



# Assembly Committee on Utilities and Energy

Assemblymember Chris R. Holden, Chair

California Legislature

## OVERSIGHT HEARING

### August 14th and 15th, 2020 Rotating Outages.

A confluence of events and regulatory shortcomings led to a shortfall in available supply to meet demand causing the California Independent System Operator to direct utilities in their balancing authority to trigger rotating outages on August 14 and 15, 2020. It was the first time in nearly 20 years that such outages occurred. The broadscale de-energization took place with little to no public warning. On those dates, there was a rare West-wide heat storm, which affected both the demand and supply of generation. Typically, high day-time temperatures are offset by cool and dry evening conditions. However, the multi-day heat storm meant that there was limited overnight cooling, so air conditioners continued to run well into the evening and the next day. The heat storm occurred as fires raged throughout the state and in the midst of a global pandemic.

In an August 17, 2020, letter to the energy organizations (California Energy Commission (CEC), California Public Utilities Commission (CPUC) and the California Independent System Operator (CAISO), Governor Gavin Newsom called upon those entities to conduct a root-cause analysis into the rotating outages.<sup>1</sup> On October 6, 2020, the energy organization released a preliminary root-cause analysis (PRCA). The PRCA identifies several factors that, in combination, led to the need for the CAISO to direct utilities in the CAISO footprint to trigger rotating outages. There was no single root cause of the outages, but rather, a series of factors that all contributed to the emergency. The energy organizations appropriately assumed responsibility for the August 14<sup>th</sup> rotating outage that forced 491,600 residences and businesses to lose electric power for between 15 to 150 minutes. On August 15<sup>th</sup>, 321,000 residences and businesses had power outages for between 8 to 90 minutes. The outages occurred in the investor-owned utility service areas: San Diego Gas and Electric (SDG&E); Southern California Edison (SCE) and Pacific Gas and Electric (PG&E).

Recognizing the dire situation and forthcoming heatwaves after those dates, Governor Newsom moved quickly to direct his administration to identify and implement strategies to manage the immediate shortfall of resources on the grid. The Governor rapidly undertook a massive statewide mobilization to conserve electricity, shift demand, and maximize existing generation resources. Those efforts are largely credited in mitigating subsequent rotating outages. The final root-cause analysis will be published prior to the end of the year.

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<sup>1</sup> Letter from Governor Gavin Newsom to energy organization (August 17, 2020).

The following are, at a high level, the contributing factors identified in the energy organizations preliminary root-cause analysis. The analysis finds that a series of factors contributed to the emergency rotating outages<sup>2</sup>:

- 1) The climate change-induced extreme heat storm across the western United States resulted in the demand for electricity exceeding the existing electricity resource planning targets. The existing resource planning processes are not designed to fully address an extreme heat storm like the one experienced in mid-August.
- 2) In transitioning to a reliable, clean, and affordable resource mix, resource planning targets have not kept pace to lead to sufficient resources that can be relied upon to meet demand in the early evening hours. This makes balancing demand and supply more challenging. These challenges were amplified by the extreme heat storm.
- 3) Some practices in the day-ahead energy market exacerbated the supply challenges under highly stressed conditions.

### **Energy Organizations Areas of Responsibilities:**

**The California Independent System Operator** is a private nonprofit public benefit corporation and the only independent grid operator in the electrically interconnected western grid. The CAISO is the Balancing Authority that oversees the reliability of approximately 80% of California's electricity demand and a small portion of Nevada. The remaining 20% is served by publicly-owned utilities such as the Los Angeles Department of Water and Power (LADWP) and Sacramento Municipal Utility District (SMUD), which operate separate transmission and distribution systems. There are some California publicly-owned utilities in the CAISO's Balancing Authority Area. The CAISO manages the high-voltage transmission system and operates wholesale electricity markets for entities within its system and across a wider Western footprint via an Energy Imbalance Market (EIM). The CAISO performs its functions under a tariff approved by the Federal Energy Regulatory Commission (FERC) and reliability standards set by the Western Electricity Coordinating Council (WECC) and the North American Electric Reliability Corporation (NERC). Approximately, sixty percent of the power supplied in the United States is managed by such regional transmission organizations or independent system operators.<sup>3</sup>

**The California Energy Commission** has many electricity planning and policy functions, including forecasting electricity and natural gas demand, investing in energy innovation, setting the state's appliance and building energy efficiency standards, and planning for and directing state response to energy emergencies. Among the CEC's key responsibilities is the preparation and adoption of electricity demand forecasts for the CAISO balancing area authority. As part of its Integrated Energy Policy Report process and in consultation with the joint entities, the CEC develops a set of forecasts to support the needs of CAISO transmission planning, CPUC Integrated Resources Planning, and CPUC and CAISO resource adequacy. For resource

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<sup>2</sup> Preliminary Root-Cause Analysis: Mid-August 2020 Heat Storm (October 6, 2020), letter to Governor Gavin Newsom.

