

Memorandum

To: ISO Board of Governors

From: Eric Hildebrandt, Executive Director, Market Monitoring

Date: February 3, 2022

Re: **DMM comments on resource sufficiency evaluation enhancements**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This memo provides comments of the Department of Market Monitoring (DMM) on Management's proposed enhancements to the energy imbalance market resource sufficiency evaluation. The memo also provides analysis of the impact that key changes being proposed would have based on analysis of market data since June 2021.

DMM supports most of the Phase 1 proposal. In particular, the proposed enhancements reducing the capacity from offline resources that is counted in the bid range capacity test will provide a more accurate assessment of the amount of capacity that has been made available in each balancing area that can be utilized by the Western EIM optimization.

The ISO proposes to suspend inclusion of inertia and net load uncertainty in the bid range capacity test in the near term, while continuing its efforts to develop a better approach for incorporating uncertainty into the requirements in the second phase of this initiative. DMM supports this as a temporary measure while a better approach for incorporating uncertainty into the requirements is developed.

DMM does not oppose the proposal to use e-Tag transmission data to limit how inertia awards are counted in the tests as an interim measure. But DMM recommends that the ISO reconsider this proposal in Phase 2 as part a more comprehensive assessment of how imports should be counted in the capacity test.

DMM recommends deferring consideration of whether or not a balancing area taking emergency actions should automatically trigger a sufficiency test failure. There did not seem to be general support for the revised draft final proposal among the balancing areas participating in EIM. Freezing transfers to a balancing area that is short on capacity and taking emergency action could be detrimental to western reliability when other balancing areas have excess capacity to trade. Therefore, this potential change should be considered as part of a broader discussion on consequences for failing sufficiency tests that the ISO has planned for Phase 2 of the initiative.

The second phase will allow for more careful and thorough consideration and analysis of a full range of potential changes and improvements. The resource sufficiency evaluation was adopted at the beginning of the energy imbalance market to incent balancing areas to make sufficient capacity available to meet their loads and deter “leaning” on other balancing areas to meet reliability needs – while still allowing economic transfers between areas. Further changes to the evaluation ultimately involve important policy decisions about level of certainty in achieving this goal that is sought by market participants collectively. In addition to considering enhancements to the quantitative methods used to calculate available supply and uncertainty, stakeholders should also seek to gain consensus on the role of the resource tests and how to balance these against other considerations.

COMMENTS

The proposed changes to reduce the capacity from offline resources that will be counted towards meeting requirements will improve the capacity test

The ISO proposes to reduce the capacity from offline resources that will be counted towards meeting a balancing areas’ capacity test. The enhancements will only count offline capacity that could have been started by the real-time market. Off-line capacity will only be counted if bids for the resource were submitted for the time period in which the real-time market would have needed to start the resource in order for the resource to be online for the hour being tested.

This enhancement will allow the bid-range capacity test to make a much more nuanced and accurate assessment of the amount of capacity that has been made available in each balancing area for the Western EIM optimization to utilize for the hour the capacity test is evaluating. It is also more accurate than the approach suggested by some stakeholders – i.e. to only count the subset of capacity that the EIM optimization chose to commit out of the entire pool of capacity that suppliers made available.

First, consider capacity that the real-time market could have committed for the hour being evaluated but which the optimization did not commit for economic reasons. This capacity was made available to cover the capacity needs of its balancing area and the broader EIM. However, in considering all offers across the EIM footprint, the market optimization determined it was more efficient to rely on less expensive capacity (potentially from a different EIM balancing area) to meet the reliability needs for the hour being evaluated.

This type of uncommitted capacity was made available for the EIM optimization to utilize for the hour being evaluated. The fact that the optimization did not commit the capacity for the hour being evaluated is a reflection of the EIM optimization using the range of capacity made available across the EIM to enhance the efficiency of the commitment and dispatch for its member balancing areas.

DMM agrees with the ISO that not counting this type of capacity towards meeting the capacity test requirement would result in EIM balancing areas making suboptimal commitment decisions in order to pass the test. This could significantly decrease the

efficiency benefits created by the EIM considering capacity made available throughout the broader EIM footprint over the real-time market horizon.

