Flexible Capacity Needs and Availability Assessment Hours Technical Study for 2021

Clyde Loutan
Principal, Renewable Energy Integration

Hong Zhou
Lead Market Development Analyst, Short-Term Forecasting

Jessica Taheri
Energy Meteorologist, Short-Term Forecasting

April 14th, 2020

What's the purpose of this call?

To discuss the assumptions, methodology, and draft results of the monthly flexible capacity requirement and Availability Assessment Hours Technical Study.

Specifically

Calculating requirements for all LRAs within the ISO footprint for RA compliance year 2021 and advisory flexible capacity requirements for compliance years 2022 and 2023

Agenda / Overview

- Background
- Process review
  - Expected build out from all LSEs (CPUC jurisdictional and non-jurisdictional)
  - Load, wind and solar profiles
  - Calculate 3-hour net load upward ramps
  - Add contingency reserves
  - Calculate monthly Flexible Capacity requirement
- Overview of methodology used for system/local availability assessment hours
  - 2021 availability assessment hours
  - 2022-2023 draft availability assessment hours

Each LSE Scheduling Coordinator shall make a year-ahead and month-ahead showing of flexible capacity for each month of the compliance year

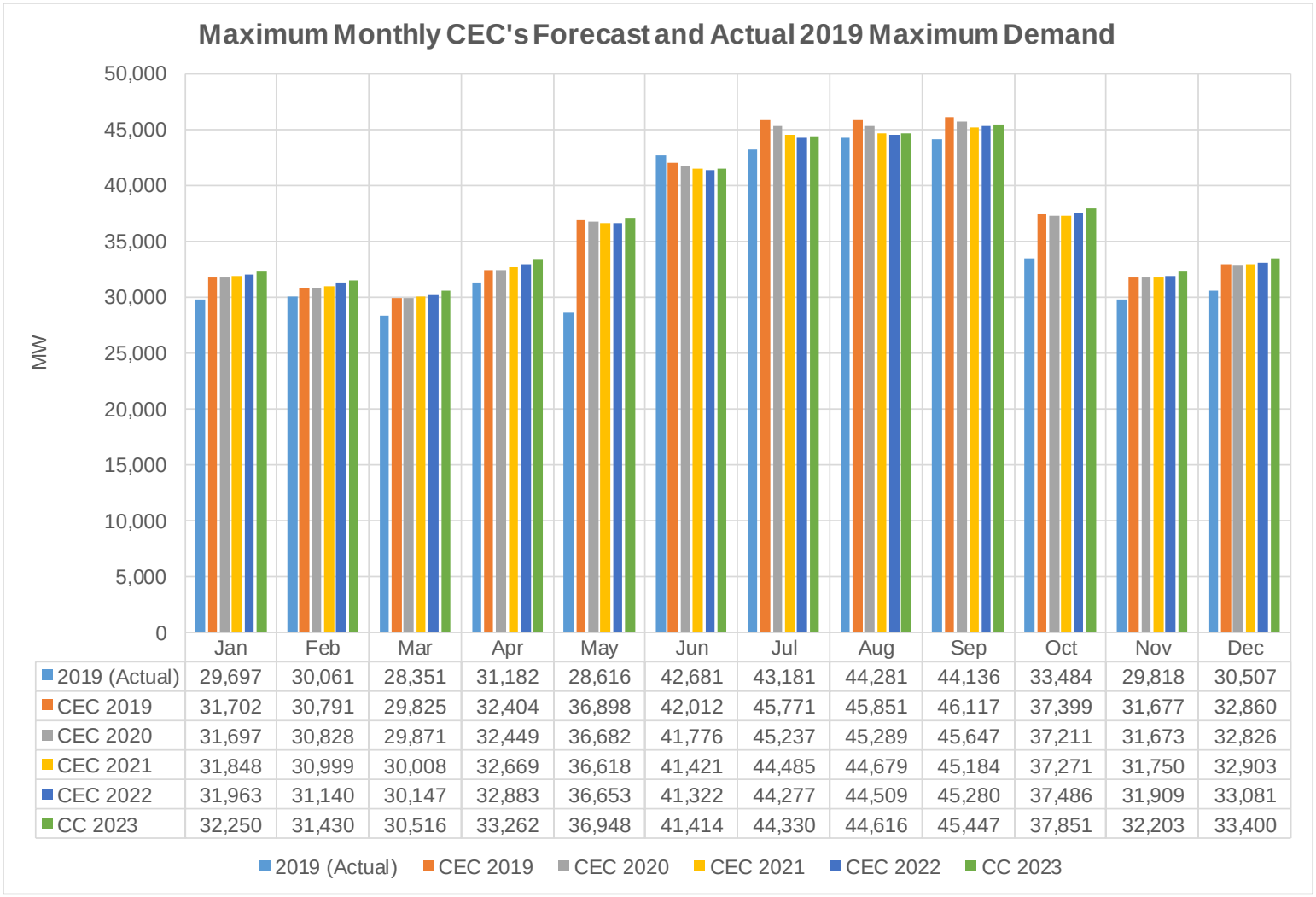
Resource Adequacy (RA)

- Ensure LSEs contract for adequate capacity to meet expected flexible needs
- Year ahead: LSEs need to secure a minimum of 90% of the next years monthly needs
- Month ahead: LSEs need to secure adequate net qualified capacity to serve their peak load including a planning reserve margin and flexible capacity to address largest 3-hour net load ramps plus contingency reserves
- All resources participating in the ISO markets under an RA contract will have an RA must-offer-obligation
- Required to submit economic bids into the ISO's real-time market consistent with the category of flexible capacity

The ISO used the following data to determine the flexible capacity

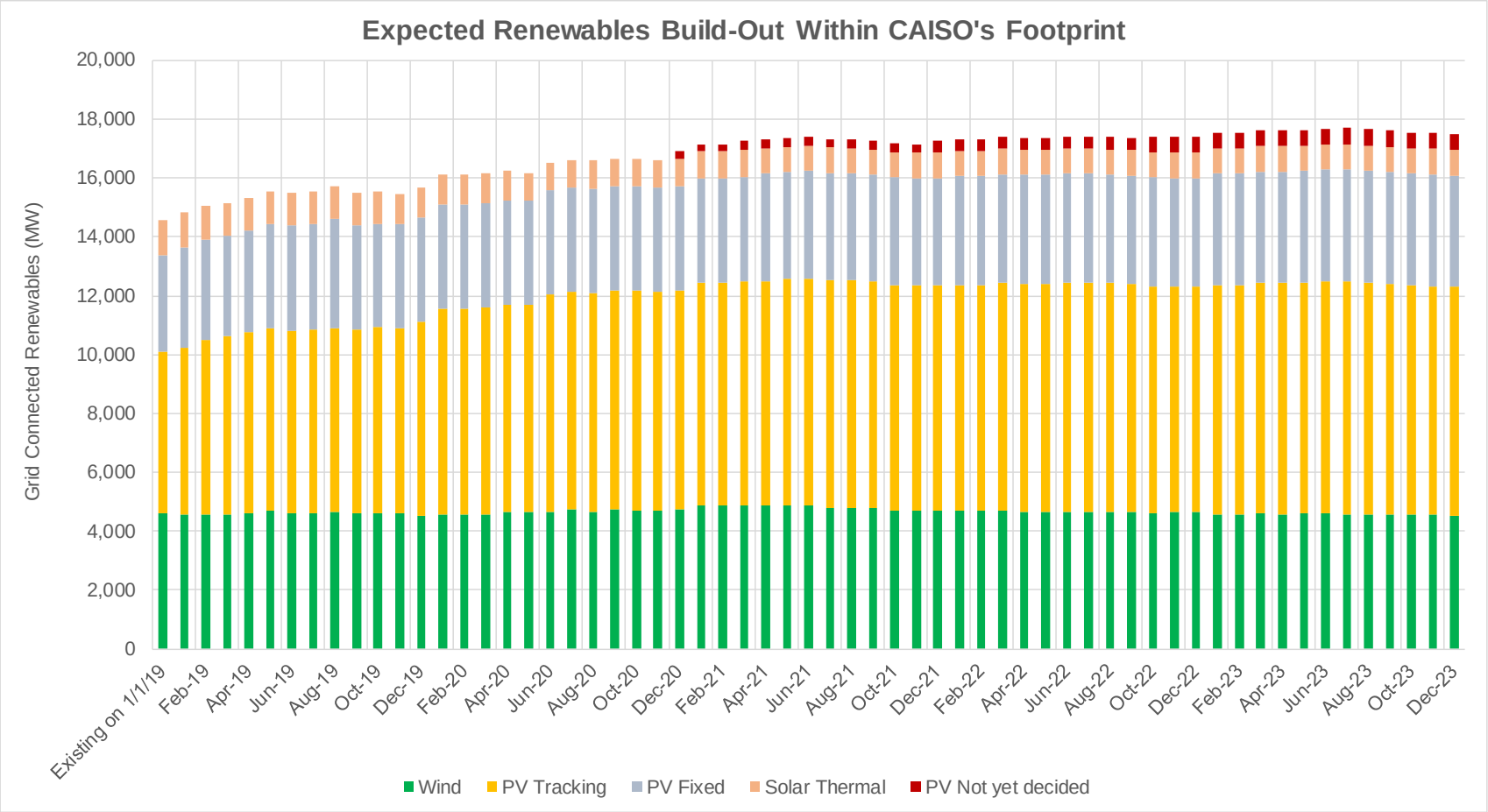
- CEC's IEPR demand forecast for 2021 through 2023
  - Behind-the-meter hourly solar PV production
  - Hourly AAEE
- LSE SCs updated renewable build-out for 2019 through 2023
- The data included:
  - Installed capacity by technology and expected operating date (e.g. Solar thermal, solar PV tracking, solar PV non-tracking, estimate of behind-the-meter solar PV, hybrid, co-located, etc.) for all variable energy resources under contract
  - Operational date or expected on-line date
  - Location of CREZ latitude and longitude coordinates
  - Resources located outside ISO's BAA indicated if the resources are firmed or non-firmed

CEC's (1-in-2) ISO coincident peak forecast

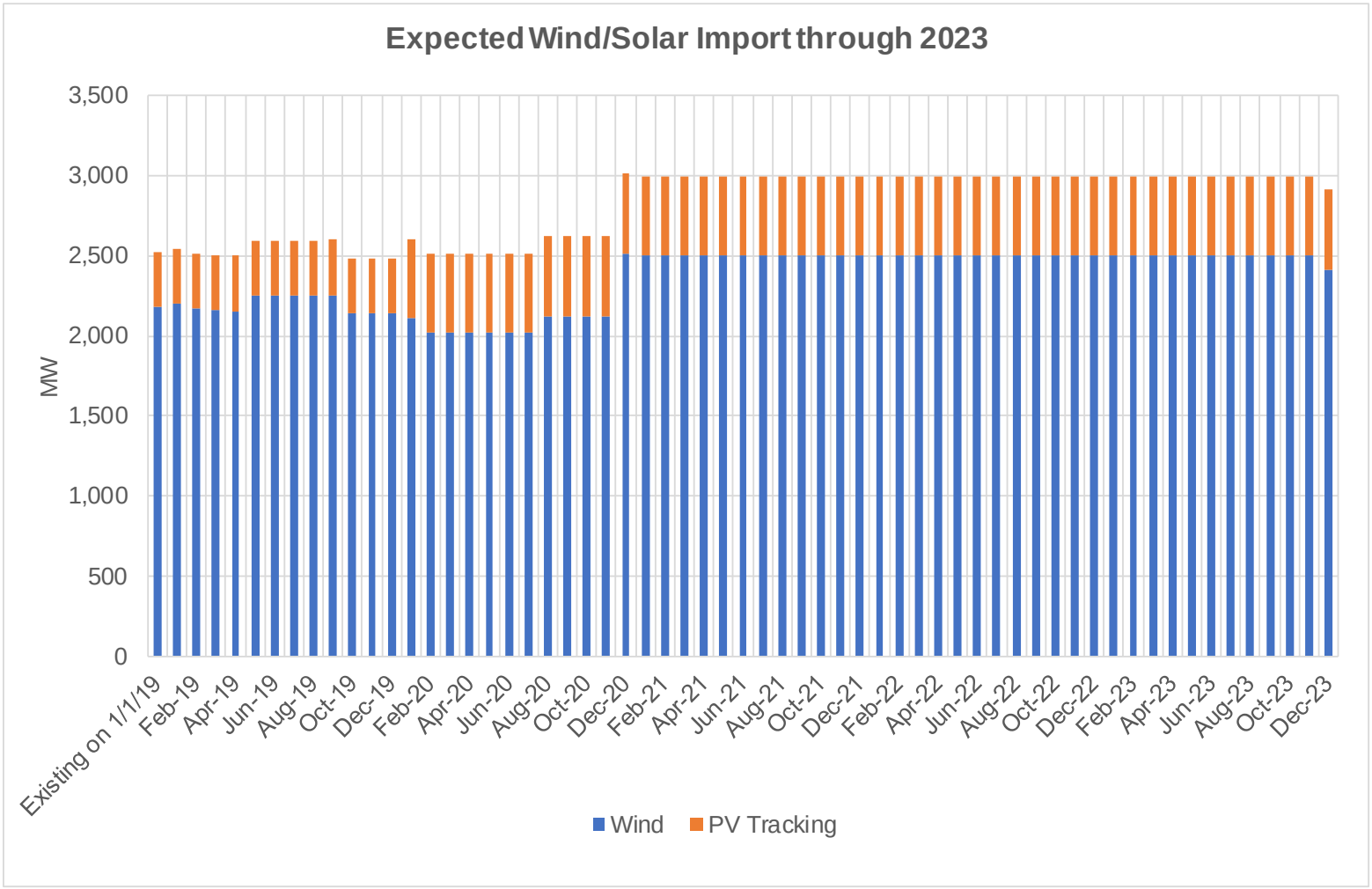


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019 (Actual)	29,697	30,061	28,351	31,182	28,616	42,681	43,181	44,281	44,136	33,484	29,818	30,507
CEC 2019	31,702	30,791	29,825	32,404	36,898	42,012	45,771	45,851	46,117	37,399	31,677	32,860
CEC 2020	31,697	30,828	29,871	32,449	36,682	41,776	45,237	45,289	45,647	37,211	31,673	32,826
CEC 2021	31,848	30,999	30,008	32,669	36,618	41,421	44,485	44,679	45,184	37,271	31,750	32,903
CEC 2022	31,963	31,140	30,147	32,883	36,653	41,322	44,277	44,509	45,280	37,486	31,909	33,081
CC 2023	32,250	31,430	30,516	33,262	36,948	41,414	44,330	44,616	45,447	37,851	32,203	33,400

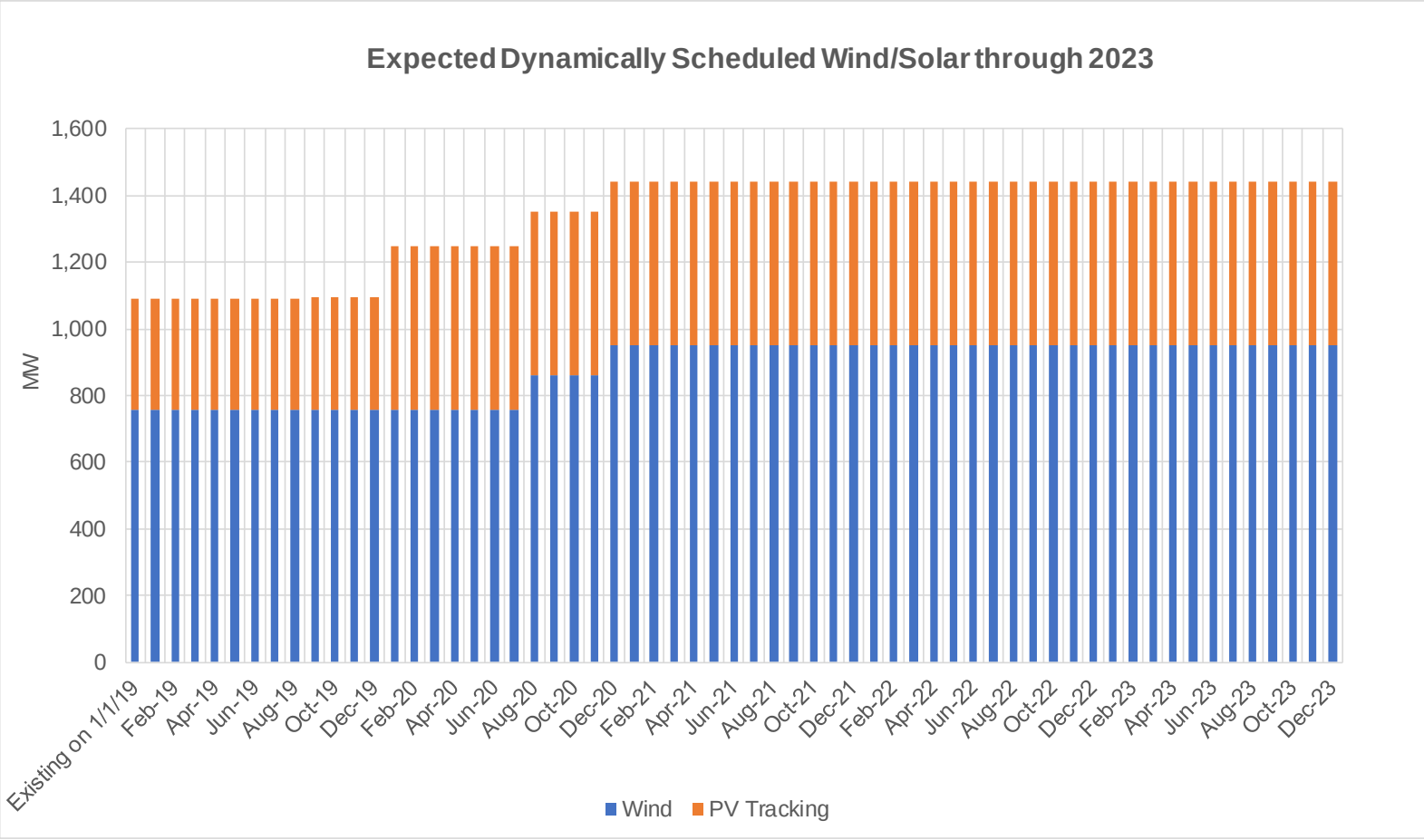
Expected renewable buildout through December 2023 based on LSE's submittal



