BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements.	Rulemaking 16-02-007 (Filed February 11, 2016)

COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

Roger E. Collanton
General Counsel
Anthony J. Ivancovich
Deputy General Counsel
Anna A. McKenna
Assistant General Counsel
Jordan Pinjuv
Senior Counsel
California Independent System
250 Outcropping Way
Folsom, CA 95630
Tel: (916) 351-4429
Fax: (916) 608-7222
Email: jpinjuv@caiso.com

Dated: July 22, 2019

Table of Contents

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements.	Rulemaking 16-02-007 (Filed February 11, 2016)

COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

The California Independent System Operator Corporation (CAISO) hereby provides comments in response to the *Assigned Commissioner and Administrative Law Judge's Ruling Initiating Procurement Track and Seeking Comment on Potential Reliability Issues* (Ruling) issued on June 20, 2019.

I. Introduction

The CAISO appreciates the opportunity to comment on Energy Division staff's analysis and agrees that without action, there will be a system resource adequacy capacity shortfall in 2021. With these comments, the CAISO submits its own independent analysis demonstrating a strong potential for insufficient resources in the hours immediately after the gross peak hour, when loads remain high but solar production rapidly decreases. The CAISO's analysis shows a potential gap of up to 2,000 MW beginning in summer of 2021 and increasing to 2,500 MW in 2022. Based on its analysis and operational experience, the CAISO urges the Commission to focus immediately on developing a comprehensive plan for addressing near-term reliability needs through 2022. This plan should prioritize procurement of existing and new resources to be online as soon as possible and, as a backstop, facilitate extending the State Water Resource Control Board's (Water Board) once-through cooling (OTC) regulations for gas-fired resources that are needed to maintain near-term reliability. As new or newly constructed resources are procured, the plan should allow for the inevitable retirement and replacement of generating units that received an extension to comply with the Water Board's OTC regulations. Specifically, the Commission's comprehensive near-term reliability plan should:

1. Work through the appropriate processes to extend the Water Board's OTC regulation compliance dates for gas-fired generating units that are needed to maintain reliability;
2. Develop a procurement plan to meet reliability needs and facilitate the retirement of any generating unit that receives an OTC compliance date extension. At a minimum, this comprehensive plan should:
    a. Direct resource adequacy procurement for uncontracted resources that are operational or mothballed;
    b. Direct increased resource adequacy procurement for uncontracted import resources;
    c. Ensure resources under construction are on-track for their online dates so that they do not exacerbate reliability concerns; and
    d. Direct procurement for new resources.

To achieve these goals in a timely fashion, the Commission should issue a Decision on near-term reliability procurement and related actions by fall 2019 and initiate procurement activities before the end of 2019.

In addition, the Commission should address medium-term (approximately 2023 through 2026) needs by developing a strategy that enables the planned retirement of the Diablo Canyon Power Plant (Diablo Canyon) while maintaining reliability and addressing renewable integration needs. Reduced greenhouse gas output and reliability are interdependent and the Commission should consider them together rather than sequentially. The Commission should issue a Decision on medium-term reliability, renewable procurement, and related actions by summer 2020.

Lastly, by summer 2020 the Commission should develop a procurement plan to address long-term reliability needs and clean energy goals.

II. Discussion

In subsection II.A below, the CAISO presents its near-term system needs analysis. Consistent with Energy Division staff's analysis, the CAISO's analysis demonstrates a need for 2,000 MW of additional system resource adequacy contracting beginning in 2021, which increases to 2,500 MW by 2022. In subsections II. B, C and D, the CAISO presents recommendations regarding how the Commission should proceed with addressing near-,

medium-, and long-term reliability needs, respectively. Finally, in section II.E, the CAISO responds to specific questions posed in the Ruling.

A. The CAISO's Independent Analysis Demonstrates a Near-Term Need for Additional System Capacity Resources.

The CAISO generally agrees with Energy Division staff's net qualifying capacity-based (NQC) analysis showing a reliability shortfall of 2,000 MW as early as 2021 and increasing to 2,500 MW in 2022 if all OTC units retire as planned. The Energy Division and CAISO analyses provide the basis for the Commission to take immediate action to (1) request an extension of the OTC compliance dates and (2) direct resource procurement to replace the retiring OTC units as soon as possible. In setting procurement targets, the Commission should acknowledge significant factual developments that occurred after Energy Division conducted its analysis, such as General Electric's June 20, 2019 announcement that the 750 MW Inland Empire Energy Center will retire December 31, 2019.[1]

Energy Division's conclusions are based on a capacity-based analysis during the system gross peak hour. Rather than reproducing Energy Division's capacity-based analysis, the CAISO's complementary analysis reflects the capability of the projected resource adequacy fleet to serve load after the gross peak hour based on operational performance rather than static capacity values. The CAISO's energy-based analysis generally uses the same assumptions as Energy Division's analysis, with minor changes. The CAISO's input assumptions are described in Attachment A to these comments.

Figures 1, 2, and 3, below, show the energy production from the projected resource adequacy fleet from hour ending 15 through 20 in 2020, 2021, and 2022, respectively.[2]

[1] Inland Empire Energy Center Decommissioning and Demolition Plan, Docket Number: 01-AFC-17C, TN Number: 228806, June 20, 2019, p.1 (Inland Empire Plan).

[2] The CAISO's analysis is conducted in Pacific Standard Time (P.S.T.) and does not account for daylight savings. In September of each year, hour ending 15 through 20 corresponds to 4:00 p.m. to 9:00 p.m. Pacific Daylight Time (P.D.T.).

