	0	1	2
Jul	31	22	21	20	20	16	15	10	20	23	23	23	21	20	20	21	21	21	20	21	19	19	22	23	23
Aug	31	26	26	25	21	10	10	13	18	23	23	22	19	16	13	13	16	16	18	19	16	18	22	24	24
Sep	30	13	12	11	6	4	1	2	4	17	20	14	11	9	5	2	2	2	4	2	3	4	7	10	10
Oct	31	18	17	18	9	4	1	1	9	27	27	26	25	23	22	18	15	13	12	12	12	13	16	19	20
Nov	30	6	11	16	18	13	6	6	14	29	30	30	30	28	28	26	14	6	1	1	1	1	1	1	3
Dec	31	2	6	9	9	7	5	1	6	21	31	31	31	31	31	29	15	1	0	0	0	0	0	0	0
Total	365	154	178	194	156	101	85	85	152	269	292	294	284	249	222	183	131	83	69	63	56	66	97	128	137
% of hours underforecast		42%	49%	53%	43%	28%	23%	23%	42%	74%	80%	81%	78%	68%	61%	50%	36%	23%	19%	17%	15%	18%	27%	35%	38%

SDG&E 2023	Days per month	Hour Ending 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	30	30	30	30	31	27	17	22	29	30	29	30	29	27	24	22	11	1	0	0	1	1	9	17
Feb	28	28	28	28	28	28	28	27	25	24	23	22	22	22	22	21	15	9	2	0	0	1	1	8	19
Mar	31	31	30	31	31	27	17	18	28	30	29	28	28	26	25	17	15	9	2	0	0	0	14	23	25
April	30	30	30	30	30	17	6	17	30	30	30	30	26	22	17	9	7	1	0	0	0	0	13	25	22
May	31	31	31	31	29	10	5	16	30	31	30	30	30	24	21	15	11	3	1	0	0	1	10	19	20
Jun	30	28	30	28	25	14	7	9	21	26	27	22	19	19	13	5	4	2	2	0	1	3	6	15	14
Jul	31	29	29	29	25	20	12	15	29	29	28	27	23	22	20	19	18	14	14	14	13	14	20	24	25
Aug	31	29	30	29	26	25	16	17	26	30	28	27	23	23	21	20	19	16	18	18	11	21	24	24	26
Sep	30	25	26	25	23	10	3	4	24	26	27	24	18	14	14	9	5	3	3	3	2	4	12	16	16
Oct	31	29	30	30	26	19	3	5	16	27	28	23	19	7	7	8	8	7	5	4	5	8	17	23	20
Nov	30	27	28	30	30	28	22	10	18	27	27	24	24	24	24	22	13	2	0	0	0	0	0	3	8
Dec	31	18	28	29	29	27	15	4	10	27	27	25	27	26	25	24	11	0	0	0	0	0	0	0	0
Total	365	336	350	350	332	256	161	159	279	336	334	311	289	258	236	193	148	77	48	39	32	53	118	189	212
% of hours underforecast		92%	96%	96%	91%	70%	44%	44%	76%	92%	92%	85%	79%	71%	65%	53%	41%	21%	13%	11%	9%	15%	32%	52%	58%

We observe a trend in under-forecasting during the middle of the day hours particularly and some late evening/early morning hours. But we understand the *magnitude* of under-forecasting is also important. We looked at the same data but for hours that were under-forecast by 10% or more. The tables below are organized the same as the tables above but reflect the count of hours where load was under-forecast by 10% or more.

Tables Reflect the Count of Hours Under-Forecast by 10% or More Across 2023 for each IOU Area

		Hour Ending																							
PG&E 2023	Days per month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	1	3	15	17	8	5	4	2	6	9	10	13	19	19	12	7	2	0	0	0	0	0	0	0
Feb	28	0	4	10	15	12	9	4	2	9	10	13	15	15	14	12	9	5	0	0	0	0	0	1	1
Mar	31	9	14	22	21	8	3	5	12	23	26	24	24	22	18	14	8	5	1	0	0	0	1	3	3
April	30	4	9	10	7	1	0	2	13	24	25	22	21	20	15	10	6	2	0	0	0	0	1	4	1
May	31	3	5	5	3	0	0	2	17	27	28	27	27	25	20	15	10	7	1	1	0	0	4	7	2
Jun	30	1	0	0	0	0	0	0	4	14	14	12	11	10	7	5	3	0	0	0	0	0	0	1	1
Jul	31	10	11	10	7	1	0	1	10	16	15	15	15	13	12	12	10	9	6	6	7	7	12	12	12
Aug	31	7	4	6	3	2	0	0	8	19	24	22	19	12	10	7	7	7	6	6	4	6	7	11	8
Sep	30	2	2	2	1	0	0	0	2	17	18	18	14	6	4	2	0	0	0	0	0	0	0	1	1
Oct	31	5	10	12	9	3	0	0	3	23	26	25	23	23	16	11	6	3	3	3	3	3	4	6	3
Nov	30	0	2	8	7	5	3	1	2	8	10	14	19	20	19	10	4	0	0	0	0	0	0	0	0
Dec	31	0	0	2	2	0	0	0	0	0	2	10	17	18	17	14	4	0	0	0	0	0	0	0	0
Total	365	42	64	102	92	40	20	19	75	186	207	212	218	203	171	124	74	40	17	16	14	16	29	46	32
% of hours underforecast		12%	18%	28%	25%	11%	5%	5%	21%	51%	57%	58%	60%	56%	47%	34%	20%	11%	5%	4%	4%	4%	8%	13%	9%

