

The ISO received comments on the topics discussed at the June 6, 2022 stakeholder call from the following:

- Aypa Power
- CalWEA
- California Energy Storage Alliance (CESA)
- EDF-Renewables
- Golden State Clean Energy (“GSCE”)
- Hydrostor
- LSA
- REV Renewables (REV)
- Vistra

Copies of the comments submitted are located on Generation Deliverability Study Generation Dispatch Assumptions page at:

[California ISO - Miscellaneous Stakeholder Meetings \(caiso.com\)](https://www.caiso.com/California-ISO-Miscellaneous-Stakeholder-Meetings)

The following are the ISO’s responses to the comments.



No		Comment Submitted	CAISO Response
1a	Aypa Power	<p>Thank you for the opportunity to comment on CAISO's analysis and proposed changes in assumptions for the Generation Deliverability Study Dispatch. Aypa Power offers the following comments:</p> <ul style="list-style-type: none"> Dispatch for Energy Storage resources in the SSN analysis should be 0% of nameplate. Energy Storage resources are designed to target the HSN time period by charging during high renewable output hours and making this capacity available during the peak load hours. Per the CAISO definition of the SNN window, it is targeting the period leading up to the system peak where there is a capacity shortage risk if intermittent resources are not deliverable. Energy Storage resources would generally be charging or at the very least not discharging during the majority of SSN window as they are typically sourcing charging energy from intermittent resources. As the SSN is expected to capture an operating scenario, in an effort to reduce solar curtailments during the SSN window, CAISO should not be evaluating planning level N-2 events as the CAISO market only operates to an N-1 standard. This criteria is creating artificial constraints that do not occur in market operations. It is estimated that an additional 2GW (or more) of deliverability would become available in SDGE if the deliverability criteria were aligned with market operations. 	<p>The narrative is not supported by the data provided in the ISO's presentations, and no data has been provided in these comments.</p> <p>The deliverability study is a transmission planning study done at least one year in advance. The NERC planning standards require the analysis of N-2 (P7) contingencies.</p>
2a	CalWEA	<p>Introduction</p> <p>CalWEA appreciates CAISO updating the generation dispatch assumptions in its deliverability assessment methodology. The dispatch assumptions indeed require reform, but other aspects of the methodology also require reform, as discussed in the 10/18/21 proposal submitted by CalWEA and the California Energy Storage Alliance in the CAISO's Policy Initiative Catalog. Therefore, we strongly encourage the CAISO to initiate a broader inquiry as soon as possible.</p> <p>Regardless of its original intent, the current gross peak (secondary system need or SSN) deliverability assessment study has become inappropriately aimed at preventing local over-supply and curtailment impacts on interconnecting resources. This is particularly true now that the gross peak load hours that SSN was intended to capture are no longer risky due to an abundance of solar resources. The ironic result of this flawed analysis is that many resources that can help the</p>	<p>At this time, the ISO does not see the need for deliverability study reforms beyond those proposed this initiative.</p> <p>The data provided in the ISO's presentation demonstrates that there is a risk of supply shortages during the SSN study period. The purpose of the SSN study is to test the deliverability of resources that need to be deliverable during this period.</p>



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		<p>CAISO-controlled grid by providing RA capacity when it is most needed (when the probability of resource capacity deficiencies is highest) are deprived of deliverability status and thus prevented from contributing to system reliability.</p> <p>This dispatch update, if properly implemented, will certainly help to correct the problem. Particularly since this effort addresses just one aspect of the deliverability methodology, CalWEA believes CAISO should tackle this issue with a vision that supports the state's SB 100 policy goals and truly represents the contribution of zero-carbon resources to system reliability. The proposed dispatch adjustments, however, are not likely to significantly increase the amount of deliverable capacity that is recognized to be available – perhaps on the order of hundreds of megawatts. The reasonable modifications that CalWEA suggests below are much more likely to increase such capacity – perhaps on the order of thousands of megawatts.</p>	<p>The data provided in the ISO's presentation demonstrates that further relaxation of the study assumptions would result in inadequately testing the deliverability of resources. Inadequate testing of the deliverability of resources would result in resources not being available when they are needed to supply load during critical resource shortage conditions.</p>
2b	CalWEA	<p>HE 18 belongs in the High System Need (HSN) window. Extending the SSN window to hour ending (HE) 18 is inappropriate because, as a gross-load test, SSN should include only the hours around peak consumption load with low/medium risk of unserved load. The 2022 summer assessment data shows that HE18 - HE21 has high risk and HE16 - HE17 has low/medium risk. Note that, as shown on slide 10 of the CAISO's June 6 presentation, HE18 has more occurrence of inadequate reserve margin (low unloaded capacity margin) than HE21.</p> <p>For these reasons, CalWEA recommends not changing the existing definition of the HSN and SSN windows.</p>	<p>The ISO developed two on-peak deliverability test scenarios because one test scenario does not adequately test the deliverability of the resources needed during the hours when a resource shortage occurs in the assessment data provided in the ISO's presentation material. As the name indicates, the Highest System Need (HSN) scenario does represent the hours when the risk of a resource shortage is the highest. However in that test the solar resources are only tested at about 10% of their capability. The Secondary System Need (SSN) scenario tests the solar resources at 40% to 56% of their capability. As shown in the ISO's presentation material, this occurs at HE 18.</p>
2c	CalWEA	<p>Energy storage (ES) dispatch assumptions in near-term deliverability studies should be set as needed to balance load and resources. CAISO examined resource production on three "capacity challenged" historical days in July 2021 (Slides 14-16). Production levels at HE18 for these three days are the basis for the proposed 80 percent energy storage dispatch assumption. There are three flaws in this approach. First, energy storage is a dispatchable resource and should therefore be studied at the expected output level instead of at an arbitrary exceedance level at times when solar output is high and storage resources are reasonably expected to be charging to be ready for the HSN period to maintain system reliability. Second, on all three selected days, HE18 is at or just after the CAISO net peak load, i.e., HE18 should be an HSN hour instead of an SSN hour. During the hours before peak load, energy storage resources should either be charging or producing near zero MW. Lastly, relatively few ES</p>	<p>CalWEA seems to have misunderstood the July 2021 information provided in the ISO's slides. The storage production level in those slides was the actual production of the ISO storage resources during that time period. That information was not based on an "arbitrary exceedance level".</p> <p>See response to 2b regarding HE18.</p>