<sup>3</sup> U.S Energy Information Administration: Today in Energy.

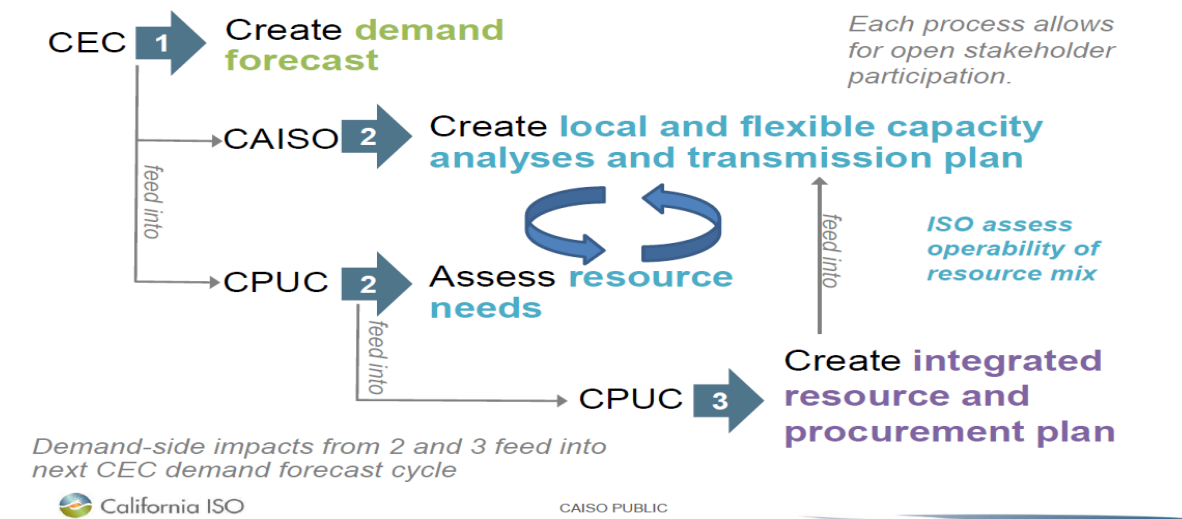
adequacy, the CPUC uses the monthly “1-in-2” peak demand forecast taken from the CEC’s hourly forecast. This forecast is constructed to have a 50% probability that actual monthly peak will be either higher or lower than the forecast, given the expected variation in temperatures.

**The California Public Utilities Commission** also has many regulatory responsibilities for energy, telecommunications, water, transportation, and safety in California. Relevant to the outages, the CPUC sets reliability requirements for the load-serving entities (LSE) that participate in the CAISO markets and comprise the majority of the CAISO footprint. Load-serving entities include the investor-owned utilities, community choice aggregators, and energy service providers. Electricity utilities regulated by the CPUC represent approximately 80% of the electricity demand in California and 91% of the electricity demand in the CAISO system. The CPUC’s reliability (termed resource adequacy) requirements are set based on the peak demand shown in the CEC’s demand forecast, plus a planning reserve margin (PRM) of 15%. The PRM is comprised of a 6% requirement to meet grid operating contingency reserves, as required by the WECC reliability rules, and a 9% contingency to account for unplanned plant outages and higher-than-average peak electricity demand.

The chart below illustrates the interdependency of the energy organization upon each other’s processes to ensure electric reliability:

### Energy Organizations Interdependence

The California ISO (CAISO), California Public Utilities Commission (CPUC) and California Energy Commission (CEC) work closely to address reliability



### Resource Adequacy

Fundamental to maintaining electric reliability, was the 2005 enactment of AB 380 (Nunez, Chapter 367) that established resource adequacy requirements on all load-serving entities (LSEs), which are the community choice aggregators; energy service providers; and investor-owned utilities. Resource Adequacy (RA) brought with it stability and reliability to the electric

system that was sorely missing in the 2001 energy crisis. Resource Adequacy (RA) has two principal goals: 1) To ensure the safe and reliable operation of the grid in real-time, providing sufficient resources to the California Independent System Operator (CAISO) when and where needed; and 2) To incentivize the siting and construction of new resources needed for future grid reliability.