Figure 1: 2020 Projected Energy Production from Resource Adequacy Fleet

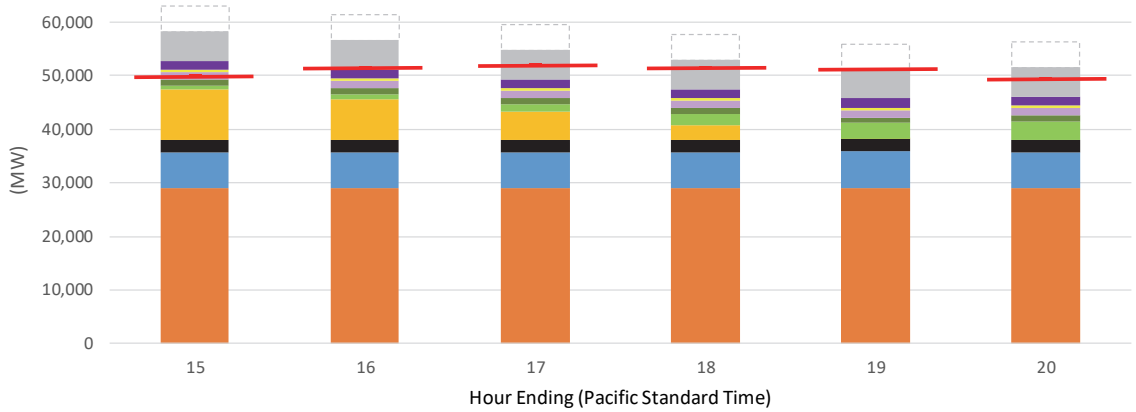


Figure 2: 2021 Projected Energy Production from Resource Adequacy Fleet

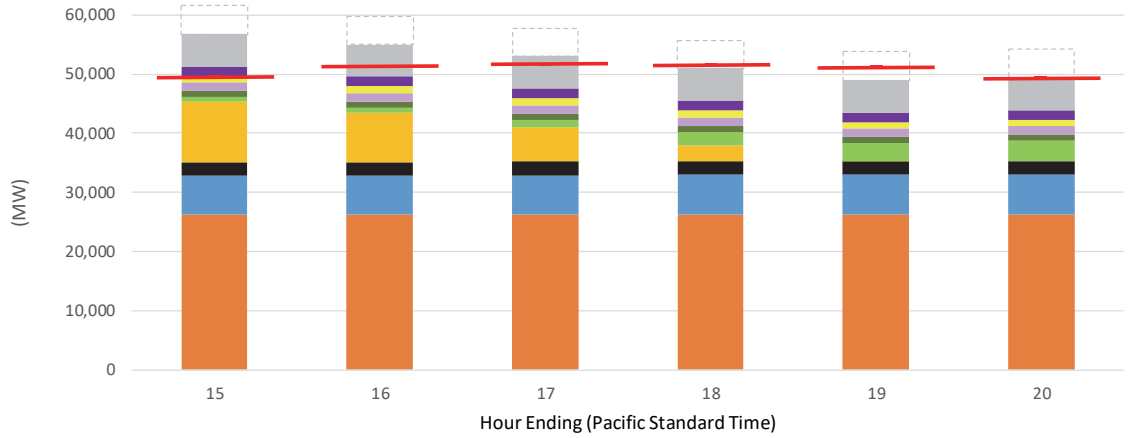
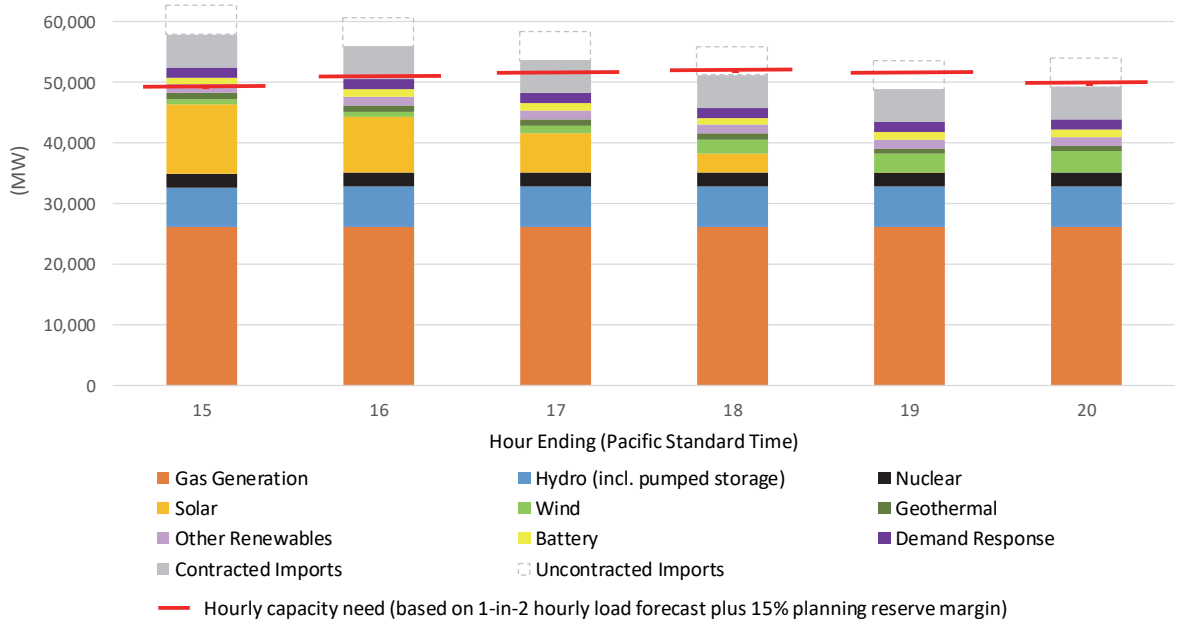


Figure 3: 2022 Projected Energy Production from Resource Adequacy Fleet



To simplify the analysis, the CAISO assumed all resources would produce energy up to their NQC value, except wind, solar, and hydro (including pumped storage) resources.[3] The CAISO modeled wind, solar, and hydro resources based on the generation profiles for those resources. The CAISO's analysis includes energy from "contracted imports," which are based on historical resource adequacy-backed import levels.[4] In addition to the projected resource adequacy capacity, the analysis includes a provision for "uncontracted imports." These uncontracted imports reflect uncontracted energy up to the maximum import capability (MIC), which the CAISO assumed to be static (at 10,193 MW) for its analysis.

Like Energy Division staff's analysis, the CAISO analyzed system peak daytime needs using the California Energy Commission's (CEC) 2018 Integrated Energy Policy Report Update (IEPR Update) 1-in-2 peak load forecast. In 2020 and 2021, the projected peak falls within hour ending 17 (based on P.S.T. or 6:00 p.m. P.D.T.). By 2022, the peak shifts to hour ending 18 (based on P.S.T. or 7:00 p.m. P.D.T.). Each graph also shows an hourly capacity need using the maximum load in each hour (based on a 1-in-2 peak load forecast) plus a planning reserve margin (PRM) equal to 15 percent of the hourly demand. This hourly capacity need shows that while loads remain high after the peak hour, the reduction in solar generation greatly reduces the total resource adequacy-backed available energy output.

In 2020, resource adequacy-backed energy exceeds the hourly capacity need from hour ending 15 through 20. The lowest margin between the hourly capacity need and the resource adequacy-backed energy is in the hour after the system peak. This is because solar generation is significantly reduced but load remains almost as high as the system peak hour.

The 2021 analysis shows a reliability concern in the hours after the peak hour. Specifically, resource adequacy-backed energy exceeds the hourly capacity need only through the peak in hour ending 17. By hour ending 18 resource adequacy-backed energy is slightly less than the hourly capacity need, and in hour ending 19 the hourly capacity need *exceeds* the resource-adequacy backed energy by 2,000 MW. In hour ending 20 the energy need is at the margin of what resource-adequacy backed capacity can supply. The disparity between resource adequacy-backed energy and the hourly capacity need reflects the reliability gap the Commission

[3] *See* Attachment A for detailed assumptions and inputs. Wind and solar are based on a generalized generation profile for each resource. Hydro (including pumped storage) resources are assumed to produce approximately 80 percent of the total NQC value to reflect historical generation plus provision of ancillary services.
[4] *Id*. Contracted Imports also includes Hoover Dam and Palo Verde Nuclear Generating Station.

should address to ensure the CAISO has the resources to serve load reliably. This analysis also shows that the system is implicitly relying on uncontracted (non-resource adequacy) imports.

By 2022, the peak hour shifts to hour ending 18 and there is a 500 MW deficiency in resource adequacy-backed energy to meet the actual system capacity requirement (1-in-2 peak load plus 15 percent planning reserve margin). The deficiency increases significantly—to 2,500 MW—in hour ending 19, when solar generation no longer provides energy. The CAISO's analysis also shows a deficiency in hour ending 20.