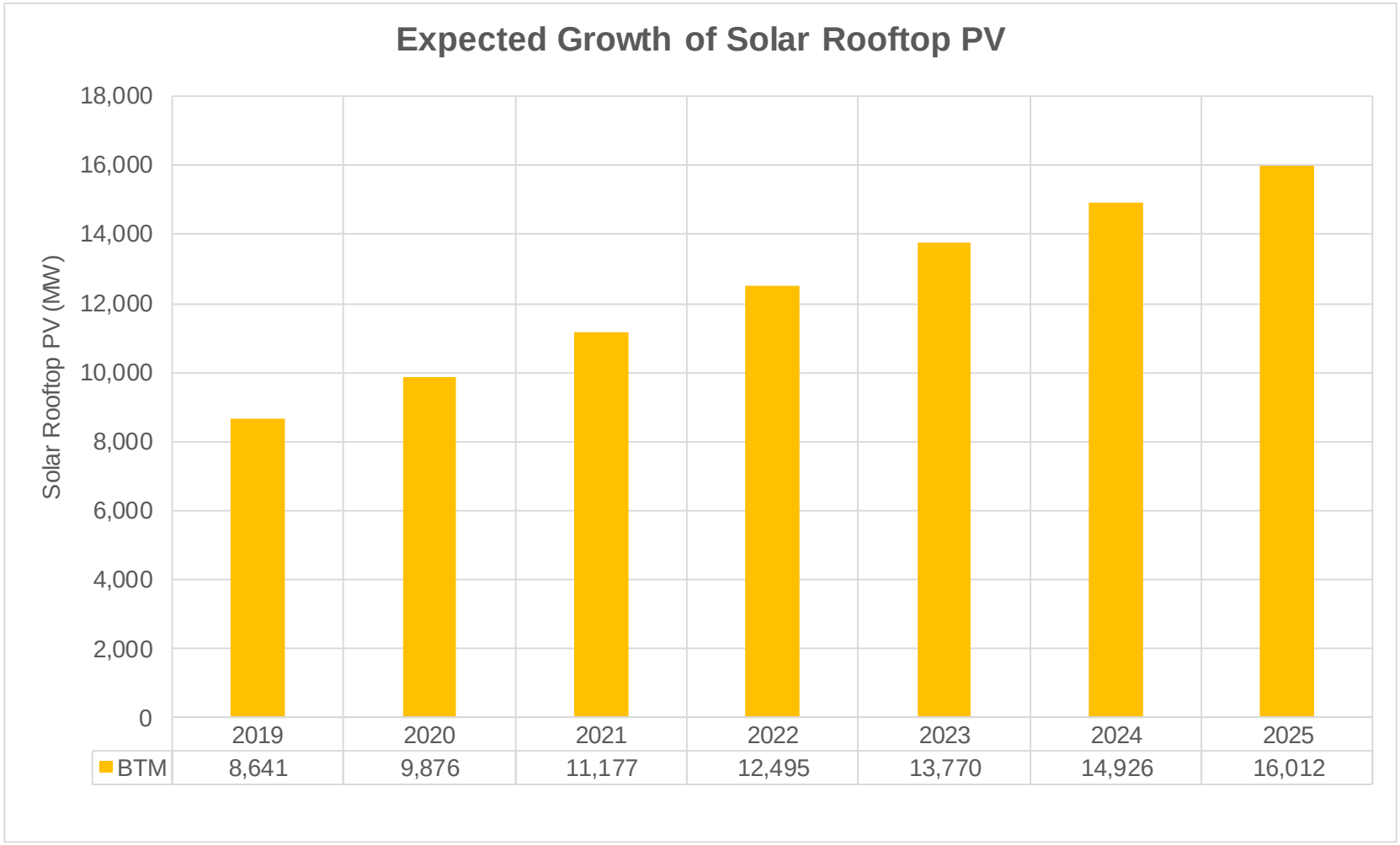
Expected wind/solar imports through December 2023 based on LSE's submittal



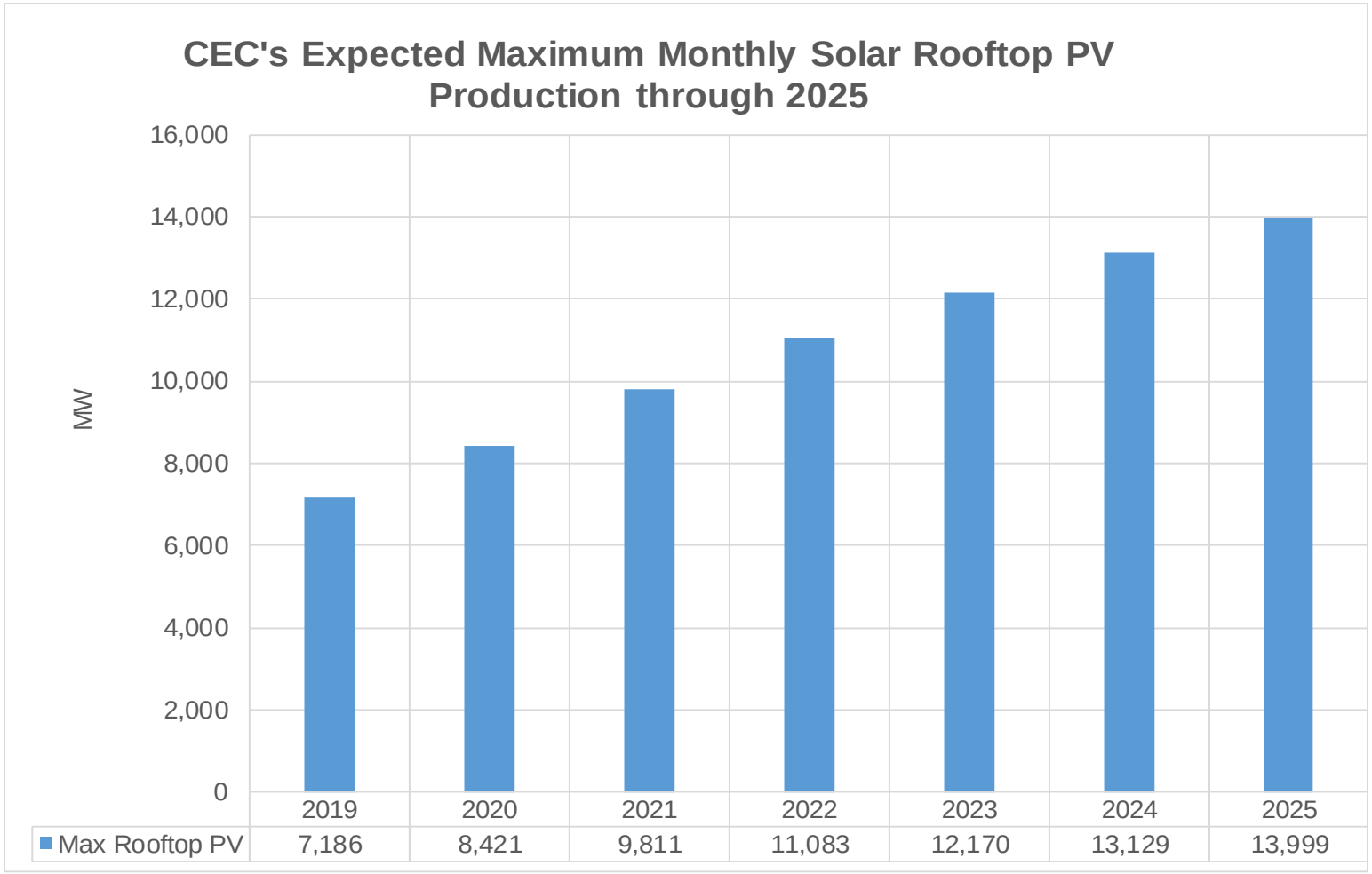
Expected dynamically wind/solar imports through December 2023 based on LSE's submittal



Expected BTM build-out through December 2025 based on LSE's submittal



CEC's forecast of the expected BTM maximum monthly production



Summary of LSEs submittal

Resource Type	***Existing VERs 2019 (MW)***	***Expected 2020 (MW)***	***Expected 2021 (MW)***
ISO Solar PV	10,151	11,244	11,690
ISO Solar Thermal	1,018	938	858
ISO Wind	4,513	4,730	4,712
Total Variable Energy Resource Capacity in the 2021 Flexible Capacity Needs Assessment	***15,682***	***16,911***	***17,260***
Non ISO Solar Resources that's Dynamically Scheduled into the ISO	347	500	500
Non ISO Wind Resources that's Dynamically Scheduled into the ISO	755	950	950
Total Internal and dynamically scheduled VERs in 2021 Flexible Capacity Needs Assessment	***16,785***	***18,362***	***18,710***
Incremental New Additions Each Year		1,577	348
Incremental behind-the-meter Solar PV Capacity submitted by LSEs**		1,235	1,317

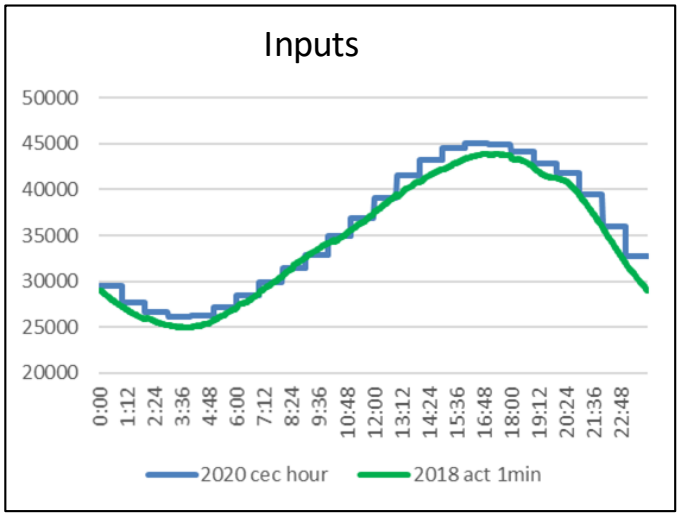
The ISO flexibility capacity assessment is based on current LSE's RPS build-out data

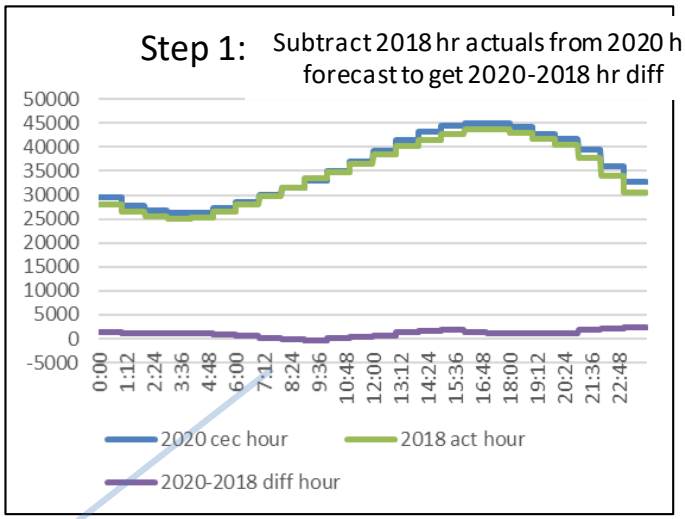
- Uses the most current data available for renewable build-out obtained from all LSE SCs
- For new renewable installation scale 2019 actual production data based on the expected installed capacity in subsequent years
- Generate net-load profiles for 2021 through 2023
  - Generate load profiles for 2021 through 2023
  - Generate solar profiles for 2021 through 2023
  - Generate wind profiles for 2021 through 2023

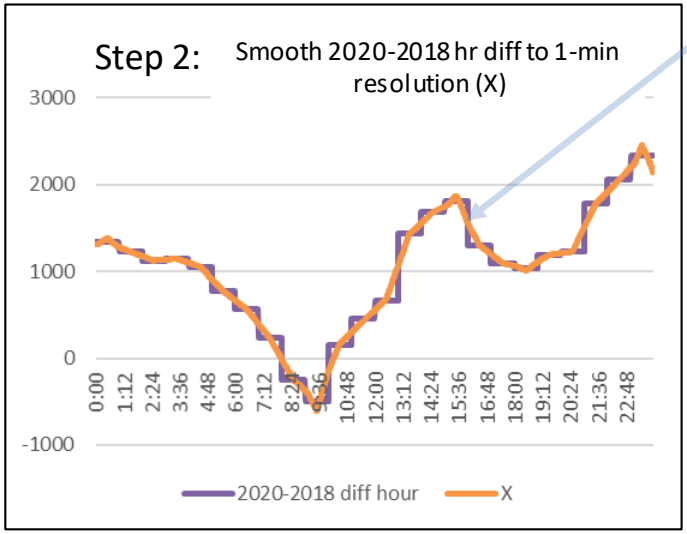
The ISO used the CEC's 1-in-2 IEPR forecast to develop the load forecast

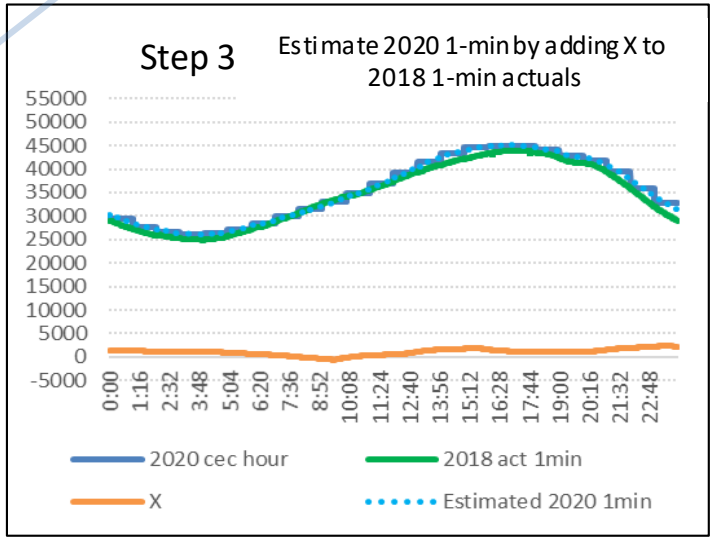
- CEC IEPR Load Forecast
  - https://ww2.energy.ca.gov/2019_energypolicy/documents/Demand_2020-2030_revised_forecast_hourly.php
  - Title of File: "CED 2019 Hourly Results - CAISO - MID-MID"
    - CAISO will be using Managed Net Load (column S) within the spreadsheet
      - **Managed Net Load (col S)** = Baseline Net Load (col R)
        - AAEE (col Q)
      - Baseline Net Load (col R) = Baseline Consumption (col M)
        - BTM PV (col N)
        - BTM Storage Res (col O)
        - BTM Storage NonRes (col P)
      - Baseline Consumption (col M) = unadjusted consumption (col E)
        + Pumping (col F)
        + climate change (col H)
        + light duty EV (col I)
        + mdhd EV (col J)
        + TOU impacts (col K)
        + other adjustments (col L)

Smoothing 1-minute load profile









Hourly load forecast to 1-minute load forecast

- Used 2019 actual 1-minute load data to build 1-minute load profiles for subsequent years
- Scaled the hourly CEC load forecast value of each hour into 1-minute forecast data using a smoothing equation looking at the differences between the forecasted year and the 2019 1-minute actuals

2021 Load 1-Minute Forecast

- **2021 $L_{CECfcst\_1min}$ = 2019 L_{Act_1min} + X**
  - **Where X = Interpolated 1min profile from the difference (2021 $L_{CECfcst\_hourly}$ - 2019 L_{actual_hourly})**

2022 Load 1-Minute Forecast

- **2022 $L_{CECfcst\_1min}$ = 2019 L_{Act_1min} + X**
  - **Where X = Interpolated 1min profile from the difference (2022 $L_{CECfcst\_hourly}$ - 2019 L_{actual_hourly})**

Solar growth assumptions through 2023

- Used the actual solar 1-minute solar production data for 2019 to develop the 1-minute solar profiles for 2020 through 2023
- Scaled 1-minute solar data using the forecast monthly solar capacity for the new plants scheduled to be operational in 2019
- Repeated the above steps for 2021, 2022 & 2023

$$2020\ S_{Mth\_Sim\_1min} = 2019\ S_{Act\_1min} * \frac{2020\ S_{Mth\ Capacity}}{2019\ S_{Mth\ Capacity}}$$

$$2021\ S_{Mth\_Sim\_1min} = 2019\ S_{Act\_1min} * \frac{2021\ S_{Mth\ Capacity}}{2019\ S_{Mth\ Capacity}}$$

$$2022\ S_{Mth\_Sim\_1min} = 2019\ S_{Act\_1min} * \frac{2022\ S_{Mth\ Capacity}}{2019\ S_{Mth\ Capacity}}$$

$$2023\ S_{Mth\_Sim\_1min} = 2019\ S_{Act\_1min} * \frac{2023\ S_{Mth\ Capacity}}{2019\ S_{Mth\ Capacity}}$$

Net-load is a NERC accepted metric[1] for evaluating additional flexibility needs to accommodate VERs

- Net load is defined as load minus wind and solar power production
- Net load variability increases as more and more wind and solar resources are integrated into the system
- The monthly 3-hour flexible capacity need equates to the largest upward change in net load when looking across a rolling 3-hour evaluation window
- The ISO dispatches flexible resources (including renewable resources with energy bids) to meet net load

1 NERC Special Report
Flexibility Report Requirements and metrics for Variable Generation: Implications for System Planning Studies, August 2010 . http://www.nerc.com/files/IVGTF_Task_1_4_Final.pdf

The flexible capacity methodology should provide the ISO with sufficient flexible capacity