The CPUC adopted a RA policy framework to ensure the reliability of electric service in California and the obligations are applicable to load-serving entities (LSEs) within the CPUC’s jurisdiction. The RA program guides resource procurement and promotes infrastructure investment by requiring that LSEs procure capacity so that capacity is available to the CAISO when and where needed. The RA program has three distinct requirements: System RA requirements, Local RA requirements, and Flexible RA requirements. Although Local and Flexible RA play important roles in assuring reliability, the August 14 through 19 events primarily implicated system resource needs. The Preliminary Root-Cause Analysis focuses on issues associated with System RA.

System requirements are determined based on each LSE’s by the CEC electricity forecast plus a 15% planning reserve margin. Local requirements are determined based on an annual CAISO study using a 1-10 weather year (once in ten years) and an N-1-1<sup>4</sup> contingency. Flexible Requirements are based on an annual CAISO study that currently looks at the largest three-hour ramp for each month needed to run the system reliably. There are two types of filings by the LSEs: annual filings (filed on or around October 31st) and monthly filings (filed 45 calendar days prior to the compliance month).

Requirement	Determination
System RA	Each LSEs CEC-adjusted forecast plus a 15% planning reserve margin.
Local RA	Annual CAISO study using a 1-in-10 weather year and an N-1-1 contingency.
Flexible RA	Annual CAISO study that currently looks at the largest three-hour ramp for each month needed to run the system reliably.

For the annual filings, LSEs are required to make an annual System, Local, and Flexible compliance showing for the coming year. For the System showing, LSEs are required to demonstrate that they have procured 90% of their System RA obligation for the five summer months of the coming compliance year. Additionally, each LSE must demonstrate that they meet 90% of its Flexible requirements and 100% of its Local requirements for each month of the coming compliance year. For the monthly filings, LSEs must demonstrate they have procured 100% of their monthly System and Flexible RA obligation. Additionally, on a monthly basis from May through December, LSEs must demonstrate they have met their revised (due to load migration) local obligation.

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<sup>4</sup> N-1-1 Contingency: A sequence of events consisting of the initial loss of a single generator or transmission component (Primary Contingency), followed by system adjustments, followed by another loss of a single generator, or transmission component (Secondary Contingency).

CPUC jurisdictional LSEs must procure sufficient resources to meet these obligations based on the resource counting rules established by the CPUC. The CEC develops the electricity demand forecasts used by the CPUC and provided to the CAISO. Non-CPUC jurisdictional LSEs in the CAISO footprint can set their own RA rules regarding resource procurement requirements including the PRM and capacity counting rules or default to the CAISO's requirements. RA capacity from both CPUC and non-CPUC jurisdictional LSEs are shown to the CAISO every month and annually based on operational and market rules established by the CAISO. The CAISO enforces these rules to ensure it can reliably operate the wholesale electricity market.

### **Interplay between Resource Adequacy and the Integrated Resource Plan**

Separate from the RA programs, California has established a long-term planning process, now known as the Integrated Resource Planning (IRP) process, through statutes and CPUC decisions. Under IRP, the CPUC models what portfolio of electric resources are needed to meet California's Greenhouse Gas (GHG) reduction goals while maintaining reliability at the lowest reasonable costs. The IRP models for resource needs in the three- to ten-year time horizons. If the IRP identifies a need for new resources, the CPUC can direct LSEs to procure new resources to meet those needs.

The RA and IRP programs work in coordination. The RA program is designed to ensure that the resources needed to meet California's electricity demand are under contract and obligated to provide electricity when needed. The IRP program ensures that new resources are built and available to the shorter-term RA program when needed to meet demand and to ensure the total resource mix is optimum to meet the three goals of clean energy, reliability, and cost-effectiveness.

The RA rules are set to ensure that LSEs have resources under contract to meet average peak demand (a "1-in-2 year" peak demand) plus a 15% planning reserve margin (PRM) to allow for 6% Western Electricity Coordinating Council (WECC)-required grid operating contingency reserves, and a 9% contingency to account for plant outages and higher than average peak demand. The demand forecasts are adopted by the CEC as part of its Integrated Energy Policy Report (IEPR) process. To develop CPUC RA obligations, the adopted IEPR forecast may be adjusted for load-modifying demand response, as determined by the CPUC.

Like RA, IRP modeling is also based on the CEC's adopted 1-in-2 demand forecast plus a 15% PRM. In addition, the CPUC conducts reliability modeling based on a 1-in-10 Loss of Load Expectation (LOLE) standard, which is more conservative than the 1-in-2 demand forecast.