The gap between resource adequacy-backed energy and persistent high loads after sunset are also cause for concern because of several key uncertainties. First, the load forecast is based on a 1-in-2 forecast, which means there is a 50 percent chance that the load could be higher than the forecast. Second, although California has recently experienced relatively flat load growth, this may not persist if California seeks greater electrification of transportation and building energy usage. Third, the CAISO's analysis assumed normal generation profiles for wind and solar and average hydro (including pumped storage) energy production. If solar generation is less than modeled (for example, due to cloud cover from annual monsoonal weather) or if drought conditions return, generation capability may be greatly reduced compared to the amount included in the figures above. Lastly, import capacity may be constrained, which would reduce the opportunity to rely on potential imports to reliably serve load.

B. The Commission Should Immediately Address Near-Term Reliability Needs.

Based on Energy Division staff's findings and the CAISO's analysis, the Commission should direct load-serving entities (LSEs) to prioritize the procurement of existing and new resources capable of serving load in the after-peak hours in the absence of solar generation. The Commission should also obtain confirmation from resources that are under construction or expected to be online will be available when needed to address the near-term (approximately 2020 through 2022) reliability needs. With respect to existing resources, the Commission should work with stakeholders to extend the Water Board's OTC regulations compliance dates for gas-fired generation units that need to be maintained for near-term reliability. However, the Commission must also identify and direct additional resource procurement as soon as possible to enable the retirement of any OTC resources that receive an extension to comply with the OTC regulations. A definitive plan for ending the reliance on once-through-cooled generation is

critical to ensure that the Water Board approves any necessary OTC compliance extensions. The Commission should focus on maximizing procurement of existing resources because newly constructed resources carry additional construction and siting risks. LSEs can more readily procure existing resources to serve as a bridge until new resources are available and come online. Well-planned new resource procurement can facilitate existing resource retirement, such as OTC units that have had their retirement dates extended.

The Commission should issue a Decision on near-term reliability procurement and all related actions by fall 2019 and initiate procurement activities before the end of 2019.

1. The Commission Should Work through the Appropriate Processes to Extend the OTC Regulation Compliance Dates for Units that Are Needed to Maintain Reliability.

The Ruling suggests that Energy Division staff begin discussions with the State Advisory Committee on Cooling Water Intake Structures (SACCWIS) to the Water Board to postpone the retirement of one or more once-through-cooled generation units to accommodate the schedule for new resources to come online and meet system reliability needs.[5] The CAISO strongly supports this suggestion and, as a member of SACCWIS, agrees that it is imperative to start the OTC compliance date extension process now to ensure that once-through-cooled generation is available to address near-term reliability needs. A similar OTC compliance extension request for the Encina Power Station required approximately 12 months to receive Water Board approval.[6] The extension process can always be reversed if newly contracted or new resources are available to mitigate the reliability need.

In accordance with the OTC regulations, there are three generation resources in the CAISO footprint that are scheduled to retire by December 31, 2020 that could potentially be considered for an OTC compliance date extension: Alamitos Generating Station (Alamitos); Redondo Beach Generating Station (Redondo); and Ormond Beach Generating Station (Ormond Beach). Together, these resources represent 3,527 MW of system capacity. The Water Board has the authority to extend the OTC compliance date for these units if necessary to maintain reliability. Notwithstanding the Water Board's authority, Alamitos Units 1, 2, and 6 must retire

[5] Ruling, pp. 15-16.
[6] See for example: https://efiling.energy.ca.gov/GetDocument.aspx?tn=205727&DocumentContentId=21728.

by the end of 2019 to repower the new 640 MW combined cycle generating facility at the Alamitos site.[7] However, the three remaining Alamitos OTC gas-fired generation units—with a combined capacity of 1,120 MW—could receive an OTC compliance date extension.[8] At Ormond Beach Units 1 and 2 are a total of 1,516 MW, and at Redondo Units 5, 6, and 8 are a total of 848 MW.[9]

The CAISO supports, at minimum, extending the December 31, 2020 OTC compliance date for Alamitos Units 3, 4, and 5. Alamitos provides significant value because it can provide both local and system resource adequacy capacity.[10] The Commission should also consider whether to request extensions for OTC compliance for additional capacity to meet 2021 and 2022 needs, or determine whether sufficient new resources can be put in place in time to meet these needs.[11]

2. The Commission Should Direct Resource Adequacy Procurement for Uncontracted Resources that Are Operational or Mothballed.

In addition to pursuing extensions for OTC compliance, the Commission should also prioritize resource adequacy contracting for any operational or mothballed resources currently not under contract. Although the CAISO agrees with Energy Division staff's methodology to include the NQC of any non-contracted operational or mothballed resources in its supply stack analysis, however, resources must be under contract to support resource adequacy needs. The CAISO notes that General Electric's Inland Empire Energy Center is included in Energy Division staff's analysis (as a mothballed unit), but it recently filed its intention to permanently retire by December 31, 2019.[12] Without a resource adequacy contract, resources may still provide energy at will, but the capacity should not be considered firm as there is no commensurate must-offer obligation.

---

[7] *Overview of the 2019 Report by the Statewide Advisory Committee on Cooling Water Intake Structures*, California Energy Commission Integrated Energy Policy Report Joint Agency Workshop on Energy Reliability in Southern California, May 23, 2019, p. 7. Available at: https://ww2.energy.ca.gov/2019_energypolicy/documents/2019-05-23-workshop/2019-05-23_presentations.php

[8] Specifically, Alamitos Units 3 (320 MW), 4 (320 MW) and 5 (480 MW). *See id.,* p. 9.

[9] *Id.,* p. 7.

[10] California Independent System Operator Corporation, *2021 Limited Local Capacity Technical Study Special Report for the State Water Resources Control Board to Determine Alamitos OTC Permit Extension*, July 10, 2019, p. 2 (2021 Local Capacity Study).

[11] However, the CAISO understands that the owner of Redondo is already in the process of selling the property on which the plant is sited, with the intention to retire the unit by December 31, 2020.

[12] Inland Empire Plan, p. 1.

3. The Commission Should Direct Increased Resource Adequacy Procurement for Uncontracted Import Resources.

California has traditionally relied on a significant amount of imported energy, not all of which is under a resource adequacy contract, to balance demand efficiently and cost-effectively. The Commission should increase import resource adequacy contracting because California already relies on this energy, especially after the gross load peak when solar generation declines. Imports are backed by existing resources throughout the west and securing much-needed energy under resource adequacy contracts ensures there is a commensurate must-offer obligation in the CAISO market. The Commission should direct LSEs to pursue reliable import contracts to the extent possible.

The Ruling suggests that any new import capacity contracts should be "discounted by 1/3 to account for the risk associated with increasing imports."[13] The CAISO disagrees with arbitrarily discounting import capacity secured under a resource adequacy contract. At the same time, the CAISO strongly supports the Commission's recent Assigned Commissioner Ruling in the resource adequacy proceeding, which seeks to clarify existing resource adequacy import policy and eliminate import double-counting and speculative supply.[14] A properly structured resource adequacy contract with the appropriate checks and balances should result in reliable firm energy with the associated must-offer obligations into the CAISO markets. Therefore, the Commission should not discount import contracts, but rather should strengthen and enforce the resource adequacy program. (See also CAISO's response to Question 2 below.)

4. The Commission Should Ensure Resources Under Construction are On-Track to Meet Online Dates So as Not to Exacerbate Reliability Concerns.