Methodology

Flexible Req_{MTHy}= Max[$(3RR_{HRx})_{MTHy}$] + Max(MSSC, 3.5%*$E(PL_{MTHy})$) + ε

Where:

Max[$(3RR_{HRx})_{MTHy}$] = Largest 3-hour contiguous ramp starting in hour x for month y

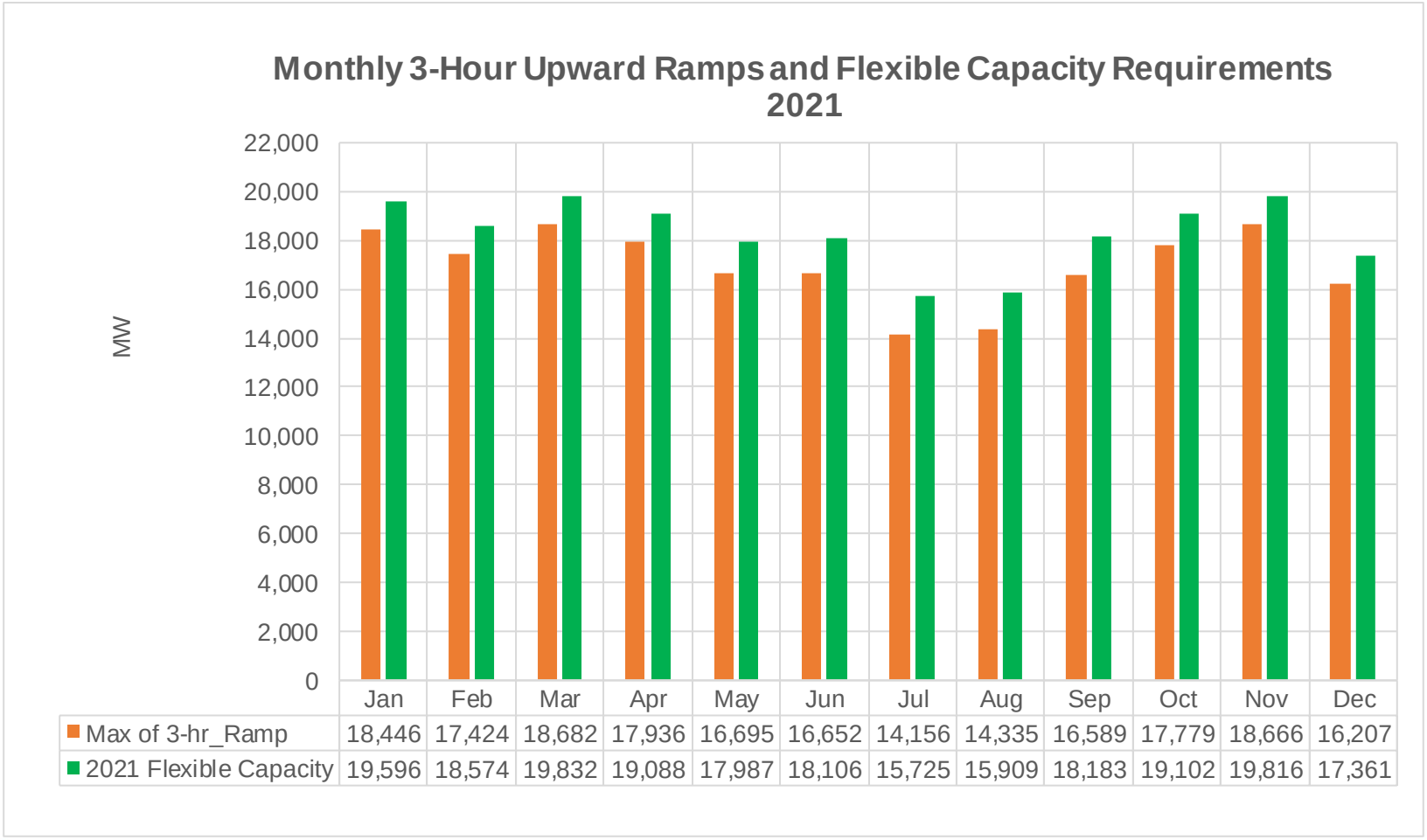
E(PL) = Expected peak load

MTH_y = Month $_y$

MSSC = Most Severe Single Contingency

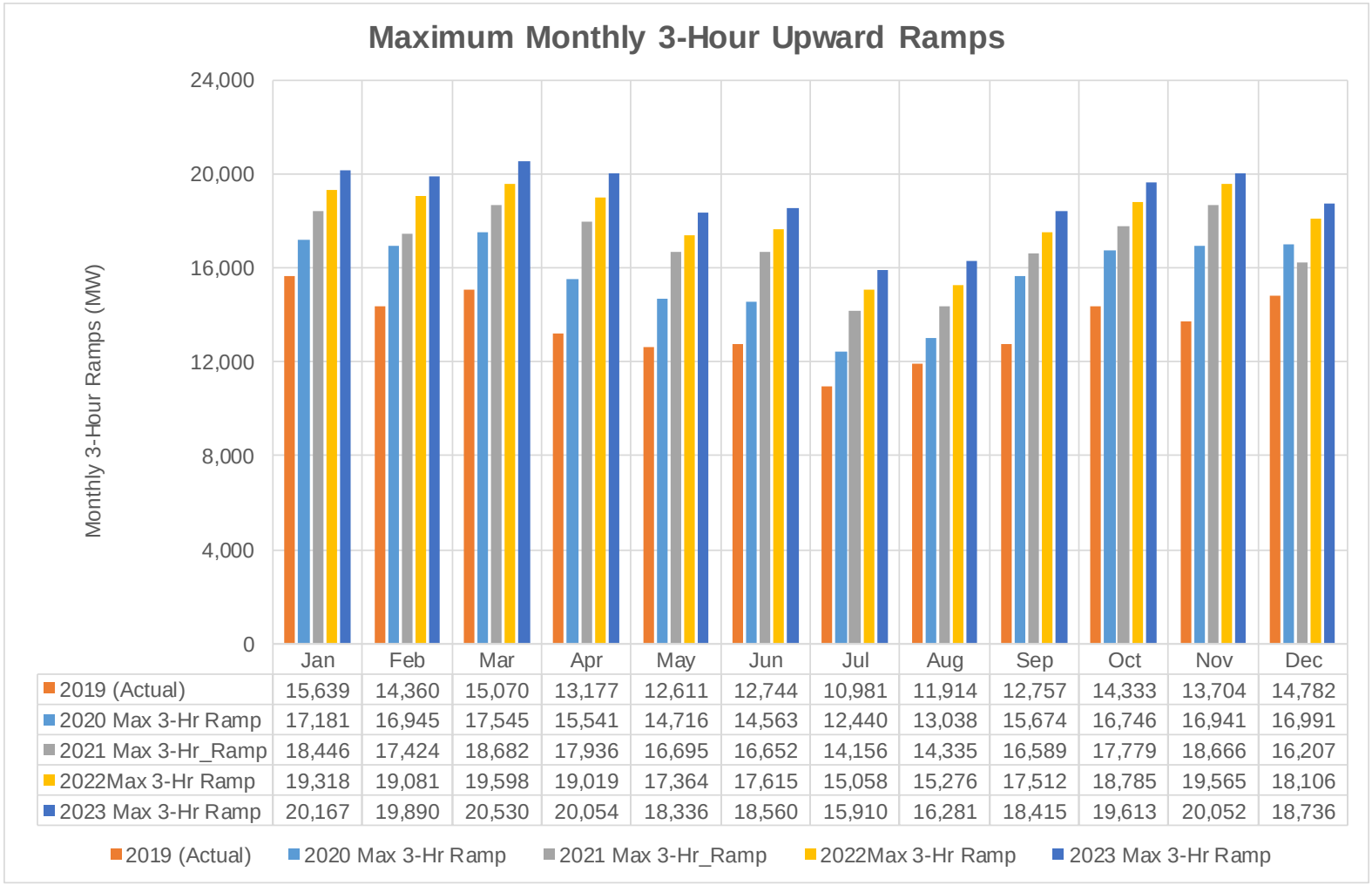
ε = Annually adjustable error term to account for load forecast errors and variability. ε is currently set at zero

Monthly 3-Hour upward ramps and total flexible capacity requirements



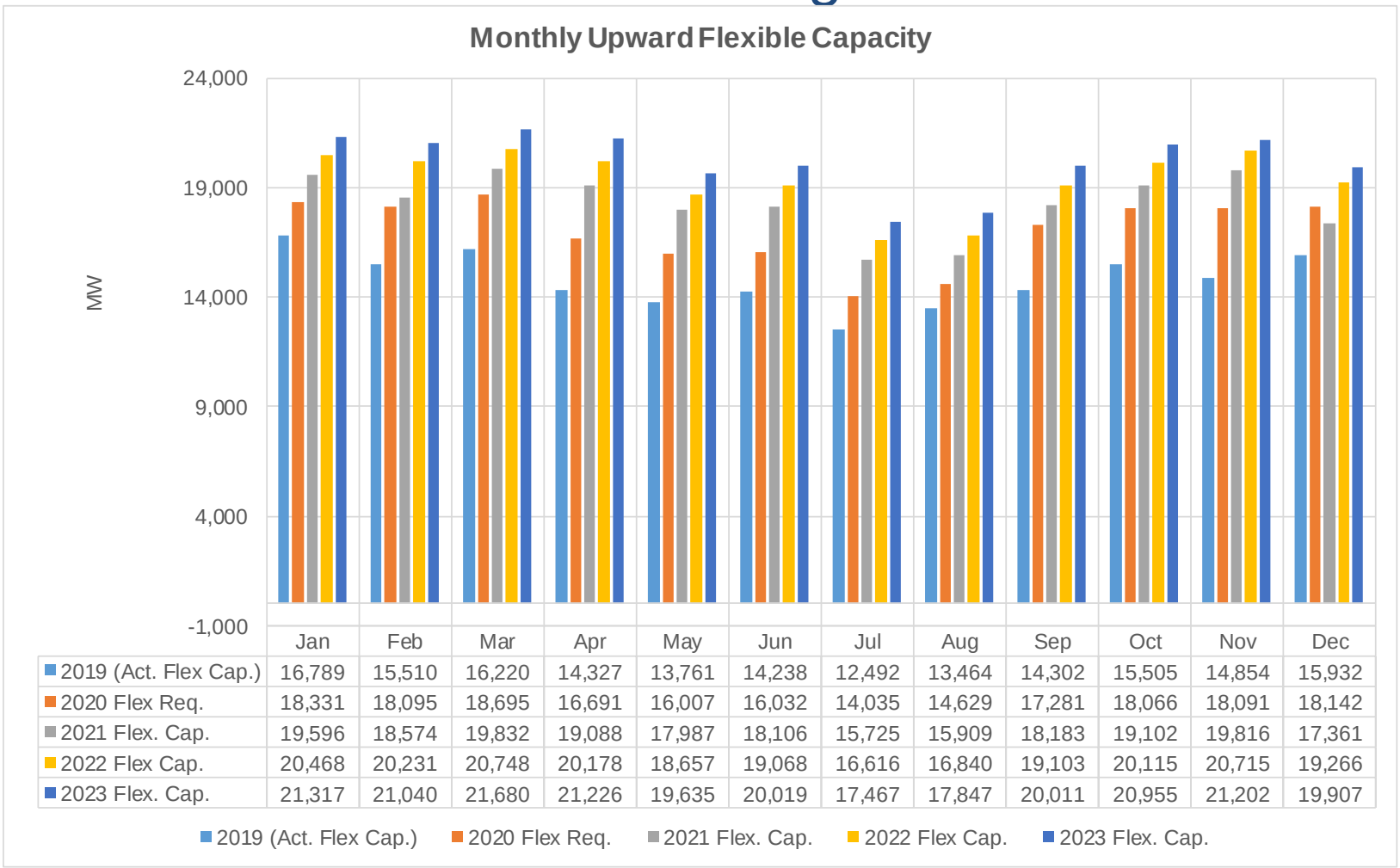
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max of 3-hr_Ramp	18,446	17,424	18,682	17,936	16,695	16,652	14,156	14,335	16,589	17,779	18,666	16,207
2021 Flexible Capacity	19,596	18,574	19,832	19,088	17,987	18,106	15,725	15,909	18,183	19,102	19,816	17,361

Maximum monthly 3-hour upward ramps using CEC's load forecast for 2020 through 2023



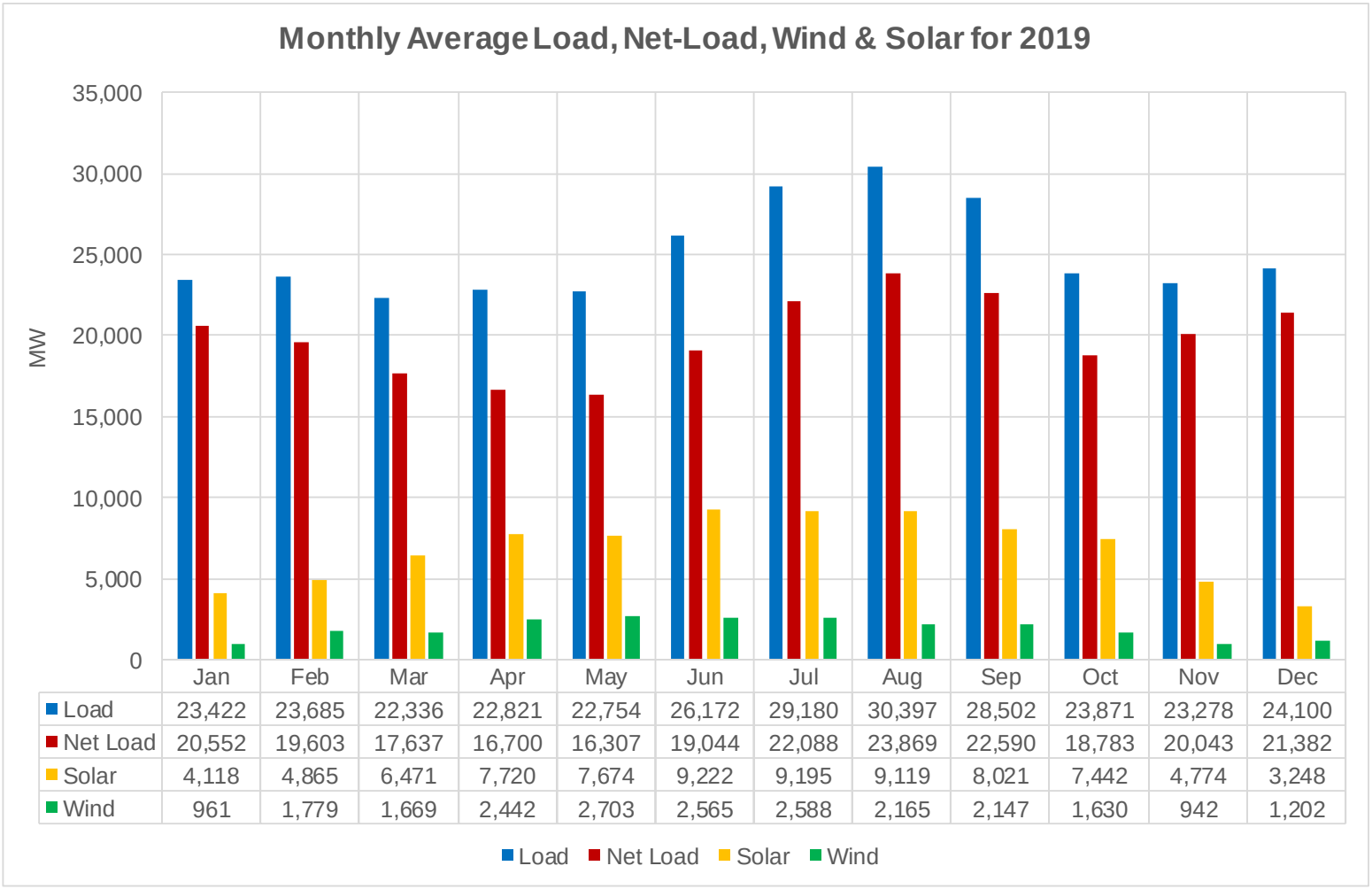
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019 (Actual)	15,639	14,360	15,070	13,177	12,611	12,744	10,981	11,914	12,757	14,333	13,704	14,782
2020 Max 3-Hr Ramp	17,181	16,945	17,545	15,541	14,716	14,563	12,440	13,038	15,674	16,746	16,941	16,991
2021 Max 3-Hr_Ramp	18,446	17,424	18,682	17,936	16,695	16,652	14,156	14,335	16,589	17,779	18,666	16,207
2022Max 3-Hr Ramp	19,318	19,081	19,598	19,019	17,364	17,615	15,058	15,276	17,512	18,785	19,565	18,106
2023 Max 3-Hr Ramp	20,167	19,890	20,530	20,054	18,336	18,560	15,910	16,281	18,415	19,613	20,052	18,736

Maximum monthly total flexible capacity requirement using CEC's load forecast for 2020 through 2023