### **Transitioning Resource Adequacy to Meet System Needs**

The construct for RA was developed around peak demand, which until recently has been the most challenging and highest cost moment to meet demand. The principle was that if enough capacity was available at peak demand, there would be enough capacity at all other hours of the day as well since most resources could run 24/7 if needed. With the increase of solar penetration

in recent years, however, this is no longer the case. The single critical period of peak demand is giving way to multiple critical periods during the day. A second critical period is the net demand peak, which is the peak of the load net of solar and wind generation resources and occurs later in the day than the peak. While RA processes should meet load at all times throughout the day, the net demand peak is becoming the most challenging time period in which to meet demand. Over time, critical grid needs may manifest in other hours, seasons, or conditions as the energy resource portfolio continues to evolve.

According to the preliminary root-cause analysis (PRCA), the rotating outages coincided closely with the net demand peaks that occurred between approximately 6:30 PM and 6:51 PM. In addition to the fact that California and the West were facing an extreme heat storm that pushed forecasted demand up to and beyond the limits that California's RA programs anticipated, many resources that were required to provide energy to the CAISO Balancing Authority Area (BAA) did not, or were not able to deliver that energy during the hours of peak and net demand peak.

### **Exacerbating the Supply Challenges Under Significantly Stress Conditions**

According to the preliminary root-cause analysis (PRCA), aspects of the energy markets operated by the CAISO appear to have contributed to the inability to obtain additional energy that could have alleviated the strained conditions on the CAISO grid on August 14 and 15. The contributing causes identified at this stage include:

- Under scheduling of demand in the day-ahead market by scheduling coordinators. The under-scheduling of load by scheduling coordinators had the detrimental effect of not setting up the energy market appropriately to reflect the actual need on the system and subsequently signaling that more exports were ultimately supportable from internal resources.
- Convergence bidding should allow bidders to converge or moderate prices between the day-ahead and real-time markets. However, during the mid-August events, it was difficult to pinpoint these contributing causes because processes that normally help set up the market were not performing as expected under the tight supply conditions. August 14 and 15, under-scheduling of load and convergence bidding clearing net supply signaled that more exports were supportable. Once this interplay was identified it was temporarily suspended for the August 18 trade date through the August 21 trade date.
- The CAISO has a residual unit commitment (RUC)<sup>5</sup> process that provides additional reliability checks based on the CAISO's forecast of CAISO load after scheduling coordinators provide all of their schedules and bids for supply, demand, but excluding convergence bids. After a review of the August 14 event, it was discovered that a prior market enhancement was inadvertently causing the CAISO's RUC process to mask the load under-scheduling and convergence bid supply effects, reinforcing the signal that

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<sup>5</sup> The residual unit commitment process designates additional power plants that will be needed for the next day and must be ready to generate electricity.

more exports were supportable. While this market enhancement was a necessary functionality in other market processes, it was not required in the RUC reliability-based process. The CAISO, therefore, stopped applying the enhancement to the RUC process starting from the day-ahead market for September 5, 2020, which allowed it to conduct its reliability check appropriately by internalizing whether load was under-scheduled as compared to the CAISO's forecast of CAISO load and regardless of the influence of convergence bidding.

- The CAISO market attracted imports including market transactions, voluntary transfers from the Energy Imbalance Market (EIM), and emergency transfers from other Balancing Authorities to reduce the impacts of these challenges. However, actual supply and demand conditions continued to diverge from market so that even with the additional real-time imports, the CAISO could not maintain required contingency reserves as the net demand peak approached on August 14 and 15.

### **Governor's Office Mobilization Actions**

Given the forecast of the forthcoming heatwave, on August 16, Governor Newsom declared a State of Emergency<sup>6</sup>, and on August 17 he signed Executive Order N-74-2045, which allowed for temporarily easing of regulations on stationary generators, portable generators, and auxiliary engines by vessels berthed in California ports. Importantly the proclamation enhanced the response of the Governor's Office, California Office of Emergency Services, CAISO, CEC, and CPUC as they implemented a state and region-wide mobilization effort:

- Conserve electricity:
- Reduce demand on the grid by:
  - Moving onsite demand to backup / behind-the-meter generation
  - Deploying demand response programs
  - Initiating demand flexibility
- Increase access to supply-side resources by:
  - Maximization of output from generation resources
  - Additional procurement of resources

