California ISO

2023 SUMMER LOADS AND RESOURCES ASSESSMENT

May 15, 2023

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I. EXECUTIVE SUMMARY

The 2023 Summer Loads and Resource Assessment (Summer Assessment) indicates considerable improvement in resource availability for the upcoming summer, compared to recent summers, driven by accelerated resource development and high hydro conditions.

- The ISO's assessment of resource development demonstrates sound progress towards meeting the conventional "one day every 10 years" (1-in-10) Loss of Load Expectation (LOLE) planning target;
- Under current high hydro conditions, the resource fleet scheduled to be online by June 1, 2023 exceeds the 1-in-10 planning target with a margin of approximately 200 MW. Under average hydro conditions, there would be a shortfall of approximately 1,100 MW in meeting the planning target;
- Under current high hydro conditions, the resource fleet scheduled to be online by September 1, 2023 exceeds the 1-in-10 planning target with a margin of approximately 2,300 MW. Under average hydro conditions, that margin would drop to approximately 960 MW;
- Although load has grown from 2022 to 2023, these results represent a significant improvement from the 2022 Summer Assessment, when there was a shortfall in reaching the 1-in-10 planning target;
- These results do not take into account more extreme events such as those demonstrated in the last several years (e.g. extreme drought, wildfires and the continued potential for widespread regional heating events and other disruptions) that continue to pose a high risk of outages to the ISO grid.

Background and Methodology

The 2023 Summer Assessment is an assessment of the expected 2023 summer supply and demand conditions for the California Independent System Operator (ISO) balancing authority area (BAA). The ISO publishes and shares the results of the Summer Assessment each year with State regulatory agencies, industry participants, and stakeholders. This 2023 Summer Assessment fits into a broader collaborative effort on behalf of the ISO, California Public Utilities Commission (CPUC), and California Energy Commission (CEC) to prepare for summer system operations and maintain grid reliability.

The ISO's methodology for summer assessments has evolved considerably over the past several years with new areas of focus, particularly in recognition of the vulnerability that extreme weather events can present to the electricity grid and the importance of connecting new resources to the system. In this assessment, the ISO adds a focus on the year-over-year advances of new resource development and progress towards meeting resource planning targets in relation to the ISO's traditional probabilistic operational risk analysis, which considers the latest available information on annual conditions, including hydro.

This Summer Assessment addresses three main issues:

1. Overall progress towards resource planning targets;
2. Operating reserve margin sufficiency at peak system conditions; and
3. Operational risk assessment.

The Summer Assessment also includes updates on California's Strategic Reliability Reserves and other extreme event measures, and preparation for Summer 2023 operations.

To evaluate progress toward planning targets, operating reserve margin sufficiency at peak system conditions, and operational risk, the ISO took the following steps:

1. The ISO assessed the adequacy of the most recent Preferred System Plan (PSP) portfolio[1] developed by the CPUC in its Integrated Resource Planning (IRP) process to determine the reliability level achieved by the portfolio based on the latest load forecast[2], and amount of resources required to achieve resource sufficiency planning targets based on the surplus or shortfall provided by the resource plan.
2. The ISO assessed whether the amount of resource development underway is on track to meet the resource requirements that achieve the planning targets. This assessment considers the status of resources moving forward in the ISO interconnection queue, augmented by the procurement requirements established by the CPUC and considering if those resources have power purchase agreements (PPAs) in place.

It is important to clarify that the traditional resource planning target of a 1-in-10 metric does not account for additional emergency measures that could be called upon if necessary. Emergency measures could be called upon to maintain reliability and avoid loss of load when conditions otherwise put load at risk. These emergency measures are also called upon to provide grid support during more extreme events. An update on available emergency measures is provided in this report.

Operating Reserve Margins at Peak System Conditions

The ISO assessed the sufficiency of the resource fleet to meet summer peak loads at the time of highest system stress, considering necessary operating reserve margins. This resource stack analysis of the fleet expected online at the time of the most critical system stress provides insight on the progress made in bringing new resources online and meeting system needs.

In considering the role of reserve margins to assess the ability to carry adequate operating reserves during peak load, it is important to clarify how the reserve margins were interpreted and applied in this analysis.

[1] The ISO studied the PSP portfolio adopted by the CPUC in Decision (D).22-02-004 adopted on February 10, 2022.
[2] CEC California Energy Demand Update (CEDU) 2022 Planning Forecast adopted in January 2023.

In more recent industry discussions regarding resource adequacy, there is general consensus that a loss-of-load-expectation (LOLE) analysis of resource requirements needed to meet a planning reliability target can be translated into a planning reserve margin (PRM)[3] needed to maintain that target. That PRM is then applied to the peak load to provide an approximation, based on specific resource accounting rules, to assess the overall adequacy of a pool of resources to meet the PRM requirements, and, by proxy, the planning target. This process is described in the preceding section where the ISO translated the CPUC PSP (less the surplus above meeting the planning target) into a reserve margin. In adding up resources and assessing their compliance with that reserve margin, all resources are considered and credited based on their overall contribution to reliability over the course of a year. However, the deterministic approach focused on the resources that would reasonably be available at the time of peak load, crediting those resources based on their contribution at that time. For example, solar resources are not included in this analysis because the period of peak system stress occurs at 8 pm, when solar generation is diminished.

The ISO considered a reserve margin of 18.5% for 2023, to assess the ability of the fleet to meet operating reserve requirements at the time of peak load. This value was derived from a contingency reserve requirement of 6%, a regulating reserve requirement of 1%, a 4% allowance for load forecast variation above the 1-in-2 CEC forecast[4], and a 7.5% allowance for forced outages of the resource fleet. This approach was the basis, with the subsequent addition of the 1% regulating reserve requirement, of the ISO's capacity assessments tied to NERC standards compliance that dictate deterministic contingency reserve requirements. The 18.5% reserve margin is another indicator of resource sufficiency, but does not directly translate to a specific level of LOLE over an entire year.

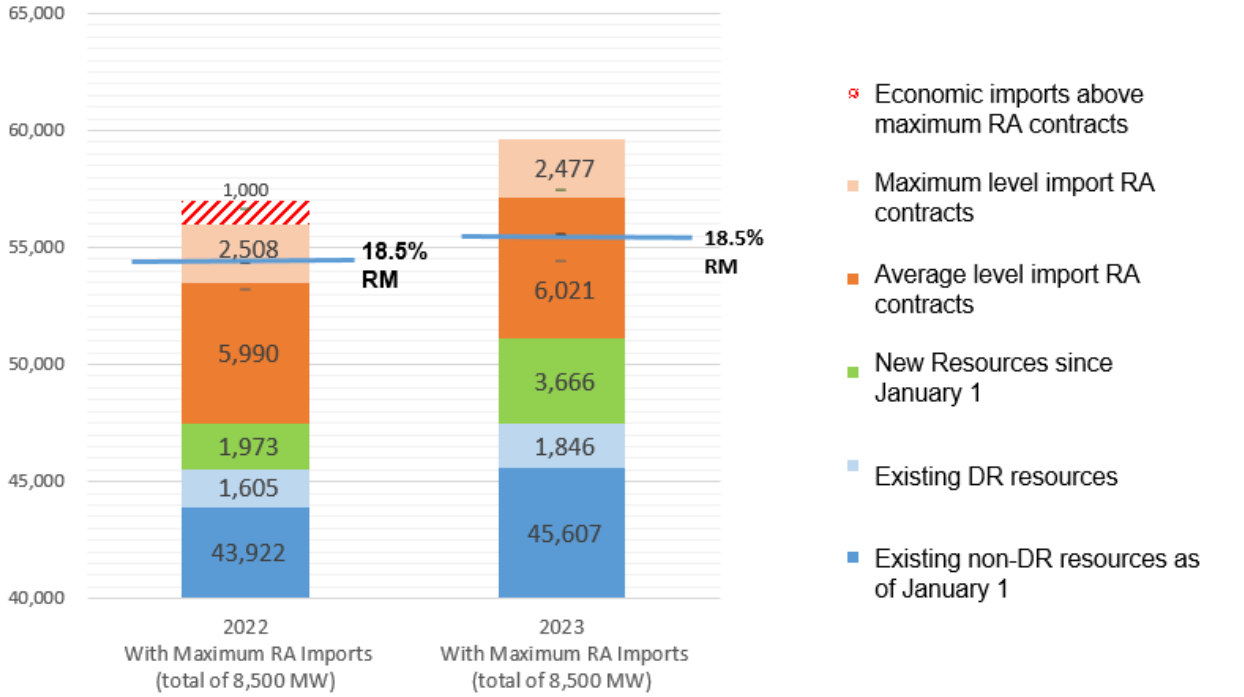
The chart below compares the resources currently scheduled to be available by September 1, 2023 against the forecast peak load at 8 pm and considering the 18.5 % reserve margin. Resource capacities are based on the current net qualifying capacity (NQC) values for all resources except solar.[5] As previously noted, solar resources were not included in the stack based on the time of day of peak load (8 pm), whereas the NQC values of other resources provide a reasonable quantification of the contribution those resources can make to 8 pm load. The resource stack is compared to the CEC's forecast 1-in-2 peak load, and allowances for higher load levels are incorporated into the reserve margin.

