

The ISO received comments on the topics discussed at the November 17, 2020 stakeholder call from the following:

1. [Bay Area Municipal Transmission group \(BAMx\)](#)
2. [California Public Utilities Commission – Staff \(CPUC-Staff\)](#)
3. [GridLiance West](#)
4. [LS Power Development \(LS Power\)](#)
5. [Pacific Gas and Electric Company \(PG&E\)](#)
6. [Public Advocates Office \(PAO\)](#)
7. [San Diego Gas & Electric \(SDG&E\)](#)
8. [Smart Wires](#)
9. [Transmission Agency of Northern California \(TANC\)](#)
10. [Visra](#)
11. [Westlands Solar Park](#)

Copies of the comments submitted are located on the 2020-2021 Transmission Planning Process page at:

<http://www.caiso.com/planning/Pages/TransmissionPlanning/2020-2021TransmissionPlanningProcess.aspx>

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

1. Bay Area Municipal Transmission group (BAMx) Submitted by: Paulo Apolinario		
No	Comment Submitted	CAISO Response
1a	<p>SDG&E's Metro Region Reliability and Economic Project (\$170 million) Per the SDG&E assessment, the primary driver for the project is a 103% overload on the Silvergate-Bay Boulevard 230kV line for the loss of the Sycamore Canyon-Penasquitos 230kV circuit.³ However, the identified P1 overload is observed only in the Spring Off-Peak High Renewables and Minimum Gas Generation case, and not in the baseline case.⁴ We are unclear about the basis for the <i>Spring Off-Peak High Renewables and Minimum Gas Generation</i> case and therefore the relevance of the identified P1 overload in this case. It appears that the CAISO's identified solution of relying on the 2-hour short term emergency rating and operation procedure that allows the market and operators to eliminate the overloads by reducing generation output in the Otay Mesa area⁵ should be sufficient mitigation to the identified reliability issue. Also, if there are any economic benefits for this project, the CAISO should identify them as part of its economic assessment. In summary, BAMx suggests that the CAISO should refrain from approving this project until further justification is provided.</p>	<p>The CAISO did not find a need for this project in the draft 2020-2021 Transmission Plan.</p>
1b	<p>Review of Projects Currently on Hold During the November 17th Stakeholder conference call, the CAISO presented the analysis conducted on the three PG&E projects that was previously placed on hold.⁶ Overall, BAMx is encouraged to see the CAISO re-evaluating projects where the driver for the project or estimated project cost has changed. BAMx encourages the CAISO to continue this practice going forward.</p> <p>However, BAMx believes that in order for the CAISO to obtain more meaningful feedback from stakeholders, the CAISO should provide more information on the alternatives to the status quo project that are currently being evaluated. Providing a cost estimate for each alternative as well as a power flow change file would allow the stakeholders to independently conduct an assessment and provide suggestions for any other potential mitigation options. Additionally, BAMx would like to provide the following comments for each of the individual projects currently on hold.</p>	<p>The CAISO has continued the analysis of the projects on hold and incorporated into the draft 2020-2021 Transmission Plan.</p>

No	Comment Submitted	CAISO Response
1c	<p>Wheeler Ridge Junction Project (\$250-\$300 million) The Wheeler Ridge Junction Project was originally submitted by PG&E in the 2013-2014 TPP in order to mitigate overloads on the following transmission elements:</p> <ul style="list-style-type: none"> • Kern-Magunden-Witco 115kV Line • Kern PP 230/115kV Transformer #3, #4, and #5 • Midway-Wheeler Ridge #1 and #2 Circuits <p>The latest Preliminary Assessment results posted for the Kern planning area indicate that different overloads on different circuits are driving the need for the upgrade. The Wheeler Ridge Junction Project is identified as long-term mitigation for thermal overloads on the following circuits:</p> <p>Kern-Magunden-Witco 115kV Line Kern-Stockdate 115kV Line Kern-Lamont 115kV Line</p> <p>Since the overloaded circuits and the contingencies driving the need for the project have changed, BAMx believes the CAISO should conduct further analysis to demonstrate that the Wheeler Ridge Project is still the most cost-effective approach to mitigating the identified overloads on the system. BAMx requests the CAISO to develop additional alternatives and provide the power flow change files, cost estimates, and power flow results for each alternative before proceeding with one of the options. Moreover, BAMx would encourage the CAISO to incorporate Battery Energy Storage System (BESS) and energy efficiency programs in the Wheeler Ridge Project alternatives.</p>	<p>The CAISO has continued the analysis of the project and incorporated a recommendation for procurement of storage as a part of the mitigation plan for the 115 kV system requirements in the draft 2020-2021 Transmission Plan.</p>
1d	<p>Moraga-Sobrante Reconductoring (\$10-\$20 million) The scope of the project is to reconductor the Moraga-Sobrante 115kV circuit with a larger conductor. The driver for the project as identified in the CAISO November 17th presentation are multiple P2 overloads at Sobrante 115kV substation starting in 2030.9 The overloads only appear in 2030, which is a ten-year out case, and exclusively for a low probability P2 type of contingency. Therefore, time is available to look for alternatives to the reconductoring project. BAMx recommends that the CAISO does not approve the Moraga-Sobrante</p>	<p>The CAISO has recommended that the project remain on hold for further review in the next planning cycle.</p>