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		<p>resources were online in 2021 and their production is not representative of future production where storage resources will be procured primarily to serve as energy-shifting reliability resources. For these reasons, CalWEA recommends that, in near-term studies, i.e., annual NQC studies until 2027, 4-hour and under ES resources be dispatched only as needed to balance load and resources, and not be included in the stress dispatch scenarios.</p>	<p>The 2021 data is the best available actual system data. As more data becomes available it will also be considered. However, the most applicable dispatch data is from resource shortage conditions.</p> <p>In the 2021 data, the storage resources were dispatched to balance load and resources.</p>
2d	CalWEA	<p>Energy storage dispatch in long-term deliverability studies should be set to offline or charging</p> <p>The material presented does not support the proposed study assumptions for three reasons. First, as we pointed out above, HE18 belongs in the HSN window. Second, the proposed assumption of 50% dispatch for ES is based on a mismatch of hours for solar and storage – it completely relies on HE18 and ignores all other hours in the SSN window. The SSN study assumption for solar PV was derived from all hours in the SSN window that have an unloaded capacity margin less than 6%. CAISO should verify ES production during hours with low-capacity margins to maintain correlation with storage resources. Even at HE18, the CAISO's analysis (Slide 20) shows a 30% minimum unloaded capacity margin, which indicates there is no reliability risk at all. Therefore, this data does not support a 50% dispatch assumption for storage.</p> <p>For these reasons, CalWEA recommends that ES should not be included in the long-term SSN analysis.</p>	<p>See response to 2b regarding HE18.</p> <p>As mentioned in the response above, the 2021 data does provide actual ES production during low capacity margins.</p> <p>As discussed during the presentation, the 2026 and 2030 simulation data was based on resource portfolios that had a surplus of capacity. That was the only long-term horizon simulation data available at the time.</p> <p>In addition, during hour 18 the solar generation is dropping precipitously. The ISO system needs to be operable. It is understandable if in the operation of the system, some resources are brought on-line and dispatched slightly before the solar generation is lost, and those resources need to be deliverable.</p>
2e	CalWEA	<p>Conclusion</p> <p>The deliverability assessment should be based on assumptions relating directly to the maintenance of system reliability; otherwise, barriers to interconnection are created. The CPUC's adopted resource plan for 2032 calls for over 40 GW of clean resources – primarily solar and storage -- to be interconnected by 2032 (starting in 2023). The deliverability study assumptions should reflect the expected use of these resources to meet reliability needs. This, in turn, will help enable these resources to obtain the deliverability status they need to interconnect and serve the reliability needs of the CAISO-controlled grid. Interconnecting resources will separately</p>	<p>Based on the data provided in the ISO presentation, the ISO recommended deliverability study assumptions reflect the expected use of wind, solar, and storage resources needed to meet reliability needs.</p>



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		consider whether curtailment concerns outweigh the value of deliverability status, and curtailment concerns will be ameliorated by the fact that many solar projects will be paired with ES.	
3a	California Energy Storage Alliance (CESA)	<p>Introduction & Summary</p> <p>CESA greatly appreciates the ISO holding the June 6, 2022 stakeholder call to assess and update the on-peak generation deliverability study generation dispatch assumptions. With energy storage being a dispatchable resource and the majority of their deployments being energy-limited in nature (i.e., 4 hours), it is important to reassess our core assumptions around how energy storage should be modeled in these deliverability studies. Especially in light of the California Public Utilities Commission's (CPUC) proposed adoption of slice-of-day (SOD) reforms, the ISO should launch a new initiative tasked with developing comprehensive reforms that fit within these new constructs where energy storage resources can be shown across different periods of the day. In addition, the deliverability reform initiative should consider: (1) the appropriateness of n-2 contingency assumptions in all cases; (2) the location of storage resources; (2) how to incorporate long duration energy storage (LDES) resources and how assumptions may need to differ; and (3) how behind-the-meter (BTM) storage aggregations can be considered in these studies when accounting for the fact that their export capacity is more likely to be consumed by local loads than to be delivered to the bulk power system. Overall, CESA is directionally supportive of the proposed changes to the level of storage dispatch relative to their maximum capacity, which is more consistent with expected storage behavior during the High System Need (HSN) and Secondary System Need (SSN) Scenarios, respectively. These changes to more realistically assume storage dispatch during the SSN period will have the intended effect of having more deliverability available for storage and other resources, which is critically needed in today's situation of capacity shortages. Yet still, CESA believes that the ISO's proposed revisions warrant revision, as discussed further below.</p>	<p>As the CPUC's proposed reforms become certain, the ISO will continue to review its generation deliverability dispatch assumptions, and update them as needed.</p>
3b	California Energy Storage Alliance (CESA)	<p>The periods for the HSN and SSN scenarios should be maintained at Hour 14- 17 and Hour 18-22, respectively.</p> <p>The ISO utilizes the recently-published 2022 Summer Assessment in determining the hours where the system faces resource shortages. Based on resource production data for three capacity-challenged days in 2021, the ISO proposed to shift Hour 18 into the SSN</p>	<p>See response to 2b</p>