The efforts led to estimated reductions in peak demand on Monday (August 17) and Tuesday (August 18) by nearly 4,000 MW and added nearly 950 MW of available temporary generation to balance the grid. The graph below<sup>7</sup> illustrates the difference between day-ahead-peak and the actual peak, which was largely realized due to the statewide and regional efforts. The following are among the actions to reduce demand and add additional generation that served to avoid further rotating outages. The activities taken to stem further rotating outages included the assistance of the publicly owned utilities (Los Angeles Department of Water and Power and Sacramento Municipal Utility District); federal entities such as the military and the Federal

<sup>6</sup> <https://www.gov.ca.gov/wp-content/uploads/2020/08/8.16.20-Extreme-Heat-Eventproclamation-text.pdf>

<sup>7</sup> Preliminary Root-Cause Analysis Mid-August 2020 Heat Storm, page 60.

Bureau of Reclamation; residence and businesses throughout the state to conserve energy at critical times.

### Initiation of Demand Flexibility

- The Department of Water Resources and the US Bureau of Reclamation shifted on-peak load resulting in 72 MW of load flexibility.
- The Governor’s Office contacted large industrial users to seek opportunities for load shifting away from peak hours. In response, Poseidon Water Desalination Plant reduced its load by 24 MW; Dole Foods reduced its load by 3.3 MW, with support from SDG&E; California Steel Industries reduced its load by 35 MW on Monday through Wednesday (August 17 through 19) during the hours of 3 to 8 pm; and California Resources Corporation reduced its demand by about 100 MW during peak hours, shutting in 7% of oil production daily for 6 hour peak periods.

**Table 5.1: Day-Ahead Peak Forecast vs. Actual Peak During Heat Event**

	Day-Ahead Peak forecast (MW)	Actual Peak (MW)	Difference (MW)
8/14/2020	46,257	46,797	540
8/15/2020	45,514	44,947	(567)
8/16/2020	44,395	43,815	(580)
8/17/2020	49,825	45,152	(4,673)
8/18/2020	50,485	47,118	(3,367)
8/19/2020	47,382	46,023	(1,359)

### Preliminary Set of Recommendations and Immediate Steps

The following are the preliminary set of recommendations and immediate steps that the preliminary root-cause analysis describes that have either been or are in the process of being implemented or are recommended to reduce the likelihood of additional rotating outages during the remainder of this year or next year.

The recommendations are organized into three timeframes: Near-term (2021), Mid-term (2022-25), and Longer-term (beyond 2025).

#### 1) Near-term – by Summer 2021

##### a) Actions That Have Already Been Taken

- **Construction of new generation** - CPUC jurisdictional LSEs have already begun procurement of new capacity that will be online by summer 2021 derivative of prior CPUC authorizations. This includes net qualified capacity (NQC) values of approximately 2,100 MW of storage and hybrid storage resources and approximately 300 MW of solar and wind resources.



- Furthermore, the CPUC is already working with its jurisdictional LSEs to track the projects with 2021 online dates to reduce the risk of delays. When possible delays are identified, the CPUC, CEC, and CAISO will work with the developers, other relevant state agencies, and local governments to ensure projects stay on track.
- **Adjustments to energy market processes** - Following the mid-August events, the CAISO took immediate actions to adjust market processes, which improved the CAISO's ability to limit market export schedules to what is physically feasible based on system conditions and inertia<sup>8</sup> constraints. These measures alleviated pressures during the Labor Day weekend heatwave.

#### b) Resource Planning and Procurement

- **Increase RA requirements for LSEs to more accurately reflect the increased risk of extreme weather events** - The current planning targets were developed in 2004 and have not been updated since. The 1-in-2 load forecast plus a 15% reserve margin should be updated to better account for heat storms like the ones encountered in both August and September. The CPUC already has an open proceeding to consider changes in how the planning targets are set for the purposes of RA rules and this discussion should start before summer 2021. Once these changes are developed, the CPUC, CEC, and CAISO should ensure they are used consistently across all long- and short-term planning programs.
- **Bring additional resources online** - The CPUC and CEC to expedite the regulatory and procurement processes to develop additional resources that can be online by 2021, including coordination with non-CPUC jurisdictional entities. This will most likely focus on "demand-side" resources such as demand response and, as possible, the acceleration of online dates of resources under development but not scheduled to be online by summer 2021. This can complement the resources that are already under construction.
- **Modernize Flex Alert** - Flex Alert was designed as a voluntary conservation program during the 2000-2001 California Electricity Crisis. It is largely a media campaign asking the public to conserve electricity on peak demand days. The program design and targeting have not changed since its inception. The program should be redesigned to better target social media and to take advantage of home automation devices. The CEC, CAISO, and CPUC should coordinate to add funding from all LSEs to better target conservation messaging and utilize automated devices.
- **Non-jurisdictional entity planning targets** - The CAISO and CEC should work with the non-CPUC jurisdictional entities to pursue consistency between CPUC and non-CPUC jurisdictional entity planning targets, including forecasting and PRM targets.
- **RA crediting counting requirements** - The CAISO should continue efforts to stipulate its expectations on credits applied by CPUC and non-CPUC jurisdictional entities.