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	<p>115kV reconductoring project at this time. If mitigation for this overload is required, BAMx recommends that the CAISO consider a generation dropping SPS to mitigate the identified overload. An SPS is likely to provide a more cost-effective solution to the identified reliability issue.</p>	
1e	<p>North of Mesa Project (\$114-\$144 million) The scope of the North of Mesa Project is to build Andrews 230/115kV substation, energize Diablo-Midway 500kV line at 230kV and connect to the Andrew substation. The project also entails looping-in the San Luis Obispo-Santa Maria 115kV line to Andrew and Mesa substations. The latest cost estimate for the project is in the range of \$114-\$144 Million. The reliability assessment need for the project is driven exclusively by higher-level P2, P6, and P7 types of contingencies. Both NERC and CAISO planning standards allow for non-consequential load dropping in non-urban areas for these types of contingencies. BAMx agrees that the CAISO should investigate if Alternative Option 1, which is to install approximately 100MW of BESS, identified in the CAISO's November 17th presentation could mitigate the identified reliability issues and allow for sufficient maintenance outages before approving the proposed North of Mesa Project. If BESS storage in itself is not sufficient for compliance with the CAISO planning standards, the CAISO should evaluate a combination of BESS storage and a load dropping RAS before approving the proposed North of Mesa Project.</p>	<p>The CAISO has continued to assess the scope of the North of Mesa project. The CAISO reliability standards require during scheduled outages the P0 and P1 performance requirements in NERC TPL-001-4 for either BES or non-BES facilities must be maintained. The CAISO has recommended procurement of storage as the mitigation plan to address the reliability constraints during maintenance outages and for the existing or modified RAS to address the constraints during peak load conditions.</p>
1f	<p>CPUC IRP and CAISO TPP Feedback Loop Historically, BAMx has expressed some serious concerns about the sufficiency of the feedback loop concerning transmission capability information between the CAISO reliability and deliverability assessment, and the CPUC's renewable portfolios. We understand that in addition to the change in resource mix, a better-coordinated resource to the busbar mapping process between the California Public Utilities Commission (CPUC) Integrated Resource Planning (IRP) and the CAISO 2020-2021 TPP has led to a reduced and more realistic renewable curtailment levels. We acknowledge the tremendous progress made jointly by the CPUC, the California Energy Commission (CEC), and the CAISO in the area of resource to the busbar mapping as part of the 2020-2021 TPP.</p> <p>There is a continued need for a timely and robust feedback loop between the 2019 IRP and 2021-2022 TPP along with periodic opportunities for the stakeholders to provide meaningful feedback. The Sensitivity Portfolio 1 studied</p>	<p>The analysis in the 2020-2021 transmission planning process presented and incorporated into the draft transmission plan used the new deliverability methodology. The CAISO will continue to coordinate with the CPUC IRP to utilize the results of the analysis utilizing the new deliverability analysis.</p>

No	Comment Submitted	CAISO Response
	<p>in the current TPP cycle, i.e., 2019 Reference System Portfolio (2019 RSP) with 46 MMT by 2030 GHG target is proposed to be the Base portfolio for the 2020-2021 TPP. Therefore, it is critical that the CPUC renewable resource portfolios are informed by the lessons learned from the current TPP in terms of resource selection and busbar mapping. BAMx also believes that the Base portfolio should be updated with the CAISO's estimates of transmission capability limits based upon the revised deliverability assessment methodology. In its recent review of deliverability assessment methodologies, CAISO has proposed new study scenarios that would align load levels with intermittent generation output.</p> <p>The CAISO has implemented a new study approach recognizing that, with a diverse grid, the peak reliability need is offset by the generation profiles under certain renewable conditions, which result in significantly more of the resources being deliverable across the transmission system. Thus, implementation of CAISO's revised transmission deliverability methodology is expected to result in accommodating more full capacity deliverability status (FCDS) resources in a given transmission area without triggering the need for costly additional transmission upgrades - than if the earlier methodology was to be used. The CAISO has found that under the new methodology, several transmission upgrades identified using the current methodology would not be needed.</p> <p>The CAISO Board of Governors approved the new deliverability methodology revisions on November 6, 2019. The Federal Energy Regulatory Commission (FERC) approved the CAISO's compliance filing revising its deliverability assessment methodology on September 11, 2020, making it effective March 3, 2020. Therefore, there is no reason to delay implementing the treatment of transmission constraints within the Integrated Resource Planning (IRP) process to reflect CAISO's most recently adopted electric deliverability methodology. Implementing this proposed methodology should be a relatively simple task, because the CAISO could provide updated transmission capability values to the CPUC, allowing easy implementation inside of RESOLVE. Moreover, applying this new methodology for the 2021-2022 TPP is appropriate as it is already in place in the CAISO's generation interconnection process and transmission planning process. Therefore, BAMx recommends that the CAISO provides CPUC with the transmission capability input estimates based upon the revised deliverability assessment methodology - as some renewable and storage</p>	

No	Comment Submitted	CAISO Response
	<p>buildout areas are likely to see significant changes in the deliverable numbers and the revised renewable portfolios would avoid identifying un-needed, and expensive transmission upgrades in the CAISO 2021-2022 Transmission Plan.</p>	
<p>1g</p>	<p>Need to provide comprehensive data on identifying battery storage as mitigation solutions in the base case and sensitivity scenarios During the November 17th stakeholder meeting, the CAISO did a commendable job at describing the overview of the CAISO's policy-driven assessment. For the Base portfolio, the CPUC did not map generic battery storage (up to 2,157 MW/5,504 MWh) and recommended the CAISO apply the resource at locations where it can mitigate transmission issues identified. Although CAISO provided the generic resource and battery storage mapping in the Base portfolio and the two Sensitivity portfolios, the CAISO did not provide any details of the storage resource mapping in the base portfolio. BAMx requests that the CAISO provide the details on the battery storage capacity that the CAISO has mapped in the Base portfolio to mitigate transmission issues. This data should be provided by renewable transmission zone (as provided on Page 27 of the November 17th presentation for the two Sensitivity portfolios) and by LCR areas (as provided on Page 26 of the November 17th presentation for the two Sensitivity portfolios). We also request that the CAISO provide the energy storage resources by all LCR sub-areas for the Base and Sensitivity portfolios.</p>	<p>The CAISO did not map the entire battery storage in the base portfolio. Consistent with the guidance from the CPUC the CAISO did consider, and where appropriate recommend, battery storage as a potential mitigation for transmission issues identified in the base portfolio. Please see the reliability assessment recommendation presentations for PG&E and SDG&E areas.</p> <p>The CAISO also notes that the CPUC, in collaboration with the CEC and CAISO, has mapped the battery storage in all portfolios for the 2021-2022 TPP including the base portfolio.</p>
<p>1h</p>	<p>Preliminary Economic Assessment Results It was not clear during the CAISO's November 17th presentation on the Preliminary Economic Assessment Results whether the Base portfolio used for the production cost simulations included the battery storage identified by the CAISO to mitigate transmission issues. Please confirm. It is critical that the production cost simulations studies performed as part of the economic assessment fully capture the key role energy storage is expected to provide in reducing renewable curtailments and thereby estimated transmission congestion.</p> <p>CAISO's November 17th presentation identified a new phenomenon that was not discovered in the earlier TPP cycles. That is, the "No Export Limit" case which showed a greater level of transmission congestion than in the "2000 MW Net Export Limit" case. Historically, the "No Export Limit" case was used as a reference to estimate curtailment related to system constraint. BAMx agrees</p>	<p>The Planning PCM for the base portfolio used the same battery storage model as in the power flow case for the reliability assessment.</p> <p>The comment on the "No Export Limit" case has been noted.</p>