		Hour Ending																							
SCE 2023	Days per month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	0	0	0	0	0	0	0	0	1	7	15	17	13	9	5	3	0	0	0	0	0	0	0	0
Feb	28	0	1	3	4	3	2	2	3	6	6	8	9	8	7	5	4	2	0	0	0	0	0	0	0
Mar	31	0	2	3	2	0	0	2	4	12	20	17	22	16	10	6	0	0	0	0	0	0	0	0	0
April	30	0	0	0	0	0	0	0	0	4	6	9	10	6	5	0	0	0	0	0	0	0	0	0	0
May	31	0	0	0	0	0	0	0	1	5	12	16	17	11	8	4	3	2	1	0	0	0	0	1	0
Jun	30	0	0	0	0	0	0	0	0	1	3	6	5	3	0	0	0	0	0	0	0	0	0	0	0
Jul	31	18	17	10	5	0	1	0	4	13	14	14	14	14	14	10	13	12	13	14	9	10	17	17	17
Aug	31	12	7	6	3	0	0	0	5	10	10	8	8	6	5	5	5	6	9	8	6	7	12	16	13
Sep	30	3	4	3	1	0	0	0	1	3	5	5	5	3	0	0	1	1	1	0	0	1	2	2	2
Oct	31	4	2	0	0	0	0	0	0	7	16	16	17	16	9	8	9	10	6	3	3	0	3	4	3
Nov	30	0	0	0	0	0	0	0	2	8	23	25	26	24	19	6	1	0	0	0	0	0	0	0	0
Dec	31	0	0	0	0	0	0	0	0	2	10	27	27	27	25	12	0	0	0	0	0	0	0	0	0
Total	365	37	33	25	15	3	3	4	20	72	132	166	177	147	111	61	39	33	30	25	18	18	34	40	35
% of hours underforecast		10%	9%	7%	4%	1%	1%	1%	5%	20%	36%	45%	48%	40%	30%	17%	11%	9%	8%	7%	5%	5%	9%	11%	10%

		Hour Ending																							
SDG&E 2023	Days per month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	3	7	14	13	9	7	3	5	12	25	24	22	24	21	15	8	3	0	0	0	0	0	0	1
Feb	28	6	10	15	15	16	11	3	8	13	13	14	15	15	14	14	9	4	0	0	0	0	0	0	1
Mar	31	16	24	24	20	8	1	5	19	25	26	27	26	25	19	14	8	3	0	0	0	0	0	0	1
April	30	10	17	14	4	0	0	2	22	29	28	24	22	14	9	6	3	0	0	0	0	0	0	0	0
May	31	7	7	5	2	1	0	3	15	28	29	29	26	23	18	10	4	0	0	0	0	0	1	1	1
Jun	30	8	10	8	1	1	1	1	12	23	21	18	18	16	6	2	2	1	0	0	0	0	1	1	1
Jul	31	20	21	17	10	4	2	2	19	27	24	18	17	17	16	13	11	3	3	4	2	2	9	14	14
Aug	31	23	24	21	15	4	0	1	16	25	25	25	21	18	14	13	10	6	5	5	1	3	8	16	17
Sep	30	9	12	10	6	0	0	0	4	21	22	20	12	10	9	5	3	1	1	1	0	2	2	4	4
Oct	31	13	15	15	9	1	0	0	2	13	21	15	8	3	3	2	2	1	0	0	0	0	1	6	5
Nov	30	3	9	14	10	3	1	1	3	17	19	19	16	14	14	10	2	0	0	0	0	0	0	0	0
Dec	31	2	6	7	6	4	0	0	1	8	10	13	18	13	14	9	1	0	0	0	0	0	0	0	0
Total	365	120	162	164	111	51	23	21	126	241	263	246	221	192	157	113	63	22	9	10	3	7	22	42	45
% of hours underforecast		33%	44%	45%	30%	14%	6%	6%	35%	66%	72%	67%	61%	53%	43%	31%	17%	6%	2%	3%	1%	2%	6%	12%	12%

