Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: May 8, 2019

Re: **Briefing on 2019 Summer Loads and Resources Assessment results**

This memorandum does not require Board action.

INTRODUCTION

The ISO's 2019 Summer Loads and Resources Assessment presents the expected supply and demand conditions for the 2019 summer peak demand period. This annual assessment helps the ISO, industry participants, and other key stakeholders in planning and preparing grid operation for the upcoming summer season. This briefing provides the ISO Board of Governors with results and information on the following topics that will be included in this year's assessment:

- Forecast of ISO peak demand for 2019;
- Assessment of capacity margins in the ISO system under diverse operating conditions and scenarios;
- Discussion of current hydro conditions and expectations for the summer power supply;
- Generation additions and retirements; and
- An update on the status of the Aliso Canyon gas storage facility.

Summary

Projections for 2019 show that there is a low probability of encountering operating conditions that could result in less than required operating reserves. The decreased risk in 2019 over 2018 is primarily a result of significantly greater than normal hydro conditions. The ISO is at greatest risk if hotter than normal weather occurs concurrently in the ISO and neighboring BAs resulting in a reduction of resources available for imports into the ISO. The level of imports during high load peak conditions is a key element for ensuring system reliability. The risk of such an event increases during late August and early September when hydro availability decreases and the afternoon decline in solar output begins sooner in the day due to shorter daylight.

Major findings for the 2019 Assessment include:

- Forecasted peak demand relatively unchanged from 2018
- Hydro conditions are significantly above normal
- 2,061 MW net reduction in dispatchable resources from retired and mothballed generation, and new additions
- Aliso Canyon related gas restrictions not included in the results, but could result in additional risk

Each of these findings is discussed in greater detail below.

Peak Demand Forecast

The 2019 base case forecasted peak demand is 46,511 MW, essentially unchanged from the 2018 forecast. The unchanged demand projection is a result of projected modest economic growth over 2018, continuing load reductions from behind-the-meter solar installations and energy efficiency programs. The ISO 2019 1-in-10 peak demand forecast is 48,979 MW.

Hydro Conditions

California hydro conditions for 2019 are well above normal. As of April 2, 2019, the statewide snow water content for the California mountain regions was 162 percent of the April 1 average. As of April 2, major statewide reservoir storage levels were at 109% of normal. California hydroelectric capability for 2019 is well above 2018 when the statewide snow water content was 51 percent of average. Above average hydro conditions will, however, exacerbate the level and frequency of oversupply conditions during the spring and early summer.

Hydro conditions for the Pacific Northwest are slightly below normal. As of April 10, 2019, the Northwest River Forecast Center projected the April to August reservoir storage at the Dalles Dam on the Columbia River to be 94 percent of average - less than the 2018 level of 118 percent of average.

Available Generation

The ISO projects 51,765 MW of system capacity for summer 2019, based on capacity available for resource adequacy. From June 1, 2018, to June 1, 2019, approximately 1,523 MW of additional generation is expected to reach commercial operation (528 MW of dispatchable and 995 MW of non-dispatchable). Of the 1,523 MW, approximately 42 percent is solar, 36 percent is gas, 10 percent is wind, 4 percent is geothermal, 3 percent is battery, 3 percent is hydro, and 2 percent is biofuel. During this same period, 2,702 MW of generation is expected to retire or mothball (2,589 MW of dispatchable and 113 MW of non-dispatchable). In aggregate, the ISO gained 882 MW of non-dispatchable capacity and lost 2,061 MW of dispatchable capacity.

Assessment of Reserve Margins

The 2019 Assessment uses an unloaded capacity margin metric to portray the capacity that is available to ISO operations to utilize for spinning and non-spinning reserves and any additional capacity that can be brought on line in a short period of time. Unloaded capacity margin levels above the operating reserve requirement for any given hour (typically around 6 percent) signifies that capacity is available beyond the requirement for operating reserves, which to the extent available, can be used during system contingencies.