[3] The ISO has used both "reserve margin" and "planning reserve margin" terms in this assessment. Reserve margin applies more generally to any margin above peak load or other load level. The ISO has reserved the use of planning reserve margin to apply to reserve margins established by the CPUC or other local regulatory agencies for resource adequacy program purposes.

[4] A 1-in-2 forecast assumes there is a 50 percent probability that the forecasted peak will be less than actual peak load and a 50 percent probability that the forecasted peak will be greater than actual peak load

[5] Net qualifying capacity is a measure of the amount of capacity from each resource that can be counted towards meeting Resource Adequacy (RA) requirements in the CPUC's RA program.

Figure ES-1: September 2022 and 2023 Base Case and Sensitivities at 8 pm on Peak Day (MW) – No Solar



Existing non-DR resources are those resources online by January 1 of each year, and new resources are those resources online or scheduled to come online since January 1 of each year.

The results demonstrate improved forecast performance at meeting operating reserve requirements over peak load periods. The results assume that all resources inside the ISO are available to serve ISO load and that they are not contracted to provide capacity to load-serving entities outside of the ISO.

- The chart displays an improvement in meeting operating reserve requirements at peak load over 2022, primarily due to the addition of new storage resources compared to last summer.
- The stack reflects a total increase of 4,725 MW NQC from September 1, 2022 to September 1, 2023 (including an increase of 2,637 MW NQC from September 1, 2022 to June 1, 2023).

Operational Risk Assessment

As noted earlier, the ISO conducted a more detailed comprehensive probabilistic analysis examining only the summer months to assess operational risks. This analysis is based on year-over-year comparisons, as there are no standard industry metrics that apply on only a seasonal basis. The ISO completed this assessment based on conditions at the time of its assessment, including hydro conditions. Overall, this analysis demonstrates an expected increase in reliability with the addition of new resources and improved hydro conditions. The overall reduction in risk also results in the residual risk being concentrated more narrowly in the early evening hours after the solar output drops off.

Strategic Reserves and other Extreme Event Measures

Since the widespread heat events of 2020 and subsequent extreme events, the ISO, the California Legislature and state entities have taken several measures to ensure grid reliability beyond conventional planning standards. These measures and programs include approving procurement of additional resources, ensuring existing resources are retained in service, and improving operational readiness and measures to access resources or load reductions when faced with the risk of shortfalls under extreme conditions.

Starting summer 2021, several emergency resource programs also emerged which provide grid support during system emergencies and extreme events. These programs include the State Power Augmentation Project (SPAP), Electricity Supply Strategic Reliability Reserve Program (ESSRRP) managed by the Department of Water Resources (DWR), the Emergency Load Reduction Program (ELRP) developed by the CPUC, and the Demand Side Grid Support Program (DSGS) and Distributed Electricity Backup Assets Program (DEBA) administered by the CEC.[6] These emergency programs are triggered based on various ISO emergency notifications. In 2022, available measures were triggered by emergency conditions. In 2023, modifications are being made to allow triggering of some of these measures prior to – and potentially to help prevent -- escalating to emergency conditions.

Preparation for Summer Operation

Building on these assessments, the ISO also undertakes a number of activities each year to prepare for summer system operations. These include fine-tuning market and operational metrics to ensure the effectiveness of the planned resource fleet in times of system stress and enhancing operational coordination with state agencies and the industry overall to access contingency reserves should the system face the risk of shortfalls due to more extreme events. The ISO will also continue to monitor transmission availability that could impact summer conditions[7]. Other routine preparatory activities include coordinating meetings on summer preparedness with the Western Electricity Coordinating Council (WECC), California Department of Forestry and Fire Protection (Cal Fire), natural gas providers, utilities, transmission operators and neighboring balancing areas. The ISO will continue to engage the appropriate entities in a tabletop exercise using September 6, 2022 as a use case. The ISO's ongoing coordination activities with these entities helps ensure readiness for the upcoming summer operational season.

[6] Note: These program are further discussed in Section II –Emergency Resources.

[7] The ISO posted on April 4, 2023, that Pacific Gas and Electric (PG&E) completed an evaluation of its existing rating methodology and proposed rerates to a number of 500 kV lines on the PG&E transmission system that became effective on May 1, 2023. The ISO studied the changes to determine their impacts on path limits and identified a derate to the California Oregon Intertie (COI) of less than 350 MW (north to south) that is being implemented in the ISO's markets and is reflected in OASIS. The ISO will be reviewing the impacts monthly through the summer, and working with PG&E and the other COI owners to better understand and mitigate these potential impacts.

II. 2023 SUMMER ASSESSMENT

Introduction

As the electric industry prepares for summer operations, this annual assessment provides a measure of the progress of resource development activities in providing resource sufficiency based on planning and procurement targets, and an update on contingency reserves in development to ensure reliability in the event of more extreme conditions.

Each year the California Independent System Operator Corporation (ISO) prepares an assessment of the expected supply and demand conditions for the coming summer for the ISO BAA. Publishing the Summer Assessment and sharing the results with State regulatory agencies, industry participants, and stakeholders is one of many activities the ISO undertakes each year to prepare for summer system operations.

In this 2023 Summer Assessment, the ISO has focused on the year-over-year advances of new resource development and progress towards meeting annual resource planning targets. Accordingly, this assessment addresses resource development progress. The assessment also addresses key observations from the ISO's traditional probabilistic operational risk analysis of the summer months that considers the latest available information on annual conditions, including current hydro conditions.

The ISO's Summer Assessment addresses three main issues:

1. *Overall Progress towards Resource Planning Targets:*

   The ISO's assessment of resource development demonstrates sound progress towards meeting the conventional "one day every 10 years" ("1-in-10") LOLE target.

2. *Operating Reserve Margin Sufficiency at Peak System Conditions:*

   The ISO conducted a deterministic assessment of the sufficiency of the resource fleet to meet summer peak loads at the time of highest system stress, considering necessary reserve margins. This simple resource stack analysis of the fleet expected online at the time the system is most stressed provides insight regarding resource development.

3. *Operational Risk Assessment*

   The ISO conducted a more detailed comprehensive probabilistic analysis focusing on the summer months to assess operational risks. This analysis is based on year-over-year comparisons, as there are no standard industry metrics that apply on only a seasonal basis.

In addition to these topics, the Summer Assessment provides an industry update on:

- *Strategic Reliability Reserves and other Extreme Event Measures; and*
- *Preparation for Summer Operation*

Background

Summer Assessments are critical to preparedness ahead of typically challenging summer conditions and high loads. The ISO's methodology for summer assessments has evolved over the last 10 years from a deterministic assessment of anticipated summer conditions to a probabilistic approach focused on operational situational awareness. The strong focus on operational situational awareness was primarily driven by a relatively stable resource fleet but a need to focus on seasonal conditions and constraints to identify particular risk periods or grid conditions. Metrics were created and tailored for an operational perspective and were (appropriately) decoupled from conventional planning metrics for integrated resource planning. The ISO also developed its own load projection methodology to underpin this analysis, which has been helpful to inform ISO input into the CEC's near-term forecasting process.

As shortfall conditions developed when new resource development failed to keep up with emerging customer demand trends, including adapting to a shifting peak as behind-the-meter solar pushed peak demands to later hours in the day, the focus of summer reliability analyses shifted. These changes include:

- Increased scrutiny on expected summer conditions applied earlier in the year, and over subsequent years;
- Increased focus on changes in demand requirements and resource additions; and,
- The risk associated with more extreme events and the availability of emergency mitigation measures.

This drove a shift to assessing the transition of long-term resource planning objectives and measures into the development of physical assets, and the attendant comparison to metrics typically used in resource planning that are of more use to policy development and resource procurement entities —the 1-in-10 LOLE in particular.

Given the evolving stakeholder community and its needs and interests, the ISO has altered its Summer Assessment activities to develop two distinct products, aligned with different stakeholder needs. This 2023 Summer Assessment, intended for the broadest stakeholder community, addresses the emerging needs described above. The ISO is also continuing to prepare its detailed and comprehensive operational assessment, primarily as an internal document that will be used to support operations staff preparedness.