No	Comment Submitted	CAISO Response
	<p>with the CAISO's observation that the greater congestion in the "No Export Limit" case seems to be stemming from the increased renewable resources included in the portfolio to meet the state GHG goal. BAMx understands that both the "No Export Limit" case and the "2000 MW Net Export Limit" case have an identical resource mix including the battery storage capacity and their locations. BAMx believes that the "No Export Case" needs to have an energy storage capacity and location pattern that is optimal for that particular case and is therefore likely different from the one in the "2000 MW Net Export Limit" case. If there is adequate battery storage capacity in certain local areas and generation pockets, it would effectively absorb the excess renewable energy, primarily solar generation, thereby reducing the overall congestion. BAMx encourages the CAISO to use different storage capacity and locations going forward that are optimal for specific export limit cases.</p>	<p>The battery storage assumption is a part of the unified planning assumption, and need to be applied consistently to all scenarios to be studied.</p>
1i	<p>BAMx Supports CAISO's Long-Term Local Capacity Technical Study Efforts</p> <p>Based on the alignment of the CAISO TPP with the CEC Integrated Energy Policy Report (IEPR) demand forecast and the CPUC IRP, the CAISO performs the Long-Term LCR assessment every two years. The CAISO has made significant progress in the development of conceptual projects to reduce or eliminate the LCR in various areas or sub-areas. BAMx acknowledges that these studies play a key role in reviewing the options to maintain local reliability. For each local area and sub-area, the CAISO has estimated the battery storage characteristics, given their unique load shape, constraints and requirements as well as the energy characteristics of other resources required to meet standards. BAMx understands that installing battery storage with insufficient characteristics (MW, MWh, and duration) will not result in a one for one reduction of the local area or sub-area need for other types of resources. However, BAMx recognizes that the graphs provided by the CAISO for each LCR area or sub-area comprising an estimated amount of energy storage that can be added from a charging restriction perspective are steps in the right direction. BAMx supports the more recent improvements to the battery storage calculation and graphs, such as the improved "energy calculation" to more closely follow the load shape. We understand that the storage charging estimates developed by the CAISO are informational only, considered preliminary, and will be refined in subsequent studies. However, for the sake of</p>	<p>The comment has been noted.</p> <p>The CAISO utilized spreadsheets and techniques that were tailored to the different circumstances in the LCR areas. These will continue to evolve and be refined, as the storage charging estimates are informational only, considered preliminary, and will be refined in</p>

No	Comment Submitted	CAISO Response
	<p>transparency and education purposes, BAMx believes that the CAISO should share the spreadsheet and techniques used to develop these estimates with stakeholders along with appropriate caveats</p>	<p>subsequent studies. Accordingly, it is premature to be providing these materials at this time and the ISO will consider the issue in the future.</p>
<p>1j</p>	<p>Wildfire Impact Assessment BAMx applauds CAISO's modeling of the two additional scenarios, i.e., lines de-energized based upon October 26, 2019 PSPS event conditions with PG&E's wildfire mitigations (10-26 PPS-WFM) and based upon potential PPS events corresponding to historical weather conditions, de-energize all lines included in 25 potential events (PPS-HWC-All). We believe that these two scenarios being more plausible provide important new information.</p> <p>In addition to the transmission-connected load, there may also be a load that will not be served due to distribution facilities also affected by PPS or wildfire events. A loss of distribution-connected load may reduce the load that the transmission system needs to supply under that specific condition, which may vary depending upon the nature of the specific event. BAMx encourages the CAISO to work with PG&E to also take into account likely distribution circuit interruptions as it continues to look at likely scenarios for PPS events.</p> <p>BAMx encourages the CAISO to continue to work with PG&E to investigate 2020 PPS events that have occurred. We understand that this work may not be accomplished prior to the finalization of the 2020-2021 Transmission Plan, however it may be analyzed as part of next year's scope.</p>	<p>The comment has been noted.</p> <p>The CAISO coordinates with the transmission owners in conducting the wildfire risk assessments. As part of the transmission planning process the focus of the study is on the transmission impacts associated with potential wildfire scenarios. The distribution owners continue to assess the distribution impacts associated with wildfire scenarios.</p> <p>The CAISO assess need for updates or further analysis in future planning cycles.</p>