When we drill down to hours under-forecast by 10% or more, we see a very clear trend to under-forecasting the middle of the day. To further explore the concern of an under-forecasting bias for middle of the day hours we did the same analysis but for 2021. Looking back to our first table, 2021 was less under-forecast overall than 2023 and there seems to be a trend towards under-forecasting. We skipped 2022 because it was a heavily under-forecast year overall with 70% of all hours being under forecast in CAISO. The tables below show the same data as above and in the same format but for 2021.

Tables Reflect Count of Hours Under-Forecast Across 2021 for each IOU Area

		Hour Ending																							
PG&E 2021	**Days per month**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	2	2	7	11	11	11	7	6	13	18	21	20	20	23	20	17	8	1	0	0	0	0	0	0
Feb	28	5	10	17	21	22	21	12	8	20	25	26	25	26	25	22	16	5	0	0	0	0	0	0	0
Mar	31	20	20	25	25	19	14	9	23	28	29	28	27	26	24	18	10	7	4	2	0	1	14	17	15
April	30	25	25	26	21	10	3	6	29	30	30	30	29	26	25	23	16	5	1	1	0	4	25	29	24
May	31	23	24	24	18	13	10	13	26	30	29	28	28	28	27	23	20	17	12	13	11	14	26	27	24
Jun	30	24	24	23	22	13	10	12	26	28	27	27	25	22	19	19	18	17	16	18	18	18	20	21	21
Jul	31	26	26	27	25	16	12	13	23	27	28	28	28	26	22	21	18	15	14	15	18	17	27	28	28
Aug	31	22	22	21	19	15	6	6	21	28	29	28	27	23	21	18	17	16	16	17	17	17	22	22	21
Sep	30	24	23	20	15	9	1	5	19	26	29	29	28	24	22	19	15	13	14	16	16	16	21	22	20
Oct	31	22	28	28	24	9	1	1	28	29	30	30	29	26	25	18	11	5	3	3	3	3	20	24	19
Nov	30	7	14	24	28	26	17	10	14	25	28	28	28	27	27	27	20	3	1	1	1	1	2	1	4
Dec	31	15	21	25	26	25	22	17	16	25	30	31	31	31	30	29	26	21	10	9	5	6	6	8	7
Total	365	215	239	267	255	188	128	111	239	309	332	334	325	305	290	257	204	132	92	95	89	97	183	199	183
% of hours underforecast		59%	65%	73%	70%	52%	35%	30%	65%	85%	91%	92%	89%	84%	79%	70%	56%	36%	25%	26%	24%	27%	50%	55%	50%

		Hour Ending																							
SCE 2021	**Days per month**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	0	0	0	4	5	3	3	4	14	17	15	16	15	13	12	7	4	1	0	0	0	0	0	0
Feb	28	0	2	4	6	4	4	2	2	5	7	5	5	2	1	0	0	0	0	0	0	0	0	0	0
Mar	31	6	10	13	8	5	2	4	10	20	22	19	17	15	8	5	4	4	1	0	0	0	3	5	3
April	30	6	4	3	1	0	1	1	2	10	15	15	16	16	14	12	10	8	4	2	2	2	4	10	5
May	31	6	4	2	1	1	2	2	5	10	15	17	17	14	13	12	12	11	10	7	2	5	10	12	10
Jun	30	16	13	13	8	6	4	3	7	11	12	17	20	19	18	18	19	19	19	20	16	15	18	19	20
Jul	31	24	22	19	16	6	7	7	9	14	14	16	22	23	22	23	23	24	24	24	17	18	24	29	24
Aug	31	16	14	12	8	3	1	1	8	11	12	15	15	16	16	17	18	18	18	17	16	18	19	19	19
Sep	30	10	10	6	5	0	0	1	1	7	9	12	15	13	12	12	12	14	12	10	8	10	12	11	8
Oct	31	4	4	1	0	0	0	1	3	12	15	14	13	11	8	6	5	5	4	2	2	2	5	6	5
Nov	30	2	2	3	4	4	4	5	7	21	25	24	25	25	23	22	15	7	5	3	2	1	2	1	1
Dec	31	13	14	16	15	14	13	13	15	22	28	29	28	29	27	23	15	9	4	3	3	2	2	6	8
Total	365	103	99	92	76	48	41	43	73	157	191	198	209	198	175	162	140	123	102	88	68	73	99	118	103
% of hours underforecast		28%	27%	25%	21%	13%	11%	12%	20%	43%	52%	54%	57%	54%	48%	44%	38%	34%	28%	24%	19%	20%	27%	32%	28%