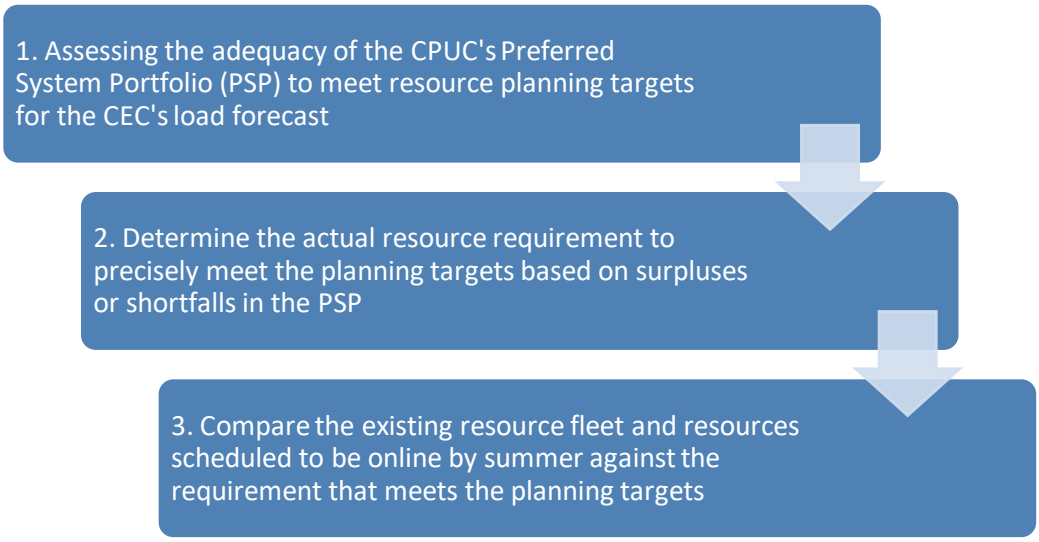
Overall Progress Towards Resource Planning Targets

The progress of actual resource development in meeting resource planning targets was assessed through several discrete steps.

First, the ISO assessed the level of reliability by reviewing the most recent CPUC PSP portfolio, developed through its IRP process alongside the most recent load forecast produced by the CEC, and compared those results to resource sufficiency planning targets.[8] Based on the differences in calculated performance against those performance target metrics, the ISO then estimated the amount of resources needed to exactly achieve the probabilistic planning target – generally known as the 1-in-10 performance metric.

The ISO then assessed the resources under development, based on the latest information available to the ISO, to examine progress towards meeting the resource requirements. These steps are displayed in the figure below:

Figure 1: Process Flow for Assessing Progress Towards Resource Planning Targets



As a material volume of new resources are scheduled to come online between the start of the summer season and the forecast peak load period in September of 2023, the ISO has provided

[8] The resource portfolio is the CPUC's Preferred System portfolio adopted by the CPUC on February 10, 2022 in Decision 22-02-004, and the load forecast is the CEC's CEDU 2022 forecast, adopted in February 2023.

results both for the resources scheduled to be online by June 1, 2023, and for all the resources scheduled to be online by September 1, 2023.

The results of this assessment of progress toward resource planning targets are summarized in Table 1, below. Key observations include:

1. With typical or average hydro conditions, the CPUC PSP demonstrated a modest surplus of 421 MW in achieving the planning target for 2023. The CPUC's PSP will require a modest increase to address the CEC's latest load forecasts through 2026. The PSP portfolio demonstrated a more substantial surplus of 1,761 MW in achieving the planning target for 2023 with the current high hydro conditions.
2. Under current high hydro conditions, the resource fleet scheduled to be online by June 1, 2023 exceeds the 1-in-10 planning target with a margin of approximately 200 MW. Under average hydro conditions, there would be a shortfall of approximately 1,100 MW in meeting the planning target;
3. Under current high hydro conditions, the resource fleet scheduled to be online by September 1, 2023 exceeds the 1-in-10 planning target with a margin of approximately 2,300 MW. Under average hydro conditions, that margin would drop to approximately 960 MW;
4. These results address conventional resource planning methodologies and do not take into account the more extreme events afflicting California in recent years such as sustained extreme heat events and wildfire risks. These results also do not rely on measures employed or accessed during those emergency events.

Since the widespread heat wave events of 2020, and the extreme events encountered in subsequent summers, the ISO, State entities, and others have put in place a number of measures to strengthen system preparedness and performance. These include approving procurement of additional resources, ensuring existing resources are retained in service, and improving operational readiness and measures to access resources or load reductions that can be implemented when faced with the risk of shortfalls.

Table 1: Summary of Resource Requirements to Achieve Resource Planning Targets

Capacity (MW)	2023	2024	2025	2026
Calculation of Required NQC to meet LOLE Target				
Preferred System Plan New Additions	2749	5348	1955	412
Cumulative new Preferred System Plan Additions	2749	8097	10052	10464
ISO PLEXOS LOLE Simulation Results				
NQC Surplus (Shortfall) to meet LOLE Target	421	1313	(1294)	(1412)
Cumulative New NQC Additions needed to maintain 1-in-10	2328	6784	11346	11876
Comparison of Required Amounts to Authorized Procurement				
Procurement Authorizations (NQC)	2825	6000	1500	2000
Cumulative Procurement Authorization (NQC)	2825	8825	10325	12325
Cumulative surplus (shortfall) in authorizations by year	497	2041	(1021)	449
Comparison of Required Amounts to Current Projection				
NQC Installed Surplus (shortfall) above PSP by June 1, 2023	(1551)			
Surplus (Shortfall) meeting LOLE Target with June 1 resources	(1130)			
NQC Installed Surplus (shortfall) above PSP by Sept 1, 2023	543			
Surplus (Shortfall) meeting LOLE Target with Sept 1 resources	964			

Current high hydro conditions provide an *additional* 1340 MW margin, achieving a 1-in-10 target even with only resources forecast online by June 1

The Preferred System Portfolio and its Effectiveness in Identifying Targets

This section describes the ISO's probabilistic study results of the CPUC's PSP in meeting resource planning performance targets, and key input assumptions upon which they are based. This analysis includes two steps, both of which are displayed in Table 1, above.

1. Determining the performance level achieved by the PSP; and
2. Determining the surplus or shortfall in precisely meeting the planning target.

The ISO's analysis of the CPUC's PSP found that the portfolio achieves planning performance targets with a slight margin for the summer of 2023, with average hydro conditions. That margin improves with higher hydro conditions, which current snow accumulation indicates will exist.

The ISO assessed the CPUC's PSP developed in its IRP proceeding against the planning target, which is the 1-in-10 LOLE, using probabilistic production cost simulations. The probabilistic production cost simulation approach is able to capture the wide range of system conditions in load, solar and wind generation, and generation resource outages. The assessment was performed with the demand forecast in the CEC 2022 Integrated Energy Policy Report (IEPR), the California Energy Demand Update (CEDU) 2022 Planning Forecast.

Table 2 below provides the CEC peak managed load forecasts and the ISO assessment results, including the LOLE and capacity surplus or shortfall in the years 2023-2026 and 2032. Average historical hydro conditions were used as the base case, consistent with planning methodologies. The ISO also performed a sensitivity study with high hydro conditions, recognizing the high

snow accumulation reported at the time of analysis. Table 2 also includes the results of the ISO's previous assessment conducted in 2022 with the CEC 2021 IEPR load forecast[9], for comparison purposes.