2. California Public Utilities Commission – Staff (CPUC-Staff) Submitted by: David Withrow		
No	Comment Submitted	CAISO Response
2a	<p>1. Use of Remedial Action Schemes in the Base Case No transmission upgrades are identified for the base case. The CAISO states that all the full capacity deliverability status (FCDS) resources are expected to be deliverable with implementation of certain remedial action schemes.</p> <p>CPUC Staff notes that for this base portfolio, CAISO has flexibility to apply storage resources (up to 2,157 MW) at locations where it can mitigate identified transmission issues. However, the CAISO stated that so far, the CAISO has not modeled any generic storage MWs in this base case.</p> <ul style="list-style-type: none"> • Does the CAISO intend to incorporate the modeling of storage resources to minimize remedial action schemes in certain areas? • Will any results from this analysis specify the amount and location of storage resources that could be utilized? • Will the modeling of generic storage resources eliminate need for any remedial action schemes identified in the base case analysis? <p>CPUC Staff looks forward to further insights on this base case analysis in the draft Transmission Plan (to be posted in January 2021), specifically regarding the amount of storage MWs that could be applied as mitigation measures in certain areas.</p>	<p>Consistent with the CPUC guidance, the CAISO did consider, and where appropriate recommend, battery storage as mitigation for transmission issues identified in the base portfolio. Please see the reliability assessment recommendation presentations for PG&E and SDG&E areas.</p> <p>The CAISO did not consider battery storage in its on-peak deliverability assessment to minimize remedial action schemes because adding battery storage resources would typically adversely impact the on-peak deliverability constraints. The CAISO considered battery storage as a mitigation in the off-peak deliverability studies in cases where RAS was not considered a viable mitigation. As indicated in chapter 3 of the draft transmission plan (see section 3.10.2), only three minor off-peak constraints were identified with the base portfolio and adding a 10 MW storage was identified as a mitigation for one of them.</p> <p>The CAISO will continue to review RAS applications, particularly complex RAS requirements, and is considering reviewing the reliance of RAS overall and may consider storage or other mitigation alternatives.</p>
2b	<p>2. Battery Storage Adjustments in the Sensitivity Cases For the sensitivity portfolios, FCDS resources in several renewable transmission zones are not deliverable without upgrades, and varying amounts and ratios of renewable curtailment are likely to occur in transmission zones. CPUC Staff looks forward to the CAISO's further evaluation of the effectiveness of transmission solutions in selected renewable zones.</p> <p>Regarding the mapping of storage resources in these sensitivity portfolios, CPUC Staff notes that CAISO adjusted the amount of batteries that had been mapped or recommended by the CPUC for both sensitivities. In addition, the CAISO noted additions and reductions of storage MWs within specific LCR sub-areas, as shown in two columns on the charts in slides 34-35 (pdf version) of the CAISO's presentation¹ at the November 17, 2020 meeting.</p>	<p>Please see section 3.8 of the draft transmission plan for the evaluation of the effectiveness of re-mapping of undeliverable battery storage and transmission solutions in selected renewable zones.</p>

No	Comment Submitted	CAISO Response
	<ul style="list-style-type: none"> • Could the CAISO clarify the reason and process for making these adjustments in both sensitivities? • Could the CAISO clarify the reason and process for making these adjustments in the mapping of storage resources to busbars in in specific LCR sub-areas? <p>It would be helpful if the draft Transmission Plan included a full explanation for all these storage mapping adjustments because these new assumptions can impact local capacity needs, renewable curtailment ratios and deliverability results in these sensitivity analyses.</p>	<p>CPUC Staff Report: Modeling Assumptions for the 2020-2021 Transmission Planning Process Release 2 (TPP Sensitivity Portfolios) CPUC Energy Division, March 30, 2020, Pages 19, 20, 25 and 26 provided instructions to the CAISO for adjusting the storage mapping. The CAISO followed these instructions. Please see section 3.4.2 of the draft transmission plan for details.</p>
2c	<p>3. Revised Deliverability Methodology</p> <p>CPUC Staff notes this is the first TPP cycle under which the CAISO's revised methodology for determining deliverability of resources has been fully implemented. This new methodology incorporates risks of capacity shortage based on differing assumptions of peak and net peak hours within scenarios for the highest and second system need.</p> <p>This new deliverability methodology refines the amount of FCDS resources that can be accommodated in each transmission area. CPUC Staff is eager to utilize updated transmission capability limits and upgrade cost estimates that have been developed based on this new methodology. This information and other insights about constraints that might result in excessive renewable curtailment enhance the IRP process for the development of renewable resources and transmission.</p> <ul style="list-style-type: none"> • Could the CAISO confirm when transmission capability limits will be upgraded? • Could the CAISO offer any further insights regarding the impacts of this revised deliverability methodology on the FCDS transmission capability that feeds back into the IRP process? 	<ul style="list-style-type: none"> • Updating the transmission capability estimates is one of the CAISO's priorities for the current year. The CAISO will coordinate the timing of the update with the CPUC's need. • The revised deliverability methodology is expected to increase FCDS capacity in areas where there is a significant amount of FCDS solar resources. However, the increase in FCDS capacity may be offset by collocated battery storage. Section 3.9 of the draft transmission plan and the February 9 policy-driven assessment update presentation may provide additional insight in this regard.

No	Comment Submitted	CAISO Response
2d	<p>4. Results of Deliverability Assessment and Curtailment Impacts CPUC Staff commends CAISO's presentation of results of deliverability assessment for the sensitivity cases.</p> <p>The CAISO's presentation nicely summarizes results of extensive analysis of the deliverability of resources in the CPUC-developed portfolios. Slides 48-111 (pdf version) identify the on-peak deliverability capabilities by each overloaded facility within each transmission zone, specify the MW amounts of renewable and storage resources behind each constraint and – importantly -- explain the types of mitigation that could be used to manage each of these constraints at peak hours.</p> <p>Among the mitigation options that are specified are curtailment of renewable resources, the charging of storage resources, remedial action schemes, and reconductoring of lines. Identifying these mitigation processes greatly helps to understand the severity of any renewable curtailment under both sensitivity portfolios as well as how these constraints might be resolved.</p> <p>The design of CAISO's presentation compacts a tremendous amount of information that is useful for developers, transmission owners and regulators. CPUC Staff appreciates this consolidated format, the sophistication of this deliverability analysis and the explanation of these results for each specific area.</p>	<p>The comment has been noted.</p>
2e	<p>5. Refinement of the Wildfire Risk Assessment The CAISO's assessment of wildfire risk in the PG&E service area includes additional scenarios which are categorized from least to most plausible. The CAISO will focus on the most plausible scenarios in its ongoing consideration of potential mitigation solutions for PSPS events.</p> <p>CPUC Staff appreciates this first-year effort to incorporate wildfire risk into transmission planning activities. CPUC Staff further appreciates the CAISO's commitment to expand its assessment beyond the PG&E service area in future assessments.</p> <ul style="list-style-type: none"> • Does the CAISO anticipate assessing wildfire risk in all transmission areas in the CAISO footprint as part of the 2021-2022 TPP cycle? 	<p>The CAISO will be expanding the wildfire risk assessment to assess the southern areas of SCE and SDG&E in the 2021-2022 transmission planning process.</p>