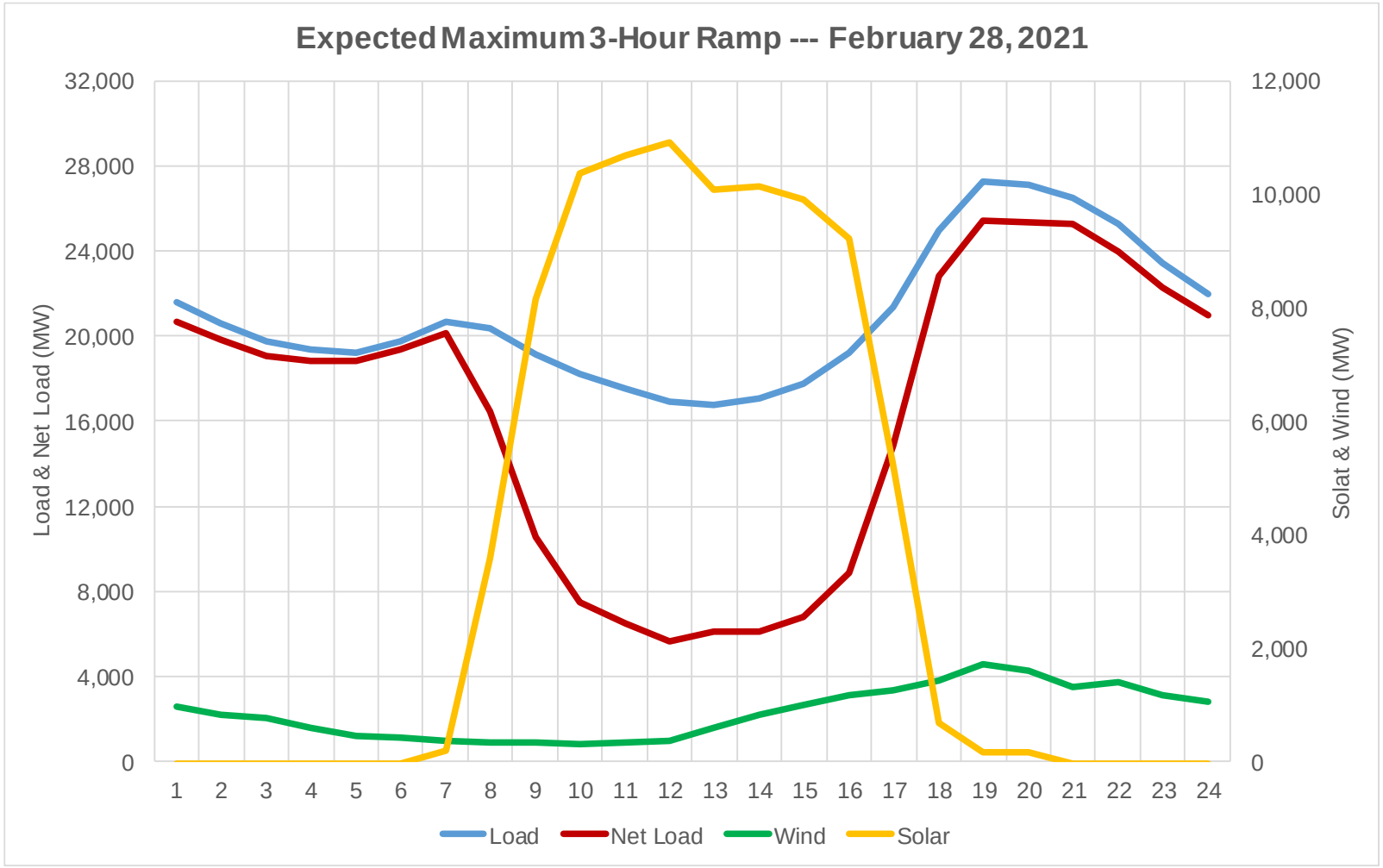
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019 (Act. Flex Cap.)	16,789	15,510	16,220	14,327	13,761	14,238	12,492	13,464	14,302	15,505	14,854	15,932
2020 Flex Req.	18,331	18,095	18,695	16,691	16,007	16,032	14,035	14,629	17,281	18,066	18,091	18,142
2021 Flex. Cap.	19,596	18,574	19,832	19,088	17,987	18,106	15,725	15,909	18,183	19,102	19,816	17,361
2022 Flex Cap.	20,468	20,231	20,748	20,178	18,657	19,068	16,616	16,840	19,103	20,115	20,715	19,266
2023 Flex. Cap.	21,317	21,040	21,680	21,226	19,635	20,019	17,467	17,847	20,011	20,955	21,202	19,907

Average actual monthly load, net load, wind and solar for 2019

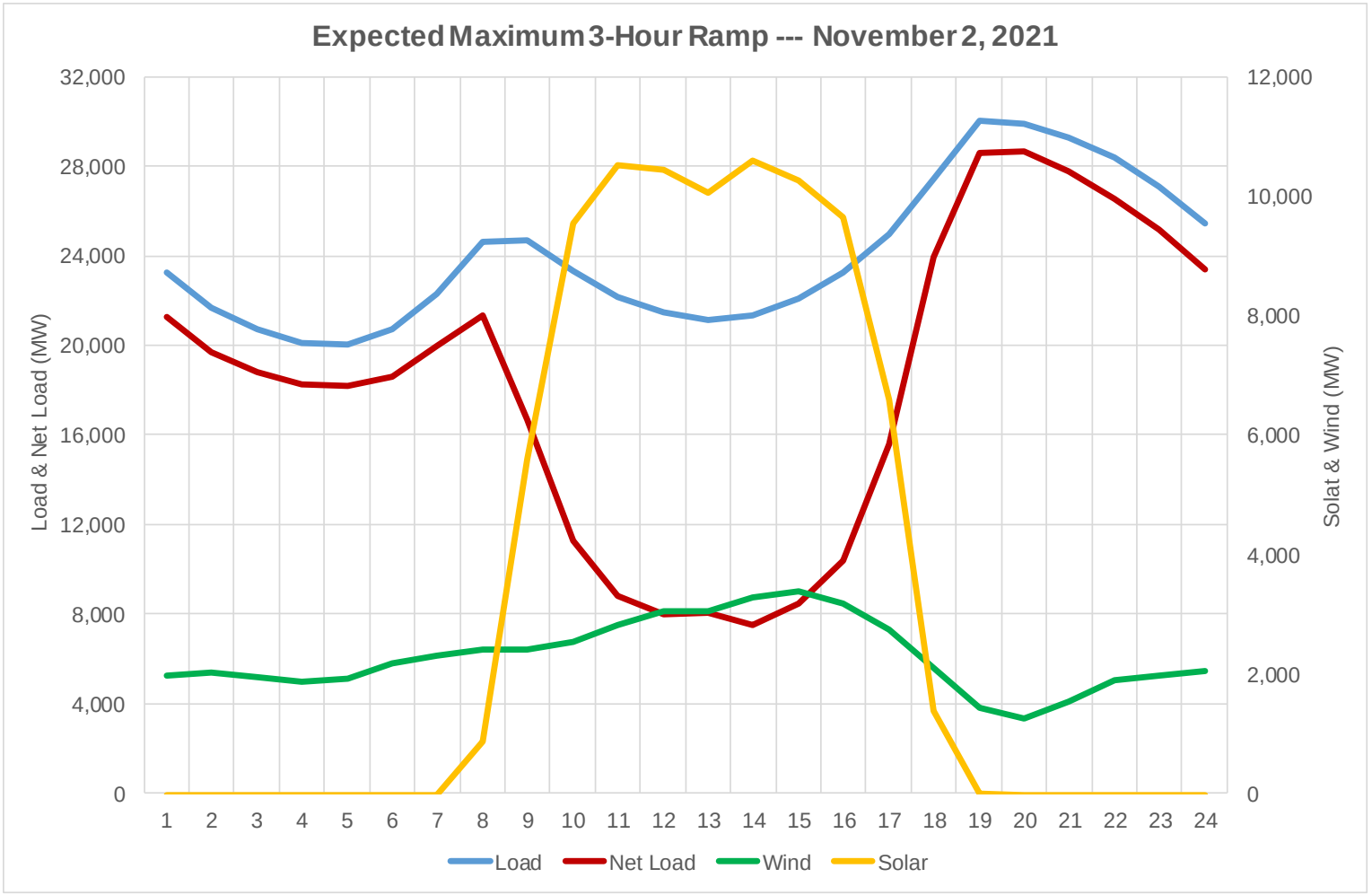


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Load	23,422	23,685	22,336	22,821	22,754	26,172	29,180	30,397	28,502	23,871	23,278	24,100
Net Load	20,552	19,603	17,637	16,700	16,307	19,044	22,088	23,869	22,590	18,783	20,043	21,382
Solar	4,118	4,865	6,471	7,720	7,674	9,222	9,195	9,119	8,021	7,442	4,774	3,248
Wind	961	1,779	1,669	2,442	2,703	2,565	2,588	2,165	2,147	1,630	942	1,202

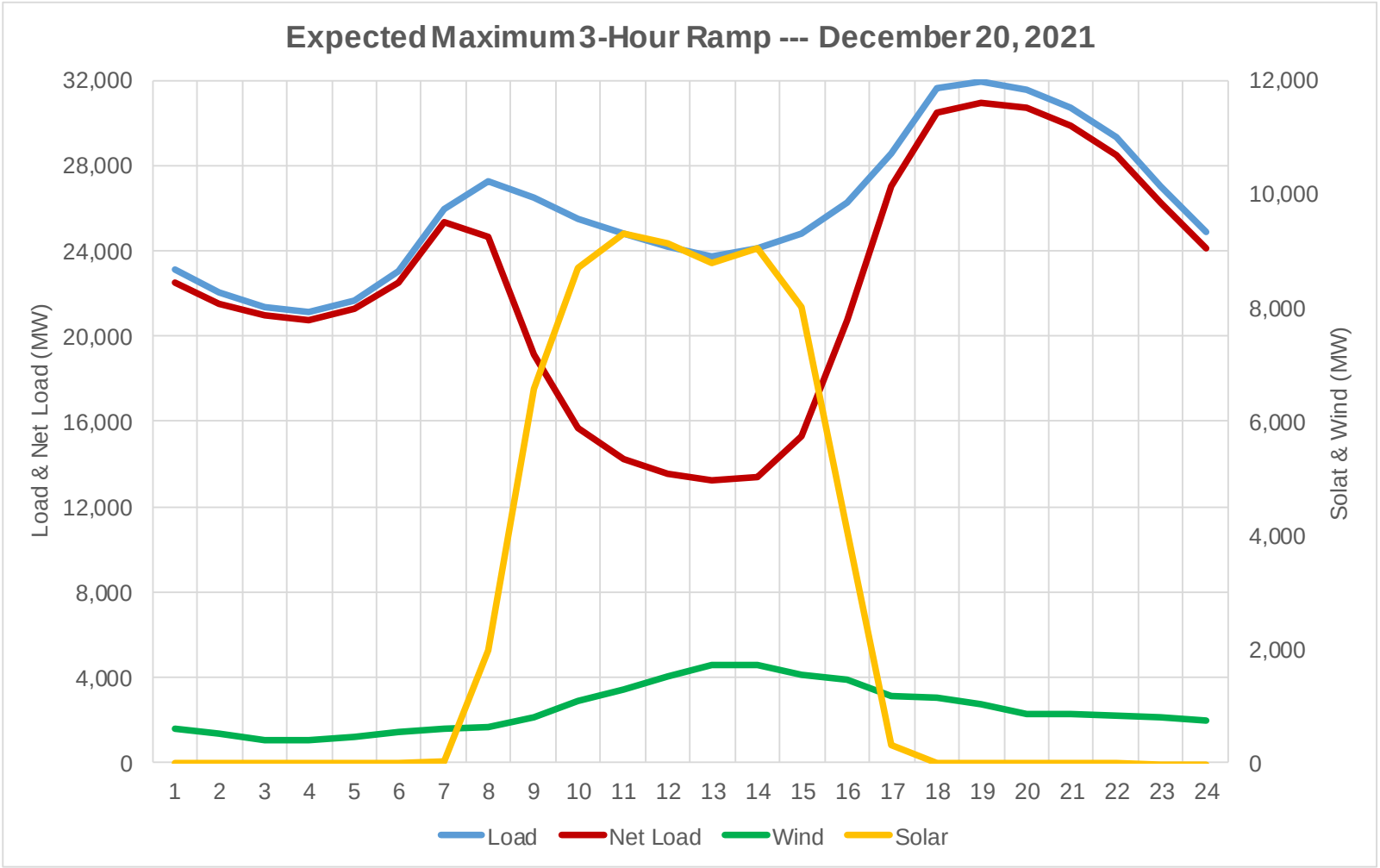
The assessment shows February 28, 2021 as having the expected maximum 3-Hour ramp



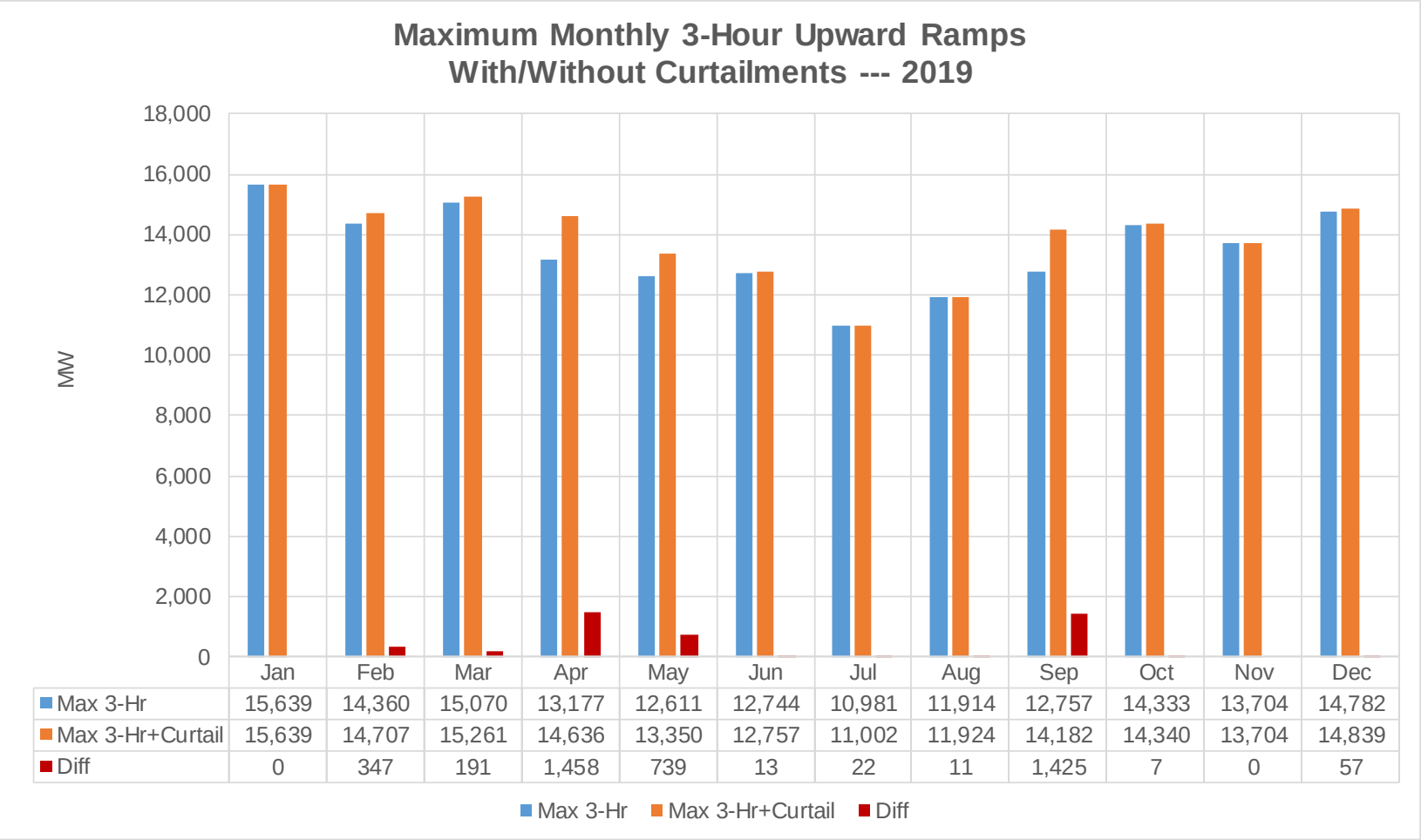
The assessment shows November 2, 2021 as having the expected maximum 3-Hour ramp



The assessment shows December 20, 2021 as having the expected maximum 3-Hour ramp