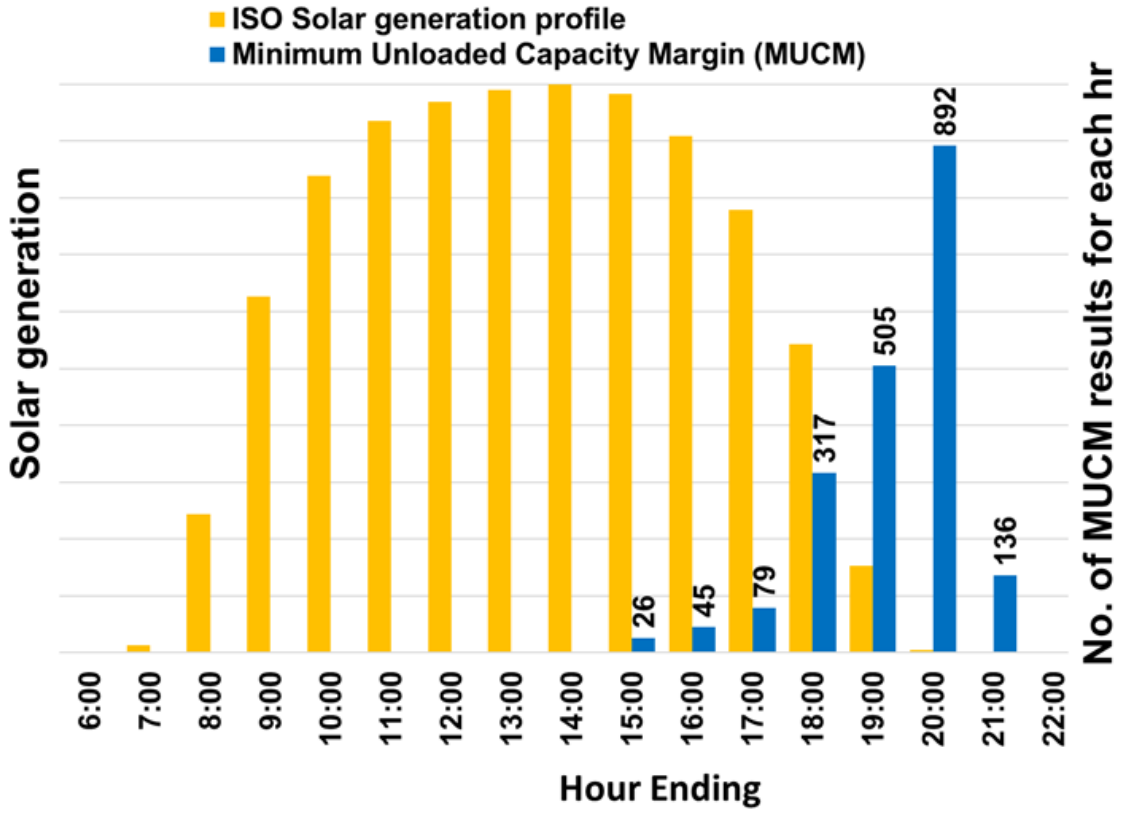
To assess resource adequacy, the analysis reviewed the operating reserve margins that fall below 6 percent, the range where a stage 2 or stage 3 emergencies could be declared. If operating reserves fall within this range, the ISO may be required to take out of market actions to secure additional reserves. Should ISO system operating conditions go into the emergency stages, the ISO will implement its mitigation operating plan to minimize loss of load in the ISO Balancing Area.

Of the 2,000 scenarios run by the model, the ISO system has a 1.3 percent probability operating at stage 2 emergency, a 0.4 percent probability at stage 3 emergency, and a 0.1 percent probability of unserved energy. Under this severe operating condition, the ISO will issue a notice of potential load interruptions to utilities – whether actual interruptions would occur depends on the specific circumstances and potential for recovering reserves.