No	Comment Submitted	CAISO Response
	<p>We also urge continued coordination with the Transmission Owners to account for the load drop due to distribution lines also taken out for PSPS events. It seems appropriate that distribution load loss should be considered in these assessments as well as the potential mitigation projects that would be considered. We anticipate that as the methodology matures for this new and unique wildfire assessment, the CAISO will better integrate the analysis of distribution and transmission facilities.</p> <p>CPUC Staff looks forward to discussion at future stakeholder meetings on this foundational assessment. Given the urgency of wildfire risk in California, CPUC Staff encourages CAISO's efforts to disseminate its findings and expand upon this important assessment in future TPP cycles.</p>	<p>The CAISO coordinates with the transmission owners in conducting the wildfire risk assessments. As part of the transmission planning process the focus of the study is on the transmission impacts associated with potential wildfire scenarios. The distribution owners continue to assess the distribution impacts associated with wildfire scenarios.</p>

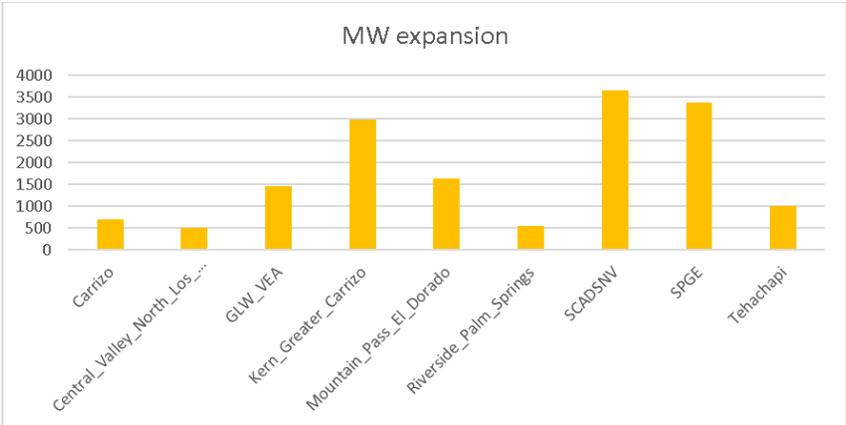
3. GridLiance West Submitted by: Jody Holland		
No	Comment Submitted	CAISO Response
3a	<p>GridLiance Comments on CAISO’s Policy Sensitivity Case 2 Expanded Energy-Only Limit Study</p> <p>GridLiance offers comments in response to the CAISO’s off-peak analysis for Policy Sensitivity Case 2 addressing the expanded Energy Only limits.</p> <p>CAISO’s Off-Peak Analysis Demonstrates Ability to Expand IRP Energy-Only Limits</p> <p>GridLiance appreciates the CAISO’s efforts to publish findings from its study of the Sensitivity Portfolio 2 – the study of expanding the Energy-Only (EO) limits used for the CPUC’s Integrated Resource Planning (IRP) Process. The findings provide helpful input to the CPUC’s process, and release at this time can enable the CPUC to incorporate these findings for their next portfolios. GridLiance strongly encourages the CAISO to pass these results to the CPUC and at this time recommend increases to the transmission limits for those areas studied such that the portfolios are not unnecessarily constrained (using overly low limits) for the subsequent portfolios that will be used for the 2021 – 2022 TPP.</p> <p>The CAISO’s results show that the renewable buildout of Sensitivity Portfolio 2 (SENS-2 in the CAISO November 17, 2020 slides) could be managed in almost all cases by renewable action schemes (curtailing the renewable generation if need be), dispatching storage, or siting portfolio storage in the areas. The three areas that seemed to warrant transmission upgrades are Tehachapi, the VEA/GLW area of Southern Nevada, and Westlands. The CAISO summarized these results on slide 100 of their November 17 results reflecting the off-peak (i.e., periods of high renewable curtailment) results.</p>	<p>The comment has been noted.</p> <p>The CAISO notes, as is indicated in footnote 114 (page 212) of the draft transmission plan, that the CAISO’s Cluster 13, Phase 1 generation interconnection studies have identified concerns with the planned RAS in the Eldorado and VEA areas that need further analysis. The identification and future resolution of these concerns will need to be incorporated in future studies of the Eldorado and VEA area system constraints, and the results of those studies could be considerably different.</p>