The Commission should ensure that resources under construction are on-track for their committed online dates to avoid any delays that could exacerbate reliability concerns. For example, the Ruling notes several Commission decisions authorizing procurement with future online dates by summer 2020 and up through 2024.[15] The Commission should ensure that these

[13] Ruling, p. 15.
[14] Assigned Commissioner's Ruling Seeking Comment on Clarification to Resource Adequacy Import Rules, *Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local and Flexible Procurement Obligations for the 2019 and 2020 Compliance Years*, Rulemaking 17-09-020, July 3, 2019 (Resource Adequacy Ruling).
[15] Ruling, pp. 8-9.

resources actually come online by their targeted in-service dates. The Commission should request that LSEs provide updates on the progress of new construction so that any deviations from the schedule are known well in advance to allow for corrective action.

Similarly, the Ruling also requests that LSEs disclose any additional resources under development that are not currently visible to the Commission or parties to this proceeding.[16] Information about any additional resources, if any, should be provided as soon as possible, but no later than the August 16, 2019 data request due date to inform an accurate understanding of the near-term resource adequacy fleet.[17] Any additional procurement will help decrease the need for OTC extensions from the Water Board or allow for an earlier release.

5. The Commission Should Direct Procurement of New Resources.

The Commission should direct procurement of new resources to address any reliability issues that cannot be resolved by procuring existing resources or once-through-cooled generation and to facilitate the replacement of any resources that receive an extension to comply with OTC regulations. Online dates for any new resources should be coordinated with the retirement of once-through-cooled generation units to ensure a smooth transition. In particular, any new resources should be online by the beginning of summer of the targeted year (June 1), rather than August 1 as proposed in the Ruling.[18] System capacity resources must be in place by the beginning of the summer peak season because the CAISO the peak can occur any time within the summer.[19] Over the last five years, the system peak occurred twice in July and three times in September.[20] Given this uncertainty, resource online dates to address the system peak should be no later than June 1 of the targeted year to recognize that the system may not have a sufficient buffer to absorb potential delays, especially in the hours after the gross system peak. (See also response to Question 6.)

[16] Ruling, p. 11.
[17] *Id.*, per D.19-04-040.
[18] *Id.*, pp. 14-15.
[19] Since 1998, the CAISO typically experienced its annual system peak during August or September, but 43 percent of the time the system peak occurred in June or July. See: https://www.caiso.com/Documents/CaliforniaISOPeakLoadHistory.pdf.
[20] *Id.*

C. The Commission Should Consider Medium-Term Reliability Needs Created by the Retirement of Diablo Canyon.

After the Commission addresses near-term reliability needs, it should next focus on medium-term (approximately 2023 through 2026) reliability procurement to accommodate the retirement of Diablo Canyon and its replacement with preferred resources. The 1,140 MW Diablo Canyon Unit 1 will retire on November 2, 2024 and the 1,140 MW Unit 2 will retire on August 26, 2025.[21] Given the near-term capacity needs, the Commission should expect that the Diablo Canyon retirement will require resource adequacy capacity replacement as well. The Commission should develop a comprehensive medium-term procurement plan by the end of 2019 and issue a Decision on medium-term procurement and related actions by summer 2020.

As described in more detail in the next section, the Commission's comprehensive procurement plan should simultaneously address reliability and renewable energy needs during the system peak and across all hours of the year.

D. The Commission Should Consider Long-Term Reliability Needs Simultaneously with 2030 Clean Energy Goals.

After the near- and medium-term needs have been addressed, the Commission should develop a procurement plan in summer 2020 to address long-term reliability needs and 2030 clean energy goals. As described in greater detail below, the comprehensive plan should address both reliability and renewable energy needs across all hours of the year; and any procurement plan should be coordinated with the Commission's regular integrated resource planning (IRP) process. The Commission should apply the following guidelines when developing the medium- and long-term procurement plans.

1. The Commission Should Consider Clean Energy Goals and Reliability Holistically.

Contrary to Energy Division staff's recommendation, the Commission should not sequence consideration of renewable integration and reliability. Renewable integration (and, ultimately, reductions in greenhouse gas output) and reliability are interdependent and the Commission should consider them together. As the CAISO's independent analysis shows, the hours following the gross load peak present particularly critical reliability concerns because load

[21] See: https://www.nrc.gov/docs/ML1833/ML18331A553.pdf.

remains high but solar production is significantly reduced. This is only one example of how renewable integration and reliability are interdependent. The Commission should ensure that renewable procurement does not exacerbate reliability concerns and that reliability-based procurement helps to meet the state's clean energy goals. Furthermore, considering needs holistically will help to identify least-cost and least-regrets solutions.

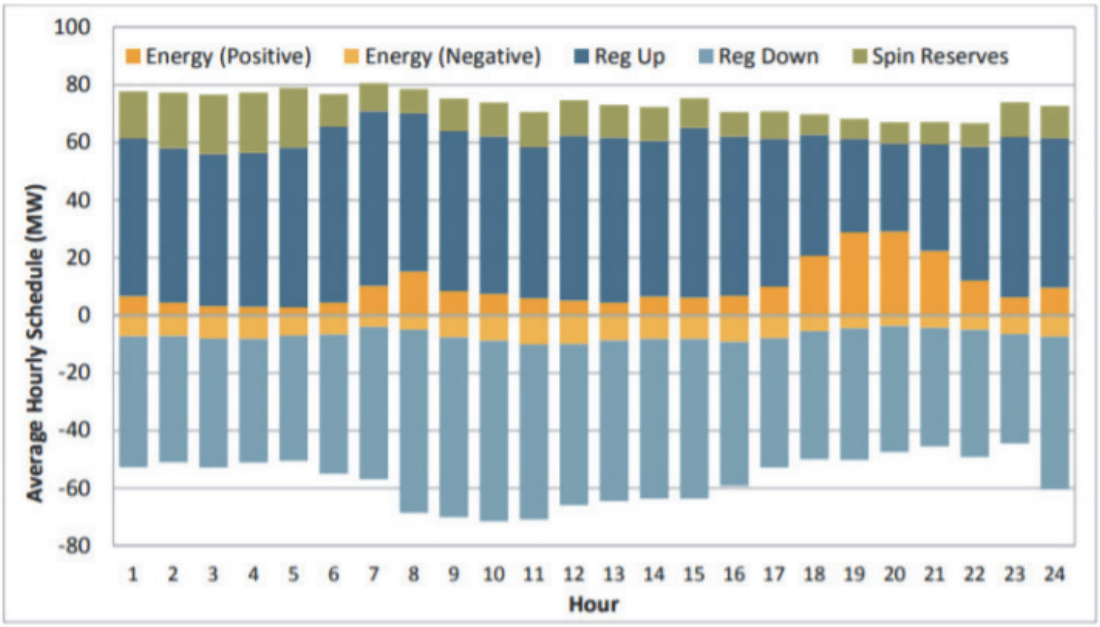
The Commission should prioritize consideration of long-lead time projects particularly. For long lead-time projects, planning must begin as soon as possible to ensure that the CAISO's transmission planning process has sufficient time to analyze Commission decisions, provide feedback, and identify and approve necessary transmission upgrades to support procurement. Providing direction regarding long-lead time projects will better inform the transition to 2030 and beyond and will have significant impacts on the remaining resource fleet.

The CAISO specifically recommends that the Commission consider both short- and long-duration storage capable of cycling (*i.e.*, fully charging and discharging) on a daily basis to address operational needs. At this nascent stage of storage penetration in the market, the Commission should seek to diversify the storage fleet and explore technologies that can cost-effectively cycle to provide diversity and renewable integration benefits. Given their different short- and long-term operational capabilities, some storage technologies are well-suited to provide bulk energy shifting and other technologies are better suited to provide regulation energy, which limits cycling. The Commission should differentiate between storage technology types and begin considering the energy ($/MWh) cost of storage, not just its capacity cost ($/MW). Doing so will help ensure the most cost-effective storage technologies are supported and developed.

