Memorandum

To: ISO Board of Governors

From: Neil Millar, Vice President of Infrastructure and Operations Planning

Date: March 17, 2021

Re: **Decision on reliability must-run designation for Kingsburg Cogen**

This memorandum requires Board action.

EXECUTIVE SUMMARY

On October 7, 2020, KES Kingsburg, LP submitted notice of retirement for the Kingsburg Cogen generating unit, effective April 8, 2021. Management is seeking the ISO Board of Governors' authorization to designate the Kingsburg Cogen unit for reliability must-run (RMR) service, to ensure compliance with reliability criteria applicable to the balancing authority area. The RMR designation will be subject to negotiation of an RMR contract with rates, terms and conditions reasonably acceptable to Management.

The ISO's most recent analysis of supply for 2021 is summarized in Attachment 1 and indicates material reliability concerns, particularly during summer conditions.
The analysis demonstrates Kingsburg Cogen, with maximum output of 34.5 MW, is required for reliable operation of the transmission system in 2021 in compliance with mandatory standards BAL-002-WECC-2a. The ISO also expects compliance with BAL-001-2 and BAL-003-1.1 would likely be compromised absent its RMR designation. In assessing the ISO's ability to comply with BAL-002-WECC-2a contingency reserve requirements, the ISO made reasonable assumptions about generation forced outage rates, load forecast variations, and available import levels. The ISO's analysis also accounts for resources that are expected to be online in time for summer operation.

Management therefore seeks Board approval of the designation of Kingsburg Cogen unit as an RMR resource, to prevent its imminent retirement/mothballing. Management notes that neither the RMR designation nor the execution of an RMR agreement precludes the resource from being procured as a resource adequacy resource by a load serving entity.

Management recommends the following motion:

> ***Moved, that the ISO Board of Governors authorizes Management to designate the Kingsburg Cogen unit for reliability must-run service contingent upon execution of a reliability must-run contract with rates, terms and conditions acceptable to Management, as described in the memorandum dated March 17, 2021.***

DISCUSSION AND ANALYSIS

In order to maintain reliability, the ISO must comply with several North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) standards in real-time. BAL-002-WECC-2a requires the ISO to carry approximately 6% of expected load as contingency reserves. The contingency reserves required under BAL-002-WECC-2a cannot be used for other types of operational needs other than contingencies unless the ISO is in an energy emergency alert. In addition, the ISO also requires unloaded capacity to meet operational needs like frequency response and regulation pursuant to BAL-003-2 and BAL-001-2. In order to assess the ISO's ability to maintain those reserve margins necessary for reliable service in real time operation, the ISO considered the capacity needs taking into account the overall outage rate of the existing fleet, which is currently about 7.5% as set out in Attachment 1. The ISO also based its assessment on meeting a 1-in-5 load forecast level. The combined effect of these requirements established a threshold need for a 17.5% margin above a 1-in-2 load forecast level.

In assessing the ISO's ability to meet that requirement, the ISO accounted for all other available internal resources, resources under development and forecast to be in service by next summer, and reasonable import assumptions.

The ISO also identified a need to consider not only peak load conditions, but also reserve levels at times of high loads when solar resources are not available. These requirements, as set out in Attachment 1, demonstrate higher resource requirements and a greater need for the Kingsburg Cogen during these periods of solar unavailability than during peak load periods, when some contribution from the existing solar fleet helps meet the need.

Based on the analysis presented in Attachment 1, the Kingsburg Cogen is required for the ISO to meet the 2021 system-wide reliability needs, due to capacity insufficiency at the net peak hour during the month of September 2021. Accordingly, the ISO cannot

allow the resource to retire or mothball because, absent these units, it faces an inability to meet reliability criteria during these months.

Because of imminent inability to meet reliability criteria applicable to the ISO as a Balancing Authority, and to prevent imminent resource retirement/mothballing, ISO Management proposes to designate Kingsburg Cogen units as an RMR resource under tariff section 41. Upon designation, Kingsburg Cogen would then be expected to develop its own proposed cost of service based *pro forma* RMR Agreement. ISO staff would then work with them to review such proposed cost of service. Subject to further resource adequacy showings, the RMR agreement would be filed with FERC by Kingsburg Cogen and subject to FERC review.