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<sup>8</sup> An interconnection permitting passage of current between two or more electric utility systems.

### c) **Market Enhancements**

Based on the Preliminary Analysis, the CAISO has identified possible improvements to its market practices to ensure they accurately reflect the actual balance of supply and demand during stressed operating conditions. Furthermore, market practices should ensure sufficient resources are available to serve load across all hours, including the peak and net demand peak.

#### **Address under-scheduled CAISO load in the day-ahead market**

The CAISO, working with stakeholders, should develop and institute a procedure to adequately communicate to the market (including LSEs and their scheduling coordinators) the need to schedule load in the day-ahead market by:

- Continuing its new practice of notifying the market of the degree of under-scheduled load based on prior day results of the day-ahead market if load is under-scheduled, and request that LSE scheduling coordinators properly schedule their anticipated load in the day-ahead market<sup>9</sup>; and
- Increasing outreach to LSEs to discuss and resolve any issues with their ability to schedule the amount of load in the day-ahead market consistent with system conditions.

#### **CAISO to pursue the following market rule enhancements through its stakeholder processes**

- Continue to review and clarify through changes to its tariffs and business practice manuals the existing rules for scheduling priorities and protection of internal and external schedules. Ensure that market processes appropriately curtail lower priority exports that are not supported by non-resource adequacy resources to minimize the export of capacity that could be related to RA resources during reliability events.
- Through a stakeholder process, pursue redesign of CAISO RA market rules to ensure planned outages do not create unnecessary reliability risk and that performance penalties are sufficient to ensure compliance.
- Through a stakeholder process, develop a process to evaluate monthly RA supply plans with backstop if necessary.
- In coordination with the CPUC, continue to work with stakeholders to clarify and refine the counting rules as they apply to hydro resources, demand response resources, renewable, use limited resources, and imports.
- Through a stakeholder process, continue to enhance the day-ahead market design to ensure reliable load and supply scheduling.

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<sup>9</sup> <http://www.caiso.com/Documents/CaliforniaISOMarketParticipantsHeatWavePreparationLoadScheduling.html>

#### d) **Improving Situational Awareness and Planning for Contingencies**

- **State-Wide and WECC-Wide Resource Sufficiency Assessments** - The CEC, in coordination with CPUC, CAISO, and other BAAs, will begin developing a statewide summer assessment to provide additional information to support RA proceedings beginning in 2021. The CEC will also engage in relevant WECC RA processes to maintain situational awareness of the WECC-wide summer assessments and publish information as appropriate.
- **Develop Communication Protocols to Trigger Statewide Coordination** - The CAISO, CEC, and CPUC will develop improved warning and trigger protocols to adequately forewarn the severity of an extreme event and initiate coordination with one another, with other State agencies and the Governor's Office, with the IOUs, municipal or POU, and the CCAs.
- **Contingency Plan** - The CEC, in coordination with the Governor's Office, CPUC, CAISO, and other appropriate state agencies and stakeholders, will systematize a Contingency Plan. This plan will draw from actions taken statewide under the leadership of the Governor's Office to mitigate the anticipated shortfall that occurred August 17 through 19. It will be ready to be deployed in case of unanticipated stressed conditions. The Contingency Plan will lay out a process to sequence emergency measures in rank order to minimize environmental, equity, and safety impacts. The measures will include: load flexibility and conservation from large users, moving demand to microgrids and back-up generation (including emergency use of diesel generation that the three large electric IOUs own or have under contract for use in major emergencies such as wildfire prevention and wildfire or earthquake response), and temporarily increase the capacity of existing generation resources.