		Hour Ending																							
SDG&E 2021	**Days per month**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	3	4	6	7	9	8	8	14	22	25	23	25	27	25	24	21	7	0	0	0	0	0	0	1
Feb	28	0	2	2	4	5	4	4	7	20	20	15	16	16	12	11	6	0	0	0	0	0	0	0	0
Mar	31	13	16	20	15	2	1	4	21	27	26	25	24	21	14	9	7	2	1	0	0	0	1	5	5
April	30	19	18	16	2	0	0	2	21	27	27	25	24	19	13	7	8	2	1	1	1	1	8	14	12
May	31	20	19	18	6	1	2	7	22	26	25	23	19	15	7	6	3	1	0	0	0	0	9	15	13
Jun	30	22	23	22	15	6	3	4	17	20	22	21	22	21	15	13	9	8	9	9	1	7	16	23	21
Jul	31	30	29	26	18	11	5	5	16	29	27	30	30	28	26	22	16	15	13	16	10	13	22	27	27
Aug	31	27	26	24	17	11	6	7	16	24	26	25	23	22	19	16	15	14	15	16	12	15	21	25	25
Sep	30	18	18	18	12	3	0	0	9	24	21	16	17	17	14	14	12	11	11	10	10	11	12	14	14
Oct	31	9	8	10	4	0	0	1	13	22	21	19	16	12	9	5	4	2	1	1	2	2	6	8	6
Nov	30	6	10	13	12	5	2	2	19	24	22	21	23	22	17	12	9	5	1	1	0	0	1	1	1
Dec	31	18	19	20	23	18	16	9	12	22	23	18	18	20	20	24	22	9	1	0	0	0	0	4	7
Total	365	185	192	195	135	71	47	53	187	287	285	261	257	240	191	163	132	76	53	54	36	49	96	136	132
% of hours underforecast		51%	53%	53%	37%	19%	13%	15%	51%	79%	78%	72%	70%	66%	52%	45%	36%	21%	15%	15%	10%	13%	26%	37%	36%

The data shows there was less under-forecasting in 2021, and the pattern in under-forecasting trends like 2023- to early morning hours and middle of the day hours. When we limit the count of hours to hours under-forecast by 10% or more in 2021 we can see the under-forecasting remains in the middle of the day, just like 2023.

Tables Reflect the Count of Hours Under-Forecast by 10% or More Across 2021 for each IOU Area

		Hour Ending																						
PG&E 2021	Days per month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	0	0	0	0	0	0	0	0	1	8	10	10	13	9	6	5	0	0	0	0	0	0	0	0
Feb	28	0	0	0	0	0	0	0	0	1	4	9	10	8	7	6	2	0	0	0	0	0	0	0	0
Mar	31	0	1	2	3	1	0	0	2	13	19	21	17	14	10	6	3	0	0	0	0	0	0	0	0
April	30	0	0	0	0	0	0	0	3	16	23	25	21	18	13	6	4	0	0	0	0	0	0	0	0
May	31	1	0	0	0	0	0	1	9	18	23	25	23	21	19	15	12	9	4	4	3	3	6	7	3
Jun	30	11	7	5	3	1	0	0	8	16	20	19	19	17	17	14	14	10	10	11	9	6	14	15	11
Jul	31	7	8	7	6	0	0	1	7	17	18	17	17	12	12	8	8	7	6	6	6	4	7	10	7
Aug	31	6	8	2	1	0	0	0	3	15	20	19	18	16	13	11	10	8	6	7	4	3	10	8	7
Sep	30	2	1	0	0	0	0	0	1	11	17	15	15	13	10	7	5	4	5	4	3	2	4	4	2
Oct	31	0	0	0	0	0	0	0	0	14	21	22	19	16	12	8	4	1	1	0	1	0	1	1	1
Nov	30	0	0	0	0	0	0	1	1	7	13	16	18	18	13	7	2	0	0	0	0	0	0	0	0
Dec	31	1	2	4	4	2	1	1	2	5	13	20	24	26	25	16	6	2	0	0	0	0	0	0	1
Total	365	28	27	20	17	4	1	4	36	134	199	218	211	192	160	110	75	41	32	32	26	18	42	45	32
% of hours underforecast		8%	7%	5%	5%	1%	0%	1%	10%	37%	55%	60%	58%	53%	44%	30%	21%	11%	9%	9%	7%	5%	12%	12%	9%