Next, consider capacity that bid into the real-time market for the hour being evaluated, but which the real-time market software could not have started for the hour being evaluated because of intertemporal constraints (such as start times or cycling times). Unlike the first type of capacity described above, this capacity was not made available to the EIM to utilize. Therefore, DMM supports the proposal to not count this capacity towards meeting the capacity test.

The ISO is proposing to not consider any ramping constraints in the capacity test at this time, but the ISO will make this option a configurable parameter in the market software. This approach reflects the fact that additional time is needed to develop and consider ways of determining whether or not capacity should be excluded from the test due to ramping constraints.

In some cases, capacity offered in the EIM cannot be utilized by the optimization because the scheduling coordinator did not make it available in time to be utilized during the hour being evaluated. But in other cases the optimization may not be able to ramp a large or slow-ramping resource into its upper bid range during the hour being evaluated only because the optimization had previously held the resource dispatch down for economic reasons. DMM recommends that in Phase 2 the ISO continue to work on developing policy for differentiating between these two types of ramp-constrained capacity so that the ISO can potentially remove the former from counting in the capacity test.

DMM supports the ISO considering changes to the tests' uncertainty requirements in the initiative's second phase

The ISO proposes to suspend the net load and inertia uncertainty components of the capacity test requirement and to consider both inertia and net load uncertainty holistically in the second phase of the initiative. DMM supports the ISO and EIM entities more comprehensively considering what the capacity test requirements should be, and how uncertainty should be added onto those requirements, in Phase 2 of the initiative.

During the initiative on summer 2021 enhancements, there seemed to be general consensus amongst the ISO and EIM entities that in order to improve the capacity tests' main goal of discouraging "leaning", uncertainty should be added onto the requirement. Due to tight implementation timelines before the summer of 2021, the ISO proposed using the same uncertainty that was calculated for the flexible ramping product and to add that onto the capacity test requirement. This was also the uncertainty component used in the flexible ramping sufficiency test.

In prior reports and comments, DMM has explained in detail many major problems with the method the ISO uses for calculating the uncertainty in these tests.¹ However, there seemed

¹ For example, see: *Comments on Flexible Ramping Product Revised Draft Technical Appendix*, December 1, 2015, p.2, Section 5: <http://www.aiso.com/Documents/DMMComments-FlexibleRampingProduct-RevisedDraftTechnicalAppendix.pdf>

to be general consensus among the ISO and EIM entities that using this method for calculating an uncertainty component to add onto the capacity test requirement was better than not including any uncertainty adder.

In the first phase of this initiative, the ISO and stakeholders continued to contemplate adjusting the capacity test requirement to account for uncertainty. However, DMM believes that the discussion of various options has not yet been able to adequately consider their complexity, unintended consequences, or alignment with generally agreed upon principles for the design and intent of the tests. Therefore, DMM continues to recommend that the ISO and stakeholders more comprehensively consider how the capacity and flexibility sufficiency tests should incorporate uncertainty in Phase 2 of this initiative.

The resource sufficiency evaluation was adopted at the beginning of the energy imbalance market to incent balancing areas to make sufficient capacity available to meet their loads and to deter “leaning” on other balancing areas to meet reliability needs – while still allowing economic transfers between areas. However, there is not an objectively correct answer to what this load and resource availability uncertainty adder included in capacity requirements should be.

On the one hand, increasing the capacity test requirement uncertainty adders will create more incentives for EIM areas to procure more capacity in advance of the real-time market and will reduce the potential for “leaning”. On the other hand, it would be prohibitively expensive to meet requirements and resource-specific counting methodologies that would ensure each balancing area would be able to meet its full imbalance requirements 100 percent of the time with just the resources it made available to the real-time market.

Therefore, the question of how to define an adder onto the capacity test requirement to account for load and resource availability uncertainty is a policy question that can only be answered through debate and consensus amongst the balancing areas participating in EIM.

DMM supports the ISO not adding load bias into the capacity test requirement in Phase 1

CAISO operators regularly use large adjustments to the hour-ahead and fifteen-minute market load forecasts over peak net load hours in order to create ramp to help address uncertainty in the net load forecast. Some stakeholders have asked the ISO to add this load bias onto the capacity test requirement as part of Phase 1.