Table 2: Results of the ISO Assessment of the CPUC Preferred System Portfolio

	2023	2024	2025	2026	2032
Peak Managed Load (MW)					
2022 IEPR Planning Scenario	46,829	47,475	47,987	48,487	53,066
2021 IEPR Mid-Mid 3-3 Scenario	46,727	47,325	47,749	48,190	51,444
Changes	102	150	238	297	1,622
Results of PSP with 2022 IEPR Forecast					
LOLE	0.064	0.026	0.134	0.142	0.438
Surplus or shortfall in effective capacity to achieve the 1 -in-10 planning target	Surplus of 421 MW	Surplus of 1,313 MW	Shortfall of 1,294 MW	Shortfall of 1,412 MW	Shortfall of 2,382 MW
Results of PSP with 2022 IEPR Forecast with High Hydro Condition [a]					
LOLE	0.024				
Surplus or shortfall in effective capacity to achieve the 1 -in-10 target performance	Surplus of 1,761 MW				
Changes of surplus in effective capacity (MW) [b]	1,340				
Results of PSP with 2021 IEPR Forecast					
LOLE	0.064	0.018	0.130	0.126	0.142
Surplus or shortfall in effective capacity to achieve the 1 -in-10 target performance	Surplus of 531 MW	Surplus of 1,493 MW	Shortfall of 1,029 MW	Shortfall of 1,146 MW	Shortfall of 509 MW
Changes of surplus or shortfall (MW) [c]	-110	-180	265	266	1,873

[a] *The high hydro case has hydro availability similar to 1997-1998 season, which is the highest among the 1998-2017 historical data the CPUC provided.*

[b] *From the case with 2022 IEPR and normal hydro to that with 2022 IEPR and high hydro.*

[c] *From the case with 2021 IEPR and normal hydro to that with 2022 IEPR and normal hydro.*

The assessment found that:

- The PSP target is sufficient to meet the 1-in-10 LOLE planning target in the years 2023 and 2024.
- The PSP targets fall short of meeting the planning reliability performance target in the years 2025, 2026 and 2032.
- The results with the 2022 IEPR forecast appear to be consistent with those using 2021 IEPR forecast, given the differences in the forecasts themselves.
- With the increase in peak managed load forecasts from 2021 to 2022 IEPR, the capacity surpluses for the years 2023 and 2024 have been reduced by 116 MW and 165 MW,

[9] ISO results communicated to the CEC on January 2, 2023 via letter to Vice Chair Gunda: http://www.caiso.com/Documents/Jan2-2023-Letter-CaliforniaEnergyCommissionViceChair-CAISOReliabilityModeling.pdf

respectively. The capacity shortfalls for the years 2025, 2026, and 2032 have increased by 265 MW, 266 MW, and 1,873 MW, respectively.

- The high hydro conditions observed and anticipated at the time of the analysis provide additional margin for 2023.

Resource Plan Assumptions

The CPUC's PSP was developed in its IRP proceeding and adopted on February 10, 2022 in Decision 22-02-004. The presentation of the portfolio set out below was revised from how it was presented in the Decision to include some of the out-of-state resources in the net import limit. The ISO net import limit is set to 5,500 MW accordingly. The details of the portfolio and the changes are listed in Table 3.

Table 3: Total Installed Capacity and Net Import of the CPUC Preferred System Portfolio

Installed Capacity (MW)	2022	2023	2024	2025	2026	2032
Nuclear [a]	2,935	2,935	2,935	635	635	635
CHP	2,195	2,156	2,107	1,997	1,892	1,514
Gas [b]	28,817	28,817	25,084	24,791	24,742	24,743
Coal [c]						
Hydro (Large)	7,073	7,073	7,073	7,073	7,073	7,073
Biomass	844	875	893	917	917	942
Geothermal	1,601	1,701	1,701	1,701	1,771	2,747
Hydro (Small)	958	958	958	958	958	958
Wind	8,667	8,689	9,019	10,501	10,501	10,501
Wind OOS New Transmission						1,500
Offshore Wind					120	1,708
Solar	18,848	22,966	24,167	27,417	27,417	33,922
Battery Storage	5,160	7,563	13,055	14,769	14,983	18,142
Pumped Storage	1,899	1,899	1,899	1,899	2,095	2,899
Shed Demand Response (DR)	2,347	2,347	2,548	2,636	2,636	2,636
Sum	**81,344**	**87,979**	**91,440**	**95,296**	**95,742**	**109,920**
Net Import	**5,500**	**5,500**	**5,500**	**5,500**	**5,500**	**5,500**

[a] Diablo Canyon unit 1 retires on November 30, 2024 and unit 2 retires on August 26, 2025, which is not available for 2025 annual peak load day in early September.

[b] Added Redondo Beach (850 MW). The 4 OTC plants (3,750 MW), Alamitos, Huntington Beach, Ormond Beach, and Redondo Beach, all retire at the end of 2023.

[c] Removed 480 MW Intermountain coal capacity in 2022 to 2024 and included it in the ISO net import limit.

[d] 2,852 MW NW scheduled hydro import for the years 2022-2032 was included in the ISO net import limit.

While not used elsewhere in this analysis, the ISO also translated the PSP from installed capacity to qualifying capacity using the existing CPUC methodologies for assessing qualifying capacity for resource adequacy purposes. This translates to a 25.75% reserve margin for 2023. Adjusting the resource requirement down by 421 MW, the amount by which the PSP exceeds the planning target in 2023 as detailed in Table 2 above, the resource requirement for PSP translates to a 24.5% reserve margin needed to meet the planning target.

Demand Forecast

The ISO's analysis relied on the most recent CEC California Energy Demand Update (CEDU) 2022 forecast, adopted in February 2023 and set out in the CEC 2022 IEPR, using the 1-in-2 Planning Forecast.

The CEC forecasted peak demand for 2023 is set out in Table 4.

Table 4: CEDU 2022 Planning Forecast for ISO Balancing Authority Area

Forecast	ISO demand
1-in-2 forecast	46,829 MW
1-in-5 forecast	48,826 MW
1-in-10 forecast	49,919 MW

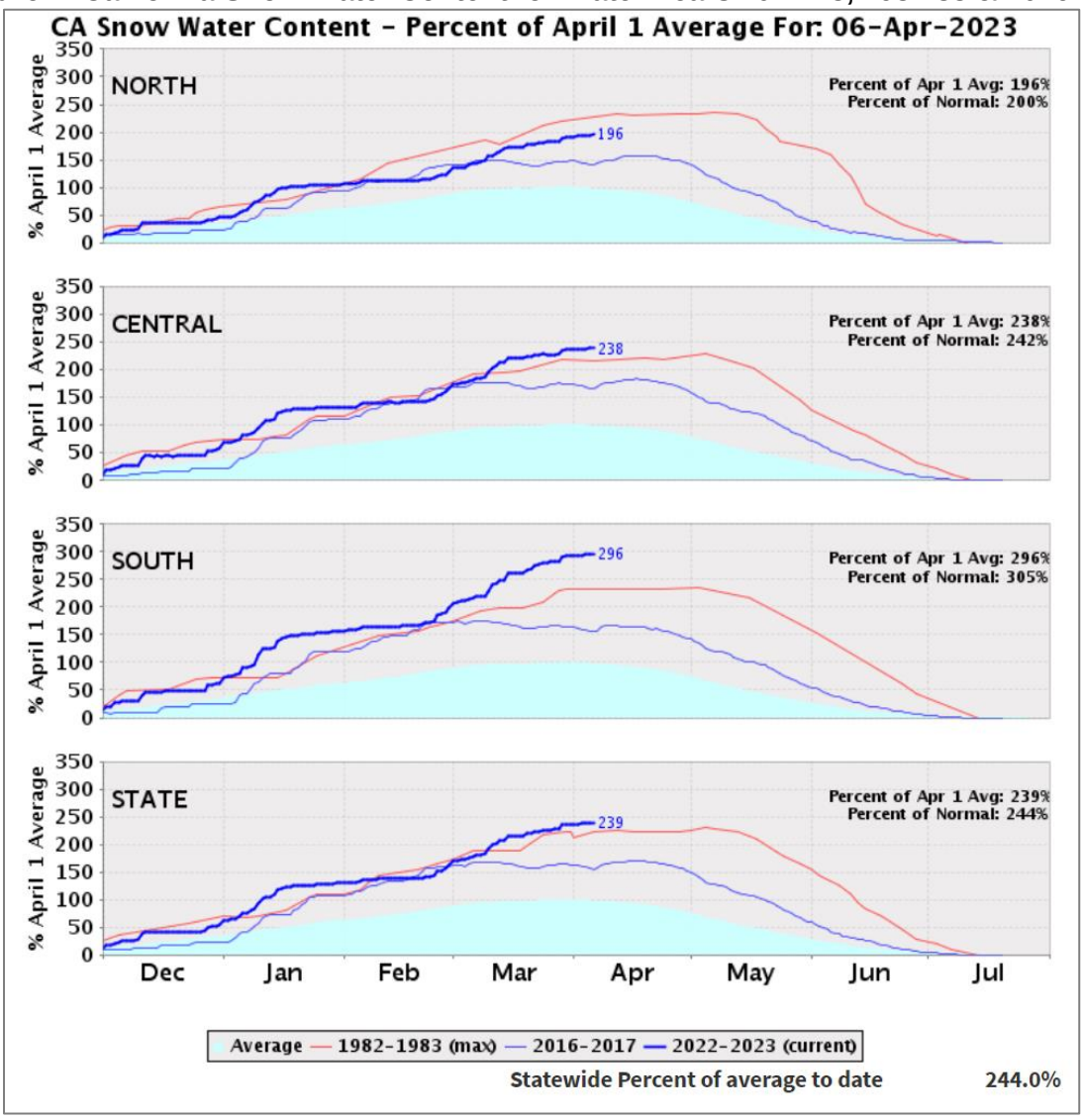
In 2022, the CEC's forecasted 1-in-2 peak demand was 46,319 MW while actual peak demand reached 52,061 in 2022. Using 28 years' worth of weather data, the ISO weighted 3-day temperature through September 6 was a 1-25 year event. The resource development exceeding the LOLE planning target and the improved hydro conditions, working together with emergency resources, leave the grid in better shape to manage these extreme events

Hydro modeling

On a statewide basis, the snow water content is trending close to the historical maximum, as shown in the graph below, which sets out the California snowpack conditions as of April 6, 2023. The year-to-date snow water content totals are significantly above average, which should result in above-average hydro energy generation in 2023. The overall positive hydro conditions at this point in time supported the ISO probabilistic studies in this assessment, including a "high" hydro sensitivity as well as an "average hydro" analysis.

