December 13, 2019

California Energy Commission
Docket Office
Re: Docket No. 19-IEPR-03
1516 Ninth Street
Sacramento, CA 95814

Via Electronic Filing

Re: 19-IEPR-03 – Electricity and Natural Gas Demand Forecast
Post 2020 Grid Operational Outlook

Dear Commissioners:

The California Independent System Operator (CAISO) hereby submits the attached comments regarding CAISO weather normalized 2019 peak demands and peak demand forecasts for 2020. The CAISO's comments are in response to the December 2, 2019 Integrated Energy Policy Workshop on the 2019 Revised Electricity and Natural Demand Forecast.

The CAISO appreciates this opportunity to submit comments and looks forward to working with the Energy Commission to develop an accurate demand forecast.

Regards,

/s/ Jordan Pinjuv
Senior Counsel

CAISO Weather Normalized 2019 Peak Demands and Peak Demand Forecasts for 2020

Market and Infrastructure Development

December 13, 2019

CAISO Weather Normalized 2019 Peak Demands and Peak Demand Forecasts for 2020

1. 2019 peak weather ranking

The CAISO's weather ranking process has four steps. The first step uses vendor provided weather data from stations across the CAISO, up to 24 weather stations for the CAISO as a whole, to calculate the various weather inputs used for PG&E (NP26), SCE, SDGE, SP26, and ISO. Each area's weather data is based on a weighted average for that area. The second step is to develop the annual peak day weather index (a combination of maximum and minimum daily temperatures for each annual peak day) for the 25 years of weather data from 1995 to 2019. The third step is to generate 100 random values based on a normal distribution of the annual peak weather index. The fourth step is to rank 2019 actual weather index in the range of 100 random values to arrive at the percentile ranking and 1-in-x weather event result. The 2019 peak weather ranking result is shown in Table 1.

Table 1. 2019 Weather Event Evaluation Results

Weather Ranking of PTO Summer Peak Day (based on 25 years of historical weighted average of 24 weather stations data across the ISO)					
Event	**Time**	**PTO Peak (MW) (hourly average)**	**Area Weather Index (weighted ave) (deg. F)**	**Percentile Ranking**	**Weather Event**
PG&E Annual Peak Weather Rank	**8/15/19 19:00**	**21,091**	**99.2**	**55%**	**1-in-2.2**
SCE Annual Peak Weather Rank	**9/4/19 16:00**	**22,924**	**93.2**	**20%**	**1-in-1.2**
SDGE Annual Peak Weather Rank	**9/3/19 18:00**	**4,088**	**86.1**	**24%**	**1-in-1.3**
SP26 Annual Peak Weather Rank	**9/4/19 16:00**	**27,116**	**92.2**	**19%**	**1-in-1.2**
ISO Annual Peak Weather Rank	**8/15/19 18:00**	**44,148**	**89.8**	**20%**	**1-in-1.2**

Weather inputs to the CAISO's daily peak models, used for weather normalization of peak demand in their specific areas, include various weather variable combinations. Variables used include daily maximum temperature, daily maximum heat index, daily minimum temperature, daily minimum heat index, cooling degree-days, and a 631 daily maximum temperature index. The CAISO weather event evaluation are somewhat different for NP26 and SP26, because humidity can be more significant in Southern California, playing a greater role in load levels. The CAISO uses Heat Index for areas in SP26 because relative humidity is included in the Heat Index. The weighting of daily minimum

temperatures are is also different in NP26 and SP26. The weather event evaluation formulas are expressed below.

- SP26, SCE, SDGE, and ISO: 70% of 631 daily maximum Heat Index[1] + 30% of daily minimum temperature
- NP26: 90% of 631 daily maximum temperature[2] + 10% of daily minimum temperature

The weather indies of 70% of 631 daily max Heat Index + 30% of daily minimum temperature and 90% of 631 daily maximum temperature + 10% of daily minimum temperature are based on CAISO use of coefficient ratios of the maximum temperature indies to the minimum temperature from CAISO MetrixND daily peak models.

2. Weather normalized results for 2019

The CAISO's weather normalized process has five steps. The first step is to develop daily peak load models for PG&E (NP26), SCE, SDGE, SP26, and ISO with MetrixND®. The inputs are historical loads (with demand response added back in, without pumping loads), weather data, economic and demographic data, and calendar information. The second step uses a weather simulation program to generate 175 weather scenarios with 25 years of historical weather data from 1995 through 2019. Seven different weather scenarios are developed for each historical year to simulate calendar effects across the weekdays. The third step uses a peak simulation process to generate 175 annual peaks through the MetrixND® models based on the 175 weather scenarios with the output year set for 2019. The fourth step randomly generates 5,000 samples from each area's range of 175 annual peaks. A range of typical pump loads during summer peak conditions are added back into the loads. Finally, the weather normalized peak is calculated at the 50th percentile (1-in-2) of the 5,000 annual peak loads. Table 2 shows 2019 weather normalized peaks.