As explained more below, including load bias in the test requirement does not align with DMM’s understanding of principles that have guided the design of sufficiency test requirements. Including load bias in the test requirements could require some significant changes in CAISO balancing area operational practices and market design, particularly regarding prioritization of low priority exports. Therefore, DMM has recommended that the ISO not incorporate the load bias into the capacity test requirement during Phase 1, and instead only consider that possibility as part of a more comprehensive assessment of how the capacity and flexibility tests for all balancing areas should incorporate uncertainty in Phase 2 of the initiative.

DMM's understanding is that a key goal of the resource sufficiency test design is to provide objective criteria for bid range capacity and flexible ramping tests that participating balancing areas can agree suffices for concluding that an area is not using the energy imbalance market to "lean" on other balancing areas. The question of how to define the requirements to account for load and resource availability uncertainty is a policy question that can only be answered through debate and consensus amongst the balancing areas participating in EIM. Individual balancing areas may want to procure capacity in excess of the standards established by the EIM resource sufficiency tests. Some balancing area operators – including the CAISO in particular – may use load bias to procure capacity in excess of the quantity that EIM entities would view as sufficient for indicating that a balancing area is not leaning on other EIM balancing areas.

It would therefore be inappropriate to set the resource sufficiency test requirements based on the amount of capacity that each balancing area wants to procure, as a balancing area may want to procure more capacity than the EIM design deems necessary for passing the resource sufficiency tests. Non-CAISO entities participating in the energy imbalance market can utilize bilateral transactions before base schedules are due to procure capacity in excess of the resource sufficiency test requirements. The CAISO balancing area currently must rely on biasing the load in hour-ahead and 15-minute market processes or out-of-market purchases to procure additional capacity. Therefore, incorporating out-of-market actions, such as load bias, directly into the sufficiency tests warrants much more careful consideration in order to avoid potential problematic unintended consequences.

DMM appreciates that the ISO has moved contemplating if or how load bias should be incorporated into the tests to the second phase of this initiative. We recommend that this aspect of the initiative incorporate a broader assessment and much more careful consideration of how uncertainty should be considered in the tests for all EIM balancing areas.

Interchange tagging requirements

The ISO proposes an additional restriction on the amount of an import award that will be counted towards meeting the balancing area's sufficiency tests. The amount of an import award that is in excess of the amount of transmission on its e-Tag at forty minutes prior to the hour (T-40) will not be counted towards meeting the sufficiency tests. The ISO also proposes to not count export awards in excess of the T-40 transmission e-Tag towards the sufficiency test requirements.

DMM does not oppose these changes as interim measures. The ISO enforces significant penalties on hourly interchange awards that do not have transmission tagged by T-40. Therefore, interchange awards that have not tagged their transmission by T-40 are unlikely to have acquired transmission by that time. So, it seems reasonable to not count them in the balancing area's sufficiency tests.

However, DMM believes the ISO's policy for counting imports towards meeting the capacity test warrants more comprehensive consideration. DMM appreciates that the ISO has committed to more carefully considering in Phase 2 how it determines uncertainty in the net imports counted in the capacity test. DMM recommends that this aspect of Phase 2 start

with a thorough reconsideration of how inertia bids and schedules should be treated in the capacity test. For example, it may be more appropriate to start by considering all import bids as potentially counting towards the capacity test and then determining the subset of those bids that should not be counted due to transmission constraints or uncertainty.

Emergency actions that constitute resource insufficiency

The ISO proposes that all EIM participants sign an attestation obligating them to notify the CAISO when the balancing area performs either of two emergency actions: (1) arming firm load to meet reserve requirements, or (2) directing a system wide reduction in operating voltage.