Over half of the hydro facilities in the ISO BAA are in the northern part of the state, which to date, is trending below the remainder of the state.

Figure 2: California Snow Water Content for Water Years 2022-23, 1982-83 & 2016-17[10]



The model in the ISO analysis for an "average hydro" year was based on the 2010-2011 hydro year. Based on conditions in February and March when the production cost modeling was run, the "high hydro" model used in the analysis was based on the 1997-1998 hydro year, which was a high hydro year that correlated most closely with the hydro conditions at that time.

Progress Towards Achieving Preferred System Portfolio

As previously discussed, this assessment considers the status of resources moving forward in the ISO interconnection queue and proceeding with the steps necessary to achieve commercial operation by the key summer dates.

[10] California Department of Water Resources. California Data Exchange Center. CA Snow Water Content – Percent of April 1 Average. http://cdec.water.ca.gov/snowapp/swcchart.action

The ISO's information includes all generation under construction for CPUC-jurisdictional and non-jurisdictional load-serving entities. The ISO's information is not limited to the procurement requirements established by the CPUC and not limited to capacity under known power purchase agreements.

It is critical to note several important distinctions regarding data coordination with the CPUC and CEC. With the benefit of additional coordination and data sharing enabled by Senate Bill (SB) 1020 (Laird), the ISO, CPUC, and CEC have considerable comfort that all three are coordinated on new resource data itself, and have a common understanding of the differences in what each entity reports. The state agencies and the ISO are using new resource data slightly differently, as discussed here.

The ISO reports the total of all resources moving through its interconnection process scheduled to be on track this summer for both CPUC-jurisdictional and non-CPUC jurisdictional load-serving entities. New capacity figures reported by the ISO therefore include the total of all installed capacity, regardless of who the offtaker is for the resource, and how much of the resource may be under contract. The CPUC and CEC generally report the progress of CPUC-jurisdictional load-serving entities in achieving procurement requirements established by the CPUC, and do not include capacity not reported as under contract, or capacity under contract with publicly owned utilities. Accordingly, there will be modest differences between the numbers for new capacity set out in this report, and reporting provided by the CPUC and CEC. In addition, the CPUC and CEC report new capacity data based on net qualifying capacity, while the ISO tracks and reports new resources primarily on the basis of net dependable installed capacity, and uses net qualifying capacity values where appropriate.

Table 5: Comparison of 2023 CPUC Preferred System Portfolio to Projected Resources

Installed Capacity (MW)	(A) 2023 Preferred System Portfolio	(B) Projected June 1 2023 Resources	(C) Surplus (Shortfall)	(D) Projected Sept 1 2023 Resources	(E) Surplus (Shortfall)
Nuclear	2,935	2,935		2,935	
CHP	2,156	1,912		1,912	
Gas	28,817	29,629		29,629	
Coal		19		19	
Hydro (Large)	7,073	6,770		6,770	
Biomass	875	559		561	
Geothermal	1,701	1,616		1,616	
Hydro (Small)	958	1,136		1,136	
Wind	8,689	8,473	(216)	8,473	(216)
Wind OOS New Transmission					
Offshore Wind					
Solar	22,966	18,897	(4,069)	20,193	(2,773)
Battery Storage	7,563	6,313	(1,250)	8,322	759
Pumped Storage	1,899	1,832		1,832	
Shed DR	2,347	1,846		1,846	
Sum	**87,979**	**81,938**		**85,245**	
Net Import	**5,500**	**5,500**		**5,500**	

- *All values are based on net dependable installed capacity and not nameplate capacity*
- *Hydro Total (Large and Small) from the 2023 Preferred System Portfolio (PSP) is 8,031 MW and ISO Total for installed capacity is 7,906 MW*
- *Nuclear resources include the pseudo-tied Palo Verde unit (SCE share)*
- *There are no pseudo-tied gas resources*
- *Contra Costa Carbon Plant is the only included coal facility. Pseudo-tied units from Intermountain Power Plant (IPP) are not included - will come through as imports*
- *The large hydro assets total includes Hoover's share to SCE, VEA, MWD, and Anaheim – all other Pseudo-tied large hydro assets will come through as imports (all of PGAE primarily dynamic schedules from BPA and PWX – around 1,200 MW)*
- *Biogas and Waste to Power resources are also included under Biomass category. Lower number possibly because some resources are mislabeled under Biomass or Natural Gas. There are no pseudo-tied resources.*
- *Includes all Pseudo-tied Geothermal resources as well (an additional 151 MW pseudo-tied)*
- *No small hydro pseudo-tied generation - refer to note on large hydro resources*
- *For wind, pseudo-tied resources are included (about 2,000 MW)*
- *For solar, pseudo-tied resources are included (about 700 MW)*
- *There are no pseudo-tied pumped hydro resources*
- *Shed DR is calculated as the sum of proxy demand response (PDR) (493 MW) and investor owned utility (IOU) Credited DR (1,353 MW), consistent with the stack analysis*
- *Imports are kept at the same level as the PSP*

In assessing the impact of the gap between the CPUC Preferred System Portfolio and actual procurement progress, this assessment focused on the gaps in solar, wind and battery storage, and approximated the impact using the qualifying capacity ratios for those resources developed by the CPUC for the 2023 mid-term procurement authorized in Decision [D.] 21-06-035.

Table 6: Estimated Resource Procurement Surpluses and Shortfalls (MW)

Resource Type	2023 Preferred System Portfolio	Projected June 1 2023 Resources	Surplus/ (Shortfall)	Qualifying Capacity	Projected September 1, 2023 Resources	Surplus/ (Shortfall)	Qualifying Capacity
Wind	8,689	8,473	(216)	(30)	8,473	(216)	(30)
Solar	22,966	18,897	(4,069)	(317)	20,193	(2773)	(158)
Battery Storage	7,563	6,313	(1,250)	(1,204)	8,322	759	731
Total				**(1,551)**			**543**

These values provide an approximate impact of the differences between the Preferred System Portfolio and actual progress for new resources online or scheduled to be online by this summer.

CPUC Procurement Requirements and Status of Power Purchase Agreements

Recognizing that the bulk of the new resources being developed in the ISO's BAA is by CPUC-jurisdictional load-serving entities in response to procurement requirements established by the CPUC, the ISO has also provided an overview of the procurement requirements established by the CPUC and the latest information regarding power purchase agreements in place to achieve those requirements.

The CPUC IRP Procurement Orders for 2019, 2021 and 2023 established obligations for CPUC-jurisdictional load-serving entities to procure new generation. The annual procurement requirements are shown in Table 7 below. To the extent a resource connected to the distribution system under a Wholesale Distribution Access Tariff (WDAT) has a procurement contract with a CPUC-jurisdictional entity, those contracts are also included in the analysis.

Table 7: CPUC Identification of Procurement Requirements (in MW, Qualifying Capacity)

Need	2023	2024	2025	2026	2027	2028
Decision [D.]9-11-016	825	-	-	-	-	
Decision [D.]21-06-035 General Requirements	2,000	6,000	1,500	-	-	
Decision [D.]21-06-035 Long-duration storage resources	-	-	-	-	-	2,000
Decision [D.]23-02-040				2,000	2,000	
Total annual capacity requirements	**2,825**	**6,000**	**1,500**	**2,000**	**2,000**	**2,000**
Total Cumulative	**2,825**	**8,825**	**10,325**	**12,325**	**14,325**	**16,325**

Based on ISO data, the level of procurement requirements established by the CPUC has already been met for each year. In addition, to the extent the CPUC increases IRP procurement requirements, significant commercial interest exists from project developers with generation resources to serve California load as demonstrated in the ISO interconnection queue.