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		<p>period instead of the HSN period. However, looking at the same data on the number of scenarios where minimum unloaded capacity margin (MUCM) is 6% or less, the critical hour of need is clearly Hour 19 (156 scenarios), followed by Hour 20 (60), Hour 18 (37), and Hour 28 (28). Including Hour 18 in the SSN window does not make sense since it is more appropriately included in the HSN window as immediately preceding the critical Hour 19 and has higher level of insufficient operating reserves compared to Hour 21. With Hour 22 also presenting no resource shortage risk, it is more reason to include Hour 18 in the HSN window to cover the four most critical hours – Hours 18, 19, 20, and 21. After all, the HSN is intended to represent when the capacity shortage is most likely to occur, which the 2022 Summer Assessment clearly shows to be Hours 18-22.</p>	
3c	California Energy Storage Alliance (CESA)	<p>The storage dispatch assumptions in the SSN window should be between 0-40% for the near-term deliverability studies and 0% for the long-term deliverability studies. Considering that the vast majority of energy storage being four hours in duration, we add that the dispatch assumptions for energy storage at 100% of capacity level in the HSN scenario would make it physically impossible for it to also be dispatched during the Hour 14-17 SSN window. Rather, storage would be mostly charging during the SSN window, such that the storage amount for the SSN should be significantly reduced from 100% of the maximum storage capability (status quo) to 0% or close to it. At minimum, in maintaining the Hour 14-17 SSN window and in using the 2022 Summer Assessment data presented at the June 6, 2022 stakeholder call (Slides 14-16), the ISO should use an assumption of 40% of the maximum storage capability for the near-term SSN study. However, for the long-term deliverability studies, the ISO's 2026 and 2030 resource portfolio analyses show that Hour 17 does not pose much risk from a MUCM perspective (Slides 19-20). If we were to extrapolate the storage dispatch curve, it would presumably reach zero or close to it, again supporting how the ISO's proposal to include Hour 18 in the SSN to be in error.</p>	<p>See response to 2b regarding hour 18 being included in the SSN study window.</p> <p>Based on the data provided in the ISO presentation, 4 hour storage facilities were dispatched during the SSN study window.</p> <p>See response to 2d.</p>
3d	California Energy Storage Alliance (CESA)	<p>Clarifications should be provided on how the proposed changes to the dispatch assumptions in the deliverability studies will impact transfers between existing solar and storage additions. CESA echoes stakeholder questions about how changed solar assumptions could impact the amount that can be transferred from solar to battery when it comes to deliverability transfers. Clarifications are sought on how SSN deliverability does not impact qualifying capacity (QC) or</p>	<p>When customers request to transfer deliverability between existing solar and storage additions, the general rule that the ISO follows is to ensure that the deliverability of all other existing resources and customers in the interconnection queue are not adversely impacted. With the proposed changes, since storage will be studied at a lower level in the SSN study, the amount of storage that can be deliverable in the SSN study should increase for the same amount of deliverability being transferred from a solar project.</p>



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		<p>effective load carrying capacity (ELCC) numbers. CESA requests that CAISO clarify that the proposed storage SSN deliverability study numbers will not impact QC or ELCC values for energy storage. Given the general education further needed on deliverability studies, CESA believes that the CAISO can dispel any confusion on the matter by clarifying that the SSN deliverability studies are intended to assess the expected discharge of energy storage resources in specific hours of concern, with energy storage able to discharge up to 100% of its installed capacity to meet real-time needs.</p>	<p>Deliverability study results are not an input to the QC or the ELCC calculations, so those calculations are not impacted by deliverability study results. However, a year-ahead deliverability study is performed annually for the purpose of verifying the deliverability of QC values, and to establish NQC, if no deliverability constraints are identified and the storage facility has FCDS, then its NQC is equal to its QC value. Deliverability studies are intended to assess the expected discharge of energy storage resources, up to 100% , as well as all other capacity resources during resource shortage conditions.</p>
3e	California Energy Storage Alliance (CESA)	<p>Conclusion CESA appreciates the opportunity to submit these comments and we look forward to continued participation in this initiative. We reiterate our recommendation to launch a deliverability reform initiative, as well as the need to continuously monitor and update modeling assumptions as load conditions and resource additions change more frequently over time. We look forward to continued collaboration with the ISO and other stakeholders.</p>	<p>The comment is noted.</p>
4a	EDF-Renewables	<p>EDF-R renewables appreciates this opportunity to provide comments on CAISO's proposal to change on-peak generation deliverability study generation dispatch assumptions. EDF-R appreciated the level of detail CAISO provided for the proposal to shift the cutover time from secondary system need (SSN) to high system need (HSN) from 17:00 to 18:00. EDF-R supports this portion of the CAISO's proposal. EDF-R is concerned about the ripple impacts of CAISO's proposal to change the dispatch of energy storage in its deliverability study assumptions from 100% to 80% and does not support the change at this time for the following reasons:</p>	<p>See responses below.</p>
4b	EDF-Renewables	<p>CAISO's shift to 80% dispatch for energy storage will increase renewable curtailment. Allowing more generation to be designated as having Full Capacity Deliverability Status (FCDS) on the existing approved and built transmission will exacerbate existing congestion. The CAISO already sees high levels of renewable energy curtailment (2,000 GWh of curtailments totaled up by the CAISO year-to-date in 2022.) Interconnection capacity and deliverability is a finite supply and allowing more generation to interconnect with FCDS in already congested areas will increase congestion.</p>	<p>The on-peak deliverability study is intended to test the deliverability of capacity resources during resource shortage conditions, which are most likely to occur during summer peak load conditions (July-Sept). In 2021 the curtailment of resources during these months was relatively low, although still significant. The off-peak deliverability study was intended to address highly localized, excessive curtailment, and was added when the on-peak deliverability study was relaxed in 2019. Much of the curtailment that occurs in the non-summer months is due to oversupply, and much of the curtailment identified as local in those months would occur anyway due to oversupply conditions.</p>
4c	EDF-Renewables	<p>CAISO's proposal has the effect of disincentivizing the approval of transmission to support deliverability via the Transmission Planning Process (TPP). The CAISO board approved new policy driven transmission projects for the first time in seven (7) years in the 2021-</p>	<p>The development of transmission is not expected to slow down in the near future. This is reflected in the increasing resource capacity included in the portfolios provided by the CPUC over the past 3 years to assess the policy-driven transmission needs.</p>