As described above, defining the criteria for passing resource sufficiency tests is a policy question that can only be answered through debate and consensus amongst the balancing areas participating in EIM. The ISO's proposal for defining emergency actions that constitute resource insufficiency does not appear to be close to achieving consensus. The ISO and stakeholders will likely be able to better assess this proposal as part of a more holistic discussion on consequences for failing a sufficiency test that the ISO has planned for Phase 2 of the initiative. Freezing transfers to a balancing area that is short on capacity and taking emergency action could be detrimental to western reliability when other balancing areas have excess capacity to trade. Therefore, DMM recommends that the ISO defer this aspect of the proposal and more carefully consider it in Phase 2 of this initiative.

DMM notes that the Phase 2 discussion of this issue should not assume that a balancing area taking emergency actions is an automatic indication that the sufficiency test requirements are flawed and that the area should have failed a sufficiency test. As discussed above, it would likely be prohibitively expensive for EIM balancing areas to meet sufficiency test criteria that were designed to ensure each balancing area would be able to meet its full imbalance requirements nearly 100 percent of the time with just the resources it made available to the real-time market. Even with the optimal sufficiency test criteria, situations may arise in which a balancing area passes the resource sufficiency tests, but contingencies occur that force the area to rely on reserves and potentially emergency actions. In these situations, the EIM may be valuable in helping to prevent the balancing area from shedding load if other balancing areas have excess capacity. Freezing the transfers would hinder other balancing areas' ability to help.

Therefore, as stakeholders have suggested, during Phase 2 the participating balancing areas and stakeholders should carefully consider whether or not freezing EIM transfers is appropriate when an EIM area is taking emergency actions or is otherwise short of capacity and has failed a sufficiency test. Alternative consequences of failing the test, such as paying an out of market penalty, may be able to appropriately incentivize areas to procure capacity in advance of real-time to prevent "leaning", while still allowing EIM areas with excess capacity to efficiently share it with areas that are periodically short of the EIM sufficiency test criteria.

ANALYSIS OF PROPOSED CHANGES

The following sections provide analysis of the impact that key changes being proposed would have based on analysis of market data since June 2021.

Excluding uncertainty from capacity requirement

Excluding the uncertainty component from the capacity requirement would significantly decrease the number of intervals that balancing areas fail the capacity test and have EIM transfers limited. Figures 1 and 2 show the impact that excluding the net load and inertia uncertainty components would have on the upward capacity test during the period from when the uncertainty was added to the requirement in June 2021 through December 2021.

- The green portion of each bar shows the portion of intervals that each balancing area failed the capacity test (and passed the flexible ramping test), but would not have failed the capacity test if the uncertainty adder was excluded from the requirement. During these intervals, EIM transfers into the balancing area would not have been limited due to failure of the capacity test.
- The yellow portion of each bar shows the portion of intervals that each balancing area failed the capacity test and the flexible ramping test, but would not have failed the capacity test if the uncertainty adder was excluded from the requirement. During these intervals, EIM transfers into the balancing area would still have been limited due to failure of the flexible ramping test.
- The red portion of each bar shows the portion of intervals that each balancing area would have failed the capacity test even if the uncertainty adder was excluded from the requirement.