Table 8: Comparison of established procurement requirements and procurement contracting progress

	Authorized Procurement (MW)	Contracted (MW)[11]	Capacity in Queue and Interconnection Process (MW)[12]
June 2, 2022 – June 1, 2023	**2,825**	**6,289**[13]	**4,719**
June 2, 2023 – June 1, 2024	**6,000**	**14,295**	**36,851**
June 2, 2024 – June 1, 2025	**1,500**	**10,041**	**51,887**
June 2, 2025 – June 1, 2026	**2,000**	**4,051**	**40,896**
June 2, 2026 – June 1, 2027	**2,000**	**4,754**	**19,211**
June 2, 2027 – June 1, 2028	**2,000**	**Not available**	**26,196**

[11] The contracted value for 6/2/2022 – 6/3/2023 includes projects that have already achieved their commercial operation date (COD). In addition, all the years include projects that have known PPAs or have completed sufficient construction to start the New Resource Interconnection process.
[12] Data as of April 27, 2023.
[13] Of the 6,289 MW expected to be online by June 1, 2023, 2,532 MW, or 40%, have already achieved their COD.

Operating Reserve Margin Sufficiency at Peak System Conditions

To assess adequate resource procurement targets and minimum resource needs under the CPUC Resource Adequacy program, the ISO developed a deterministic stack analysis. In addition to the stochastic modeling described above, the ISO deterministic stack analysis is included to provide an additional perspective on the amount of capacity the ISO is expecting to be available for summer 2023 and the level of reliability anticipated under various load levels and import conditions.

The ISO considered several sets of parameters to determine the appropriate reserve margin against which to assess the resource fleet. In considering the role of reserve margins to assess the ability to carry adequate operating reserves at the time of peak load, it is important to clarify how the reserve margins were interpreted and applied in this deterministic analysis.

In more recent industry discussions regarding resource adequacy, there is generally consensus that LOLE analyses of resource requirements needed to meet a planning reliability target can be translated into a planning reserve margin (PRM) necessary to maintain that target. That PRM is then applied to the peak load to provide an approximation, based on specific resource accounting rules, to assess the overall adequacy of a pool of resources in meeting the PRM requirements, and, by proxy, the planning target. This process is described in the preceding section where the ISO translated the CPUC Preferred System Portfolio, less the surplus above meeting the planning target, into a reserve margin. In adding up resources and assessing their compliance with that reserve margin, all resources are considered and credited based on their overall contribution to reliability over the course of a year. However, this is *not* the application of reserve margins being employed in this deterministic assessment of peak load operating conditions.

This deterministic approach instead focuses specifically on the resources that reasonably would be available at the time of peak load and crediting those resources based on their contribution at that time. For a number of those resources, the net qualifying capacity provides a reasonable estimation of the contribution of those resources at 8 pm. Solar resources are not included in this analysis because the period of peak system stress occurs when the sun is setting and solar generation is at or near zero. In this context, the ISO considered several reserve margins for presentation purposes.

First, the ISO considered its own reserve requirements to reasonably maintain operating reserves under stressed system conditions, ensuring the ability to comply with several NERC and WECC reliability standards in real time. NERC requires the ISO to carry approximately 6 percent of expected load as contingency reserves.[14] This contingency requirement cannot be used for other types of operational needs other than contingencies unless the ISO is in an EEA 3 condition. In addition, the ISO also requires unloaded capacity to meet operational needs like

[14] BAL-002-WECC-2a

frequency response and regulation pursuant to other NERC requirements.[15] Regulation reserve requirements add an additional percentage point to the reserve margin requirements. Additionally, to assess the ISO's ability to maintain reserve margins necessary for reliable service in real-time operation, the ISO considered capacity needs accounting for the overall forced outage rate of the existing fleet, which is currently about 7.5 percent. The ISO also based the deterministic assessment on meeting at least a 1-in-5 load forecast level. The 1-in-5 level is generally about 4 percent above the 1-in-2 forecast used as a baseline, providing an allowance for loads up to 1-in-5. (The 2023 CEC forecast showed a 4.3 percent increase). The combined effect of these requirements established a threshold need for an 18.5 percent margin above a 1-in-2 load forecast level. This measure is another indicator of resource sufficiency, but does not directly translate into a particular level of LOLE over an entire year.

The ISO also considered the CPUC's resource adequacy procurement targets. The CPUC established a 15% PRM for 2022, 16% for 2023, a minimum of 17% for 2024, and an effective PRM range of up to 22.5%.[16] While the CPUC's initial development of the 15% planning reserve margin was correlated to a 1-in-10 LOLE performance target at that time, the resource fleet and load characteristics have changed. The 15% PRM essentially allowed for a 4% load variation to 1-in-5 weather events, a 6% reserve margin and a 5% assumed generation forced outage rate. In Decision (D.) 22-06-050, the CPUC adopted a 16 percent PRM for 2023 and continued use of an "effective PRM" of 20 to 22.5 percent for summer 2023. The CPUC noted that a 16 percent PRM for 2023 does not change the contingency resource target of 2,000 to 3,000 MWs that the investor-owned utilities (IOU) were directed to procure for summer 2023 in D.21-12-015. The ISO therefore compared the resource stack expected by September 1 to both the established PRM for each year and the 22.5% ceiling of the "effective PRM" range.

The ISO has therefore compared the resources available at 8 pm against (1) a reserve margin of 18.5 percent derived from reasonable requirements to maintain operating reserves, (2) a planning reserve margin of 16 percent established by the CPUC for the 2023 resource adequacy year, and (3) the effective planning reserve margin range of 20.5 to 22.5 percent.

Figure 4 shows the result of the deterministic stack analysis for the month of September 2023, at 8 pm, which is the month and hour of the greatest supply risk.

Approximately 4,715 MW of NQC have reached commercial operation or are scheduled to be added in the twelve months ending September 1, 2023. Figure 4 and Figure 5 show a breakdown of that amount; in each of those figures, existing resources are those that were online by January 1 of each year, and new resources are those that reached commercial operation or are scheduled to achieve operation by September 1, 2023. The NQC of new resources were reduced by 296 MW to account for solar generation not being available at 8 pm.

[15] BAL-003-2 and BAL-001-2

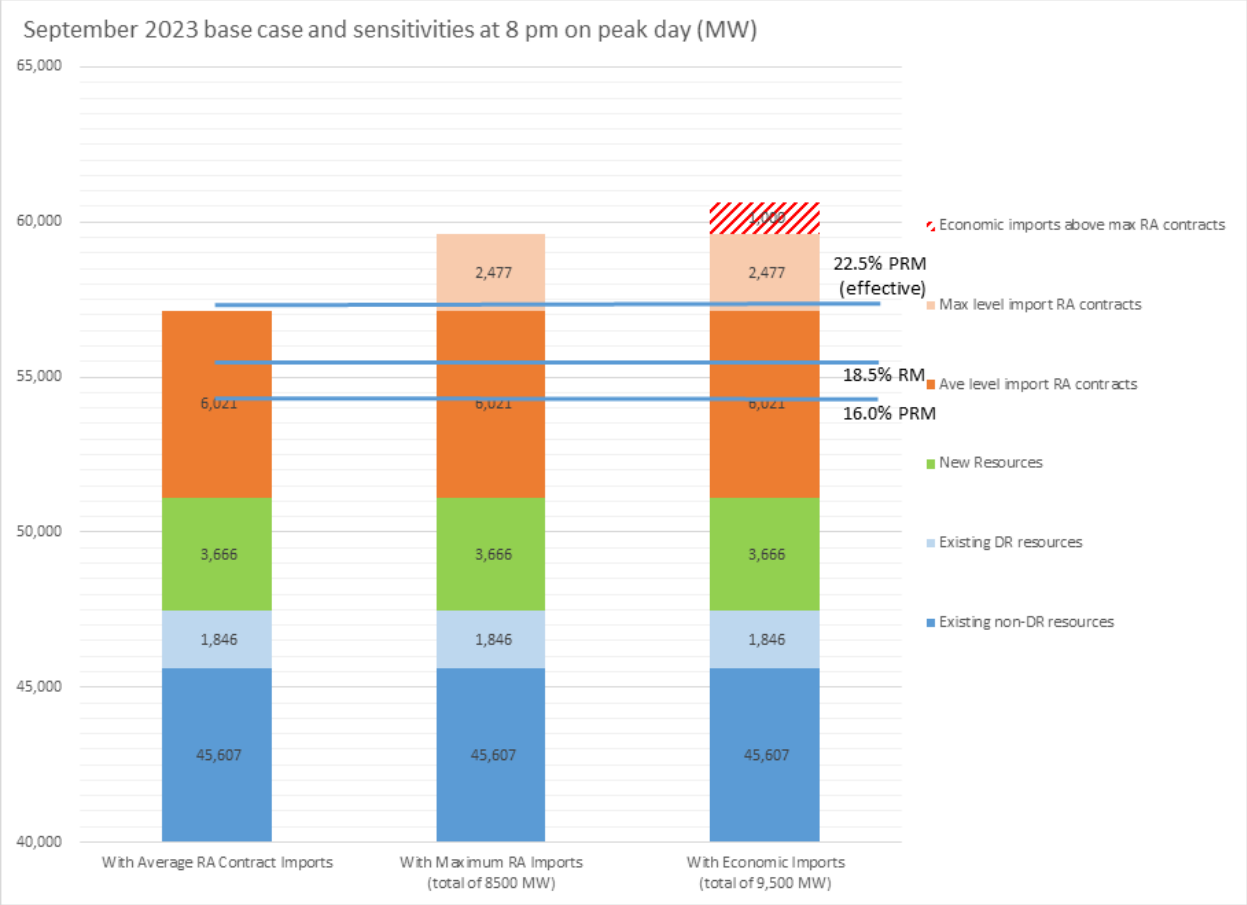
[16] CPUC, Decision (D.) 21-12-015 Phase 2 Decision Directing PG&E, SCE and SDG&E To Take Actions to Prepare for Potential Extreme Weather in the Summers of 2022 and 2023, December 2, 2021.