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		<p>2022 TPP report. It is abundantly clear based on California law mandating additional renewables as well as the CAISO's 20-year transmission plan that significant transmission development is needed to support the aforementioned, as well as the interim goals between now and 2040. Changing the energy storage dispatch to 80% creates an immediate "headroom" in the existing base case and will slow the velocity of the processes that trigger that transmission development.</p>	
4d	EDF-Renewables	<p>Changing the storage dispatch from 100% to 80% will exacerbate the supercluster drivers CAISO seeks to remedy in its IPE 2021 stakeholder initiative. Implementation of this proposal will encourage a queue "goldrush" because the change creates newly available transmission plan deliverability (TPD) in places where it has historically been limited. In response interconnection customers will undertake enthusiastic efforts to seek to receive the allocation of that deliverability in the 2022-2023 allocation process as well as Cluster 15.</p>	<p>The availability of transmission deliverability will unfortunately still be far less than what has been requested by generators that are already in the ISO queue.</p>
4e	EDF-Renewables	<p>The CAISO should offer the same keep-whole opportunity now that it provided during the CAISO's 2019 effort to change the deliverability dispatch amounts.</p> <p>In 2019 the CAISO lowered the study amounts for wind and solar projects, thus limiting the opportunity to "transfer" deliverability. In 2019 the CAISO changed the solar dispatch from ~90% to ~10% and, in coordination with that effort, afforded interconnection requests studied under the ~90% dispatch methodology an opportunity to add energy storage (but not interconnection capacity) via MMA applications and transfer deliverability from solar to storage. EDF-R believes the CAISO should make an equivalent opportunity in this case, and give interconnection customers the opportunity to keep their existing deliverability. EDF-R proposes that storage projects that are already FCDS could bring their 20% with them to Cluster 15, and projects that have PCDS could elect to keep their 20% and increase their PCDS % / MW value.</p>	<p>In 2019 solar resource study amounts were drastically reduced. Storage resources will still be studied at 100% of their 4 hour MW capability, so the circumstances of this change in 2022 and the change in 2019 are considerably different. Also, given that the queue is already oversubscribed, as reflected in the extension of the Cluster 14 study schedule, repeating what was done in 2019 is not warranted and not feasible.</p> <p>EDF-R seems to be underestimating the studies that would be needed to repeat what was done in 2019.</p>
4f	EDF-Renewables	<p>CAISO may need Board and FERC approval for this change, topic may not be sufficiently socialized among market participants. CAISO proposed and received approval for the equivalent changes in 2019 via a formal stakeholder process, which included approval from its Board and FERC. Will this effort require similar treatment, or will it be vetted through the CAISO's Business Practice Manual (BPM) process? EDF-Renewables suggests that if the answer to both questions is "no" then this topic has not received sufficient socialization among affected market participants because it was</p>	<p>This 2022 stakeholder process is an equally formal process as what was done in 2019, although with the much smaller scope, the number of meetings needed is reduced. Also, the changes in 2019 required a tariff and BPM change, and the changes in 2022 do not require a tariff and BPM change.</p>



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		announced via one market notice and was reviewed under the “miscellaneous stakeholder meetings” banner. EDF-Renewables suggests that the remedy to that discrepancy in audience size could be rectified by issuing a targeted email to interconnection customers or to the participant list for the 2019 stakeholder effort, consistent with CAISO’s stakeholder affairs emails that announce paper posting etc.	
4g	EDF-Renewables	Finally, on the June 6 call to discuss this change, CAISO explained that it expects dispatch percentages for generation to change every 2-3 years as the generation fleet undergoes the significant changes expected in the next decade. If that is to be the case, EDF-Renewables request that the CAISO establish in its BPM a consistent process for notifying interconnection customers of the proposed change(s) and their expected affects.	The comment has been noted.
5a	Golden State Clean Energy (“GSCE”)	<p>Golden State Clean Energy (“GSCE”), the developer of the Westlands Solar Park, appreciates the opportunity to submit this comment on the recent meeting to discuss potential updates to generation dispatch assumptions in the California ISO’s on-peak deliverability study. GSCE comments to (i) support this undertaking to update deliverability study assumptions, (ii) support revisions to generator dispatch assumptions that can create additional available TP deliverability on existing transmission for the 2022-23 allocation cycle, and (iii) request additional documentation be provided as part of the next steps in this undertaking.</p> <p>GSCE believes that CAISO’s review of deliverability study assumptions and its willingness to revise study assumptions based on updated dispatch data is very important given the need to get new resources online in the next three years to address California’s capacity shortage. If the system can reliably support more deliverability for new resources, altering the methodology to accurately reflect the grid’s topology and free up more deliverability is important and should be done as often as needed to keep up with the changing grid. CAISO’s deliverability study has a crucial impact on California’s resource adequacy program and the RA market, so reasonable reforms to the deliverability study that can improve the RA market should be undertaken as often as needed.</p> <p>In CAISO’s review of dispatch assumptions, analysis showed that storage dispatch assumptions in the Secondary System Need scenario could reasonably be reduced to better align with observed storage output during tight system conditions. By reducing dispatch assumptions for storage in the deliverability study, CAISO can create more TP deliverability on existing transmission and reduce the barrier</p>	The comment has been noted.