### 2) **Mid-Term (2022 through 2025) and Long-Term**

#### a) **Resource Planning and Development**

- **Consider New Resources** - Consider whether new resources are needed to meet the mid- and longer-term timeframes reflective of the reevaluation of the forecast basis and PRM noted above. Conduct a production cost analysis to ensure that additional resources will meet reliability needs during all hours of the year including the net demand period.
- **Accelerate Deployment of Demand-Side Resources**
  - **Dynamic Rates** - Rate design can help reduce demand at net demand peak by creating financial incentives to shift demand to other times of the day. The CPUC is already implementing rate design changes by directing the three large IOUs in California to default all residential customers to Time of Use Rates (TOU). SDG&E has already defaulted most of its customers to TOU rates. Most commercial and industrial customers are already on mandatory TOU rate plans. PG&E and SCE will begin moving their customers to TOU plans in 2021.

- Beyond the move to TOU rates, other dynamic rate designs that more accurately reflect real-time market conditions (or GHG emissions) can be developed. These rate plans can be paired with low-cost hardware to enable automated demand flexibility. The CEC has already opened a proceeding on Load Management Standards (LMS) to 1) require the large electric utilities and CCAs to post their time-based rates in a public database in a standardized format, and 2) automate the publishing of those rates in real-time in machine-readable form. The CEC is also beginning the process to implement the load flexibility requirements laid out in Senate Bill (SB) 49 (Skinner, 2019) in conjunction with the State Water Board. The CPUC and CEC should open additional proceedings to expand dynamic rate plans and encourage the roll-out of automated devices. The CPUC and CEC will need to coordinate with the smaller non-CPUC jurisdictional entities and CCAs to encourage these entities to implement similar rate plans and automate access to them.
- Building on the Senate Bill (SB) 100 (De León, 2018) scenarios, consider where diverse resources can be built and the transmission and land use considerations that must be taken into account. Establish a transmission technical working group (CAISO, BAs, CEC, and CPUC) to evaluate the transmission options and constraints from the SB 100 scenarios.

**b) Market Enhancements**

- The CAISO to continue to engage with stakeholders to develop market enhancements identified in the near-term.

**c) Improving Situational Awareness and Plan for Contingencies**

- Statewide and WECC-Wide RA Assessments as Part of the Integrated Energy Policy Report (IEPR): Building on the statutory role of the CEC in reviewing POU IRPs, the CEC, in coordination with CPUC, CAISO, and statewide LSEs, will develop necessary assessments as part of the IEPR to develop state-wide, and WECC-wide RA assessments.
- As part of IEPR, continue efforts to expand assessments to support mid- to long-term planning goals by including the following:
  - The CEC, CPUC, and CAISO continue mid-term efforts from SB 100, IRP, and the CAISO's transmission planning process to address electric sector reliability and resiliency considering evolving policy goals of the state.
  - Update (likely broaden) the range of climate scenarios to be considered in CEC forecasting (supply and demand).
  - Consider developing formal crosswalks between the CEC forecast and emerging SB 100 scenarios to bridge gaps between planning considerations across various planning horizons.

## **Next Steps**

Additional analysis that will be performed for the final root-cause analysis, including, but is not limited to:

- Evaluate how credited resources performed across CPUC and non-CPUC jurisdictional footprints.
- Evaluate demand response performance based on settlement meter data.
- Analyze how different LSE scheduling coordinators scheduled load in the day-ahead market compared with their forecasted peak demand, and understand and address the underlying drivers.
- Improve communications to utility distribution companies to ensure appropriate response during future critical reliability events and grid needs.
- Review performance of specific resources during the heat storm.

### Outstanding Questions

- 1) Has CAISO analyzed and confirmed whether the correct implementation of the residual unit commitment would have obviated the need to curtail load on the 14th and 15th?
- 2) The report indicates that scheduling coordinators for load-serving entities collectively under-scheduled their demand in the day-ahead timeframe, which allowed for energy to be exported, and I see that one of the next steps you identify is comparing scheduled load to the different load-serving entities' RA peak forecasts.
  - a) Have you performed any preliminary analysis on this yet, and if so do you have any information on whether the under-scheduling was more of a pronounced issue for certain load-serving entities versus others? For example, IOUs vs CCAs vs POU's vs Energy Service Providers.
- 3) Historically, the IOUs have done their own scheduling coordination and they covered the vast majority of the demand in the CAISO system. With the transition to a more disaggregated group of load-serving entities serving demand - the report shows that 21 CCAs are now scheduling demand and presumably all of the energy service providers are doing so as well.
  - a) Did the expansion in the number of entities contribute in any way to any of the under-scheduling issues?
- 4) The report identifies extended planned outages for which no replacement capacity was provided by the resource owner, and there is a recommendation to address this in CAISO's market rules.
  - a) Can you explain under what circumstances resources might go on planned outages during the summer when resources are likely to be most needed? Are there penalties assessed for this type of outage?
- 5) It appears that there is a lot of energy classified as non-RA energy that supported the exports, but there are a lot of qualifiers in the resource-by-resource evaluation that some energy from RA resources may be contributing to that non-RA energy used to support exports.
  - a) Explain the difference between RA energy that supports exports and non-RA energy that supports exports.
- 6) The report recommends "Ensure that the generation and storage projects that are currently under construction in California are completed by their targeted online dates." How will these agencies work to get projects moving faster from the moment they are signed, not just once construction begins? Specifically:

- a) How will the State help to expedite permitting and the environmental impact report process, and how will the CAISO and the transmission and distribution providers expedite interconnection and avoid interconnection delays, which can slow down projects by months or more?
  - b) How will the CPUC and CAISO work to remove regulatory uncertainty? Some developers are hesitant to contract for a project worth hundreds of millions of dollars when the rules and valuations of certain resources keep changing. Current uncertainties include how clean energy resources, including storage, will count towards reliability capacity; how load-serving entities are to procure these resources and count them for compliance; and the rules that govern how these resources will be deployed in the CAISO market.
- 7) The report suggests initiating a discussion about procurement of new capacity through an existing proceeding at the CPUC - and starting that conversation before next summer. What do you envision to be the scope of that conversation, and why not start it now?
  - 8) There are several existing assets throughout the state that could soon retire. What is being done keep necessary assets online and make sure they're available until they can be replaced with newer, cleaner resources that meet the system's needs?
  - 9) The CEC is currently developing its 2020 Integrated Energy Policy Report (IEPR), with a draft coming soon. Part of that process will be to provide updated energy demand forecasts based on 1-in-2, 1-in-5, 1-in-10, and 1-in-20 scenarios. Will the CEC be adopting a 1-in-10 or 1-in-20 year demand forecast in your Resource Adequacy planning, rather than the current 1-in-2 (or average) year forecast? What are the rate impacts of such modifications?
  - 10) According to the report, additional storage is a key component to meeting our needs next summer. During the summer there is very little solar overgeneration. How does night-time charging help meet our GHG reduction goals when natural gas is the primary resource operating at night?
  - 11) The report indicates that scheduling coordinators were under-scheduling in the day-ahead timeframe. What is the penalty for under-scheduling? Is the penalty significant enough to prevent the Scheduling Coordinator from under-scheduling and selling generation outside of CAISO?
  - 12) When will the CEC's assessment of drop in solar production on the distribution and wholesale side of the grid be available? In particular, what are the implications of the following: 1) smoke and particulate matter blocking sunlight; and 2) dirt and soot on panels. Some of the trade publications have said the smoke and particulate matter reduced production by 30%.

- 13) Load shifting of water pumps and other energy-intensive processes was critical in meeting system needs after the August 14<sup>th</sup> and 15<sup>th</sup> outages. What regulatory processes are necessary to enable and incentivize load shifting to meet system needs?
- 14) Demand response is an underutilized resource. There are currently no active stakeholder initiatives at CAISO specifically addressing demand response. While there are two resource adequacy proceedings at the CPUC that have a demand response component to them, there is still no date for a workshop, after having been postponed twice.
  - a) What steps do both the CAISO and the CPUC plan to take to address their concerns about reliability from DR resources? What are the intended outcomes?
  - b) Besides demand response resources, what other flexible resources are the agencies considering that will meet reliability needs and the state's environmental goals?
- 15) What adjustments were made to the CPUC's August demand response capacity of 1,180 MW for the IOU demand response programs to turn it into the 1,482 MW shown in Figure ES.4 and Figure 4.5 in the preliminary root-cause analysis?
- 16) Can the reliability demand response resources and proxy demand response be segregated more clearly into separate graphs?
- 17) Can balancing area authorities (BAA) recall imports in the face of supply shortages, especially when the import spans multiple paths and BAAs?
- 18) What is the status of the CAISO's revised straw proposal in its RA Enhancements Initiative proceeding to extend the real-time must offer obligation to all megawatts?
- 19) Why did it take so much longer for some utilities to restore power and what is the CPUC doing to ensure that re-energization promptly occurs?
- 20) As capacity continues to tighten in the West, what actions have the energy organizations taken to address the concern that the use of speculative supply contracts could lead to supply shortfalls and price spikes in the short-term markets that will undermine reliability and adversely affect the RA program?