In conclusion, the ISO's analysis indicates it must keep the specific facility in operation, after considering all other available resources, to reasonably meet established reliability criteria.

POSITION OF PARTIES

The owners' intention to retire the Kingsburg Cogen facility was posted on the ISO's website in October 2020 as part of the ISO's process to provide transparency regarding potential retirements. With the exception of a reconsideration of forced outage rates, the need justification for Kingsburg Cogen is virtually unchanged from that already supplied for the RMR designation of the Midway Cogen presented to the Board in December. The analysis provided then was updated in order to reflect a reconsideration of fleet-wide forced outage rates, down from 10% to 7.5%. This in turn translated into an overall 17.5% margin vs. the previous proposed 20% margin. This change did not affect the assessment of the need for the Midway Cogen, or the Kingsburg Cogen, facilities. No stakeholder has raised an issue with the need determination to the Board of Governors or during the FERC proceeding regarding Midway Cogen RMR designation.

CONCLUSION

Management recommends the ISO Board of Governors approves the designation of the Kingsburg Cogen unit as a reliability must-run resource.

ATTACHMENT 1: 2021 Reliability during the net demand period

The ISO's analysis consisted of two steps; first assessing the need for capacity required to meet the contingency provisions of BAL-002-WECC-2a, and then assessing the ability of existing and forecast resources to meet those needs in the summer of 2021. The ISO considers that a 17.5% margin applied to a 1-in-2 load level is necessary to provide reliable service pursuant to the contingency reserve provisions. This consists of the 6% operating reserve contingency requirement set out in the standard, allowance for 7.5% for forced outages, and a 4% margin for higher loads than an average 1-in-2 system load forecast. The 4% allowance for load accommodates forecast loads up to a 1-in-5 level above the 1-in-2 forecast used as a baseline. This allowance is necessary – but not excessive – to provide reasonable certainty that BAL-002-WECC-2a compliance can be achieved, as those compliance requirements are expected to be achieved at all times except immediately following an event that calls for activation of the contingency reserves.

Traditionally, such assessments have focused on the peak load hour. However, with the proliferation of solar resources, both behind the meter and grid-connected, the most critical hours the ISO typically faces now are after the peak load period when load is still relatively high, but intermittent resource generation is below its capacity value and output is rapidly declining. The Root Cause Analysis specifically pointed to the net demand peak period—the peak of load net of solar and wind generation resources—as an especially challenging period for grid operations during the August 2020 heat storm. This aligns with the 2020 Summer Loads and Resources Assessment[1] prepared in the spring of 2020 that identified the post-solar window as being the highest risk period. Significant renewable penetration has "shifted" the peak to later in the day and "[o]n hot days, load later in the day may still be high, after the gross peak has passed, because of air conditioning demand and other load that was being served by behind-the-meter solar comes back on the system."[2]

The ISO performed a stack analysis focused on meeting load plus having sufficient reserves to meet reliability standards requirements, load forecast variability, and generation forced outage rates, during the most critical hour after peak for each month

[1] 2020 Summer Loads and Resources Assessment located at: http://www.caiso.com/Documents/2020SummerLoadsandResourcesAssessment.pdf

[2] PRCA, p. 79.

June through October 2021. This translated to a 17.5% margin overall, applied to the baseline 1-in-2 load forecast. The ISO conducted its analysis on the hour that ends (hour ending, HE) at 8 p.m. Pacific Daylight Time (PDT) because solar generation is or is almost at zero by the end of the hour, but the load remains relatively high compared to the peak.[3] Table 1 below shows this relationship. In July and August, the load for HE 8 p.m. PDT is over 1,000 MW lower than the peak of the month, which occurs an hour or two earlier. For June, September, and October, the difference is much smaller.