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		for new storage resources to receive a deliverability allocation. GSCE supports this revision and urges CAISO to implement the change in time for the 2022-23 deliverability allocation cycle.	
5b	Golden State Clean Energy ("GSCE")	GSCE requests that CAISO create additional documentation to support this stakeholder effort, beyond the slides presented on June 6. A technical bulletin or similar report would be useful for educating stakeholders and ensuring that interconnection customers understand the implications and thinking behind CAISO's methodology changes. The documents should clarify the current and changing deliverability conditions and assumptions, including any context or background that could help stakeholders better understand the deliverability study and allocation process. We are particularly interested in scenarios on how deliverability transfers will be affected by the proposed revisions.	The posted On-Peak Deliverability Study Methodology document will be updated with minor edits corresponding to what was discussed in the stakeholder process. The methodology document helps put the presentation materials in context for those that have not followed the numerous stakeholder processes in the past focused on the deliverability studies. See comment to 3d.
6a	Hydrostor	<p>Introduction</p> <p>Hydrostor is a leader in advanced compressed air energy storage ("A-CAES"), a proprietary emissions-free technology that stores electricity in the form of compressed air. A-CAES is a clean technology solution that will help California achieve its goal of decarbonizing the electricity grid and achieving its renewable energy goals. A-CAES is a compelling bulk-scale (200-500+ MW), long duration (4-24+ hours) energy storage solution. Hydrostor A-CAES is unique amongst long duration energy storage in that it can be sited where needed, including in many urban or semiurban locations. It is a long lifespan resource, with 30-50+ years of standard operability.</p> <p>Hydrostor appreciates the CAISO undertaking a review of the generation dispatch assumptions for its On-Peak Generation Deliverability studies including the presentation and discussion on June 6, 2022. As we understand it, the proposal from the CAISO would: (1) change the secondary system need ("SSN") window to include hour ending ("HE") 18; (2) revise the SSN generation dispatch assumption for energy storage in near-term Deliverability studies to 80%; (3) revise the SSN generation dispatch assumptions for energy storage in medium and long-term Deliverability studies to 50%. We further understand that the medium and long-term Deliverability studies include the Deliverability studies undertaken as part of the interconnection process and that the CAISO proposes to make these study assumption changes prior to the 2022-2023 Transmission Plan Deliverability allocation cycle.</p>	



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		<p>While Hydrostor strongly supports revising the generation dispatch assumptions for energy storage in the SSN window, we do not believe that the proposed changes go far enough nor do they reflect the expected behavior of energy storage in the SSN window. We recommend that the CAISO adopt generation dispatch assumptions that dispatches energy storage at 0% or charging in the SSN window, particularly for medium and long-term Deliverability studies.</p>	<p>The data provided in the ISO's June 6, 2022 stakeholder meeting materials supports the proposed changes.</p>
6b	Hydrostor	<p>Comments CAISO Technical Studies Must Align With Policy Objectives We believe that it is vitally important that the CAISO align its technical studies with the policy objectives of California including supporting the development of new generation projects that will enable a cleaner and more reliable electricity grid. Under the current Deliverability studies, many proposed projects are prevented from receiving Deliverability due to constraints identified during the SSN window. The consequence is that such projects are stymied even though they could provide much needed capacity and reliability during the highest system need ("HSN") when, as the name implies, the need is greatest. Development on many of these projects becomes stalled or delayed as they await re-study or the potential approval of expensive and long-dated transmission upgrades. Further, the failure to address Deliverability issues disproportionately impacts long duration energy storage projects. This conflicts with the CAISO's own stated concern regarding reliability over longer timeframes including multi-day reliability needs which long duration energy storage can help address. While some shorter duration storage projects could proceed as "Energy Only" if they do not receive Deliverability, this is not generally a viable option for many long duration energy storage projects that rely on Resource Adequacy ("RA") payments as a major revenue stream. Under the current CAISO market structure, long duration energy storage projects do not derive as much market revenues (such as energy arbitrage) as shorter duration projects (per megawatt of capacity) and proceeding as "Energy Only" is challenging economically. Dispatching energy storage at 0% (or charging) during the SSN window also reflects the expected future operation of energy storage projects as solar generation remains high in the SSN window. Therefore, adopting such an assumption will be more reflective of future energy storage operation, is better aligned with state objectives and will enable the development of significantly more</p>	<p>The data provided in the ISO's June 6, 2022 stakeholder meeting materials supports the ISO's proposed changes.</p>