The three bars of stacked resources portray three scenarios of progressively increasing resource amounts. Moving from left to right, the first bar represents resources similar to the stochastic sensitivity case, where imports are limited to the average of the last eight years of resource adequacy imports[17] procured by the load-serving entities to meet their collective resource adequacy obligations. The middle bar represents an increase in the resource adequacy import level to 8,500 MW, the highest amount procured for the month of September over the last eight years. The bar on the right represents the total resources if the import levels were to include an additional 1,000 MW of economic imports, increasing imports overall to 9,500 MW.

- The bar on the left shows that if the system is limited to imports of 6,021 MW, the 16 percent PRM associated with 1-in-2 load can be met in September. Additionally, the 18.5 percent PRM associated with 1-in-5 load can also be met. The 22.5 percent PRM, however, is not met.
- The middle bar shows that if system imports reach 8,500 MW, approximately 2,500 MW greater than the typical RA procurement levels, the 22.5 percent PRM can be met as well.
- The last bar shows that we do not need to depend on additional economic imports in meeting the maximum PRM of 22.5 percent for 2023.

[17] The 2015-2022 average of the total import capacity procured by all load serving entities to meet their RA program obligations is 6,021 MW for the month of September.

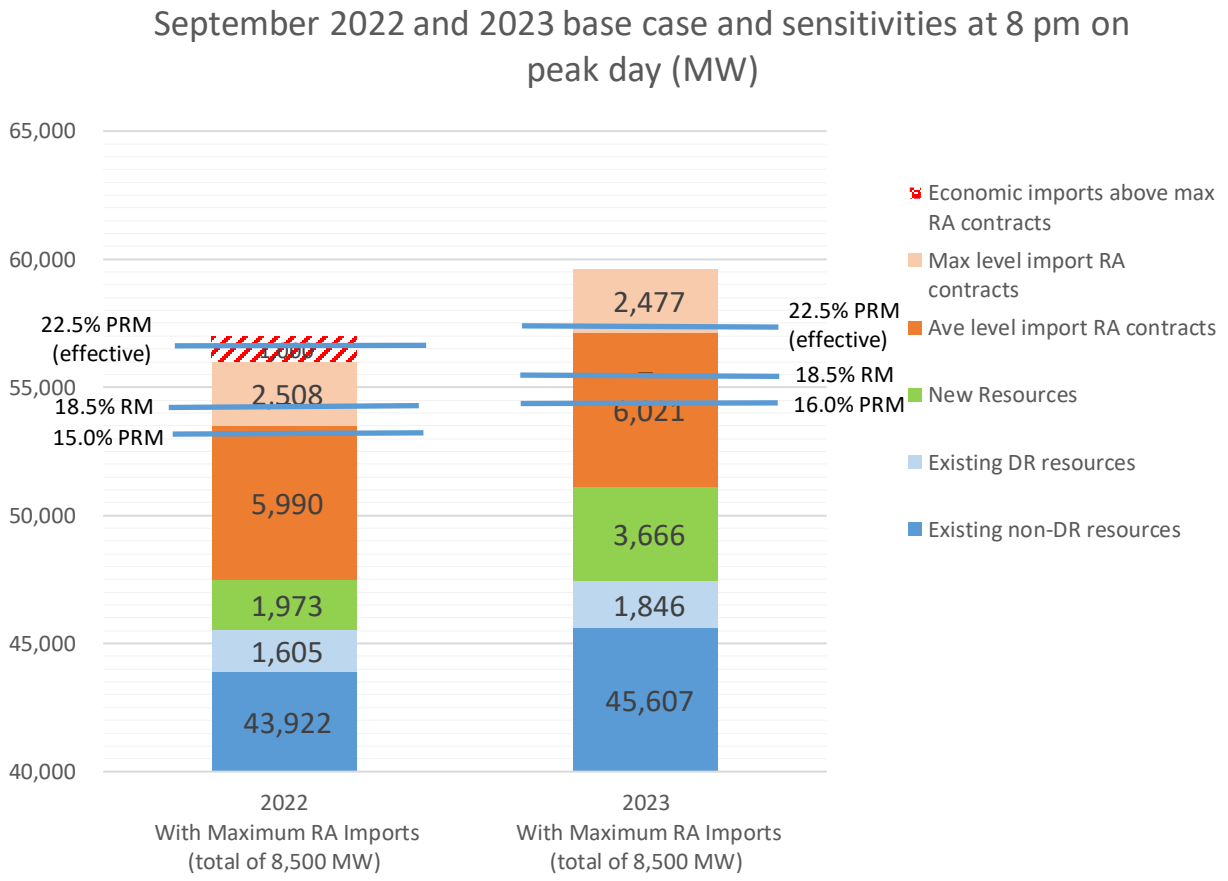
Figure 4: Stack analysis for September 2023
(PRM levels based on CEC 1-in-2 load forecast plus planning reserve margin)



Existing non-DR resources include all resources that reached commercial operation by January 1, 2023. New resources are those that came online or are scheduled to come online since January 1, 2023.

Figure 5 provides a reference to the results from 2022, comparing the maximum import scenario, which shows a significant improvement in 2023 supply over 2022. The approximate gain of 3,962 MW of new resources is partially offset by a 1,200 MW higher load forecast for 2023 based on the latest CEC 1-in-2 forecast. The higher load forecast for 2023 is illustrated in *Figure 5* by the higher PRMs for the bar on the right.

Figure 5: Stack analysis comparison of September 2023 to September 2022
(PRM levels based on CEC 1-in-2 load forecast plus planning reserve margin)



Existing non-DR resources include all resources that reached commercial operation by January 1 of each year. New resources are those that came online or were scheduled to come online since January 1 of each year.

Operational Risk Assessment

The ISO's more detailed comprehensive probabilistic analysis examining only the summer months was conducted to assess operational risks, and is being identified as the ISO's Operational Risk Assessment. This analysis is based on year-over-year comparisons, as there are no standard industry metrics that apply on only a seasonal basis. This assessment was developed after annual conditions, including hydro conditions firmed up and could be reflected in the analysis.

The Operational Risk Assessment develops an independent projection of this summer's demand and identifies potential operational issues using information held by the ISO, third-party modeling tools, and public information from various state agencies, generation and transmission owners, load-serving entities, and other balancing authorities (BAs). The Operational Risk Assessment considers the supply and demand conditions across the entire ISO balancing authority area and, to a more limited extent, the entire WECC.

Consistent with other analyses described in this Summer Assessment, the Operational Risk Assessment does not take into account extraordinary measures employed under the extreme loss-of-load conditions to mitigate the actual risk of having to shed or curtail firm load. Therefore, capacity shortfalls identified in this report are more indicative of the likelihood of needing to rely on those extraordinary measures, rather than the actual risk of loss of firm load.

Overall, the analysis demonstrates a significant increase in reliability with the addition of new resources and improved hydro conditions, as demonstrated in the loss-of-load study conducted to assess achievement of annual resource planning reliability targets.