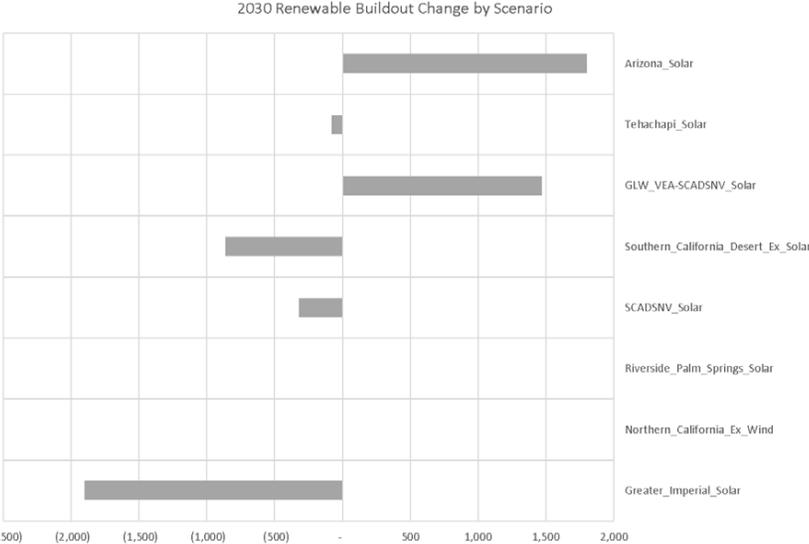
No	Comment Submitted	CAISO Response																															
	<p style="color: #4F81BD; margin: 0;">Summary of off-peak deliverability assessment results</p> <ul style="list-style-type: none"> Pre-contingency renewable curtailment was identified to varying extent in the base and sensitivity portfolios In addition to RAS, transmission upgrades, dispatching storage behind the constraint in charging mode and adding storage (subject to on-peak deliverability) are considered to mitigate renewable curtailment <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2">Renewable Transmission Zone</th> <th rowspan="2">Constraint</th> <th rowspan="2">Battery Storage Behind Constraint (Base/Sens-1/Sens-2) (MW)</th> <th rowspan="2">Renewable Curtailment (Base/Sens-1/Sens-2) (MW)</th> <th colspan="3">Potential Mitigation</th> </tr> <tr> <th>Transmission</th> <th>Dispatch Storage (Base/Sens-1/Sens-2) (MW)</th> <th>Add Storage (Base/Sens-1/Sens-2) (MW)</th> </tr> </thead> <tbody> <tr> <td>Tehachapi (Whirlwind)</td> <td>Whirlwind 500/230 Banks</td> <td>0/267/305</td> <td>0/120/240</td> <td>Whirlwind 500/230kV No. 4 (~\$100M) - Sens-1, Sens-2</td> <td>0/120/240</td> <td>N/A</td> </tr> <tr> <td>Southern NV (CAISO)</td> <td>VEA/GLW Area Constraints</td> <td>0/40/40</td> <td>0/0/830</td> <td>Multiple options (~\$90M-\$192M each) - Sens-2</td> <td>0/0/NA</td> <td>0/0/790</td> </tr> <tr> <td>Westlands</td> <td>Kettleman- Gates 70 kV constraint</td> <td>0</td> <td>10/10/10</td> <td>Reconductor Kettleman-Gates 70 kV line - Base, Sens-1, Sens-2</td> <td>N/A</td> <td>10/10/10</td> </tr> </tbody> </table> <ul style="list-style-type: none"> RAS is expected to address pre-contingency curtailment in other areas <p style="font-size: small; margin-top: 10px;"> California ISO Page 100 </p>	Renewable Transmission Zone	Constraint	Battery Storage Behind Constraint (Base/Sens-1/Sens-2) (MW)	Renewable Curtailment (Base/Sens-1/Sens-2) (MW)	Potential Mitigation			Transmission	Dispatch Storage (Base/Sens-1/Sens-2) (MW)	Add Storage (Base/Sens-1/Sens-2) (MW)	Tehachapi (Whirlwind)	Whirlwind 500/230 Banks	0/267/305	0/120/240	Whirlwind 500/230kV No. 4 (~\$100M) - Sens-1, Sens-2	0/120/240	N/A	Southern NV (CAISO)	VEA/GLW Area Constraints	0/40/40	0/0/830	Multiple options (~\$90M-\$192M each) - Sens-2	0/0/NA	0/0/790	Westlands	Kettleman- Gates 70 kV constraint	0	10/10/10	Reconductor Kettleman-Gates 70 kV line - Base, Sens-1, Sens-2	N/A	10/10/10	
Renewable Transmission Zone	Constraint					Battery Storage Behind Constraint (Base/Sens-1/Sens-2) (MW)	Renewable Curtailment (Base/Sens-1/Sens-2) (MW)	Potential Mitigation																									
		Transmission	Dispatch Storage (Base/Sens-1/Sens-2) (MW)	Add Storage (Base/Sens-1/Sens-2) (MW)																													
Tehachapi (Whirlwind)	Whirlwind 500/230 Banks	0/267/305	0/120/240	Whirlwind 500/230kV No. 4 (~\$100M) - Sens-1, Sens-2	0/120/240	N/A																											
Southern NV (CAISO)	VEA/GLW Area Constraints	0/40/40	0/0/830	Multiple options (~\$90M-\$192M each) - Sens-2	0/0/NA	0/0/790																											
Westlands	Kettleman- Gates 70 kV constraint	0	10/10/10	Reconductor Kettleman-Gates 70 kV line - Base, Sens-1, Sens-2	N/A	10/10/10																											
	<p>Of these three areas, the upgrades to the VEA/GLW system can provide substantial reductions in curtailment for relatively low-cost transmission enhancements. The CAISO's presentation further displayed options it considered for the VEA/GLW area in its slide 48.</p>																																