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		resources, including long duration resources, than adopting the currently proposed dispatch assumption of 50% (for medium and long-term Deliverability studies).	
6c	Hydrostor	<p>Adjusting Study Assumptions Is Less Expensive Than Transmission Upgrades</p> <p>The Preferred System Portfolio adopted by the California Public Utilities Commission (“CPUC”) in February of this year requires the build-out of over 40 GW of new resources by 2032. Absent appropriate changes to the CAISO’s generation dispatch assumptions, enabling Deliverability for the build-out of this portfolio will likely require significant, costly, long-dated and potentially challenging to permit transmission upgrades to be completed. Modest adjustments to the Deliverability study assumptions in the SSN window (which still reflect expected operation of energy storage resources) is a lower / no cost alternative that will result in ratepayer savings while still enabling the development of materially more projects than what would occur under the current proposal.</p>	Lithium based storage resources are the vast majority of storage projects in the ISO queue, are not location constrained resources, and in general should be located where it does not drive transmission upgrades. It would be short-sighted to address the issue of an excessive amount of resources in the ISO queue, by making unrealistic generation dispatch assumptions in those studies. The ISO recommended assumptions are based on the data provided and are realistic assumptions.
6d	Hydrostor	<p>Conclusion</p> <p>Hydrostor strongly supports revising the generation dispatch assumptions for energy storage in the SSN window as it will both reflect how energy storage will operate as well as enable more projects to receive Deliverability and provide reliability benefits to the CAISO grid. However, we believe that the CAISO should adopt a dispatch assumption that dispatches energy storage at 0% or charging in the SSN window. Adopting this assumption will support broader policy objectives as well as be more cost effective than transmission upgrades.</p> <p>We appreciate the opportunity to provide comments and look forward to continuing to work with the CAISO on this and other topics.</p>	See responses above.
7a	LSA	<p>LSA appreciates the opportunity to comment on the CAISO’s proposed changes to the Deliverability Assessment Methodology (Assessment) scenario-hour definitions and certain resource dispatch assumptions, as described in the recent June 6th CAISO meeting presentation.</p> <p>LSA agrees generally that periodic updates to the Assessment structure and assumptions are appropriate. The current structure and assumptions have not been updated since 2018, and LSA recommends that the CAISO consider updates on a more regular and predictable basis.</p>	



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		<p>However, some additional clarifications and information are needed. With respect to specific changes proposed in this effort, LSA has the following overall comments:</p> <ul style="list-style-type: none"> • Scenario-hour definitions: The proposed changes seem consistent with the overall trend toward peak-hour flows later in the day, but CAISO should clarify the new definitions, since: <ul style="list-style-type: none"> □ Slides 14-26 show “updated” SSN hours as HE14-18 and HSN hours as HE18-22; but □ Slides 19-20 show updated SSN hours as HE15-18 and HSN as HE19-22; but • Storage dispatch assumptions: LSA is more concerned with the proposed energy-storage dispatch assumptions. LSA requests that the CAISO: <ul style="list-style-type: none"> □ Clarify its proposal for calculating energy storage dispatch. The multipliers for the proposed 80% and 50% dispatch levels are unclear, as is the direction of the dispatch. □ Clarify the timing and method for implementing the new dispatch assumptions, for the different Assessment applications. □ Better explain the implications of the new storage dispatch assumptions. <p>LSA’s concerns about the energy storage dispatch assumptions are described further below.</p> <p>Finally, the CAISO should issue a draft mark-up version of the Deliverability Assessment Methodology description currently posted on the CAISO Web site, as it did during the late-2019 Assessment methodology-change stakeholder process.</p>	<p>Hour Ending or "HE" means a consecutive sixty minute period ending at :00. For example, HE 7 means the period from 6:01 am through 7:00 am.</p> <p>The current HSN time period is HE 18-22, and SSN time period is HE 15-17</p> <p>This is being adjusted so the HSN time period is HE 19-22, and SSN time period is HE 15-18</p> <p>So this is the time period starting at 14:00 and ending at 18:00 for SSN and for HSN 18:01 through 22:00</p> <p>Slides 14-16 are continuous time so the windows are starting at 14:00 and ending at 18:00 for SSN and for HSN 18:01 through 22:00.</p> <p>Slides 19-20 are in HE format so the HSN time period is HE 19-22, and SSN time period is HE 15-18.</p> <p>See responses below.</p> <p>A revised On-Peak Deliverability Assessment Methodology document will be posted with minor edits to reflect what was discussed during the June 6, 2022 stakeholder call. A mark-up version will be posted in the same location as these responses to comments.</p>
7b	LSA	<p>Calculation methodology for dispatch levels</p> <p>CAISO currently assumes energy storage dispatch at the four-sustainable output, but the June 6th meeting slides reference the new 80% and 50% (short- and long-term) dispatch levels as a percentage of “installed capacity.” Is “installed capacity” the same as four-hour sustainable output?</p>	<p>Yes, the 80% and 50% values are as a percentage of the four-hour MW output capability of the storage.</p>



No		Comment Submitted	CAISO Response
		<p>Charging vs. discharging dispatch: The CAISO should also clarify whether storage dispatch in the SSN scenario would be a charging dispatch at the level defined above, and not a discharging dispatch. The meeting slides seem to indicate a discharge mode, but</p> <ul style="list-style-type: none"> • Storage dispatch was described in the earlier Assessment stakeholder process as a mitigation measure; and • The SSN scenario assumes higher renewable-resource flows – specifically, higher solar output, and thus higher likelihood that mitigation would require storage charging and not discharging, at least during the earlier portion of the SSN window. 	<p>The On-Peak deliverability studies only consider storage in the discharging mode. Only the off-peak deliverability study considers storage in the charging mode.</p> <p>The SSN study is only considering resource shortage conditions that occur during the SSN study window. Storage charging should never occur during resource shortage conditions.</p>
7c	LSA	<p>Implementation timing and method</p> <p>The CAISO proposes that SSN scenario storage dispatch levels be reduced to 80% in the “short-term” and 50% in the “long-term.” The CAISO should clarify the timeframes for these “short-term” and “long-term” changes, the transition between them, and how and when these changes would be implemented in the various Deliverability Assessment applications (annual NQC determination, Transmission Plan Deliverability (TPD) allocation process, Transmission Planning Process (TPP)).</p>	<p>The 50% assumption was based on the 2026 and 2030 analysis, so 2026 and beyond should be considered to be “long-term” in this context</p>
7d	LSA	<p>Rationale for, and implications of, the new storage dispatch assumptions</p> <p>Among other things, CAISO should:</p> <ul style="list-style-type: none"> • Offer a reasonable explanation for why storage utilization would go down over time, given factors such as the huge quantities of renewable energy required to meet the state’s long-term goals and the imminent retirement of large natural gas plants. • Clarify the reliability implications of studying energy storage at a level below the current CPUC Qualifying Capacity (QC) methodology, if the proposed SSN dispatch is in discharge mode. <p>Currently, the CAISO’s posted Deliverability Assessment methodology specifies that intermittent generators would be studied in the SSN scenarios at “50% exceedance level in applicable hours, but no lower than average summer QC ELCC factor.” The reference to</p>	<p>As more behind the meter solar continues to be added to the system, the load profile is expected to change as shown on slide 12, and the dispatch of storage resource during the SSN time frame is expected to gradually go down as well.</p> <p>Based on the data provided in the ISO’s June 6, 2022 presentation materials the proposed SSN dispatch assumptions will maintain the deliverability of resources during resource shortage conditions.</p>



