Memorandum

To: ISO Board of Governors

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

Date: May 9, 2018

Re: **Briefing on 2018 Summer Loads and Resources Assessment results**

This memorandum does not require Board action.

INTRODUCTION

The ISO's 2018 Summer Loads and Resources Assessment presents the expected supply and demand conditions for the 2018 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 2018;
- 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

In preparing for the 2018 Assessment a number of modeling enhancements were made to achieve model results that more closely align with the issues and limitations that ISO operations faces during extreme high loads as well as more normal operating conditions. Noteworthy modeling enhancements that were made include the following:

- Use of historical unit by unit forced outage rates.
- Removal of the day-ahead unit commitment process that committed units in the day-ahead to be available for meeting flexible capacity requirements the following day.

- A shift from reporting the operating reserve margin to an unloaded capacity margin, which more closely portrays the amount of capacity that operations can bring on line in a short period of time to deal with unexpected contingencies such as resource forced outages.

Major findings for the 2018 Assessment include:

- Peak demand relatively unchanged from 2017
- Hydro conditions are below normal
- 789 MW reduction in dispatchable resources from generator retirements
- 50% probability of a stage 2 emergency for at least 1 hour during the summer
- Aliso Canyon related gas restrictions not included in the results, but could result in additional risk

Projections for 2018 show that the ISO faces significant risk of encountering operating conditions that could result in less than required operating reserves. The increased risk in 2018 over 2017 is primarily a result of lower hydro conditions and the retirement of dispatchable generation that had been available to meet high load conditions that persist after the solar generation ramps down in the late afternoon. The risk increases during late summer when hydro availability decreases as the snow runoff progressively declines and the early evening output of solar declines due to shorter daylight. The ISO is at greatest risk if seasonal peak producing hot weather occurs in late August and early September.

Peak Demand Forecast

The 2018 base case forecasted peak demand is 46,625 MW, a modest 0.09 percent decrease over the ISO 2017 weather normalized peak demand. The slight decrease in the demand projection is a result of projected modest economic growth over 2017, based on the economic base case forecast from Moody's Analytics, reduced by continuing load reductions due to ongoing behind the meter solar installations and energy efficiency program impacts on peak demand. The ISO's 2018 1-in-10 peak demand forecast is 51,632 MW.

Hydro Conditions

Current hydro conditions for 2018 are below normal levels. As of April 2, 2018, the statewide snow water content for the California mountain regions was 51 percent of the April 1 average. While statewide large reservoir storage levels are near normal or above, snow water content is the more accurate measure of summer hydro capability. Of the hydro units within the ISO, the majority of the capacity is located on smaller reservoirs that depend on snowmelt to operate. California hydroelectric capability will be below normal for 2018 providing less than normal hydro energy during the spring and summer seasons.

As of April 2, 2018, the Northwest River Forecast Center projected the April to August reservoir storage in the Dalles Dam on the Columbia River to be 118 percent of average. Summer 2018 water supply projections for the Pacific Northwest are similar to 2017 levels. There are no concerns with Pacific Northwest hydroelectric generation.

Available Generation

The ISO projects that 51,947 MW of net qualifying generation capacity will be available for summer 2018. From June 1, 2017, to June 1, 2018, approximately 692 MW of additional generation is expected to reach commercial operation, with 40 MW in the southern portion of the ISO system and 652 MW in the northern portion of the ISO system. Of the 692 MW, approximately 60 percent is solar, 24 percent is biofuel, 7 percent is wind, 7 percent (48 MW) is gas, and 2 percent is hydro. During this same period, 860 MW of generation is expected to retire, 837 MW is gas and 23 MW is geothermal. Of the 837 MW of gas, 67 percent are once-through cooled facilities. The net reduction in dispatchable generation is 789 MW (837 MW of gas-fired retirements less 48 MW of new gas generation).

Assessment of Reserve Margins

The unloaded capacity margin is the metric the 2018 Assessment is using to portray the capacity that is available to ISO operations to utilize for spinning and non-spinning reserves and any additional capacity that can bring on line in a short period of time. Whenever the unloaded capacity margins is at or below the level of the operating reserve requirement for any given hour (typically around 6 percent) the unloaded capacity margins is equivalent to the capacity available to meet the operating reserve requirement for that hour. To assess resource adequacy, the analysis reviewed the operating reserve margins at or below 6 percent and above 3 percent, the range where a stage 2 emergency could be declared. Of the 2,000 scenarios run by the model over half (1,035) produced at least one hour where the operating reserve was within this range, with the majority of these (767) having a duration of only 1-2 hours over the entire summer season.