		Hour Ending																						
SCE 2021	Days per month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	1	0	0	0	0	0	0	0	0
Feb	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar	31	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
April	30	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	2	2	2	1	0	0	0	1	0
May	31	0	0	0	0	0	0	0	0	1	1	1	1	1	3	2	3	2	0	0	0	0	0	0	0
Jun	30	4	3	2	0	0	0	0	0	0	4	7	13	11	11	11	12	11	11	9	4	3	5	5	4
Jul	31	5	3	1	0	0	0	0	0	4	7	8	10	11	12	12	13	13	12	13	7	6	9	9	8
Aug	31	3	0	0	0	0	0	0	0	1	2	4	9	8	6	8	10	10	11	9	4	5	8	5	3
Sep	30	2	1	0	0	0	0	0	0	0	0	1	2	3	4	4	5	6	6	4	1	2	3	3	0
Oct	31	0	0	0	0	0	0	0	0	0	0	2	2	3	1	1	1	2	1	1	1	1	1	1	0
Nov	30	0	0	0	0	0	0	0	1	4	5	6	6	7	8	7	4	2	0	0	0	0	0	0	0
Dec	31	0	0	0	0	0	0	1	2	4	6	8	10	11	9	8	5	1	0	0	0	0	0	0	0
Total	365	14	7	3	0	0	0	1	3	15	26	39	57	59	58	57	56	49	43	37	17	17	26	24	15
% of hours underforecast		4%	2%	1%	0%	0%	0%	0%	1%	4%	7%	11%	16%	16%	16%	16%	15%	13%	12%	10%	5%	5%	7%	7%	4%

		Hour Ending																						
SDG&E 2021	Days per month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	31	0	0	0	0	0	0	0	1	9	13	11	10	11	9	8	5	0	0	0	0	0	0	0	0
Feb	28	0	0	0	0	0	0	0	0	4	7	7	7	5	4	1	0	0	0	0	0	0	0	0	0
Mar	31	0	0	0	0	0	0	0	3	12	19	15	14	12	8	4	1	0	0	0	0	0	0	0	0
April	30	0	0	0	0	0	0	0	1	14	16	12	12	9	7	4	2	0	0	0	0	0	0	0	0
May	31	0	0	0	0	0	0	0	3	11	18	16	11	8	3	2	0	0	0	0	0	0	0	0	0
Jun	30	4	3	1	1	0	0	0	3	9	11	8	10	10	9	4	2	2	1	1	1	1	1	2	1
Jul	31	8	6	1	1	0	0	0	4	8	13	14	19	16	14	9	7	6	3	4	1	2	3	7	7
Aug	31	8	7	6	4	1	1	0	2	12	17	16	20	17	13	13	9	7	6	4	3	3	7	7	8
Sep	30	5	4	1	1	0	0	0	0	6	11	11	10	9	9	7	6	5	4	2	1	1	3	6	5
Oct	31	0	0	0	0	0	0	0	0	9	12	10	8	4	2	2	1	1	0	1	1	1	1	2	0
Nov	30	0	0	0	0	0	0	0	2	12	13	13	11	7	6	5	5	1	0	0	0	0	0	0	0
Dec	31	2	1	3	7	1	0	0	0	8	11	12	13	15	15	13	7	0	0	0	0	0	0	0	1
Total	365	27	21	12	14	2	1	0	19	114	161	145	145	123	99	72	45	22	14	12	7	8	15	24	22
% of hours underforecast		7%	6%	3%	4%	1%	0%	0%	5%	31%	44%	40%	40%	34%	27%	20%	12%	6%	4%	3%	2%	2%	4%	7%	6%

Based on this data analysis we must take a good look at the assumptions and actual behind-the-meter resource input or what model elements impact reductions in the load forecast in the middle of the day. Bluntly, we consistently get this part wrong in the IEPR forecast. There is likely more analysis to do to get to the root of why the mid-day is chronically under-forecast, but an obvious take away is the behind-the-meter PV (BTMPV) load reduction is not accurate and being given too much credit in the modeling. It is heartening we don't see as many under