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		<p>summer QC ELCC factor was added during the earlier stakeholder process on this methodology due to potential reliability problems if a resource was studied at one level but allowed to count at a higher level under the CPUC QC methodology.</p> <p>If the CAISO proposing to assume discharge levels at the new, lower levels, then is it possible that this could cause similar reliability issues? For example, if a 100MW/400MWh resource counts for 100 MW of QC as an FCDS resource but the CAISO only studies it at 80% discharge dispatch (80MW), it would count at a higher level than it was studied.</p> <ul style="list-style-type: none"> • Explain how the new assumptions would impact energy storage deliverability status, and deliverability transfers to/from energy storage. It would be extremely helpful if the CAISO could explain the implications of the proposed changes. For example, are there any implications for these situations? □ Energy storage FCDS: If the CAISO is proposing to dispatch energy storage discharge at an 80% dispatch level, could a 100 MW storage resource become FCDS with only 80 MW of deliverability? Might some current PCDS storage resources become FCDS as a result (e.g., using this example, a 100 MW storage resource with PCDS at 80 MW)? □ Deliverability transfers: Would a 100 MW storage resource be able to transfer only 80 MW of deliverability to another resource? □ FCDS for other resources: Would the charging dispatch of energy storage at lower levels provide less mitigation in high-flow SSN study hours, and therefore: (1) reduce the amount of deliverability available to other projects; and/or (2) trigger need for additional Delivery Network Upgrades? 	<p>The example resource would still be studied at 100 MW in the HSN study.</p> <p>The deliverability status of existing resources and previous TPD allocations would not change as a result of this modification to the study assumptions.</p> <p>In the SSN study analysis of a deliverability transfer, a storage resource would only be able to transfer the studied amount. See response to 3d.</p> <p>No. The On-Peak deliverability studies (SSN and HSN) only consider storage in the discharging mode.</p>
8a	REV Renewables (REV)	<p>REV Renewables (REV) requests that CAISO provide more detailed justification on its use of the proposed 80% maximum storage capability in the near-term deliverability studies and 50% in the mid- and longer-term studies for SSN hours. In particular, when CAISO says it only sees 70% to 90% of storage dispatched for SSN hours in near-term, does that mean while storage may be available at 100%, the CAISO market isn't fully dispatching storage in discharge mode because the market may be sending charge awards to the remaining</p>	<p>No. During resource shortage conditions like those analyzed in 2021, it is not likely that the market was sending charge awards to storage facilities.</p>



No		Comment Submitted	CAISO Response
		<p>capacity so that it could be dispatched in HSN hours to meet reliability? In addition, further explanation on the implications of this proposed use would be helpful. For instance, if the storage gets dispatched down to 80% and 50% in the near- and long-term respectively, what generation technology does CAISO plan to dispatch up to make up for loss of storage?</p> <p>REV also requests that CAISO clarify that the proposed storage SSN deliverability study numbers (80 or 50% of installed capacity) should not be conflated with Qualifying Capacity or ELCC values. It will be helpful to clarify that CAISO deliverability studies are merely attempting to mimic expected discharge of storage for the hours of concern and in most instances, storage can be dispatched up to 100% installed capacity based on the real time system needs.</p>	<p>New resources in the generation interconnection queue outside of the study area can be turned on to balance loads and resources.</p> <p>The proposed storage SSN deliverability study numbers (80 or 50% of installed capacity) should not be conflated with Qualifying Capacity or ELCC values.</p> <p>See response to 3d.</p>
9a	Vistra	<p>Vistra Corp. respectfully submits these comments in response to the CAISO's On-Peak Generation Deliverability Study Generation Dispatch Assumptions¹ posted on June 3, 2022 and discussed at a public stakeholder call on June 6, 2022. Vistra respectfully urges the CAISO to not adopt the storage dispatch assumption change it proposes to make in its Generation Dispatch Assumptions. Vistra is concerned with unintended consequences that assuming generation dispatch of storage at less than 100% of maximum operating level may have on storage development activities. In spirit of good utility practice, the RA obligation is to provide the full capacity under contract, where the capacity must provide 100% deliverability not 80% , or 50%, deliverability and the planning studies should assume that same expectation. Unless RA rules change to only require a portion of a BESS MW sold for RA to have full capacity deliverability status, the assumption change is inappropriate and inaccurate. It does not reflect the expectation of RA performance, nor does it reflect expected operations from a technical perspective.</p>	<p>Storage will continue to be studied at 100% in the HSN study scenario.</p>
9b	Vistra	<p>CAISO should not reduce the storage dispatch assumption below 100% of Pmax CAISO proposed at its June 6th call to adopt new assumptions for storage dispatch:</p> <ul style="list-style-type: none"> • Reduce dispatch assumption to 80% of maximum operating level ("Pmax") in near-term deliverability studies: CAISO states, "However, the current storage study amount for the SSN study should be reduced from 100% of the maximum storage capability to 80% of the maximum storage capability, for near-term deliverability studies."² <p>Our understanding is that the CAISO is</p>	