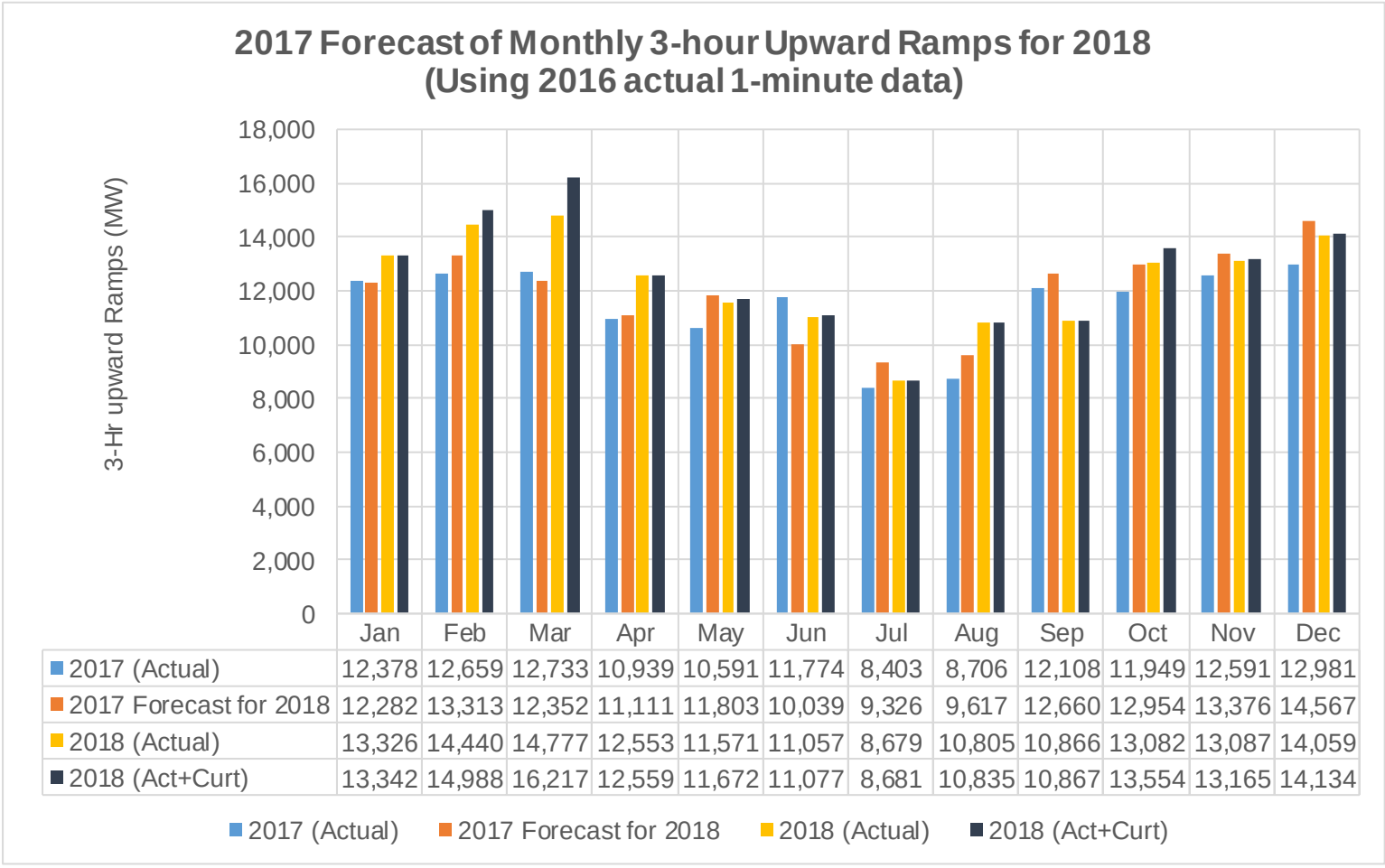


Maximum monthly 3-hour upward ramps with and without curtailments in 2019

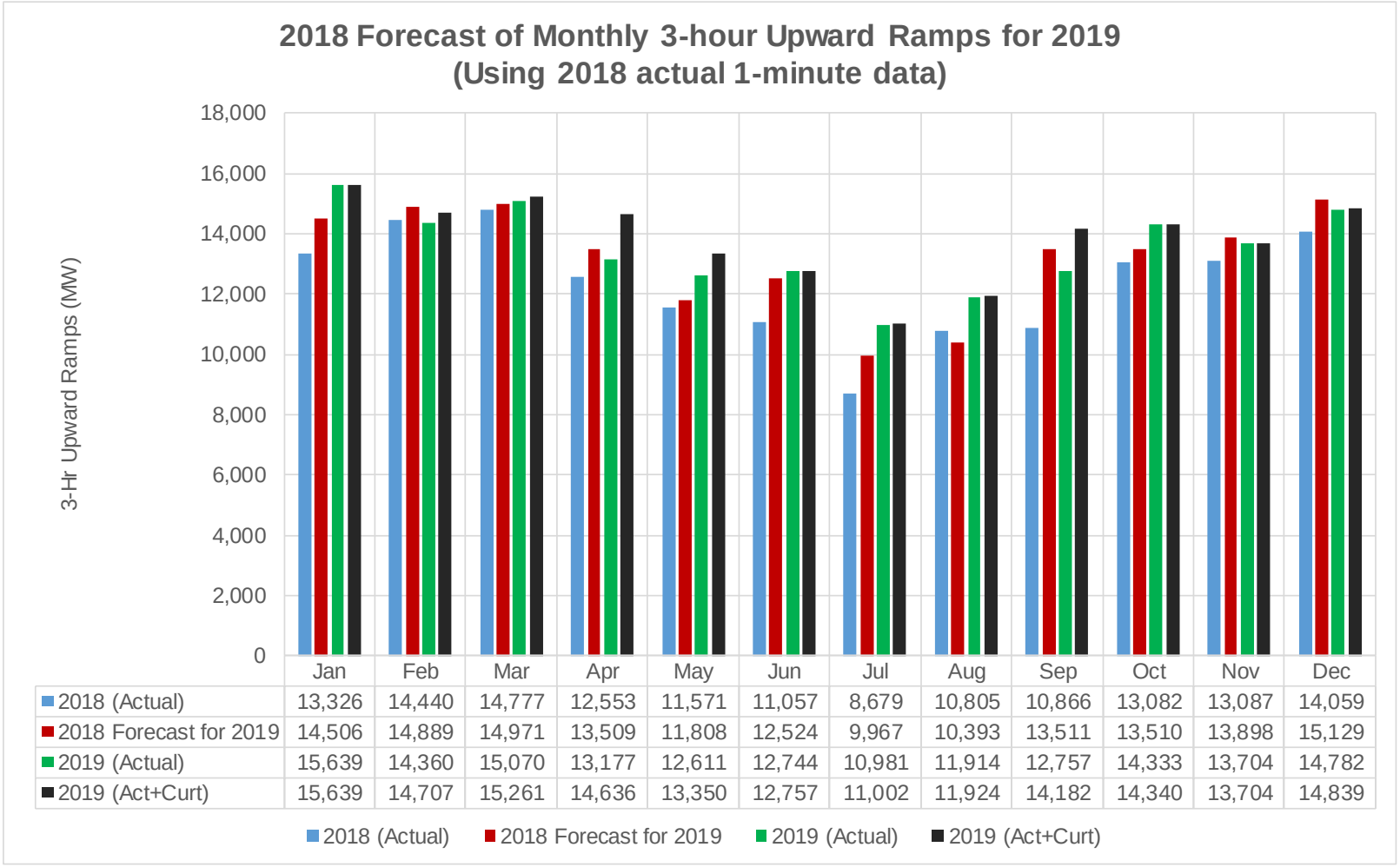


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max 3-Hr	15,639	14,360	15,070	13,177	12,611	12,744	10,981	11,914	12,757	14,333	13,704	14,782
Max 3-Hr+Curtail	15,639	14,707	15,261	14,636	13,350	12,757	11,002	11,924	14,182	14,340	13,704	14,839
Diff	0	347	191	1,458	739	13	22	11	1,425	7	0	57

2017 forecast of maximum monthly 2018 upward 3-hour ramps using 2016 actual 1-minute data

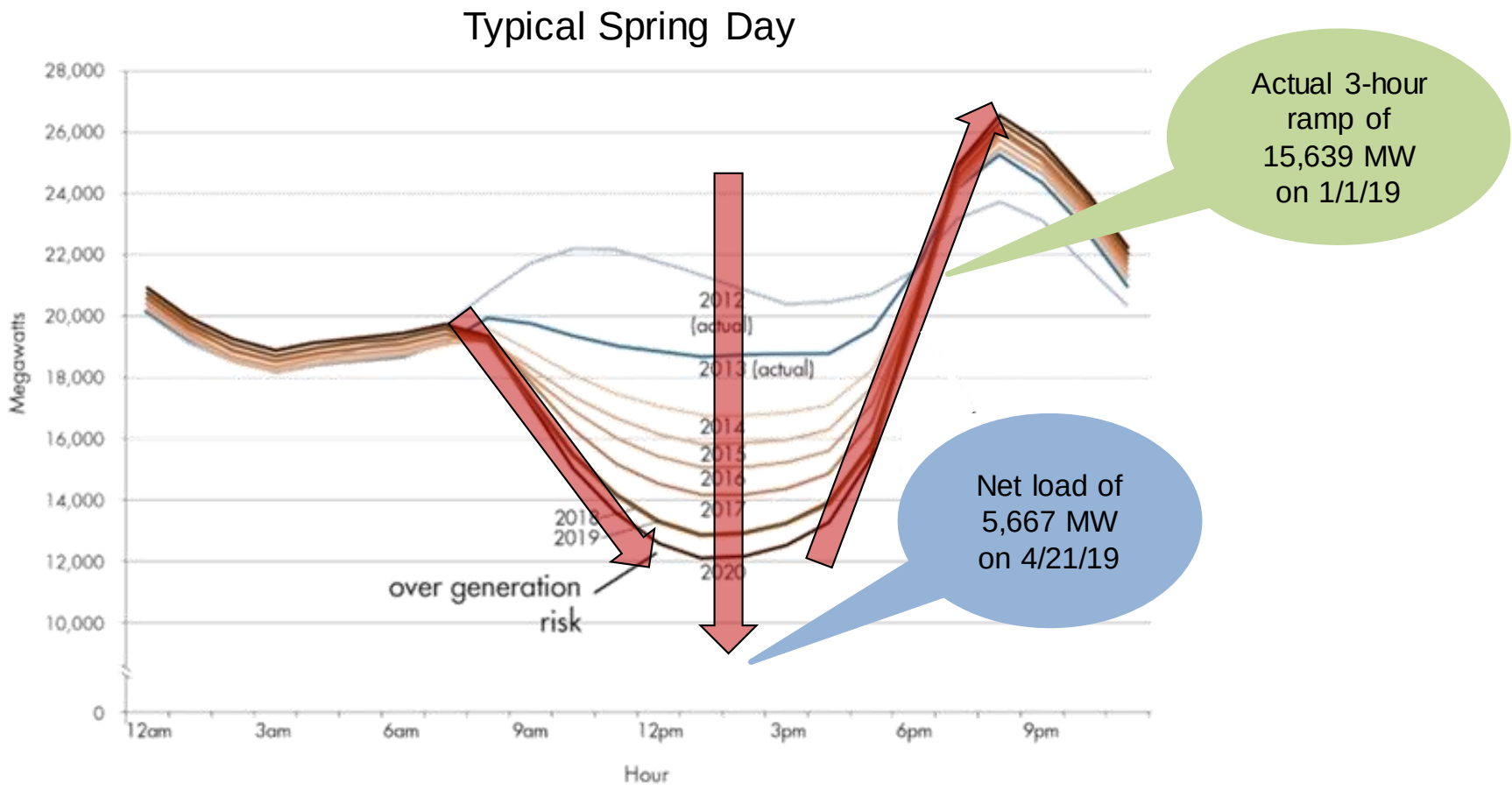


2018 forecast of maximum monthly 2019 upward 3-hour ramps using 2017 actual 1-minute data

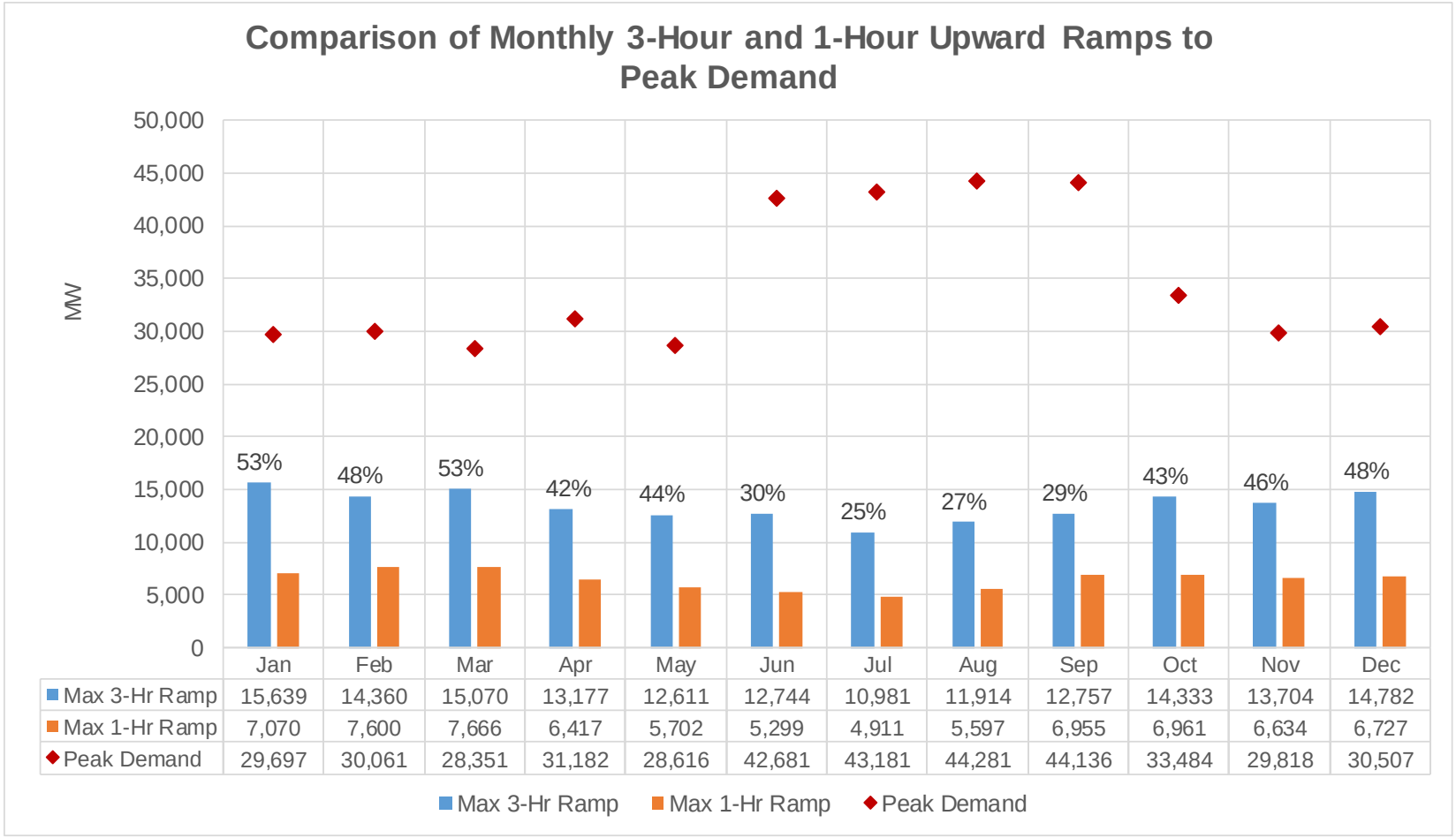


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018 (Actual)	13,326	14,440	14,777	12,553	11,571	11,057	8,679	10,805	10,866	13,082	13,087	14,059
2018 Forecast for 2019	14,506	14,889	14,971	13,509	11,808	12,524	9,967	10,393	13,511	13,510	13,898	15,129
2019 (Actual)	15,639	14,360	15,070	13,177	12,611	12,744	10,981	11,914	12,757	14,333	13,704	14,782
2019 (Act+Curt)	15,639	14,707	15,261	14,636	13,350	12,757	11,002	11,924	14,182	14,340	13,704	14,839

The actual net load and 3-hour ramps are about four years ahead of the ISO's original estimate primarily due to under forecasting rooftop solar PV installation

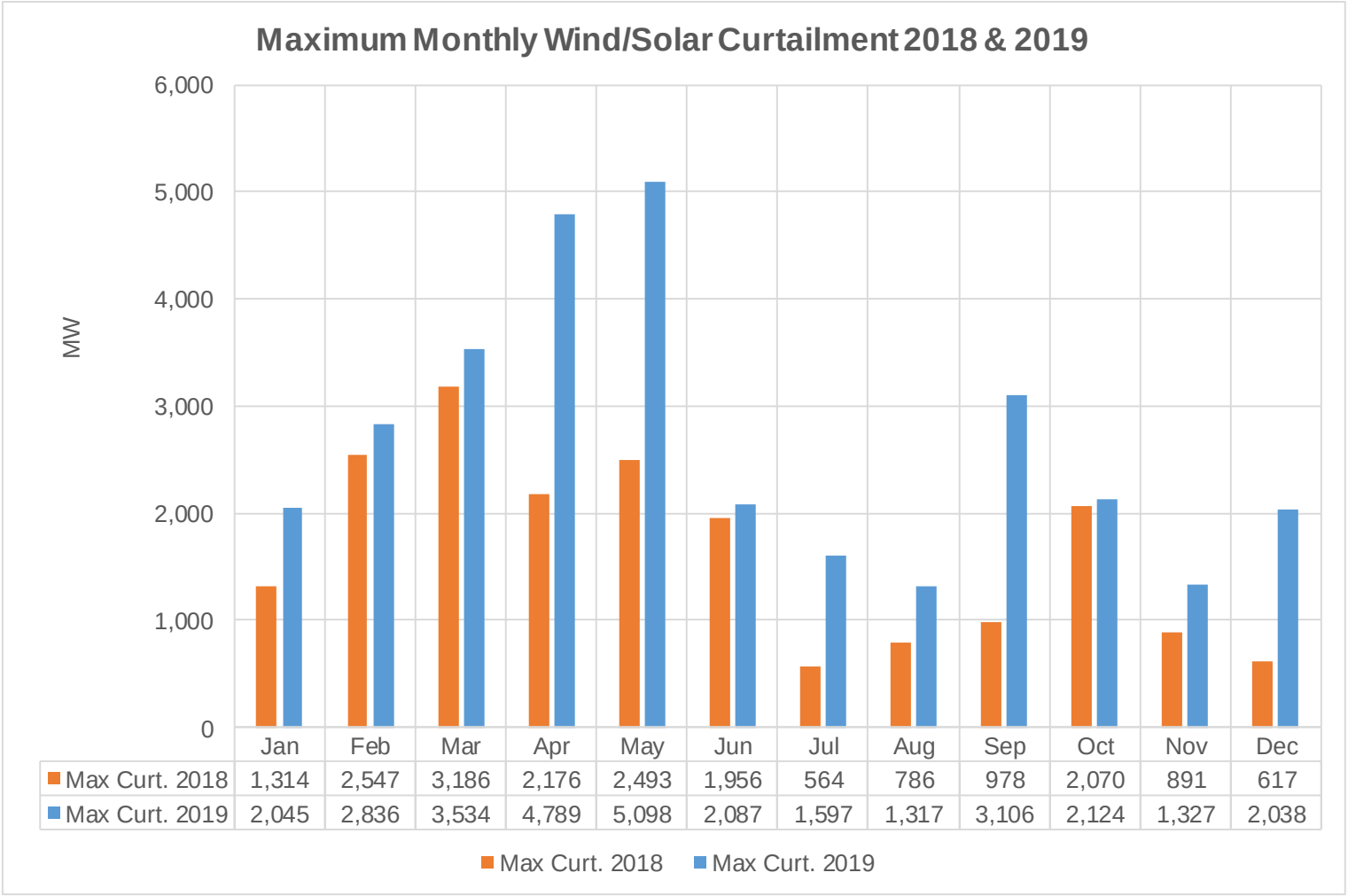


The 3-hour upward ramps can be more than 50% of the daily peak demand, which indicates the need for faster ramping resources