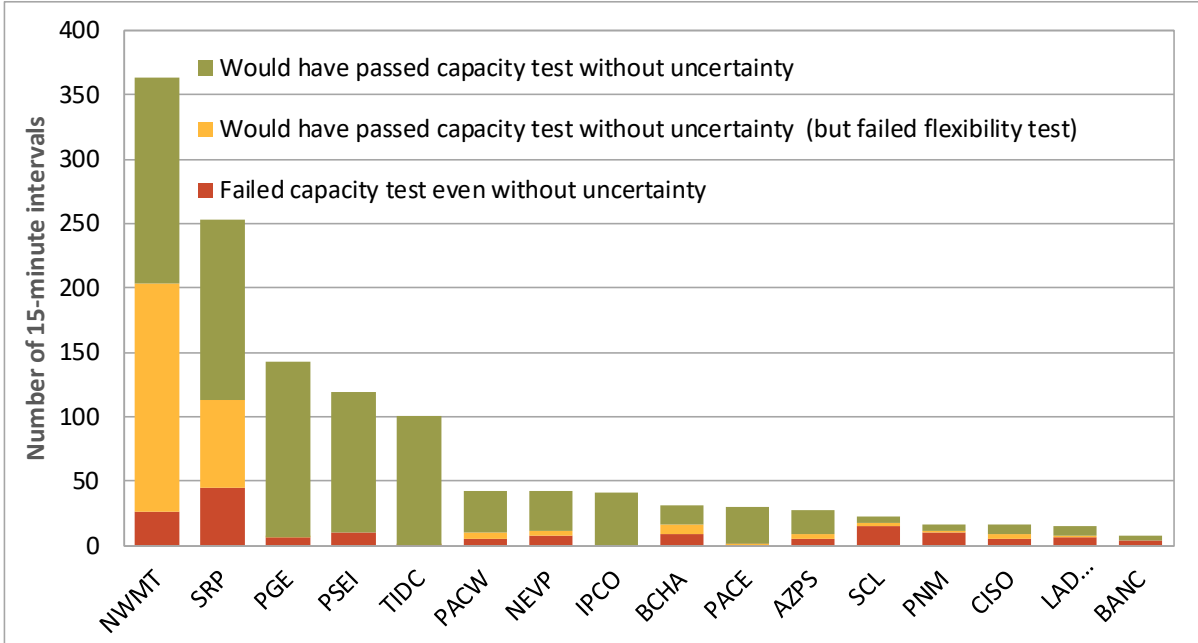
Figure 1 shows these results in terms of the total number of 15-minute intervals each balancing area would have failed the test with and without the uncertainty component from June to December 2021. Figure 2 shows these results in terms of the percentage reduction in test failures that would have resulted in each balancing area with removal of the uncertainty component over this period.

Exclusion of some off-line capacity from test

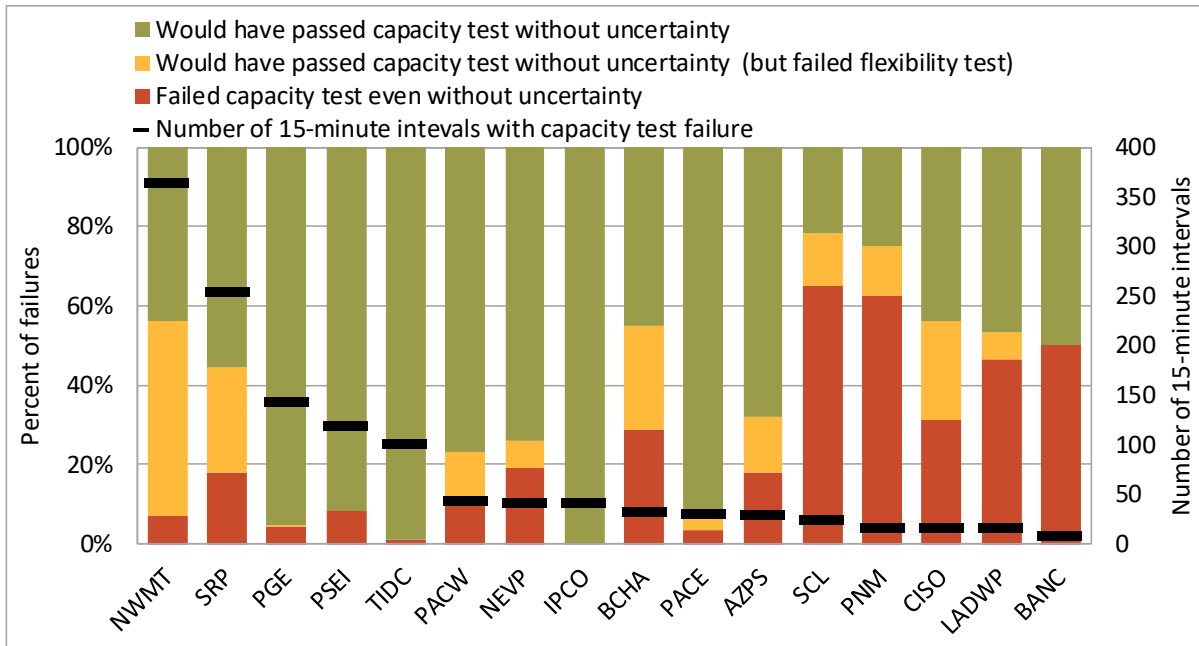
Numerous EIM entities have asked CAISO or DMM to provide stakeholders with analysis of capacity that would be excluded under the proposal for the peak load hours of the five highest load days of summer 2021. DMM has placed a priority on completing such analysis for consideration in the stakeholder process.