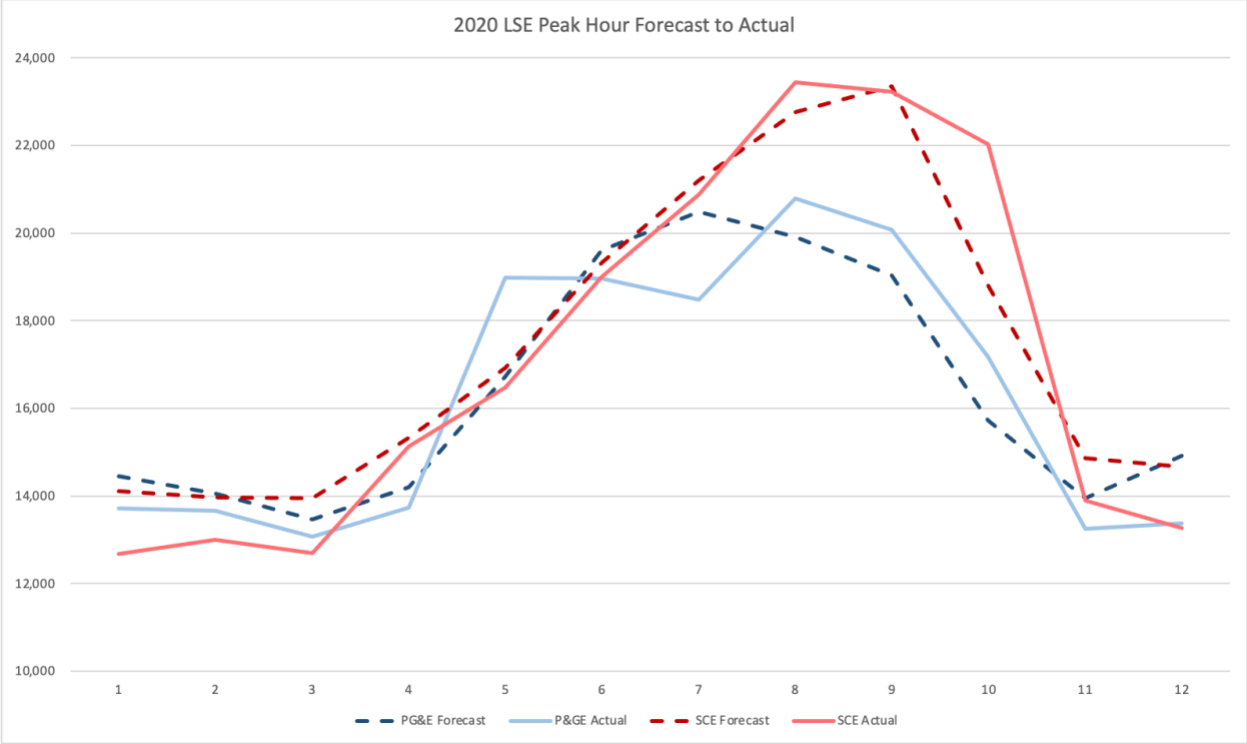
forecast hours in the 'peak' hours but getting all hours more accurately forecasted is critical as we move to a slice-of-day paradigm.