Furthermore, the Commission should verify that expected modeled behavior aligns with operational needs and, ultimately, actual resource behavior. For example, Energy Division's current production cost modeling assumes that storage resources complement solar production by charging during high solar output periods and discharging as solar production wanes in the evening hours. Based on recent operational experience, the current fleet of battery resources largely do not reflect this expectation. Figure 4 below presents analysis from the CAISO's Department of Market Monitoring (DMM) regarding 2018 average hourly schedules for battery storage resources participating in the CAISO markets. Figure 4 shows that existing storage resources are largely providing regulation services rather than shifting large quantities of excess

midday energy to the late day net load upward ramping period. Contrary to DMM's findings, current IRP modeling expects storage resources to provide large and favorable load shift and shaping to help meet California's reliability and renewable integration needs. Battery resources continue to operate similarly in the first six months of 2019.

Figure 4: Average Hourly Battery Schedules (2018)



Source: Department of Market Monitoring, 2018 Annual Report on Market Issues and Performance, May 2019, Figure 1.11: Average hourly battery schedules (2018).

There may be several reasons for the discrepancy between modeling expectations and operational performance. For example, current contracting practices and prevailing battery technologies may not be best suited to provide the multiple and/or deep cycling capabilities required to address reliability and renewable integration needs. Continuous cycling may have a disproportionate impact on certain battery storage technologies leading to cell degradation and significant costs for equipment replacement.[22] The CAISO energy and ancillary services

[22] For example, see discussion in the CAISO's Department of Market Monitoring's (DMM's) *2018 Annual Report on Market Issues and Performance*, p. 271 (DMM 2018 Annual Report), available at http://www.caiso.com/Documents/2018AnnualReportonMarketIssuesandPerformance.pdf:

> [C]urrent structures for modeling battery resources may not accurately reflect the ways in which operating a battery accelerates the need for the battery owner to incur significant, lumpy maintenance costs such as augmenting battery cells. For example, the depth of a battery's charge

markets may not provide sufficient revenues to ensure cost recovery for the capital expenditures required to replace battery cells more frequently than contemplated due to more frequent and/or deeper cycling costs.[23] Furthermore, bidding or other behavior that limits cycling, or the lack of advanced bidding functionality, would reduce the effectiveness of such resources to address operational and renewable integration needs, especially in the constrained local areas and sub-areas during peak net load periods.[24]

These results highlight that the Commission needs to consider a more diversified portfolio of renewables, especially taking into account resources that can operate during and after the gross peak hour. Similarly, the Commission should consider preferred resources and distributed energy resources which are operationally responsive to grid needs. Lastly, the Commission should consider selectively retaining natural gas resources that remain necessary to integrate renewables and ensure reliability, consistent with the state's clean energy goals.

2. The Commission Should Consider System Energy Needs Across All Hours of the Year.

CAISO's independent analysis shows a potential shortfall in resource adequacy-backed energy in the hours following the system gross peak. Currently, California relies on voluntary imports to supplement resource adequacy energy and support renewable energy integration. The CAISO is concerned that over time imports without resource adequacy contracts will decrease because as other balancing authorities in the west address growing baseload retirements, climate

---

> or discharge may significantly impact how often a battery resource requires cell augmentation. Stakeholders have explained that battery owners may agree to less expensive tolling contracts with developers if the contract or negotiated warranty includes provisions that limit how the battery can operate in [CA]ISO's markets. However, managing potential maintenance costs through contractual limitations or negotiated warranties could result in inefficient utilization of battery resources in wholesale electricity markets.

[23] *Id.*

[24] *Id.*, p. 271:

> Moreover, the ISO does not permit market participants to constrain resource parameters below the resource's actual physical operating characteristics in order to manage contractual limitations or to limit costs, such as major maintenance costs. Artificially constraining resource parameters could lead to inefficient market outcomes if a battery resource dispatch that may be part of a least cost market solution does not occur because the resource is constrained by a physical-type parameter set below the battery's actual physical characteristics.

For advanced bidding functionality, see for example: http://www.caiso.com/Documents/CPUCComments-EnergyStorageandDistributedEnergyResourcesPhase4WorkingGroup-Jun27-2019.pdf.

change impacts, and other local pressures or preferences.[25] This is especially true for imports backed by hydroelectric generation, which native balancing authorities may be more likely to rely on in the future due to their relatively low cost and clean energy profile. The Commission should plan for long-term reduced resource adequacy imports accordingly by considering system energy needs across all hours of the year and ensuring that the resource adequacy program procures accordingly.[26] This requires specific improvements the Commission's resource adequacy program and IRP process to more closely integrate planning and procurement efforts.

To accomplish this integration, the CAISO recommends that the Commission first expand its focus in the resource adequacy program beyond the single peak hour of the year.[27] Next, the Commission should better align the resource adequacy and IRP proceedings by evaluating IRP reliability based on resource adequacy capacity, rather than historical market transfers. This includes conducting a production cost modeling exercise to understand the ability to serve load across all hours. In addition, the IRP should consider conducting additional years of production cost modeling analysis in addition to 2030. The IRP proceeding should also conduct a loss of load expectation (LOLE) study to ensure that the static planning reserve margin from the resource adequacy program continues to meet the industry standard 1-in-10 annual LOLE.

Furthermore, the Commission should expand the multi-year resource adequacy program to include system and flexible capacity so that near-term reliability gaps, like the one newly identified in this IRP proceeding (but not in the resource adequacy proceeding), can be addressed with sufficient lead-time to avoid stop-gaps measures that may be inefficient and costly.[28]

E. CAISO Responses to Questions Posed in the Ruling

---

[25] *See* also CAISO comments: http://www.caiso.com/Documents/2019-01-31-Comments_ProductionCostModeling-IRPProceeding-R16-02-007.pdf

[26] The recent Commission Decision recognizing availability-limited resources in the local areas is a step in the right direction.

[27] Public Utilities Code (PUC) § 380(c) already recognizes this need:

> Each load-serving entity shall maintain physical generating capacity and electrical demand response adequate to meet its load requirements, including, *but not limited to*, peak demand and planning and operating reserves. The generating capacity or electrical demand response shall be deliverable to locations and at times as may be necessary to maintain electric service system reliability and local area reliability. (emphasis added).

[28] *See* CAISO's testimony in the resource adequacy track 2 proceeding supporting multi-year procurement for system, flexible, and local capacity (Track 2 Testimony): http://www.caiso.com/Documents/Jul10_2018_RAProceedingTrack2Testimony-Chapter2-Multi-YearRAProcurementRequirements_ProposalNo1_R17-09-020.pdf.

In this section, the CAISO responds to selected questions posed in the Ruling. For clarity, the relevant questions from the Ruling precede the CAISO response.

Question 1: Do you believe that there could be reliability challenges as soon as 2021? Why or why not? Include comments on any concerns you have about the staff analysis presented in Section 2.1 of this ruling, and cite to publicly-available data to support your analysis.