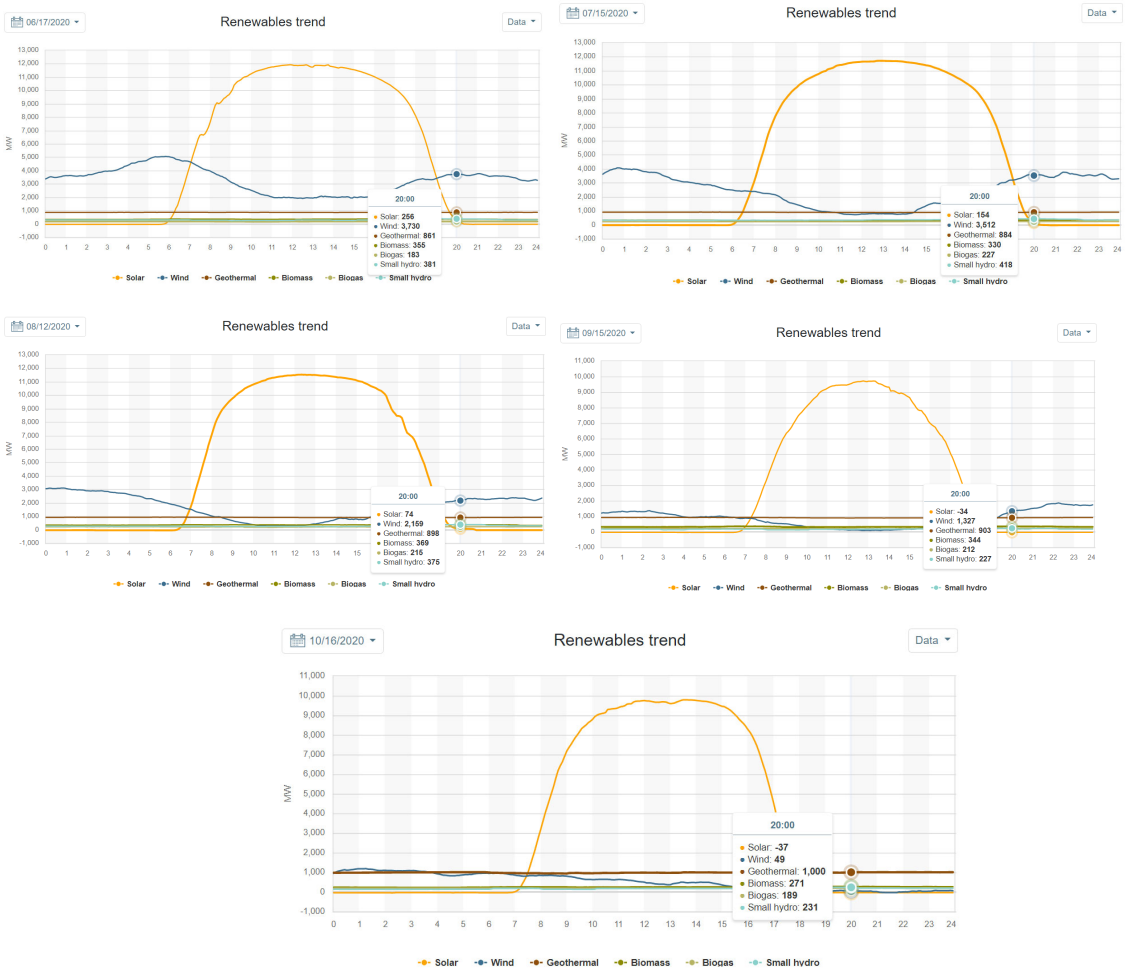
Table 1: Comparison of June-October 2021 Peak Demand and Load for HE 8 p.m. PDT

Month	Peak demand (MW)	Peak demand hour ending (PDT)	Load for HE 8 p.m. PDT	Peak demand minus HE 8 p.m. PDT load ([B] - [D])
[A]	[B]	[C]	[D]	[E]
June	41,421	7 p.m.	41,104	317
July	44,485	6 p.m.	43,306	1,179
August	44,679	6 p.m.	43,644	1,035
September	45,184	7 p.m.	44,861	323
October	37,271	8 p.m.	37,271	0

Figure 1 below shows five illustrative snapshots of renewable generation in the ISO market from the middle of each month from June through October 2020. Each figure shows that by 8:00 p.m. PDT (shown as military time 20:00) solar generation declines from a peak of approximately 10,000 MW or more to less than 300 MW.