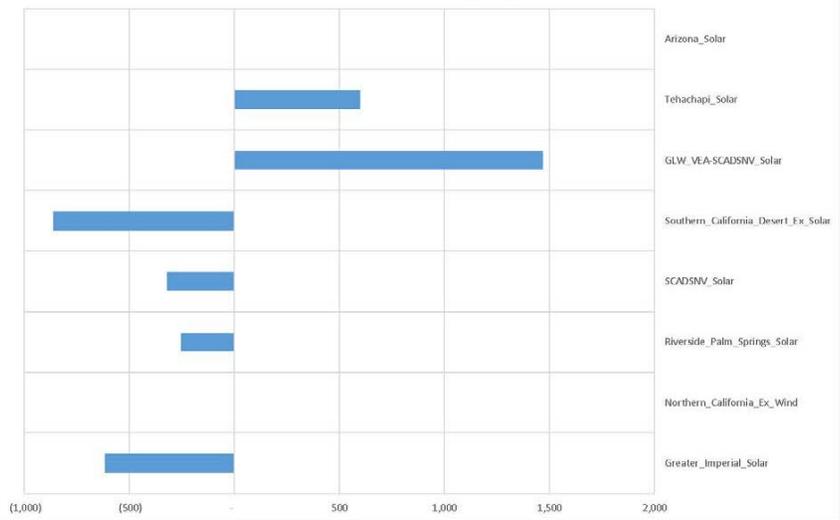


No	Comment Submitted	CAISO Response																																																																																																																																		
	<div style="border: 1px solid #ccc; padding: 10px;"> <h3 style="margin: 0;">Mitigation Options</h3> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #e6f2ff;"> <th style="width: 10%;">Options</th> <th style="width: 10%;">Pahrump-Sloan Canyon rebuild</th> <th style="width: 10%;">Innovation-Desert View reconductor</th> <th style="width: 10%;">Desert View-Northwest reconductor</th> <th style="width: 10%;">Innovation-Northwest 138kV rebuild</th> <th style="width: 10%;">Pahrump-Sloan Canyon #2</th> <th style="width: 10%;">Innovation-Desert View #2</th> <th style="width: 10%;">Desert View-Northwest #2</th> <th style="width: 10%;">138kV Phase Shifter</th> <th style="width: 10%;">Gamebird-Arden 230kV</th> <th style="width: 10%;">Cost Estimate (\$M)*</th> <th style="width: 10%;">Gen Curtailment (MW)</th> <th style="width: 10%;">Inc MW/\$M</th> </tr> </thead> <tbody> <tr> <td>Status Quo</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> <td>0</td><td>830</td><td></td> </tr> <tr> <td>Option 1</td> <td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td><td></td> <td>192</td><td>450</td><td>1.98</td> </tr> <tr> <td>Option 2A</td> <td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td> <td>112</td><td>120</td><td>6.34</td> </tr> <tr> <td>Option 2B</td> <td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td> <td>162</td><td>110</td><td>4.44</td> </tr> <tr> <td>Option 2C</td> <td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td> <td>121</td><td>130</td><td>5.79</td> </tr> <tr> <td>Option 3</td> <td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td></td><td>✓</td> <td>90</td><td>0</td><td>9.22</td> </tr> <tr> <td>Option 4</td> <td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td> <td>162</td><td>80</td><td>4.63</td> </tr> <tr> <td>Option 5</td> <td>✓</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td> <td>121</td><td>350</td><td>3.97</td> </tr> <tr> <td>Option 6</td> <td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td> <td>151</td><td>300</td><td>3.51</td> </tr> </tbody> </table> <p style="font-size: small; margin-top: 5px;">* Cost estimate as provided by GLW</p> <div style="display: flex; justify-content: space-between; align-items: center; font-size: x-small;"> California ISO Page 48 </div> <div style="text-align: center; background-color: #0056b3; color: white; padding: 2px; font-size: x-small; margin-top: 5px;">California ISO Public</div> </div>	Options	Pahrump-Sloan Canyon rebuild	Innovation-Desert View reconductor	Desert View-Northwest reconductor	Innovation-Northwest 138kV rebuild	Pahrump-Sloan Canyon #2	Innovation-Desert View #2	Desert View-Northwest #2	138kV Phase Shifter	Gamebird-Arden 230kV	Cost Estimate (\$M)*	Gen Curtailment (MW)	Inc MW/\$M	Status Quo										0	830		Option 1	✓	✓	✓	✓						192	450	1.98	Option 2A					✓	✓	✓			112	120	6.34	Option 2B				✓	✓	✓	✓			162	110	4.44	Option 2C					✓	✓	✓	✓		121	130	5.79	Option 3						✓	✓		✓	90	0	9.22	Option 4			✓	✓	✓	✓				162	80	4.63	Option 5	✓					✓	✓	✓		121	350	3.97	Option 6			✓	✓	✓		✓			151	300	3.51	
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	<p>Of these projects considered, Option 3 - the lowest cost set of upgrades - had the biggest benefit in reducing curtailment; according to these CAISO's assessment it had the biggest bang-for-the-buck using the CAISO's simple comparison of annual reduction in curtailment per \$M of capital investment.</p>																																																																																																																																			
3b	<p>Full Production Cost Modeling by GridLiance Further Demonstrates Reasonableness of EO Limit Expansion</p> <p>GridLiance has performed more extensive production cost modeling of the projects included in Option 3. The modeling was performed using the same tool, GridView, used by the CAISO in its TPP economic studies. GridLiance applied the CAISO's topography, as well as the consistent IRP portfolios and IEPR input assumptions. GridLiance's study of the Gamebird – Arden 230kV upgrade, for example, shows upgrading this path alone has a significant impact at reducing the renewable curtailment, and it produces benefits that essentially would pay for the upgrade costs (estimated at \$69M) in just one year (2030 simulation year). The annual savings resulting for this upgrade path alone are as follows.</p>	<p>The comment has been noted.</p> <p>It is worth clarifying that no significant congestion and renewable curtailment were observed in the GridLiance West and VEA system in the Base Portfolio planning PCM study result. Thereby the GridLiance West and VEA area was not selected to receive detailed economic assessment in this planning cycle.</p>																																																																																																																																		

No	Comment Submitted			CAISO Response
	Table 1 - Gamebird to Arden Upgrade Impacts to CAISO Load Payments CAISO Load payment Generation profits Transmission revenue Net Payment of CAISO Load Customer	Base Case (\$M) 7,106 2,736 200 4,169	With Gamebird – Arden 230kV Upgrade (\$M) 7,000 2,644 255 4,101	Difference (Base – Upgrade) (\$M) 106 -92 54 69
	<p>Based on GridLiance’s production cost modeling, inclusion of additional circuits between the VEA/GLW substations Innovation to Desert View and Desert View to Northwest3 further enhances the reduction in curtailment and produces additional benefits to CAISO load of \$81.6M. The additional Innovation to Desert View and Desert View to Northwest upgrades are expected to cost \$24M. Together with the Gamebird to Arden upgrade (total cost of \$93M) the benefits would again nearly pay for the upgrades within one year. GridLiance looks forward to continuing to work with CAISO to determine the optimal projects to accommodate additional buildout of renewables with the GridLiance expanded EO limit of 2,170 MWs.</p> <p>In short the CAISO’s findings support increasing the EO limits in the GridLiance area, and GridLiance’s complete production cost modeling analysis further reinforces the benefits of the limited transmission upgrades that would support delivery of the renewable energy if sited at the level of the studied EO limit of 2,170 MWs. GridLiance supports expansion to the other limits shown to be manageable through RAS or otherwise cost-effectively managed with upgrades. GridLiance respectfully requests that the CAISO transmit these findings to the CPUC at this time to avoid further delay in an IRP solution that reflects these limits tested through the CAISO’s more detailed analysis.</p>			