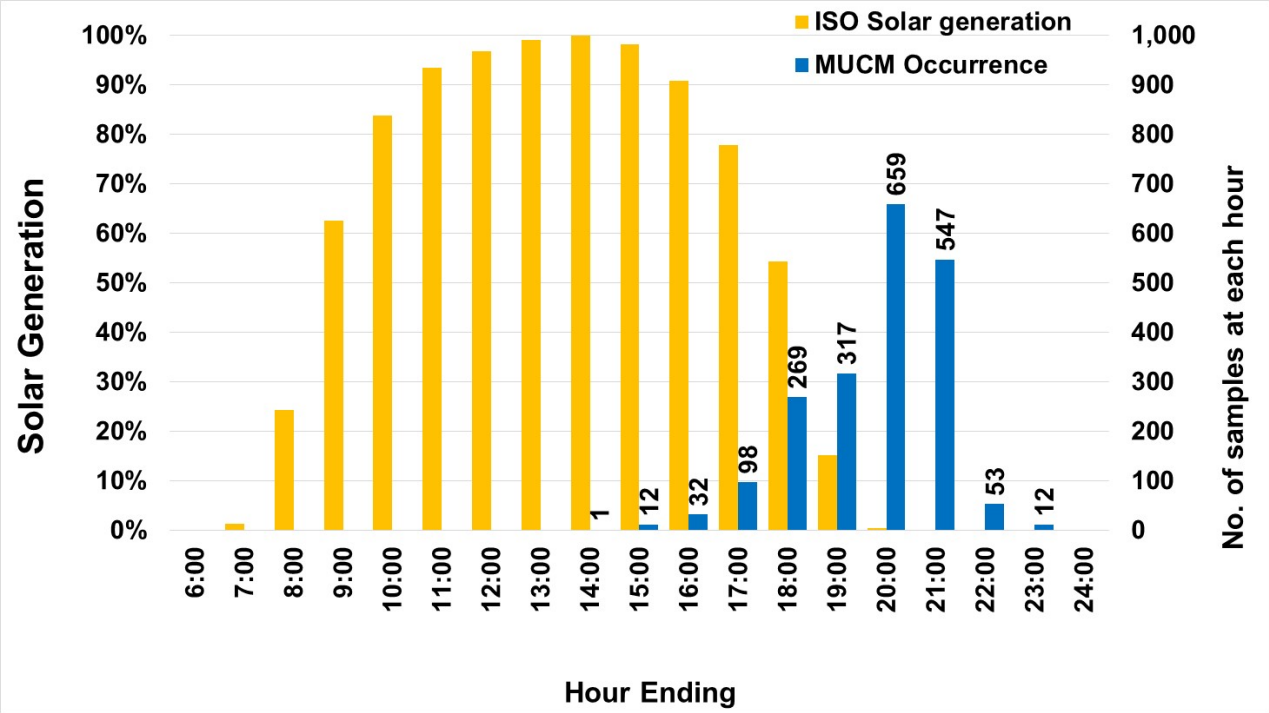
Of the 2,000 scenarios, 26 produce operating margins at or below a 3 percent margin, the range where a stage 3 emergency may be declared. For most of the 26 scenarios (21) stage 3 conditions occurred in only 1 or 2 hours. Under this more severe operating condition, the ISO will issue a notice of potential load interruptions to utilities – whether actual interruptions would occur depends on the specific circumstances and potential for recovering reserves.

The minimum unloaded capacity margin 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 minimum unloaded capacity margin over the hours of the day in comparison to the hours of solar generation during the 2017 summer peak day. The

minimum unloaded capacity margin has the highest level of occurrences at hour ending 20:00. Considering all values, 79 percent fall in periods of low to zero solar generation.

Figure 3

Solar generation profile vs.
Minimum Unloaded Capacity Margin Occurrences



The month of September experiences the greatest number of occurrences where the operating reserve margin dropped below 3 percent, the point of initiating a stage 3 emergency. The only result outside of September was one result in July. This is a function of the below normal hydro year where available hydro energy drops off in September.

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 early May 2018.

The outlook for energy reliability in Southern California remains challenging due to uncertainty about the status of its natural gas system. The challenges to the gas system are

greater than for the previous two summers and leave SoCalGas unable to meet demand on a 1-in-10 peak day without potentially having to curtail gas to the electric generators in the Southern California or using gas from the Aliso Canyon underground gas storage facility. The challenges stem primarily from continuing outages on as many as four key natural gas pipelines. The ability for the ISO electric system in Southern California to maintain electric reliability at lower gas burn levels is the result of a combination of transmission upgrades and some generation retirements. As a result with even greater system risk to electricity reliability this summer than last, measures to mitigate the risk remain necessary.

The risk associated with the gas storage facility restrictions at the Aliso Canyon and other gas storage facilities to electric reliability is greater in the local reliability areas in Southern California than to the ISO system. However, from a system perspective, the ability to re-supply from electric supply sources not impacted by SoCalGas limitations may be more constrained then in previous years.

Since 2016 the ISO has implemented several operational tools and market mechanisms to mitigate the electric system reliability risk posed by the restricted operations of Aliso Canyon. In 2016 FERC temporarily approved some tariff provisions while approving others as permanent changes. Because Aliso Canyon remains under restricted operations the ISO requested in December 2017 that FERC extend the temporary measures for one year, which FERC approved.

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 and neighboring balancing areas. The ISO's ongoing relationships with these entities help to ensure everyone is prepared for potential times of system stress.