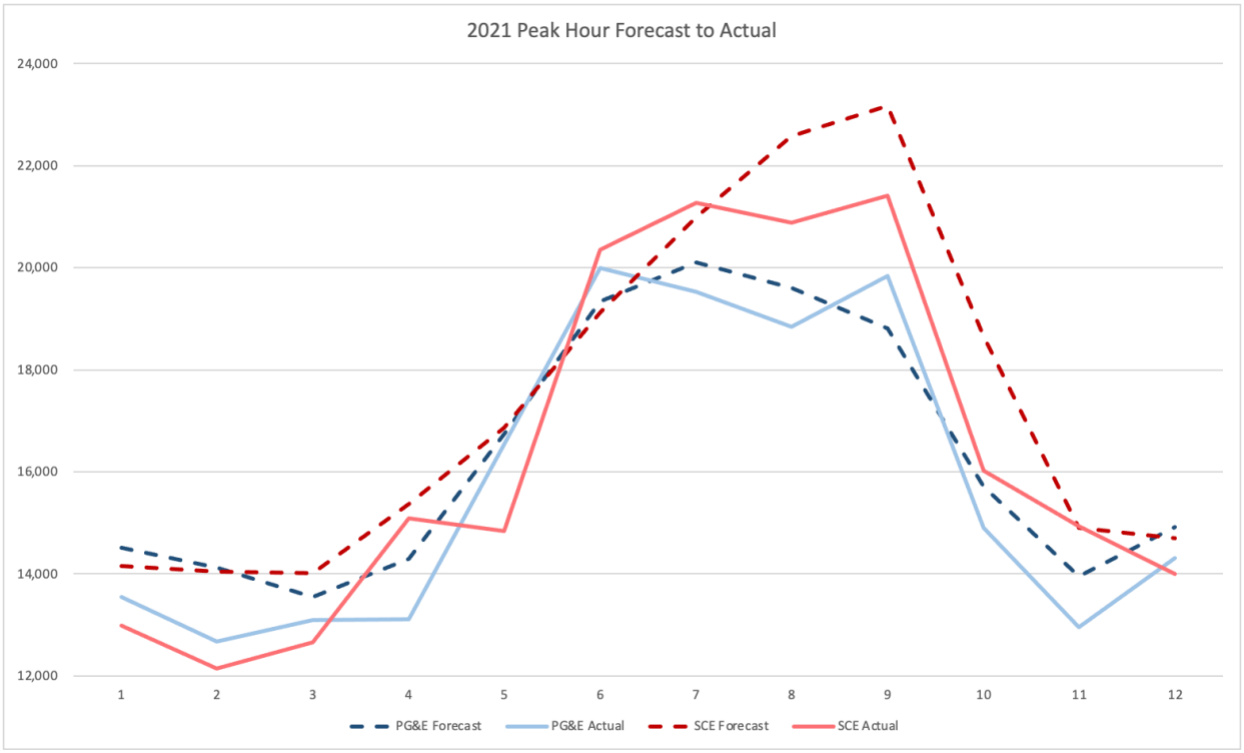
Under-Forecasting Peak Load

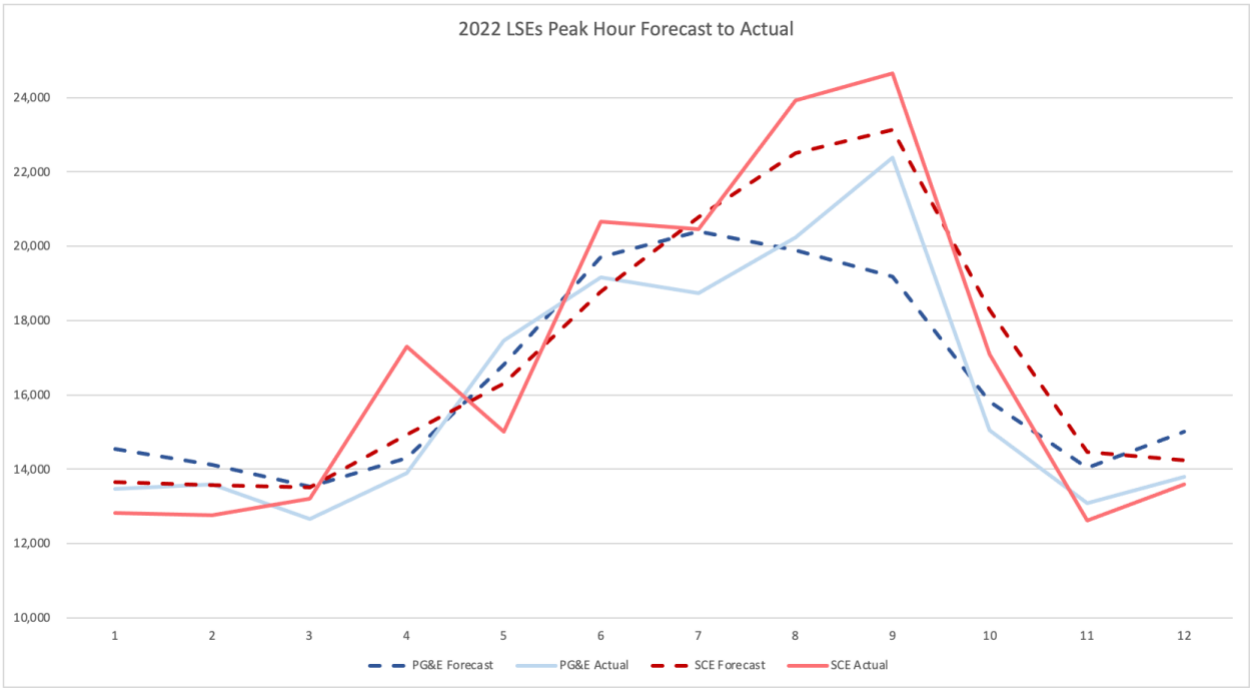
The presentations at the July 30 workshop seemed to speak to the need for better and sharper locational weather data to inform forecasting across the state. This is encouraging, and WPTF supports these efforts. We looked at monthly peak load IEPR forecasts at the IOU level compared to EMS data to see how IEPR peak load forecasting performs at a somewhat more specific geographic area. The graphs below are simply IEPR forecast compared to EMS data. We did not include SDG&E on the graphs so we could take a better look at the large loads. A few take aways from peak load data comparison:

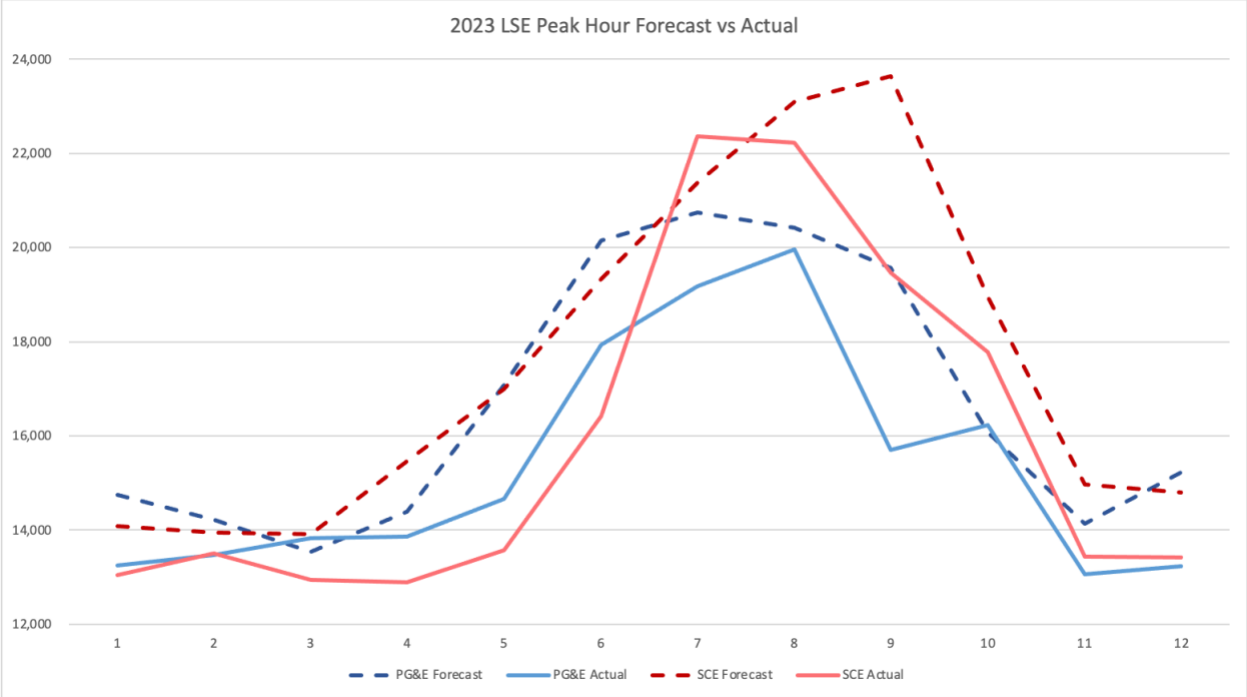
- SCE and SDG&E have at minimum one month under forecast each year since 2020
- June and July forecasts tend to be tight or under
- Greatest under-forecast is typically during peak summer periods

In the graphs below, the dashed line is the forecast line and the solid line is the actual load for the year. When the solid line of the same color exceeds the dashed line, actual load exceeds the forecast for the month.




2021 Peak Hour Forecast to Actual
24,000
22,000
20,000
18,000
16,000
14,000
12,000
1
2
3
4
5
6
7
8
9
10
11
12
PG&E Forecast
PG&E Actual
SCE Forecast
SCE Actual


2022 LSEs Peak Hour Forecast to Actual
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
1
2
3
4
5
6
7
8
9
10
11
12
PG&E Forecast
PG&E Actual
SCE Forecast
SCE Actual



Conclusion

WPTF appreciates the work the CEC is doing to update methods in the IEPR load study. The data presented here is from the 'old' methods, but we believe it is important to look at where we have been to inform where we are going. We strongly suggest that the Energy Commission needs to revisit the inputs that are over-estimating behind-the-meter inputs and impacting the mid-day load forecasts. And, putting greater focus on localizing climate forecasting, as presented in the workshop, should be a win for system forecasting.

Commission Staff gave a short presentation at the end of the workshop regarding their plans for changing the IEPR forecast and baseline methodology based on the climate modeling that was discussed during the majority of the workshop. WPTF observes that an all-day workshop is likely needed for Staff to explain their next steps and methodology changes in more detail and for stakeholders to have the opportunity to ask questions and provide feedback. We look forward to the opportunity to participate more actively in Staff-led workshops in the future.

Thank You,

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Via electronic submission.