The CAISO believes there is a potential shortfall in system resource adequacy capacity in 2021 based on Energy Division staff's NQC supply stack methodology. The CAISO notes that Energy Division's methodology assumes that all currently operational and mothballed units will be available and should be considered part of available supply. The CAISO requests two immediate corrections. First, Energy Division staff should remove the Inland Empire Energy Center capacity from its supply stack, as the resource owner announced the units permanent decommissioning by December 31, 2019.[29] In addition, Energy Division staff should update its analysis to differentiate between imports under resource adequacy contracts and potential imports that could be procured base on MIC. This modification would show that actual resource adequacy-backed imports are well below the MIC.[30]

Though the on-peak NQC-based analysis is helpful, in future the Commission should analyze the resource adequacy fleet based on its ability to serve load, particularly when the system is vulnerable to energy shortfalls, *i.e.*, after the gross peak when the sun sets but the demand remains high.

Question 2: Are you concerned about increasing reliance on imported capacity for meeting resource adequacy requirements? Why or why not?

The Commission should increase resource adequacy contracting with imports because the state already relies on this energy to cost effectively meet demand, especially after solar generation declines. Imports are backed by existing resources throughout the west and securing needed energy under resource adequacy contracts ensures there is a commensurate must-offer obligation into the CAISO market.

---

[29] Inland Empire Plan, p. 1.

[30] For example, the maximum resource adequacy-backed import capacity was 4,463 MW during September for the 2017 resource adequacy year. *See*: California Public Utilities Commission Energy Division, *The 2017 Resource Adequacy Report*, August 2018, Table 4, p. 16 (2017 Resource Adequacy Report).

Energy Division staff's concerns about relying on imports up to the MIC[31] and the Ruling's suggestion that firm imports should be discounted by 1/3 to account due to their implied risk[32] are misplaced. These concerns conflate the need for clearer, and perhaps more stringent, resource adequacy import contract terms with the value of imports generally. As a preliminary point, the CAISO notes that MIC only demonstrates the available transfer capability based on historical operating conditions and feasible import schedules into the CAISO balancing authority during peak conditions, calculated annually.[33] If the operating conditions and feasible import schedules increase over time, MIC will also increase. Second, the MIC itself has not historically been a limiting factor to resource adequacy procurement. As the Ruling notes, historical resource adequacy-based imports during the peak summer months are approximately 3,000 to 4,000 MW[34] whereas the recent MIC allocations ranged between 10,000 MW and 11,000 MW.[35] Third, the Ruling's citation to the CAISO's Resource Adequacy Enhancements stakeholder initiative erroneously focuses on the MIC rather than how entities are fulfilling their import resource adequacy requirements with energy that may be speculative or double counted.[36] The CAISO strongly supports the Commission's recent Assigned Commissioner Ruling in the resource adequacy proceeding to clarify existing policy and eliminate double counted and speculative import supply.[37] A properly structured resource adequacy contract with the appropriate checks and balances should result in reliable firm energy with the associated must-offer obligations to California to ensure reliability. Therefore, the Commission should not discount imports to only one-third of stated capacity to account for a perceived risk, but rather strengthen and enforce the resource adequacy program.

For example, the Commission should require imports: (1) to be "firm energy" and thus backed by identified physical resource(s) or, at a minimum, identify the source balancing authority; (2) not be subject to recall by the resource's native balancing authority; and (3) have firm transmission. The intent of requiring firm energy and transmission is to ensure energy associated with resource adequacy capacity that clears the CAISO market is delivered and not

[31] Ruling, p. 13.
[32] *Id.*, p. 15.
[33] See CAISO tariff section 40.4.6.2.
[34] Ruling, p. 12 and 2017 Resource Adequacy Report, p. 16.
[35] Ruling, p. 13.
[36] *Id.*, pp. 12-13.
[37] Resource Adequacy Ruling.

recalled to prevent double counting and speculative supply. In addition, the Commission should not require contract terms that would render the energy "must-take" (such as terms for actual energy delivery) which reduces the flexibility needed on the system to operate the grid. If the CPUC elects to treat resource adequacy imports as must-take resources, it should account for the supply in the maximum cumulative capacity (MCC) buckets and ensure LSEs do not over procure inflexible energy commitments for midday deliveries. Furthermore, the Commission should consider requiring resource adequacy import contracts to include energy hedging provisions.[38]

Question 3: Should the Commission be concerned about specific local and/or flexible resource adequacy needs, or only the system needs identified herein? Explain.

The CAISO appreciates the question and encourages the Commission to prioritize resources that can meet multiple needs and are able to meet the operational needs of the grid across all hours. At this point, the CAISO has not identified specific local or flexible needs beyond the current resource adequacy levels but notes that Alamitos provides both local and system resource adequacy capacity.[39] The Commission should consider multi-year resource adequacy requirements that include system and flexible capacity, in addition to local, which would have more effectively addressed the 2021 reliability shortfall rather than the current ad hoc approach.[40] The CAISO stands at the ready to work collaboratively with the Commission to consider how to address system, local, and flexible resource adequacy needs.

Question 4: If a need for system reliability resources in the near-term is identified within this proceeding, will there be sufficient time to bring new resources online to meet the need? If not, should the Commission pursue delays to the OTC retirement schedules to bridge this short-term gap? Why or why not? If the Commission pursues OTC retirement date delays, or which plants and for how long should we request the delays?

To the extent new resources are determined to be needed for addressing the reliability needs in 2021 and 2022, the CAISO is concerned that there is a significant risk that many of

[38] California Independent System Operator Corporation, Comments on Assigned Commissioner's Ruling Seeking Comment on Clarification to Resource Adequacy Import Rules, July 19, 2019, Proceeding No. R.17-09-020.
[39] 2021 Local Capacity Study, p. 2.
[40] *See* Track 2 Testimony.

these new resources will not come online on time. Therefore the CAISO strongly recommends the Commission start the OTC extension process *now* as a similar extension request for the Encina Power Station OTC resource required approximately 12 months from request to approval at the Water Board.[41] The process can always be reversed if new resources are ultimately determined not be needed in 2021 and 2022 or able to come online sooner than expected. The CAISO supports, at minimum, the extension of the December 31, 2020 deadline for Alamitos because it can provide both local (Western LA Basin) and system reliability benefits.[42] The Commission should also consider whether to request OTC compliance date extensions for additional capacity to meet 2021 and 2022 needs or whether new resources can be put in place in time to meet these needs.

Question 5: Comment on the proposed requirements in Section 2.2 of this ruling for 2,000 MW of new resource adequacy capacity procured and online by August 1, 2021, procured on a proportional and all-source basis by all jurisdictional LSEs. Parties may also propose an alternative requirement.

The CAISO's analysis shows a potential gap of up to 2,000 MW beginning in summer of 2021 and increasing to 2,500 MW in 2022. At this point, it is uncertain how much of that gap can be addressed through additional resource adequacy procurement of existing resources (including imports). Therefore, the CAISO recommends the Commission simply direct additional procurement of 2,000 MW of resource adequacy capacity by 2021 and let the LSEs determine whether they can meet these additional requirements through existing resources, including new contracts for incremental imports, or if they need to rely on new resources. The Ruling also notes that additional resources may be procured by load serving entities but not yet disclosed to the Commission or this proceeding.[43] Information about any additional resources contracted for capacity, if any, should be provided as soon as possible but no later than the August 16, 2019 data request due date to inform an accurate understanding of the resource adequacy fleet in the near-term.[44] The Commission must ensure that the newly procured

[41] See for example: https://efiling.energy.ca.gov/GetDocument.aspx?tn=205727&DocumentContentId=21728
[42] 2021 Local Capacity Study: Alamitos Units 1, 2 and 6 are scheduled to be retired by the end of 2019 to allow for transfer of emission credits to the new repowering 640 MW Alamitos combined cycle generating facility. This will leave only three remaining Alamitos OTC units on site: Units 3 (320 MW), 4 (320 MW) and 5 (480 MW) for OTC schedule extension consideration.
[43] Ruling, p. 11.
[44] *Id.*, per D.19-04-040.

resources work together to meet the grid's operational needs especially in the hours after peak when load remains high but solar energy has significantly reduced or ceased. As explained below, the Commission should ensure resources are procured and online no later than June 1, 2021.