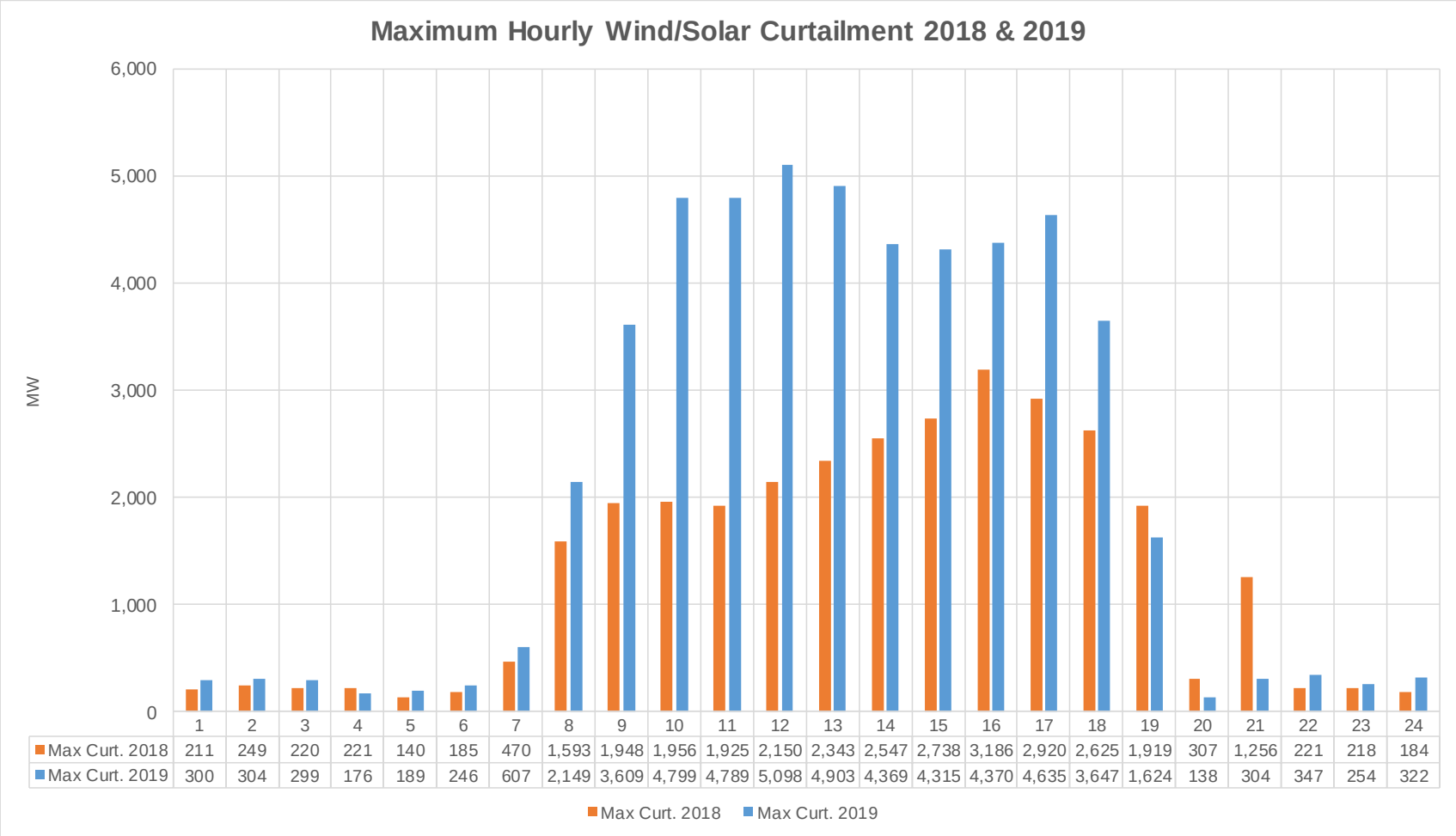
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max 3-Hr Ramp	15,639	14,360	15,070	13,177	12,611	12,744	10,981	11,914	12,757	14,333	13,704	14,782
Max 1-Hr Ramp	7,070	7,600	7,666	6,417	5,702	5,299	4,911	5,597	6,955	6,961	6,634	6,727
Peak Demand	29,697	30,061	28,351	31,182	28,616	42,681	43,181	44,281	44,136	33,484	29,818	30,507

Maximum monthly wind/solar curtailment by month in 2018 and 2019



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max Curt. 2018	1,314	2,547	3,186	2,176	2,493	1,956	564	786	978	2,070	891	617
Max Curt. 2019	2,045	2,836	3,534	4,789	5,098	2,087	1,597	1,317	3,106	2,124	1,327	2,038

Maximum hourly wind/solar curtailment by hour in 2018 and 2019



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Max Curt. 2018	211	249	220	221	140	185	470	1,593	1,948	1,956	1,925	2,150	2,343	2,547	2,738	3,186	2,920	2,625	1,919	307	1,256	221	218	184
Max Curt. 2019	300	304	299	176	189	246	607	2,149	3,609	4,799	4,789	5,098	4,903	4,369	4,315	4,370	4,635	3,647	1,624	138	304	347	254	322

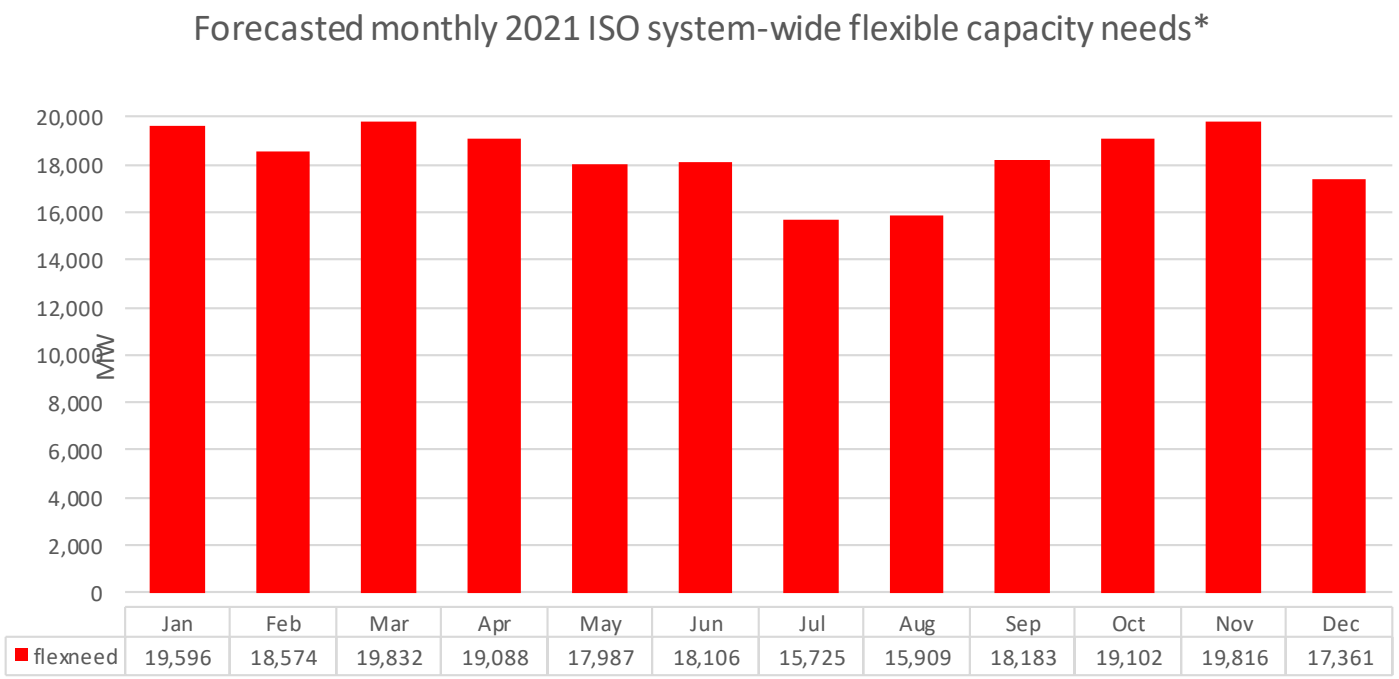
California ISO

Preliminary Results

Hong Zhou.
Lead Market Development Analyst, Short-Term Forecasting

Jessica Taheri
Energy Meteorologist, Short-Term Forecasting

Forecasted monthly 2021 ISO system-wide flexible capacity needs*



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
flexneed	19,596	18,574	19,832	19,088	17,987	18,106	15,725	15,909	18,183	19,102	19,816	17,361

*Flexibility Requirement$_{MTHy}$= Max[(3RR$_{HRx}$)$_{MTHy}$] + Max(MSSC, 3.5%*E(PL$_{MTHy}$)) + ε

Components of the flexible capacity needs

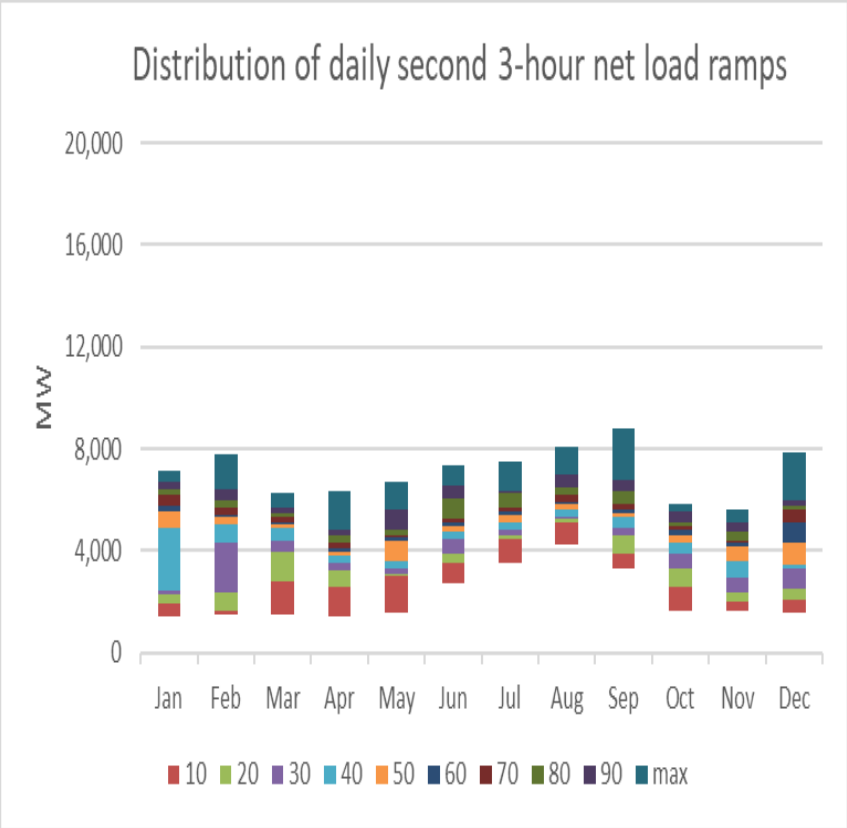
Month	Average of Load contribution 2021	Average of Wind contribution 2021	Average of Solar contribution 2021	Total percent 2021
January	46.61%	0.52%	-53.91%	100%
February	44.99%	2.68%	-57.69%	100%
March	40.13%	-0.82%	-59.05%	100%
April	36.79%	-0.22%	-62.99%	100%
May	34.47%	-3.02%	-62.50%	100%
June	32.10%	-2.98%	-64.92%	100%
July	21.34%	-2.73%	-75.93%	100%
August	23.98%	-1.10%	-74.92%	100%
September	29.98%	-1.07%	-68.96%	100%
October	34.01%	-1.49%	-64.50%	100%
November	38.40%	-8.90%	-52.71%	100%
December	41.13%	-3.18%	-55.68%	100%

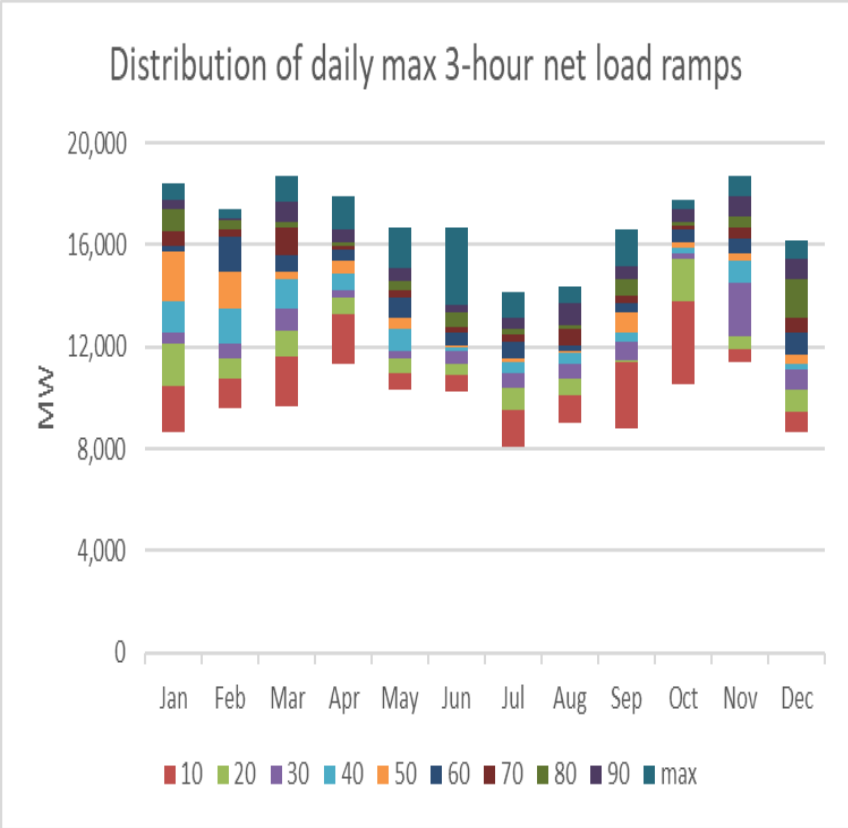
$$\Delta \text{Load} - \Delta \text{Wind} - \Delta \text{Solar} = 100$$

Flexible capacity categories allow a wide variety of resources to provide flexible capacity

- Category 1 (Base Flexibility): Operational needs determined by the magnitude of the largest 3-hour secondary net load ramp
- Category 2 (Peak Flexibility): Operational need determined by the difference between 95 percent of the maximum 3-hour net load ramp and the largest 3-hour secondary net load ramp
- Category 3 (Super-Peak Flexibility): Operational need determined by five percent of the maximum 3-hour net load ramp of the month

The 2021 forecasted distribution range of daily maximum and secondary 3-hour net load ramps