[3] The net demand peak does not always occur between 7 p.m. and 8 p.m. PDT. All times throughout this filing are noted in PDT.

Figure 1: Illustrative Snapshots of Renewable Generation in ISO Footprint mid-June-October 2020



The ISO reasonably assumed zero solar generation in the stack analysis recognizing the minimal solar output at the end of the hour, if not over the whole hour, for the HE 8 p.m. in each of the summer months. For all other resources, the analysis reflects the 2021 net qualifying capacity values available for each month, resources that are expected to be online by summer 2021 by month, and resource adequacy imports based on the historical average from 2015 through 2020 for each month. The total resource stack compares to the California Energy Commission's 2019 Integrated Energy Policy Report mid-mid managed 2021 hourly demand forecast for the ISO footprint, plus a 17.5% margin.[4]

[4] Note that the CEC's Integrated Energy Policy Report data is in Pacific Standard Time, which does not reflect daylight saving.

Figure 2 below shows the stacked resource columns for June through October 2021 compared with the load for HE 8 p.m. PDT plus a 17.5% PRM. Table 2 below provides the numerical comparison between the total resource stack versus the load for HE 8 p.m. PDT plus a 17.5% margin. For illustrative purposes the table also includes a 15% margin applied to the load for HE 8 p.m. PDT.

Figure 2: June – October 2021 Resource Stack vs. Load for HE 8 p.m. PDT Plus 17.5% Planning Reserve Margin