Question 6: Is the requirement for commercial online date of August 1, 2021 sufficiently clear or are other requirements needed? Explain.

Commercial online dates should be coordinated with OTC retirements to ensure a smooth transition or should be online by June 1 of the targeted year, rather than August 1. Since 1998, the CAISO system has reached its system peak during June or July 43 percent of the time.[45] Over the last five years, the system peak occurred twice in July and three times in September.[46] Given this uncertainty, the CAISO believes online dates to address the system peak should be no later than June 1 of the targeted year to account for uncertainty and in recognition that the system may not have sufficient buffer to absorb potential online delays, especially in the hours after the gross system peak.

Question 7: Comment on how demand-side resources included in this new resource procurement should be counted (e.g., as part of a reduction in the system resource adequacy requirement as part of the IEPR, etc.).

Operationally responsive demand-side resources, such as demand response, can be considered supply-side resources and shown on supply plans if they are able to respond to CAISO dispatch and address reliability needs such as during the critical hours at, or immediately after, the gross peak. If demand-side resources cannot be operationally responsive, the Commission should ensure they are considered load modifiers and include them in the California Energy Commission's IEPR forecast. Currently, all non-Demand Response Auction Mechanism (non-DRAM) demand response is withheld from load serving entity supply plans and only reflected as a credit to each entity's resource adequacy requirement. This crediting process is opaque and does not provide information to parties in either the Commission proceedings or the CEC's IEPR process to sufficiently understand the capacity and eliminated the must-offer

[45] See: https://www.caiso.com/Documents/CaliforniaISOPeakLoadHistory.pdf
[46] *Id.*

obligation in the CAISO market. The Commission should either require these non-DRAM resources to be shown on supply plans or re-categorized as load modifiers in the IEPR forecast.

Question 8: Comment on the proposed requirement in Section 2.2 of this ruling that SCE contract for 500 MW of existing resource adequacy capacity from a resource or resources that do not have contracts extending past 2021, for 2-5 years, with cost allocation addressed through a modified CAM mechanism. Parties may also propose an alternative approach.

The CAISO supports prioritizing existing resources for additional contracting to address the near-term reliability needs (2020 through 2022).

Question 9: Should any procurement from existing resources be focused on resources that have formally notified the CAISO and the Commission of an intention to retire? Why or why not?

The Commission should pursue procurement from existing resources even if there is a formal notice to the CAISO and the Commission of an intention to retire. While contracting with such resources may not be a viable long-term solution, it can help bridge the transition to a better solution set in a timely and cost-effective manner.

Question 10: If individual LSEs are unable to procure their responsible share of the authorized procurement, should an interim backup mechanism and role be established to ensure the procurement needs are met and that all LSEs pay their fair share? Could this interim backup mechanism be developed and implemented in time to get resources procured and online by August 1, 2021? If yes, describe implementable solutions.

In this IRP procurement track, the Commission should stay focused on addressing 2021 reliability needs so that there is a feasible retirement pathway for any OTC units whose original retirement has been extended beyond 2020. The creation of a backup mechanism is a longer-term goal and should be addressed after the most pressing reliability needs are addressed.

Question 11: If the Commission is unable to develop and implement an interim backup mechanism in time to meet peak system resource adequacy needs in 2021, what type of compliance mechanism will be needed to ensure that LSEs comply with their share of the procurement responsibility? Provide implementable solutions.

See the CAISO's response to Question 10 above.

Question 13: Provide any other comments you think the Commission would find relevant to its consideration of system resource adequacy issues and potential procurement by 2021.

The CAISO emphasizes that the Commission should consider a more diversified portfolio of renewables, especially taking into account resources that can operate during and after the gross peak hour.

III. Conclusion

The CAISO appreciates the opportunity to provide comments and looks forward to working with the Commission to address these reliability issues.

Respectfully submitted,

By: *<u>/s/ Jordan Pinjuv</u>*

Roger E. Collanton
General Counsel
Anthony J. Ivancovich
Deputy General Counsel
Anna A. McKenna
Assistant General Counsel
Jordan Pinjuv
Senior Counsel
California Independent System
250 Outcropping Way
Folsom, CA 95630
Tel: (916) 351-4429
Fax: (916) 608-7222
Email: jpinjuv@caiso.com

Attorneys for the California Independent System Operator Corporation

Date: July 22, 2019

Attachment A
CAISO Input Assumptions for Independent Analysis

The available generation capacity in the CAISO assessment is based upon the net qualifying capacity (NQC) of the generation within the CAISO grid (with the exception of the solar, wind, hydro and pumped storage generation) and the imports into the CAISO (both contracted and potential uncontracted). The following table provides the assumptions for Figures 1, 2, and 3.

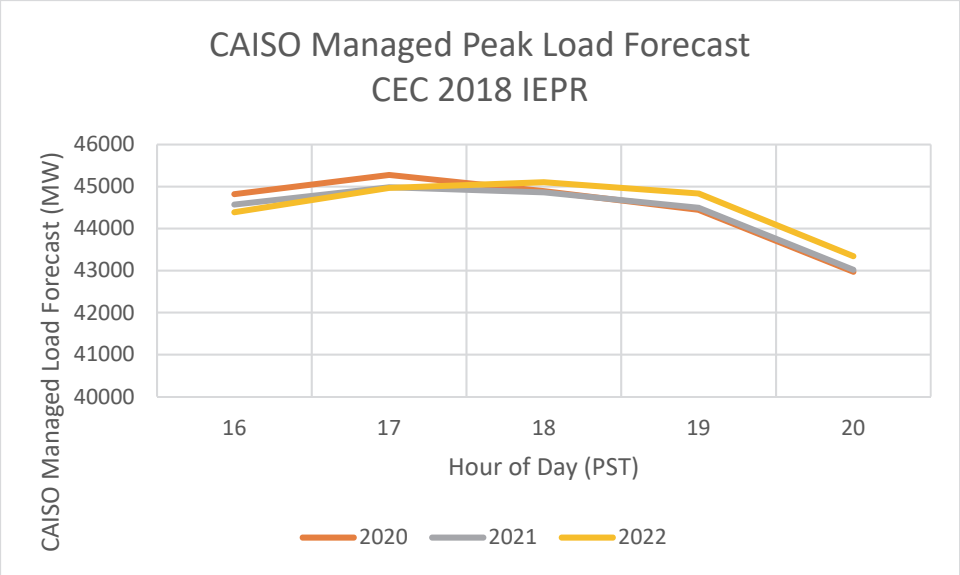
Table 1: ISO Load and Resource Assumptions