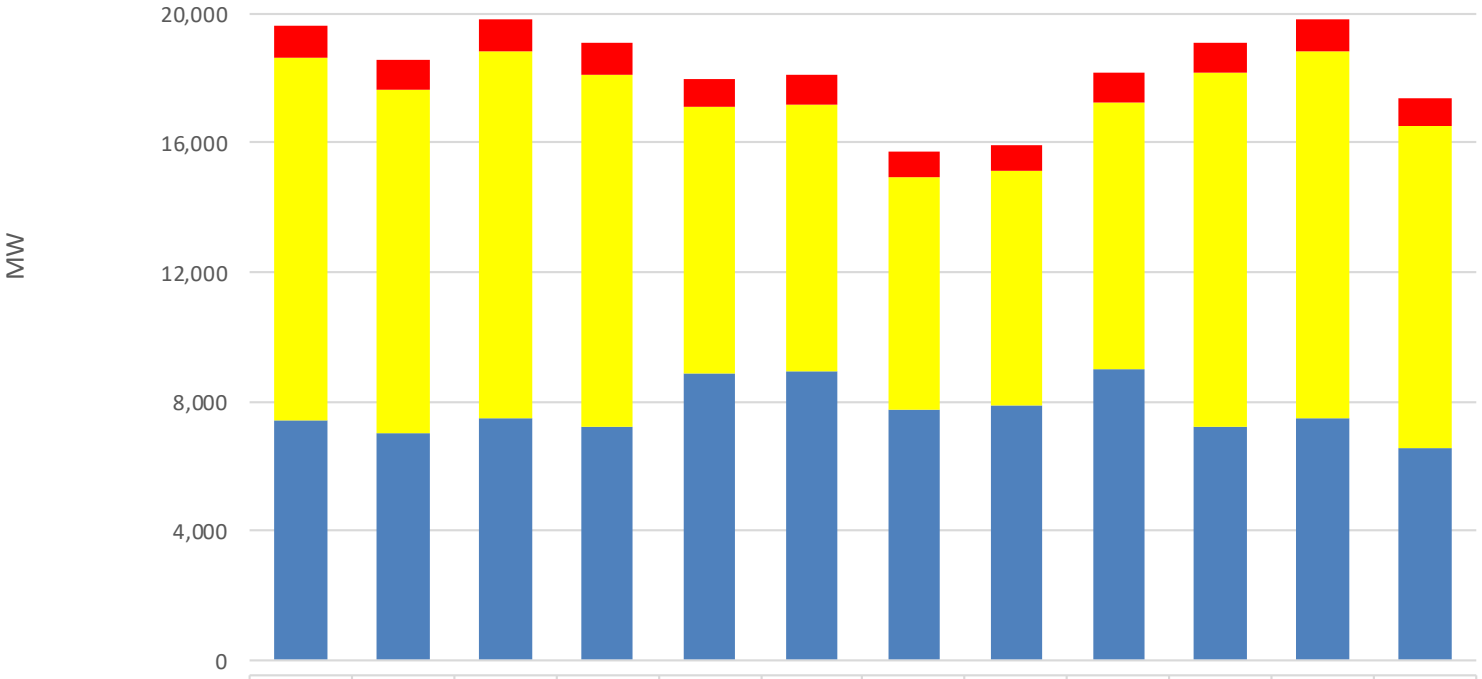




Seasonal breakout of flexible capacity needs

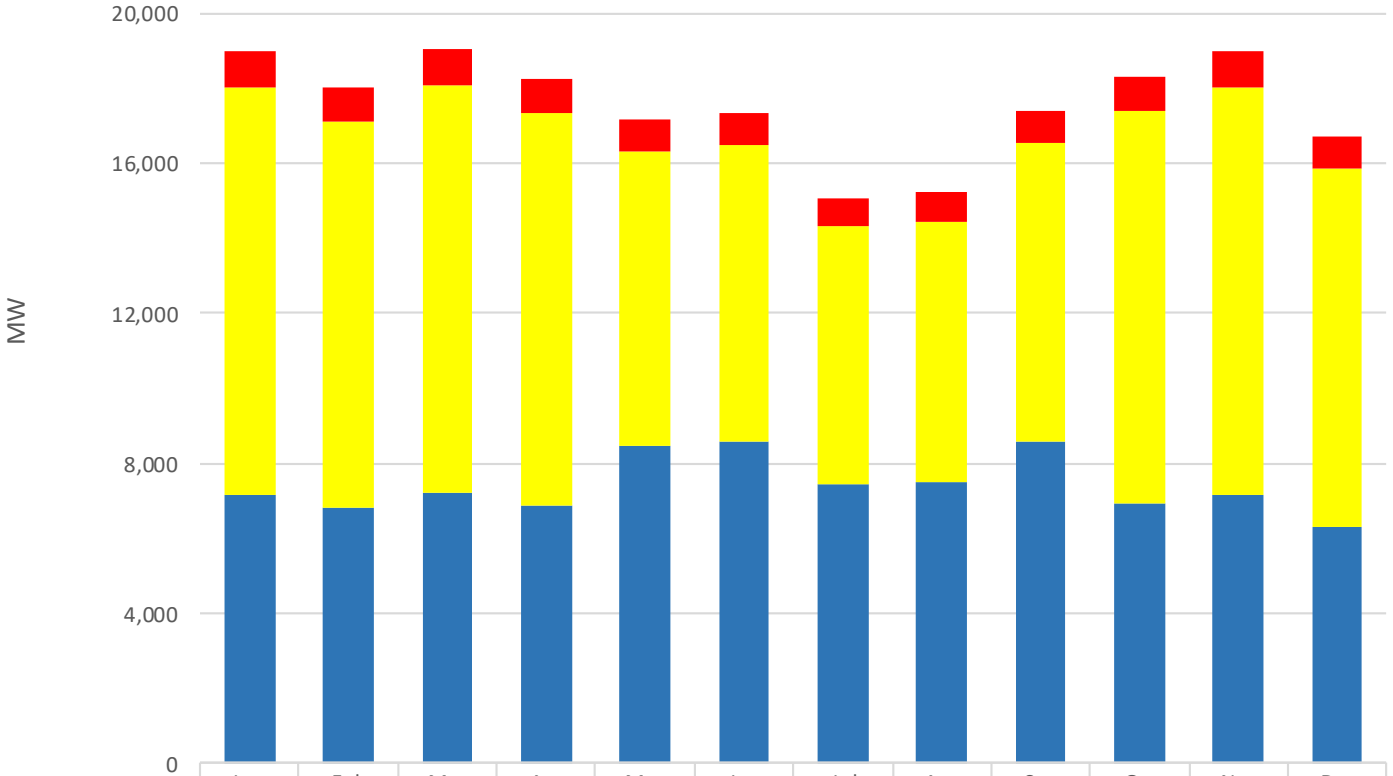
	Actual Contributions			Seasonal Contribution		
	Unadjusted			Adjusted		
Month	Base Flexibility	Peak Flexibility	Super-Peak Flexibility	Base Flexibility	Peak Flexibility	Super-Peak Flexibility
January	39%	56%	5%	38%	57%	5%
February	45%	50%	5%	38%	57%	5%
March	33%	62%	5%	38%	57%	5%
April	35%	60%	5%	38%	57%	5%
May	40%	55%	5%	49%	46%	5%
June	44%	51%	5%	49%	46%	5%
July	53%	42%	5%	49%	46%	5%
August	56%	39%	5%	49%	46%	5%
September	53%	42%	5%	49%	46%	5%
October	33%	62%	5%	38%	57%	5%
November	30%	65%	5%	38%	57%	5%
December	49%	46%	5%	38%	57%	5%

Total flexible capacity needed in each category – seasonally adjusted



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Super-Peak Flexibility	980	929	992	954	899	905	786	795	909	955	991	868
Peak Flexibility	11,228	10,642	11,363	10,937	8,206	8,260	7,174	7,258	8,296	10,945	11,354	9,947
Base Flexibility	7,388	7,003	7,477	7,197	8,881	8,940	7,764	7,855	8,979	7,202	7,471	6,545

CPUC jurisdictional flexible capacity allocation - by flexible capacity category



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Super-Peak Flexibility	950	902	953	913	857	868	754	761	871	916	948	835
Peak Flexibility	10,884	10,331	10,919	10,468	7,822	7,922	6,878	6,941	7,946	10,501	10866	9569
Base Flexiblity	7,162	6,798	7,185	6,888	8,466	8,574	7,444	7,512	8,599	6,910	7150	6297

Start time of 3-Hour net load ramp to evaluate seasonal must offer obligations

	Three-Hour Net Load Ramp Start Hour (Hour Ending)					
Month	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**	**18:00**
January		1	30			
February		1	16	11		
March			1	14	16	
April				4	25	1
May				6	24	1
June				3	25	2
July				6	25	
August				7	24	
September	1		4	20	5	
October			4	27		
November		3	21	6		
December		1	30			

Seasonal must-offer obligations for peak and super-peak flexible capacity

- Recommended Must-offer obligation hours in Hour Ending

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HE15-HE19	v	v									v	v
HE16-HE20									v	v		
HE17-HE21			v	v	v	v	v	v				

Review of preliminary assessment results

- Flexible Capacity need is largest in the off-peak months
  - Flexible capacity makes up a greater percentage of resource adequacy needs during the off-peak months
  - Increase almost exclusively caused by 3-hour ramp, not increase in peak load
- Growth of behind-the-meter solar PV and utility scale PV contributes to the larger flexible capacity requirements
- Using the ISO flexible capacity contribution calculation majority of 3-hour net load ramps are attributable to CPUC jurisdictional LSEs
- The Peak and Super-Peak MOO hours have changed from the 2020 study (information below is in Hour Ending)
  - November through February: HE 15- HE 19 (2:00 p.m. to 7:00 p.m.)
  - March through August: HE 17 – HE 21 (4:00 p.m. to 9:00 p.m.)
  - September through October: HE 16- HE 20 (3:00 p.m. to 8:00 p.m.)

AVAILABILITY ASSESSMENT HOURS

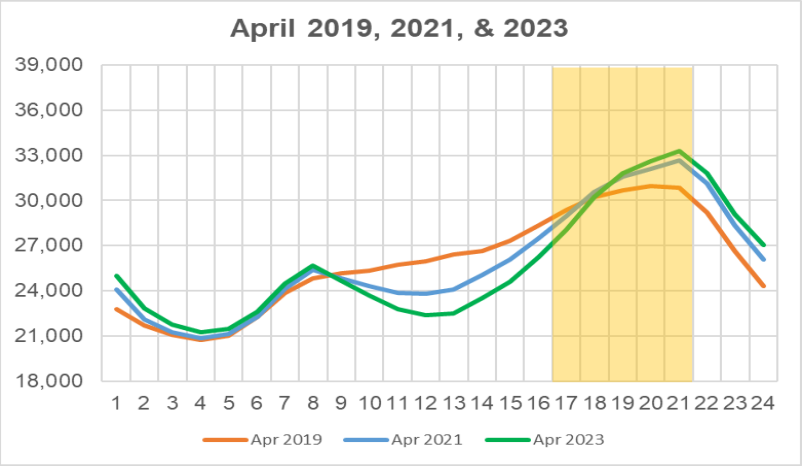
Availability assessment hours: Background and purpose

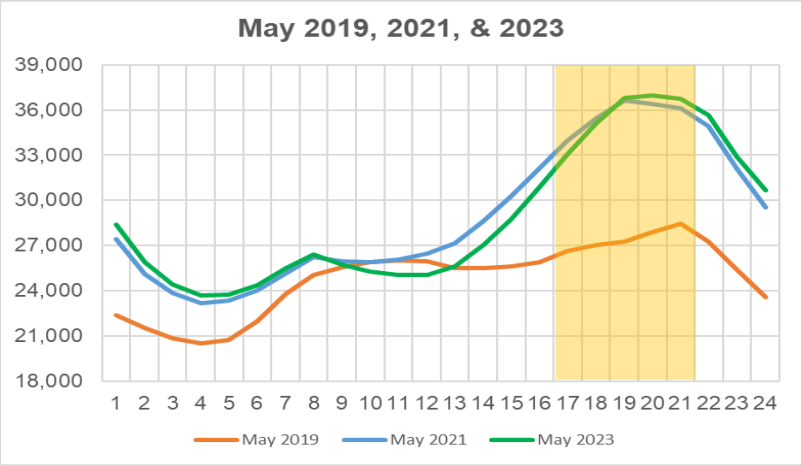
- Concept originally developed as part of the ISO standard capacity product (SCP)
  - Maintained as part of Reliability Service Initiative – Phase 1 (i.e. RA Availability Incentive Mechanism, or RAAIM)
- Determine the hours of greatest need to maximize the effectiveness of the availability incentive structure
  - Resources are rewarded for availability during hours of greatest need
  - Hours determined annually by ISO and published in the BPM
    - See section 40.9 of the ISO tariff

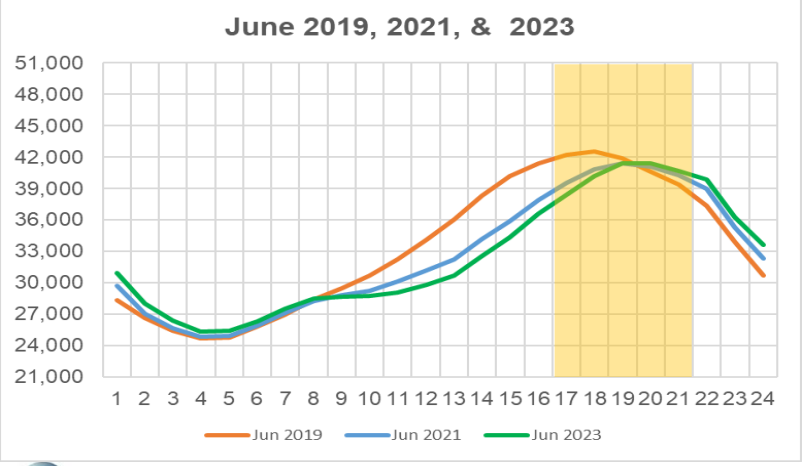
Methodology overview of system/local availability assessment hours

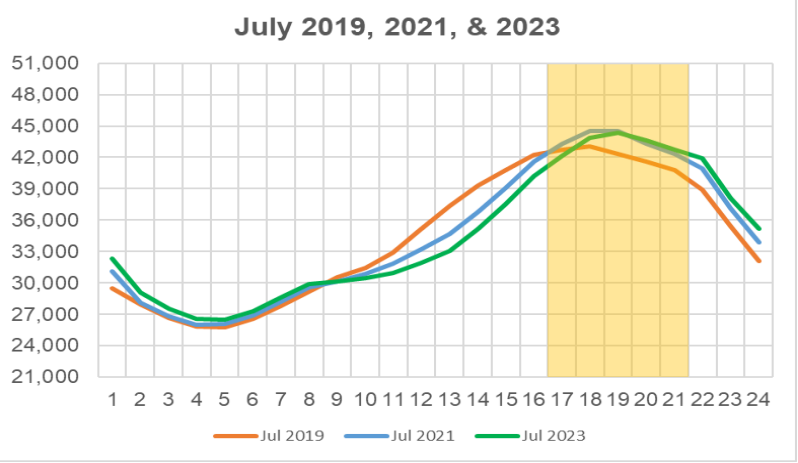
- Used CEC IEPR data described in previous slides to obtain:
  - Hourly Average Load
    - By Hour
    - By Month
    - Years 2019-2023
- Calculated:
  - Top 5% of Load Hours within each month using an hourly load distribution
  - Years 2021 - 2023