DMM has worked with the ISO to understand the details of its proposal, and has developed analysis that mirrors the proposal and estimates the capacity that could not realistically be started in the Short Term Unit Commitment (STUC) horizon after accounting for bid availability and start-times.

**Figure 1. Impact of including uncertainty in upward capacity test
June to December, 2021**



**Figure 2. Impact of including uncertainty in upward capacity test
June to December, 2021**

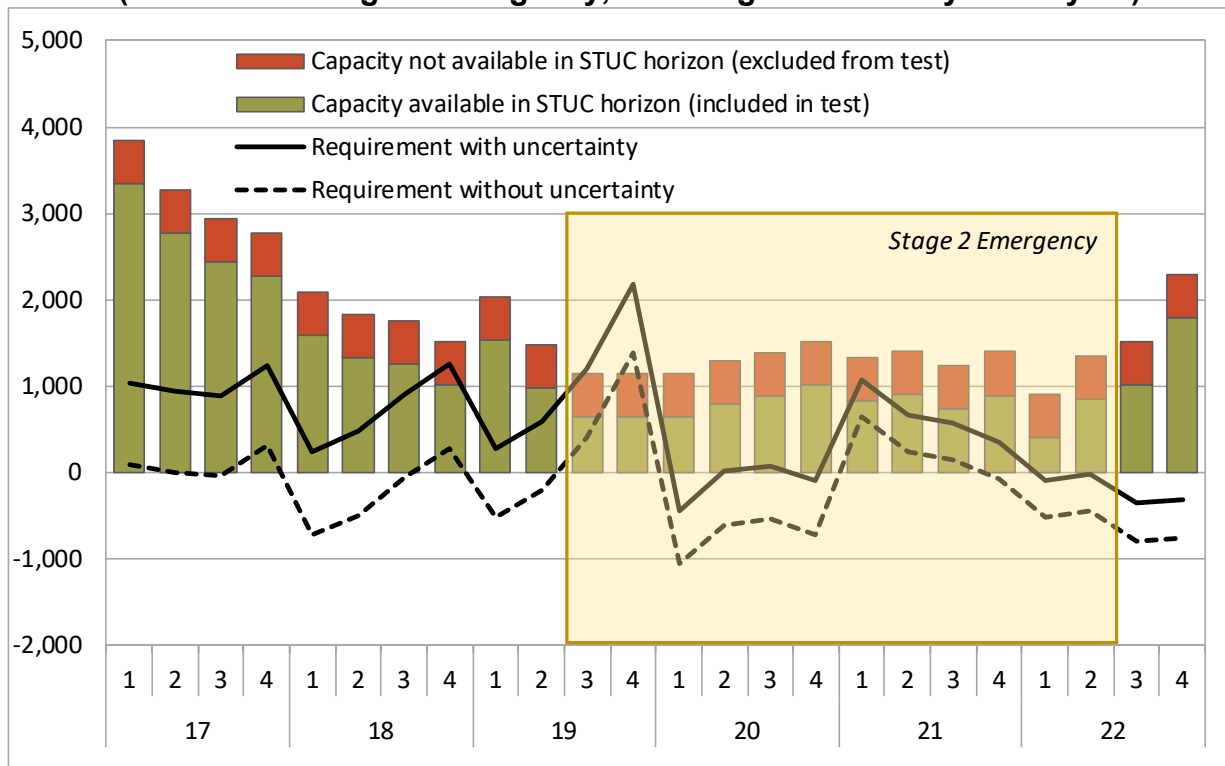


The analysis below shows how the proposal to exclude capacity that could not be committed in STUC would impact ISO’s available capacity on the three highest load days of 2021. While these examples cover only a handful of days, they cover days in which the ISO is most likely to fail and the proposal is most likely to have an impact.