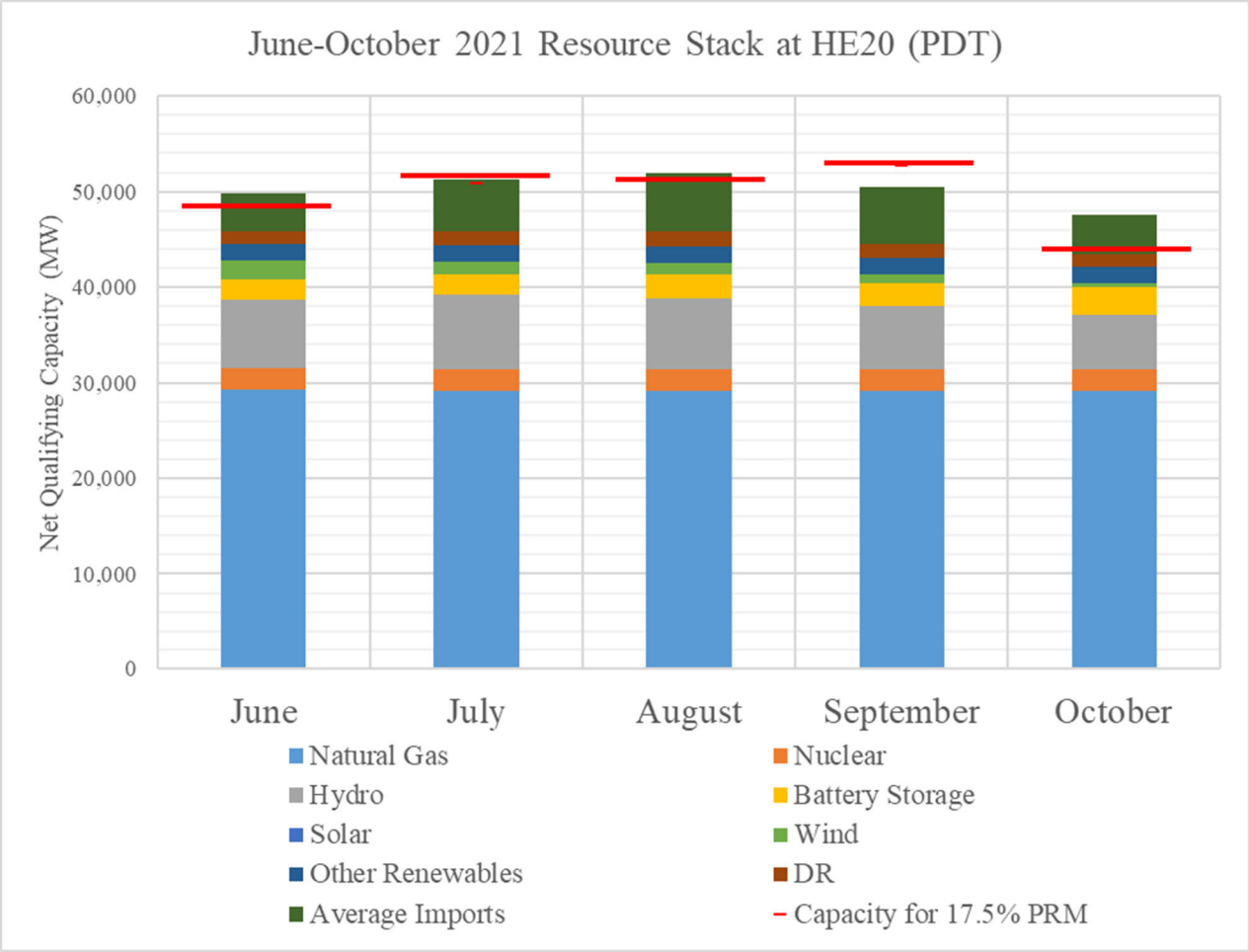


Table 2: Comparison of 2021 Total Resource Stack and Load for HE 8 p.m. PDT Plus 15% and 17.5% Margin

Month	Total resource stack with average RA imports (MW)	15% PRM plus load for HE 8 p.m. PDT	17.5% PRM plus load for HE 8 p.m. PDT	Total resource stack minus 15% PRM plus load ([B] - [C])	Total resource stack minus 17.5% PRM plus load ([B] - [D])
[A]	[B]	[C]	[D]	[E]	[F]
June	49,825	47,270	48,297	2,555	1,527
July	51,209	49,802	50,885	1,407	325
August	51,889	50,191	51,282	1,698	607
September	50,484	51,591	52,712	(1,106)	(2,228)
October	47,574	42,861	43,793	4,713	3,781

The results show a distinct difference between the five months. For June and October, the 17.5% margin level (shown as horizontal red lines in Figure 2) is below the total resource stack. This signals that for June and October there may be sufficient net qualifying capacity available for procurement to satisfy a 17.5% margin. In other words, for these two months load serving entities may be able to contract with existing resources to sufficiently respond to the most critical hour after peak and the Kingsburg Cogen facility is not required for reliability purposes. Table 2 provides the exact values.

For July and August the 17.5% margin level is relatively close to the total stack. This signals that for July and August almost all of the existing and planned resources available for procurement to are required to satisfy the 17.5% planning reserve margin.

However, the resource stack for September falls below the 17.5% margin level for HE 8 p.m. PDT as shown on Figure 3. This means there is insufficient capacity to meet the requirement even when including all of the resources on the net qualifying capacity list, new resources expected online by summer 2021, plus an average level of resource adequacy imports. For September, the shortfall between the total resource capacity and the load plus 17.5% planning reserve margin is approximately 2,200 MW (shown as a negative value in Table 2, column [F]).

To test the reasonableness of conclusions in our analysis, the ISO also conducted a sensitivity study using the maximum resource adequacy import (contracted) showings over the past five years, instead of the average contracted import capacity used in the preceding analysis. The maximum resource adequacy import showing over any summer month over

the last 5 years was during September 2020, at approximately 8,500 MW. Assuming resource adequacy imports at 8,500 MW, the resource stack would only produce an 18% planning reserve margin for September, only marginally higher than the 17.5% margin the ISO found necessary to meet BAL-002-WECC-2a requirements on a forecast basis.

The pending loss of the Kingsburg Cogen facility, which is capable of providing service over the critical post-solar window, will exacerbate reliability shortfalls in meeting the requirements of BAL-002-WECC-2a and, it therefore must remain online to help the ISO close the gap to meeting the mandatory reliability standards. The capacity the unit provides will assist in meeting load levels in the post-solar window, and this dispatchable unit will provide further flexibility to meet the ramping requirements necessary as the solar output drops in the late afternoon.