Table 2. 2019 Weather Normalized Peak Demand

2019	ISO	SP26	PG&E (also NP26)	SCE	SDGE
1-in-2	45,357	27,378	20,878	23,608	4,312
1-in-5	47,092	28,467	21,616	24,902	4,504
1-in-10	47,647	29,152	22,373	25,358	4,653

[1] The 631 daily maximum Heat Index (HI) is a weighted average weather variable calculated as 60 percent of a given day's maximum HI, 30 percent of prior day's maximum HI and 10 percent of two days prior maximum HI.
[2] The 631 daily maximum temperature is a weighted average weather variable calculated as 60 percent of a given day's maximum temperature, 30 percent of prior day's maximum temperature and 10 percent of two days prior maximum temperature.

3. 2020 Peak Demand Forecasts

The CAISO peak forecast utilizes the same daily peak load models as the weather normalized process with the output year set for 2020. Table 3 shows the peak load forecast results for 2020.

Table 3. 2020 Peak Demand Forecasts

2020	ISO	SP26	PG&E (also NP26)	SCE	SDGE
1-in-2	45,314	27,559	20,858	23,777	4,313
1-in-5	47,075	28,628	21,633	25,135	4,505
1-in-10	47,699	29,225	22,569	25,598	4,693

4. Historical Annual Peak Demand

Table 4 provides the historical annual peak loads from 2002 to 2019 from the CAISO EMS.

Table 4. Historical annual peak demands from 2002 to 2019

Year	ISO	SP26	PG&E (also NP26)	SCE	SDGE
2002	42,337	22,038	23,617	19,196	3,582
2003	42,584	24,625	20,893	20,703	3,922
2004	45,441	25,700	20,966	21,522	4,178
2005	45,304	26,394	21,097	22,391	4,079
2006	50,085	27,634	22,632	23,291	4,463
2007	48,491	28,251	21,245	23,831	4,592
2008	46,814	26,446	21,833	22,311	4,347
2009	45,807	26,742	19,946	22,287	4,455
2010	47,125	27,910	21,217	23,303	4,645
2011	45,429	27,631	19,703	23,276	4,355
2012	46,674	26,712	20,136	22,423	4,620
2013	44,941	27,058	20,928	22,514	4,605
2014	44,704	27,747	19,515	22,947	4,867
2015	47,257	27,475	20,462	22,863	4,721
2016	46,008	27,679	20,412	23,597	4,264
2017	49,900	28,776	21,714	24,186	4,477
2018	46,310	28,472	19,166	24,096	4,358
2019	44,148	27,117	21,091	22,924	4,088
Average[1]	46,725	27,904	20,569	23,533	4,382

[1] Average over last 5 years.

5. 2019 Weather Normalization Comparison

Table 5 provides the actual 2019 peak demands and the CAISO weather rankings for the peak day for each of the IOU TAC areas based on the CAISO weather normalization process (rows 1 & 2). Rows 3 and 4 show the CAISO and CEC weather normalization results and row 5 provides that amount that the CAISO normalized results is greater than the CEC results.

Table 5. 2019 Weather Normalization Comparison

2019 Demand and Weather at Time of Peak	PG&E	SCE	SDGE
1) 2019 Actual Peak Demand	21,091	22,924	4,088
2) 2019 Actual Weather Percentile Ranking[1]	55%	20%	24%
3) CAISO Normalized Peak Demand	20,878	23,608	4,312
4) CEC Normalized Peak Demand	20,468	22,708	4,126
5) ISO Normalized Peak Demand Compared to CEC	2.0%	4.0%	4.5%

[1] 50% is equivalent to 1-in-2. Greater than 50% is hotter than normal, less than 50% is cooler than normal.

6. Conclusion and Request to the CEC

The CAISO's weather normalization results provided in row 3 of Table 5 are what the peak amounts would have been under 50 percentile weather conditions. Based on the CAISO's analyses, all of the normalized peaks developed by the CEC are low. PG&E is within 2% (row 5 of Table 5), which could be considered within a threshold of reasonableness. However, SCE and SDG&E are 4.0% and 4.5% lower respectively than the CAISO amounts. The weather in the SCE area was below normal, however, the CEC normalized load for SCE is lower than SCE's actual peak demand. The CAISO believes the CEC normalized load for SCE is contradictory to the fact that SCE's actual weather during the 2019 peak was below normal weather. The weather in the SDG&E area was below normal as well, and while the CEC normalized load for SDG&E is greater than SDG&E's actual peak demand, the CAISO believes the CEC normalized load for SDG&E is also low.

The CAISO requests that the CEC provide an equivalent weather percentile ranking as the CAISO's amounts shown in row 2 of Table 5. The CAISO requests that the PG&E normalized load be increased to be within 1% of the CAISO's amount. Of greater concern are the normalized amounts for SCE and SDG&E. The CAISO

requests the CEC normalized amount be increased to within 1% of the CAISO's normalized amounts as well. The figures in slides 17 and 18 of the Hourly Load Model presentation, TN# 230924, show the monthly peaks in the winter months are too high, while the summer monthly peaks are too low. Increasing the CEC normalized 2019 peak demands for SCE and SDG&E would correct this by increasing the summer demands and lowering the winter demand (while keeping the energy under each curve unchanged).