The overall reduction in risk also results in the residual risk becoming concentrated more narrowly in the early evening as solar output drops off. This is demonstrated in a comparison of the periods of when the minimum unloaded capacity margins occurred, in the samples that experienced minimums below the thresholds established in each year's studies. The ISO's results for the summer of 2022 demonstrated the highest system risk occurring in hour ending 19:00, with the risk tailing off in the hours on either side. The results for the summer of 2023 demonstrate more consistent risk across the hours ending 19:00 through 21:00, as well as significantly lower risk in the hours leading up to hour ending 19:00. This can be attributed in part to the larger fleet of storage resources available to manage the rapid decline of solar output.

Emergency Resources

As mentioned earlier in this report, following the widespread heat events of 2020, the ISO, the California Legislature, and state entities have taken several measures to ensure grid reliability under extreme events, beyond conventional planning standards. These measures and programs include pursuing and approving procurement of additional resources, ensuring existing resources are retained in service, and improving operational readiness and measures to access resources or load reductions when faced with the risk of shortfalls. Starting in summer 2021, several emergency resource programs have also emerged which provide grid support during system emergencies and extreme events. These programs include both conventional generation assets and voluntary load reduction programs administered by state agencies including the Department of Water Resources (DWR), CPUC and the CEC. These programs trigger based on various ISO emergency notifications.

The ISO processes for operation of various emergency resources are detailed in the ISO's Emergency Procedure 4420.[18] Updates for Summer 2023 are in progress and will be posted along with other summer readiness efforts.

State Power Augmentation Project (SPAP) – 120 MW, Sept 2021-2023

Under the SPAP established in 2021, DWR contracted for installation of a total of 120 MW of emergency capacity with 60 MW at the Roseville Energy Park managed by the City of Roseville and another 60 MW at the Greenleaf 1 site managed by Calpine. Each site is comprised of two General Electric TM2500 gas turbine generator units rated at 30 MW each. The Greenleaf 1 site is located near Yuba City and utilized a Pacific Gas and Electric Company (PG&E) interconnection for a retired resource to establish the interconnection within the ISO BAA. The Roseville Energy Park site established a new interconnection using a spare transformer in the Roseville Energy Park substation located within the Western Area Power Administration region of the BANC BAA. These resources must be dispatched for emergency conditions designated by the ISO BAA.

Electricity Supply Strategic Reliability Reserve Program (ESSRRP) – 171 MW, 2023-2027

In 2022, California State Assembly Bills (AB) 205 and 209 established authorization and funding of the Electricity Supply Strategic Reliability Reserve Program (ESSRRP), which included contracting for reserve resources available during extreme events. The first of the resources contracted in this program is the 27.5 MW California State University, Channel Island (CSU CI) co-generation unit beginning January 1, 2023 through December 31, 2027. This resource is located in the Southern California Edison Company (SCE) area and the ISO BAA. In addition to

[18] CAISO Operating Procedure 4420, System Emergency: http://www.caiso.com/Documents/4420.pdf

this unit, DWR has also contracted to install natural gas reciprocating engine generator units at the distribution system level in three separate locations as follows:

Table 9: DWR Natural Gas Reciprocating Engine Generation Locations

Location	Balancing Authority Area	Capacity	Estimated Commercial Operation Date
City of Lodi	ISO	48 MW	September 2023
TID	TID	47.5 MW	October 2023
MID	BANC	48 MW	July 2023

The ESSRRP resources may be utilized by any California BAA declaring an Extreme Event.

Demand Side Grid Support (DSGS) Program

In 2022, California State Assembly Bills 205 and 209 established authorization and funding for the CEC to administer the Demand Side Grid Support Program (DSGS) to provide load reduction to support grid reliability during extreme events. The CEC launched the DSGS program in August 2022, and funding for the DSGS program spans five years. The program was initially limited to publicly-owned utility customers, but was modified by AB 209 to allow statewide participation. DSGS customer response is voluntary – there are no penalties for non-participation and no requirements to reduce load by a particular amount during a DSGS event. DSGS events are triggered based on ISO emergency notifications. In 2022, over 315 MW of load reduction enrolled in the CEC DSGS program. The CEC expects to expand the DSGS program in 2023.

Distributed Electricity Backup Assets (DEBA) Program

In 2022, California State Assembly Bills 205 and 209 established authorization and funding for the CEC to administer the Distributed Electricity Backup Assets (DEBA) program to provide load reduction to support grid reliability during extreme events. Funding for the DEBA program spans five years. The DEBA program is a statewide program, intended to procure clean and efficient distributed energy assets that will serve as on-call emergency supply or load reduction during extreme events. The CEC continues to develop the parameters of the DEBA program.

Emergency Load Reduction Program (ELRP) 2021-2025

The CPUC established the Emergency Load Reduction Program in 2021. ELRP is a five-year demand response pilot program. In 2021, the ELRP program was limited to commercial customer participation. Starting in 2022, the CPUC expanded the ELRP to residential

customers. The ELRP is managed by the state's three investor-owned utilities – PG&E, San Diego Gas & Electric Company, and SCE and is a voluntary demand response program designed to compensate customers for reducing energy consumption in the summer months (May-October) during a grid emergency. ELRP customer response is voluntary – there are no penalties for non-participation and no requirements to reduce load by a particular amount during an ELRP event. ELRP events are triggered or called by the IOUs based on ISO emergency notifications or in some cases, an ISO-issued Flex Alert.

NERC Energy Emergency Alert Designations

Historically, the ISO has used Alerts, Warnings, and Emergencies notifications to signal activation of system emergency procedures. Effective May 1, 2022, the ISO changed its messaging system to align with NERC's Energy Emergency Alert[19] (EEA) designations. The ISO made this change to align its emergency levels with the NERC standards, align our emergency levels with Reliability Coordinators and neighboring Balancing Authority procedures, and to ensure that everyone is using consistent terminology during supply shortages. Table 10 provides the NERC emergency levels the ISO uses.

Table 10: ISO Balancing Authority Emergency Notifications

CAISO Emergency Declarations (RC WEST & CAISO BA)
CAISO BA Declarations
Flex Alert
Restricted Maintenance Operations
Transmission Emergency
RC West Declarations
EEA Watch
EEA 1
EEA 2
EEA 3 Using load as reserves EEA 3 Firm load interruption

EEA Watch: Analysis shows all available resources are committed or forecasted to be in use, and energy deficiencies are expected. Market participants are encouraged to offer supplemental energy. This notice can be issued the day before the projected shortfall or if a sudden event occurs.

[19] See Emergency notifications Fact Sheet on the ISO webpage – http://www.ISO.com/informed/Pages/Notifications/NoticeLog.aspx

EEA 1: Real-time analysis shows all resources are in use or committed for use, and energy deficiencies are expected. Market participants are encouraged to offer supplemental energy and ancillary service bids. Consumers are encouraged to conserve energy.

EEA 2: ISO requests emergency energy from all resources and has activated its emergency demand response programs. Consumers are urged to conserve energy to help preserve grid reliability.

EEA 3 Using load as reserves: ISO is unable to meet minimum contingency reserve requirements and has asked utilities to prepare for the possibility of rotating power outages

EEA 3 Firm load interruption: Energy supply is insufficient to meet demand, and utilities have been directed to initiate rotating power outages.

Preparation for Summer Operation

Preparing and publishing the Summer Assessment report and sharing the results with industry participants and stakeholders is one of many activities the ISO undertakes each year to prepare for summer system operations. These include fine-tuning market and operational metrics to ensure the effectiveness of the planned resource fleet in times of system stress, and enhancing operational coordination with state agencies and the industry overall to access contingency reserves should the system face the risk of shortfalls due to more extreme events.

As noted, the ISO, state entities, and stakeholders have employed a number of contingency measures to continue to improve system preparedness and performance. These included pursuing and approving procurement of additional resources, with a significant amount going into operation over the past year; ensuring existing resources are retained in service; and improving operational readiness and measures to access resources or load reductions that can be implemented when faced with the risk of shortfalls. The ISO processes for operation of various emergency resources are detailed in the ISO's Emergency Procedure 4420.[20] The ISO is also developing a public summer playbook, which will provide detail on ISO timelines for operational coordination and communication channels for ISO emergency notices which trigger the use of various emergency resources.

Other activities include coordinating meetings on summer preparedness with the WECC, California Department of Forestry and Fire Protection (Cal Fire), natural gas providers, transmission operators and neighboring BAs. For 2023, the ISO will continue to engage the appropriate entities in a tabletop exercise using September 6, 2022 as a use case. The ISO's ongoing coordination with these entities helps ensure that everyone is prepared for the upcoming summer operational season.

[20] CAISO Operating Procedure 4420, System Emergency: http://www.caiso.com/Documents/4420.pdf