Load & PRM	
Load	California Energy Commission 2018 Integrated Energy Policy Report Update (2018 IEPR Update) 1-in-2 system peak Mid/Mid Load (2020 and 2021 peak hour = hour ending 17 PST; 2022 peak hour = hour ending 18 PST)
Planning reserve margin	15%
Generation	
Net Qualifying Capacity	2019 NQC list: http://www.caiso.com/Documents/NetQualifyingCapacityList-2019.xlsx
Mothballed Units	http://www.caiso.com/Documents/AnnouncedRetirementAndMothballList.xlsx#search=mothball
Gas Generation	
Gas Generation	Existing generators from CAISO from Masterfile and 2019 NQC list Less OTC, Mothballed, Announced Retirements and New Units. Dynamic scheduled generators included in imports on the interties
Once-through-cooling (OTC)	OTC retirements based upon compliance dates. See: https://efiling.energy.ca.gov/GetDocument.aspx?tn=228353&DocumentContentId=59542
New Units	Announced new gas generation (includes repowering for Huntington Beach and Alamitos)
Sutter	Assumes Sutter can be brought back for RA purposes (Sutter does not have a connection to CAISO but may be able to get transfer into the CAISO.)
Hydro Generation	
Hydro Generation (Including Pumped Storage)	Pumped Storage includes Helms, San Luis and Eastwood. Hoover is included in Contracted Imports (see below). Total generation reflected as the sum of historical 2013-2018 energy output during peak loading periods in August and September plus observed 2018 summer operating reserves. This results in approximately 80% of NQC. (See below.)
Other Existing	
Nuclear	Existing generators from CAISO from Masterfile and 2019 NQC list (Diablo Canyon only; Palo Verde accounted for under imports)
Solar	Based upon hourly profiles at time of peak loads from CAISO's PLEXOS modeling for the IRP proceeding. Time of peak defined as the first Tuesday in September to coincide with the IEPR peak day, which is the first Tuesday in September for every forecasted year in the 2018 IEPR Update vintage. (See also below.) The CAISO's full PLEXOS model and output files can be accessed at http://12.200.60.146:990. Parties requiring access to the CAISO's PLEXOS database should request log-in and password information by emailing the CAISO via e-recipient@caiso.com.
Wind	Based upon hourly profiles at time of peak loads from CAISO's PLEXOS modeling for the IRP proceeding. Time of peak defined as the first Tuesday in September to coincide with the IEPR peak day, which is the first Tuesday in September for every forecasted year in the 2018 IEPR Update vintage. (See also below.)

	The CAISO's full PLEXOS model and output files can be accessed at http://12.200.60.146:990. Parties requiring access to the CAISO's PLEXOS database should request log-in and password information by emailing the CAISO via e-recipient@caiso.com.
Geothermal	Existing generators from CAISO Masterfile and 2019 NQC list
Other	Existing generators from CAISO from Masterfile and 2019 NQC list (Includes Biomass, BioGass, Waste and Other)
Storage	
Battery	Includes Customer, Distribution and Transmission Connected
Resolution E-4949	Authorized Storage Procurement by PG&E in Moss Landing Area of Greater Bay Area
Future Solar and Wind	
Future Solar	From CPUC "RESOLVE_2017IEPRupdate_2018-04-17.zip" Results-Resource Build = FCDS
Future Wind	From CPUC "RESOLVE_2017IEPRupdate_2018-04-17.zip" Results-Resource Build = FCDS
Demand Response	
Demand Response	2019-2020 TPP Study Plan (Pages 25-27)
Imports	From Maximum Import Capability (MIC) Total Imports to be shared 10,193 MW
Contracted Imports	Based upon historical resource adequacy-backed imports, including Palo Verde and Hoover
Uncontracted Imports	Calculated as the difference between the MIC and Contracted Imports

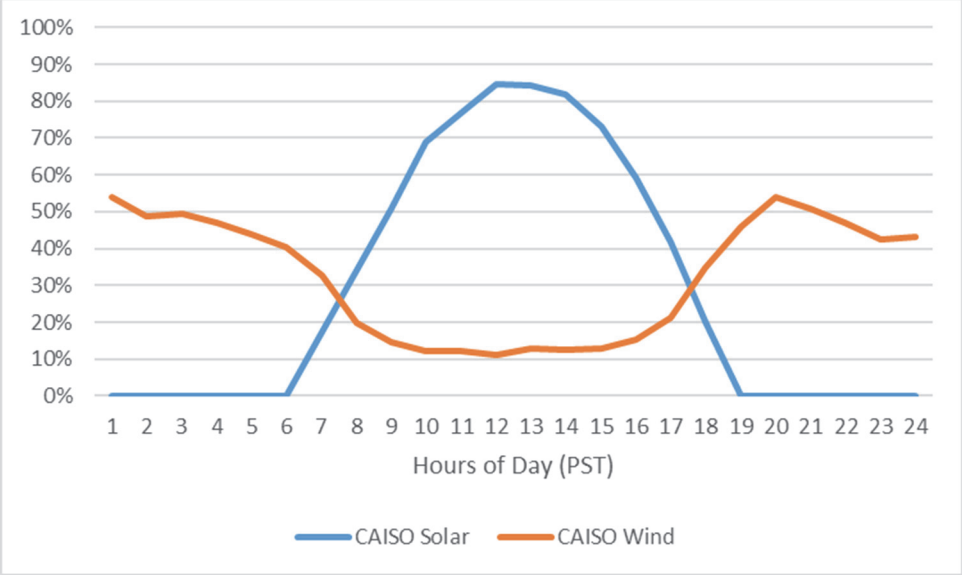
Load Forecast

The CAISO's analysis uses the forecasted 1-in-2 mid-mid managed peak load for the CAISO from the California Energy Commission 2018 Integrated Energy Policy Report Update (CEC 2018 IEPR Update). The 2020, 2021, and 2022 load forecasts are reproduced below. The managed peak load hour is hour ending 17 (based on Pacific Standard Time or hour ending 18 (6:00 p.m.) Pacific Daylight Saving Time) for 2020 and 2021 and hour ending 18 (based on Pacific Standard Time or hour ending 19 (7:00 p.m.) Pacific Daylight Saving Time) for 2022. With the increased penetration of behind-the-meter solar, the peak hour for the managed load for the CAISO has been shifting to later hours. As can be seen in the forecast below, the managed peak load in all of the years is effectively the same for hours ending 17, 18, and 19 while solar generation (behind-the-meter and transmission connected) output decreases.



Solar and Wind Profile

The following are the assumed solar and wind profiles for the peak load day.



Hydro and Pumped Storage Generation Capacity

The hydro (including pumped storage) generation assumptions were based on average historical generation from 2013 to 2018 during the time of peak loading periods in August and September to account for variations between high and low water years. In addition, the data includes observed provision of ancillary services (regulation up, regulation down, spinning reserves and

non-spinning reserves) from 2018 during the time of peak loading periods during summer. Only 2018 observations for ancillary services were used due to the change in BAL-002-2 standards effective January 1, 2018.[47] Collectively between energy and provision of ancillary services, hydro (including pumped storage) is reflected at approximately 80 percent of NQC.

[47] BAL-002-2 and operating reserve requirement changes implemented by the ISO is available here: http://www.caiso.com/Documents/Presentation-BAL-002-2DisturbanceControlStandardkContingencyReserveforRecoveryfromaBalancingContingencyEvent.pdf or in the NERC BAL-002-2 reliability standard here: http://www.nerc.com/pa/Stand/Reliability%20Standards/BAL-002-2.pdf.