The minimum unloaded capacity margin (MUCM) is the lowest unloaded capacity margin within each of the 2,000 scenarios. It is used to show the likelihood of reaching various levels of low operating reserves for at least one hour over the summer period. *Figure 1* shows the distribution of the MUCM over the hours of the day in comparison to the hours of solar generation anticipated during the 2019 summer peak day. The MUCM has the highest level of occurrences at hour ending 20:00. Figure 4 demonstrates the timing of 93 percent of the MUCM values fall in periods of significantly reduced to no solar generation output.

Figure 1

Solar generation profile vs.
Minimum Unloaded Capacity Margin Occurrences



The month of August experiences the greatest number of occurrences where the operating reserve margin dropped below 3 percent, the point of initiating a stage 3 emergency.

Due to the significant above normal hydro conditions for California, the ISO performed a sensitivity assessment to understand the results under less favorable conditions. The sensitivity assessment was performed representing lower hydro conditions and higher loads in the Southwest. The assumptions for the sensitivity were:

1. The ISO hydro conditions from 2018 where snow water content was 51 percent of normal
2. Hydro for Bonneville Power Administration and BC Hydro at 93 percent of normal (actual 2019 hydro conditions)
3. Peak demand of 1-in-10 in Arizona Public Service (APS) and Salt River Project (SRP), versus the 1-in-2 normally assumed (to simulate a southwest heat wave)

4. ISO net imports capped at 9,309 MW – the maximum imports experienced during 2018 when ISO demand was within 10 percent of the summer peak[1]

Table 1 provides a comparison of the probabilities for system capacity shortages from the base case assessment and the sensitivity assessment.

The simulation results for this sensitivity indicate that the ISO system has a 26 percent probability of operating at a stage 2 emergency, a 12 percent probability of a stage 3 emergency, and a 6 percent probability of having unserved energy.

Table 1

Probabilities for System Capacity Shortages

	Base case	Sensitivity case
Stage 2	**1.3%**	**26%**
Stage 3	**0.4%**	**12%**
Unserved energy	**0.1%**	**6%**

This comparison highlights the importance of California hydroelectric generation and imports for meeting peak summer conditions – in light of declining levels of gas-fired generation within the ISO.

Aliso Canyon

The results of the latest studies and recommendations by various state agencies on the operating restrictions of Aliso Canyon going forward and the projected impacts to electric system reliability are being assessed by the ISO, Los Angeles Department of Water and Power, California Energy Commission and California Public Utilities Commission (Joint Agencies). The results of the Joint Agencies assessment for this summer and beyond will be presented in a report that is expected to be released in May 2019.

The outlook for energy reliability in Southern California remains challenging due to uncertainty about the status of its natural gas system. The Southern California Gas (SoCalGas) system continues to operate at less than full capacity due to pipeline outages and continuing restrictions on use of the Aliso Canyon natural gas storage facility. Pipeline outages will continue through much of the summer with some potentially returning to service later in the summer.

The risk to electric reliability associated with operating restrictions at Aliso Canyon and other gas storage facilities is greater in the local reliability areas in Southern California than to the

[1] The base case assessment assumed that imports up to the highest level seen during 2017, 11,701 MW, could occur during any hour of 2019. Availability of sufficient imports during high peak load conditions is critical to ensuring system reliability and the maximum import capability assumption has a large impact on the modeling results.

ISO system as a whole. From a system perspective, risk to electric reliability and the ability to re-supply from electric supply sources not impacted by SoCalGas limitations is similar to previous years.

Preparation for Summer Operation

Producing this report and publicizing its results is one of many activities the ISO undertakes each year to prepare for summer system operations. Other activities include coordinating meetings on summer preparedness with the Western Electricity Coordinating Council (WECC), California Department of Forestry and Fire Protection (Cal Fire), natural gas providers, transmission operators and neighboring balancing areas. The ISO's ongoing coordination activities with these entities help to ensure everyone is prepared for the upcoming summer operational season.