No		Comment Submitted	CAISO Response
		<p>basing this recommendation on its view of storage fleet producing between 70-90% of its peak storage output during SSN period³, a similar analysis it reviewed for intermittent resources.</p> <ul style="list-style-type: none"> • Reduce dispatch assumption to 50% of maximum operating level (“Pmax”) in long-term deliverability studies: CAISO states, “Therefore for long-term deliverability studies storage should be studied at 50% of installed capacity in the SSN study”⁴. Our understanding is that the CAISO is basing this recommendation on its view of storage fleet producing almost 50% of maximum operating level during SSN in its analysis of the 2026 and 2030 IRP portfolios. <p>CAISO should not treat BESS like intermittent resources, which reducing the dispatch assumption based on the analysis described does so based on flawed logic that BESS output is intermittent and historical output shapes or forward model assumptions should limit the assumed amount of capacity that is deliverable – this is inaccurate since BESS are on-demand resources dispatchable up to Pmax. Importantly, battery energy storage systems (“BESS”) are not intermittent resources but are instead dispatchable resources, where historical output levels could be result of CAISO dispatch instructions. As dispatchable resources, BESS that have full capacity deliverability status and are under a Resource Adequacy (“RA”) contract have a must offer obligation to make its peak output level (100% of Pmax) available to CAISO market unless physically unavailable and CAISO market or grid operations can either issue a market dispatch or an out-of-market dispatch to 100% of Pmax. BESS operations are akin to thermal on-demand generation subject to use limitations, not to intermittent resources. As an owner and operator of a large BESS, we view a dispatch assumption less than 100% of maximum operating level as inaccurate. An assumption less than 100% of the maximum operating level does not reflect the expected battery operations during SSN and should not be adopted.</p>	<p>BESS are energy limited resources and the ISO’s recommendations are supported by the information provided in the ISO’s presentation in this stakeholder process.</p>
9c	Vistra	<p>Opposition to storage dispatch assumption changes based on actual experience</p> <p>Vistra is a leading, Fortune 275 integrated retail electricity and power generation company based in Irving, Texas, providing essential resources for customers, commerce, and communities. The company brings its products and services to market in 20 states and the District of Columbia as well as Canada and Japan and participates in six of the seven competitive wholesale two-settlement markets in the U.S. and the Western Energy Imbalance Market with approximately 39,000</p>	



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	<p>megawatts across a diverse portfolio, including natural gas, nuclear, solar, and battery energy storage facilities.</p> <p>In California, Vistra owns and operates a portfolio of 1,130 MW of generation and 400 MW/ 1,600 MWh of energy storage and provides natural gas retail products to California consumers. Through its subsidiaries, Vistra operates the Moss Landing Energy Storage Facilities and the natural gas-fired Moss Landing power plant, which provide Resource Adequacy capacity and other products to the grid. Vistra also operates the distillate fuel-fired Oakland power plant, which is subject to a Reliability Must Run Agreement with the California Independent System Operator. Vistra is developing energy storage facilities in California that can provide Resource Adequacy capacity and other grid services to enhance the reliability of the California grid for up to an additional 1,810 MW/ 7,240 MWh of combined storage projects.</p> <p>Vistra provides the following storage dispatch assumption feedback based on its experience operating the Moss Landing Energy Storage 400 MW/ 1,200 MWh battery energy storage system (BESS) that achieved commercial operations in 2021 and its plans to develop an additional 1,810 MW/ 7,240 MWh BESS beginning in 2023.</p> <p>Vistra's experience with BESS operations does not provide any support for an assumption that BESS dispatches are only reliable up to a portion of its maximum operating level. It is the opposite of intermittent output where a portion of its capacity may not be reliably deliverable, the entire output subject to a capacity obligation must be reliably deliverable up to 100% of Pmax under our long-term arrangement. BESS is akin to use limited resource that is dispatchable but limited to a certain MWh energy limit per cycle and is limited to a number of cycles per day depending on its technical capabilities. It is important that these MWh state of charge capability, round-trip efficiencies, and depth of discharge are highly resource specific details and a fleet wide assumption disincentivizes developers to strive to bring the highest quality assets to the grid. Like hydro with energy use limitations or thermal generation with use limitations, BESS should be assumed to provide 100% of maximum operating level during SSN, or HSN. Below we will address the fact that the ability of storage to manage its use limitations are largely done through overbuilding where there are greater "MW" behind the Point of Interconnection ("POI") to ensure the BESS can meet its obligations to support full capacity deliverability up to its POI injections.</p>	<p>Vistra's comments here are a thwart to the data provided in the ISO's presentation material in this stakeholder process, and to the comments above from other industry stakeholders.</p>



No	Comment Submitted	CAISO Response
	<p>BESS developers and operators can manage the need to be deliverable up to its Pmax through oversizing behind the POI. There is a gentle balance to maintain from a development perspective because the over-sized portions are used to manage technical capabilities including round-trip efficiencies and depth of discharge limits, but this limits the full output that can be made available. Oversizing to fully mitigate these parameters is costly and unrecoverable as we can only sell capacity up to the MW amount limited by our Point of Interconnection. The important element of this feedback to consider is that the ability of storage to produce up to 100% of maximum operating level is the expectation of the asset and it is developed to be able to do so today, even if that means developers choose to oversize the MWh behind the POI to manage technical concerns from depth of discharge, round-trip efficiencies, and longer-term expectations of degradation. In practice, we develop and operate the asset to be able to inject 100% of its RA obligation, potentially up to POI, and CAISO planning should expect that performance on-demand if dispatched to provide full output when dispatch, assuming sufficient state of charge.</p> <p>Vistra urges the CAISO to not prematurely change the generation dispatch assumptions for BESS.</p>	