Expected load shape evolution: Summer season

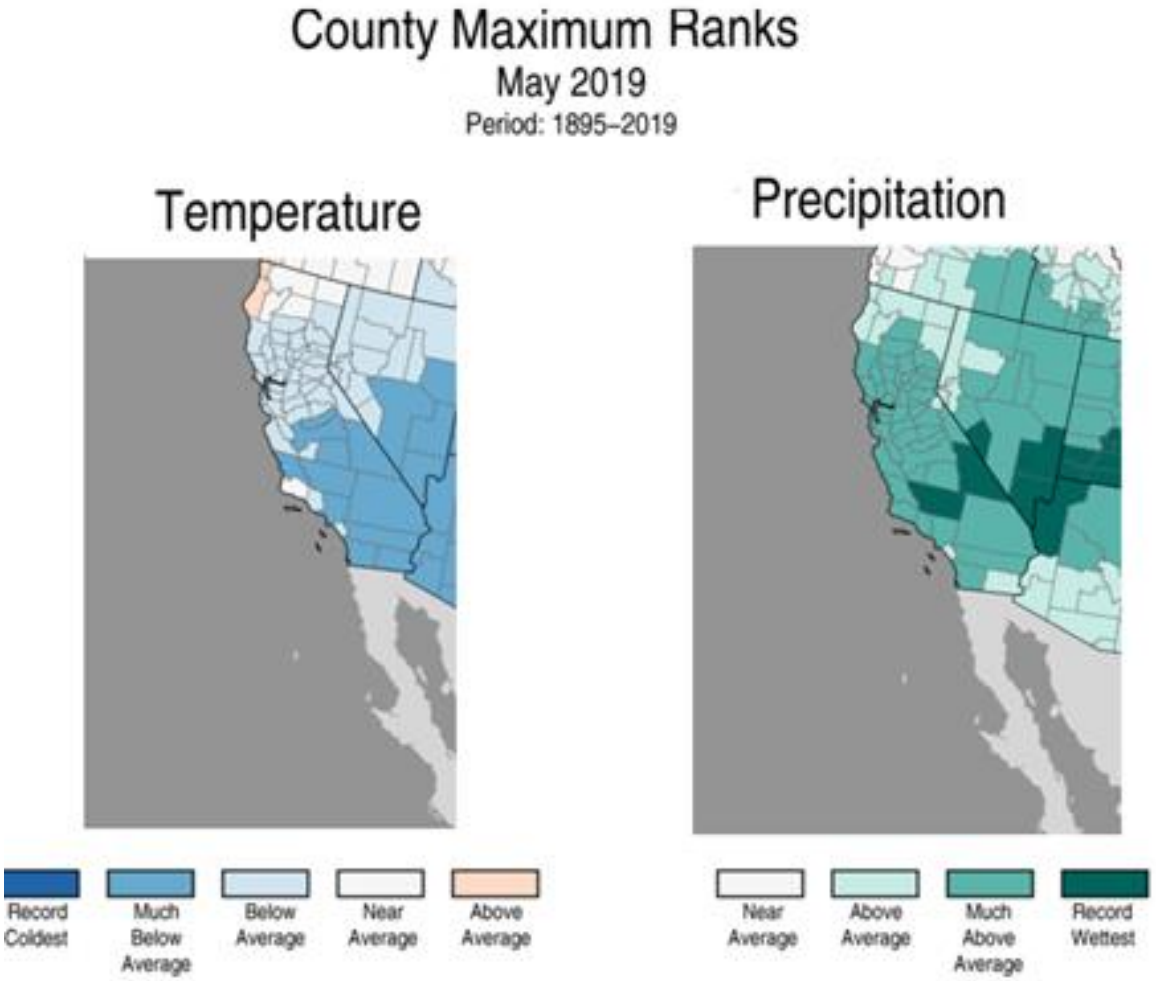




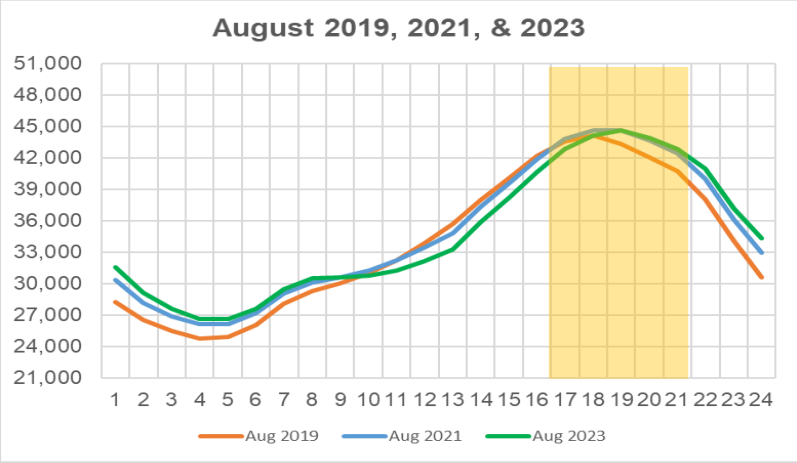


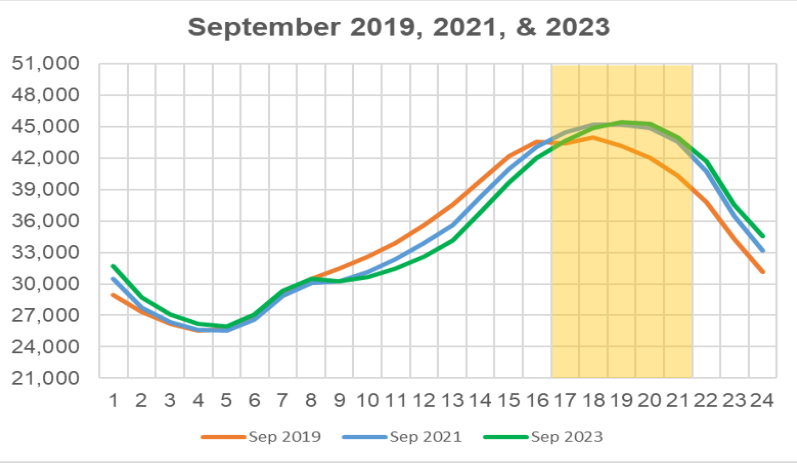


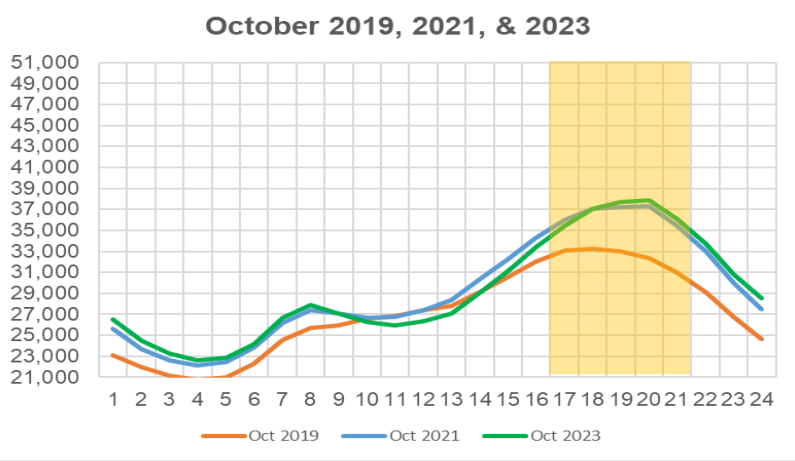
May 2019 Climatology



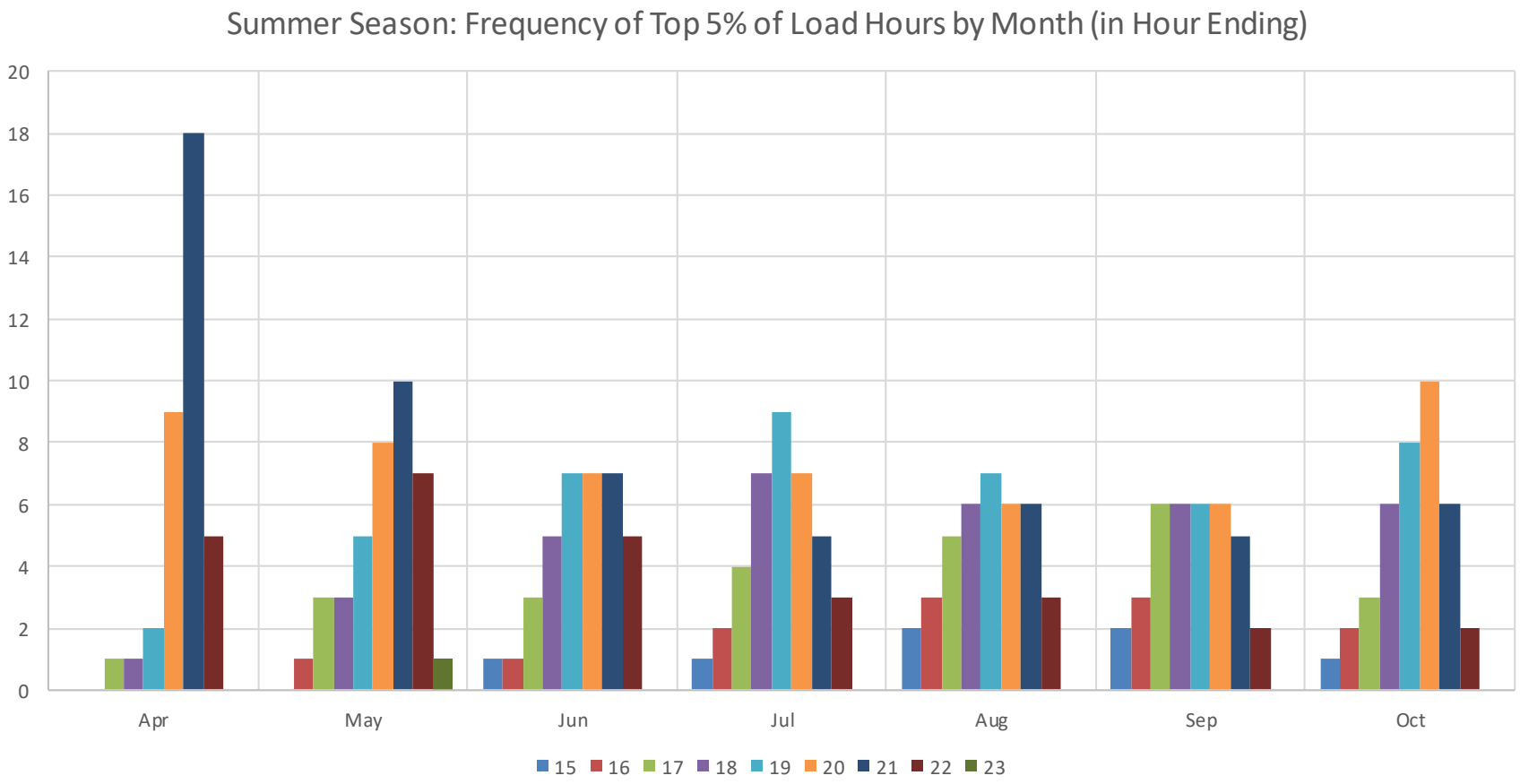
Expected load shape evolution: Summer season



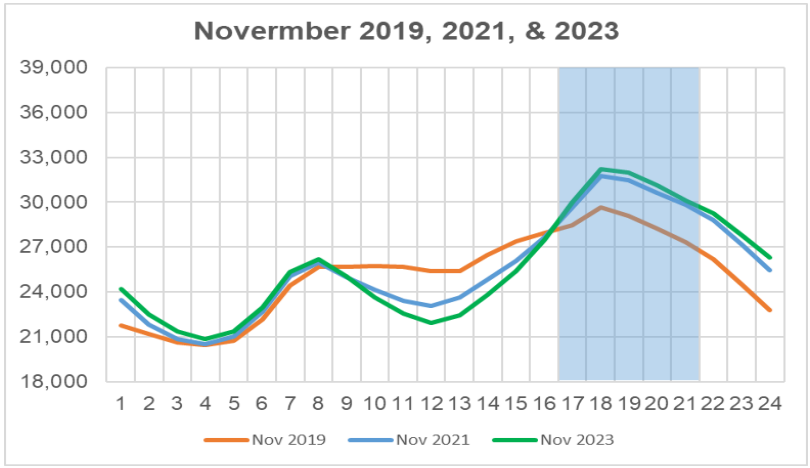


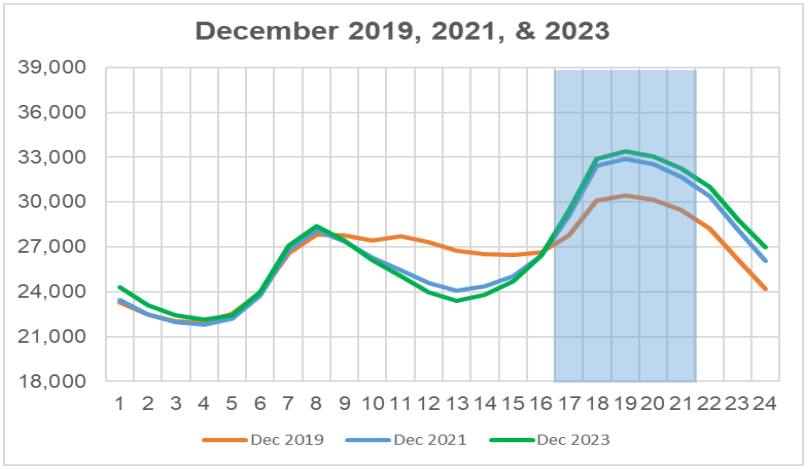


Summer Season
2021 top 5% of load hours (in HE)

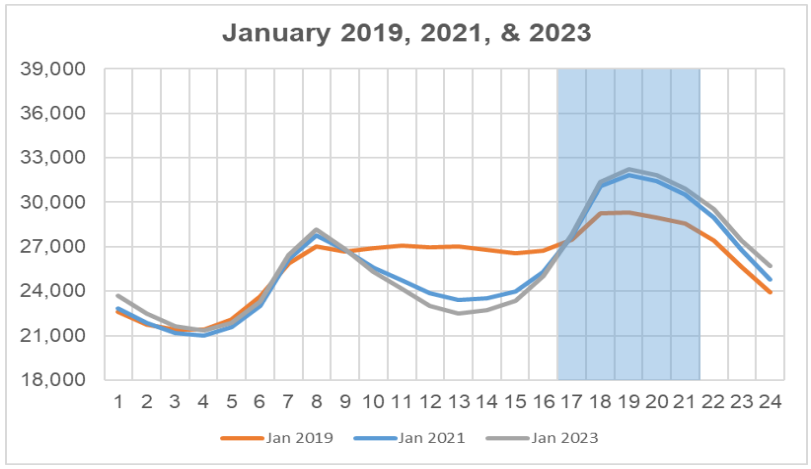


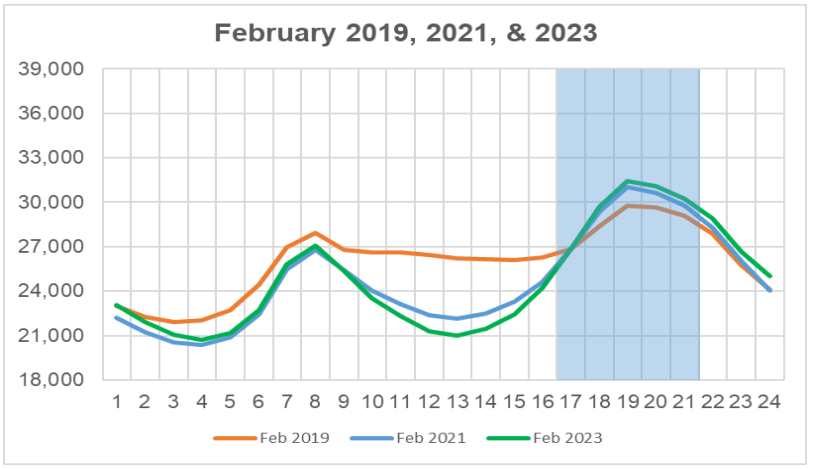
Expected load shape evolution: Winter season

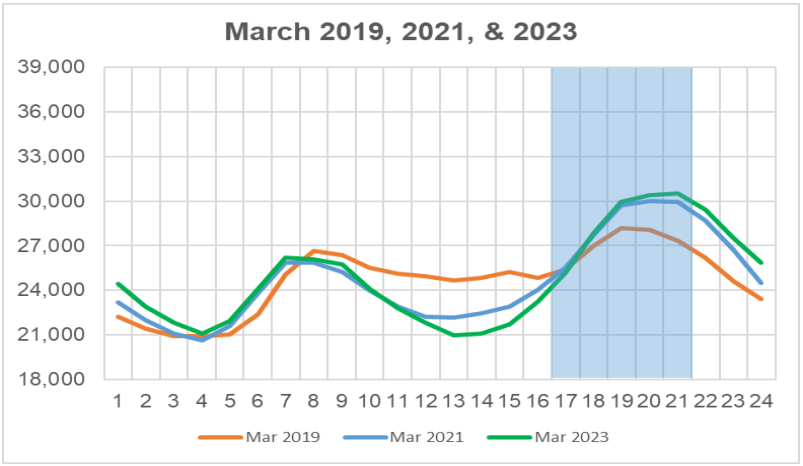




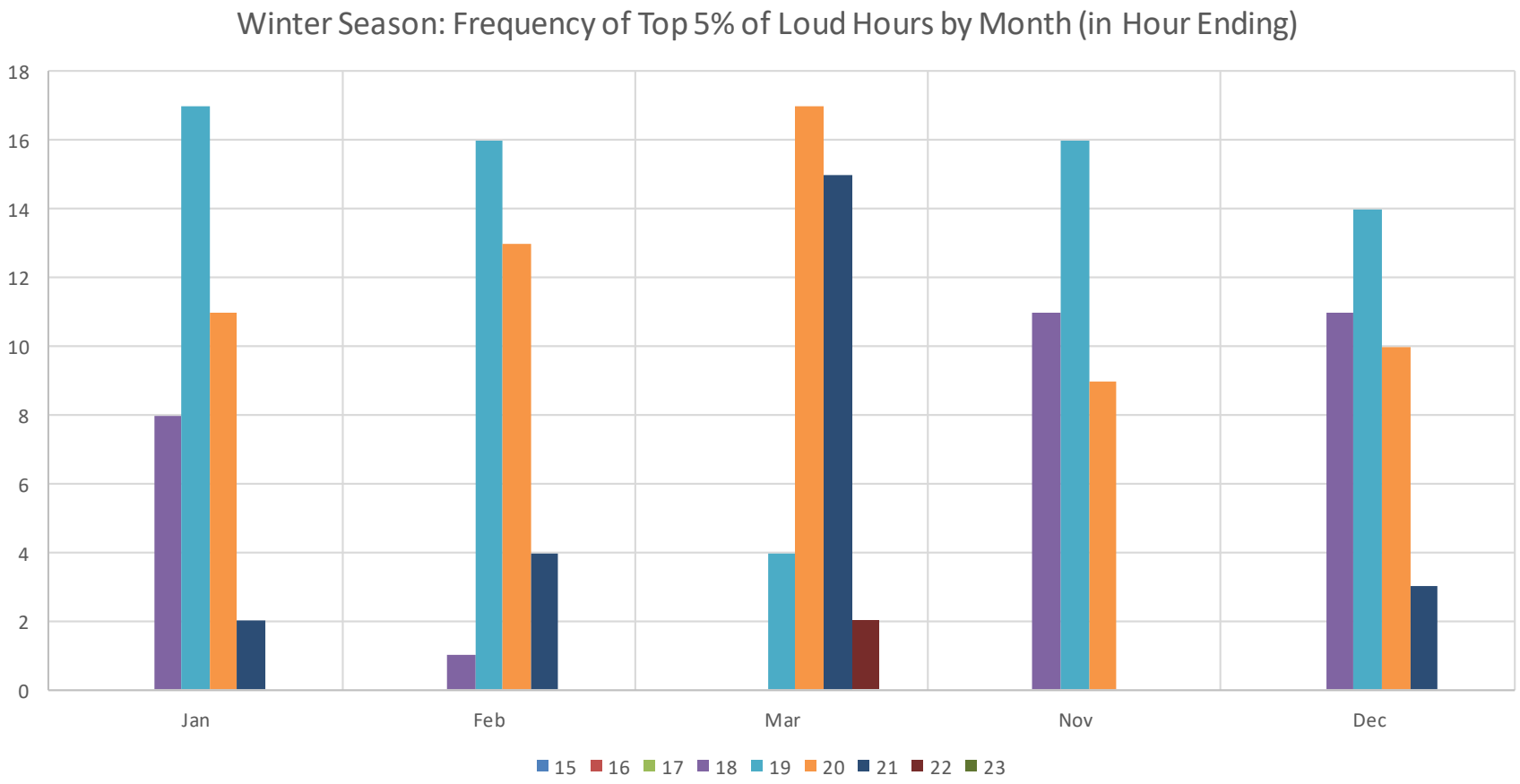
Expected load shape evolution: Winter season







Winter Season
2021 top 5% of load hours (HE)



Availability assessment hours draft recommendation

Winter Season Draft Recommendation

Year	Start	End
2020 (Final)	HE 17	HE 21
2021 (Draft)	HE 17	HE 21
2022 (Estimate)	HE 17	HE 21
2023 (Estimate)	HE 17	HE 21

Summer Season Draft Recommendation

Year	Start	End
2020 (Final)	HE 17	HE 21
2021 (Draft)	HE 17	HE 21
2022 (Estimate)	HE 17	HE 21
2023 (Estimate)	HE 17	HE 21

Reliability Requirements; Section 7 –BPM Updates Needed

2021 System and Local Resource Adequacy Availability Assessment Hours

Analysis employed: Top 5% of load hours using average hourly load

Summer: April 1 - October 31

Availability Assessment Hours: 4pm – 9pm (HE17 – HE21)

Winter: November 1 - March 31

Availability Assessment Hours: 4pm – 9pm (HE17 – HE21)

2021 Flexible Resource Adequacy Availability Assessment Hours and must offer obligation hours

Flexible RA Capacity Type	Category Designation	Required Bidding Hours	Required Bidding Days
January – February November – December			
Base Ramping	Category 1	05:00am to 10:00pm (HE6-HE22)	All days
Peak Ramping	Category 2	2:00pm to 7:00pm (HE15-HE19)	All days
Super-Peak Ramping	Category 3	2:00pm to 7:00pm (HE15-HE19)	Non-Holiday Weekdays*
March – August			
Base Ramping	Category 1	05:00am to 10:00pm (HE6-HE22)	All days
Peak Ramping	Category 2	4:00pm to 9:00pm (HE17-HE21)	All days
Super-Peak Ramping	Category 3	4:00pm to 9:00pm (HE17-HE21)	Non-Holiday Weekdays*
September – October			
Base Ramping	Category 1	05:00am to 10:00pm (HE6-HE22)	All days
Peak Ramping	Category 2	3:00pm to 8:00pm (HE16-HE20)	All days
Super-Peak Ramping	Category 3	3:00pm to 8:00pm (HE16-HE20)	Non-Holiday Weekdays*

Next steps

- Published Draft Flexible Capacity Needs Assessment for 2020- April 9, 2020
  - Comments due April 28, 2020
    - Please submit comments on the assumptions to

      initiativecomments@caiso.com

- Publish Final Flexible Capacity Needs Assessment for 2020 –

  May 15th, 2020

Questions

Stay connected

@California_ISO

Download ISO Today mobile app

Sign up for the Daily Briefing at www.caiso.com