For each of the charts below, the total height of the bars is capacity that was counted as upward capacity in 2021. The red portion of each bar is capacity that would have been excluded as part of the ISO proposal. The ISO is also proposing to temporarily suspend both net load and intertie uncertainty from the capacity test. The solid and dotted black lines show the capacity requirement with and without all uncertainty, respectively.

Figure 3 shows results for the CAISO balancing area on July 9, 2021. On this day, there was about 500 MW of capacity that would-have-been excluded in each interval under the proposal. This is because of a single extremely long-start unit that went on outage in the morning and was not able to return in any STUC horizon during the peak load hours.

**Figure 3. California ISO — July 9, 2021
(CAISO hit a stage 2 emergency, Third highest load day of the year)**

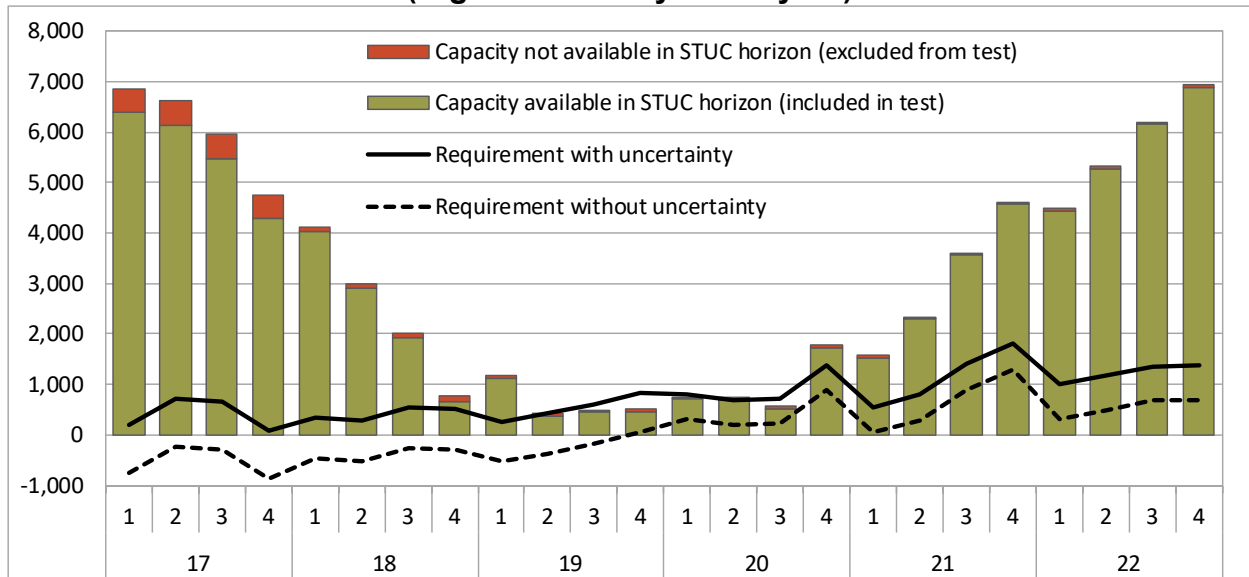


Figures 4 and 5 show results for the CAISO balancing area for September 8 and 9, 2021, which represent the first and second highest load days of the year, respectively. For each of these days, just under 500 MW of off-line capacity would be excluded in HE17, but otherwise the proposal had little impact on available capacity during the other highest net-load hours. In HE17, the excluded capacity was associated with long-start resources, which was scheduled for the highest load hours, but could not be committed in STUC horizon for HE17.

As shown in Figures 3 through 5, removing the uncertainty requirement would have reduced the number of intervals in which the ISO area failed the test on July 9 and September 8, but would not have had any impact on September 9.

DMM has completed analysis of other high load days for the ISO and other balancing areas. Results for these other days and balancing areas are similar to those shown in Figure 5. Specifically, these results indicate that the proposed changes would not have changed whether or not any areas failed the test on these very high load days. DMM is seeking to complete and provide a more holistic review of the proposal's impact in the near future.

**Figure 4. California ISO - September 8, 2021
(Highest load day of the year)**



**Figure 5. California ISO - September 9, 2021
(Second highest load day of the year)**