No	Comment Submitted	CAISO Response																				
3c	<p>Expanded EO Limits Result in Rational IRP Results in RESOLVE</p> <p>To ensure the expanded EO limits would produce rational results in the IRP, GridLiance further tested the impacts of the expanded EO limits by performing RESOLVE runs. The findings are rational and further support the CAISO authorizing the increased EO limits to the CPUC at this time.</p> <p>GridLiance tested the results by increasing the EO limits in RESOLVE in accordance with the CPUC’s Policy Sensitivity Case 2 expansions. Note that the CPUC developed its Policy Sensitivity Case 2 portfolio using the expanded EO limits, but it also set a carbon goal of 38MMT to drive the portfolio siting high enough to stress test curtailment. GridLiance applied the higher EO limits to the Reference System Plan RESOLVE assumption set, including the 46 MMT carbon goal. In its testing of the expanded EO limits GridLiance also made one adjustment in RESOLVE based on a distortion GridLiance has identified in the past in RESOLVE related to interconnection cost assumptions, a distortion that has caused the CPUC to adjust the portfolios in the mapping process outside of RESOLVE. To have the RESOLVE results be inclusive of this adjustment GridLiance made an adjustment to interconnection cost assumptions within RESOLVE.</p> <p>The increases were to the areas and by the amounts shown below.</p> <div data-bbox="275 1000 1121 1425">  <table border="1"> <caption>MW expansion</caption> <thead> <tr> <th>Region</th> <th>MW Expansion (Approximate)</th> </tr> </thead> <tbody> <tr> <td>Carrizo</td> <td>700</td> </tr> <tr> <td>Central_Valley_North_Los...</td> <td>500</td> </tr> <tr> <td>GLW_VEA</td> <td>1500</td> </tr> <tr> <td>Kern_Greater_Carrizo</td> <td>3000</td> </tr> <tr> <td>Mountain_Pass_El_Dorado</td> <td>1600</td> </tr> <tr> <td>Riverside_Palm_Springs</td> <td>500</td> </tr> <tr> <td>SCADSNV</td> <td>3600</td> </tr> <tr> <td>SPGE</td> <td>3300</td> </tr> <tr> <td>Tehachapi</td> <td>1000</td> </tr> </tbody> </table> </div>	Region	MW Expansion (Approximate)	Carrizo	700	Central_Valley_North_Los...	500	GLW_VEA	1500	Kern_Greater_Carrizo	3000	Mountain_Pass_El_Dorado	1600	Riverside_Palm_Springs	500	SCADSNV	3600	SPGE	3300	Tehachapi	1000	<p>The comment has been noted.</p>
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No	Comment Submitted	CAISO Response
	With these expanded limits the RESOLVE results do not change dramatically or unexpectedly.	
3d	<p><i>Figure 1- Change in Buildout with Expanded EO limits</i></p>  <p>The findings show that the RESOLVE does not wildly change with increases to transmission limits as tested by the CAISO in its TPP. Figure 1 demonstrates that when the limits are expanded additional siting occurs at the lower cost areas and siting decreases within California. (RESOLVE areas not shown on the chart had no change in portfolio siting with the EO limit expansion.) We note that this result is not entirely driven by the expansion, as it is itself quite sensitive to the interconnection issue sited above. In fact, when the Arizona solar interconnection is increased to 1.5x the cost in the base RESOLVE assumptions siting at Arizona does not increase with expanded EO limits, and siting interior to California instead increases as shown in Figure 2.</p>	The comment has been noted.
3e	Figure 2 - Change in Buildout with Expanded EO Limits at 1.5x Az Solar Interconnection Costs	

No	Comment Submitted	CAISO Response																		
	<p style="text-align: center;">2030 Renewable Buildout Change by Scenario</p>  <table border="1"> <caption>2030 Renewable Buildout Change by Scenario</caption> <thead> <tr> <th>Scenario</th> <th>Change (Approximate)</th> </tr> </thead> <tbody> <tr> <td>Arizona_Solar</td> <td>0</td> </tr> <tr> <td>Tehachapi_Solar</td> <td>500</td> </tr> <tr> <td>GLW_VEA-SCADSNV_Solar</td> <td>1,400</td> </tr> <tr> <td>Southern_California_Desert1_Ex_Solar</td> <td>(1,000)</td> </tr> <tr> <td>SCADSNV_Solar</td> <td>200</td> </tr> <tr> <td>Riverside_Palm_Springs_Solar</td> <td>200</td> </tr> <tr> <td>Northern_California_Ex_Wind</td> <td>0</td> </tr> <tr> <td>Greater_Imperial_Solar</td> <td>(600)</td> </tr> </tbody> </table> <p>For the CAISO in its TPP some of these details about RESOLVE responses are not directly relevant as the specific RESOLVE outcomes and IRP choices are under the purview of the CPUC in its IRP process. However, we include these RESOLVE findings in these TPP comments to demonstrate that if the CAISO promotes the tested EO limits to the CPUC for inclusion in the IRP, the results driven by these EO limits are expected to be rational and not produce in themselves wild swings in IRP portfolios.</p>	Scenario	Change (Approximate)	Arizona_Solar	0	Tehachapi_Solar	500	GLW_VEA-SCADSNV_Solar	1,400	Southern_California_Desert1_Ex_Solar	(1,000)	SCADSNV_Solar	200	Riverside_Palm_Springs_Solar	200	Northern_California_Ex_Wind	0	Greater_Imperial_Solar	(600)	<p>The comment has been noted.</p>
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4. LS Power Development (LS Power) Submitted by: Sandeep Arora and Renae Steichen		
No	Comment Submitted	CAISO Response
4a	<p>(1) Reliability Study: Request Window submittal for SWIP-North transmission project</p> <p>LS Power had submitted SWIP-North as a transmission solution to address reliability issues for the Bulk system in the Northern California area. In its review CAISO concluded that SWIP N is <i>"not considered a reliability alternative as the submission does not meet a reliability need identified in the CAISO reliability assessment results"</i>. LS Power disagrees with this conclusion. To address the thermal overloads identified in reliability analysis, CAISO's proposed recommendation is to operate within the California Oregon Intertie (COI) nomogram, which typically involves reduction in COI flow. While this may be an effective short term operating solution, this is not a long-term solution and is counter to the going forward demands on the grid which include the need for spare capacity, durability and flexibility. Implementing operating solutions may resolve the reliability need temporarily but the implications and effectiveness of these should be carefully assessed. For instance, reducing COI flows and/or Path 26 flows, or tripping additional generation post contingency to address thermal overloads could result in significant issues and may even be impractical to implement on capacity shortage days such as the recent load shedding events of Aug 14 & 15, 2020. LS Power encourages CAISO to consider permanent planning solutions such as SWIP-North as it finalizes its 2020-21 Transmission Plan. Continuing to rely on operating solutions that reduce imports will not address the growing capacity shortage concerns and will only lead to more blackouts in the coming years.</p>	<p>The CAISO has continued to assess the COI and Path 26 congestion with the analysis incorporated into the Draft 2020-2021 Transmission Plan.</p>
4b	<p>(2) Economic Study: COI congestion & SWIP-North as an economic project</p> <p>CAISO staff has made some modest improvements to its ADS PCM model in this Planning cycle, and partly because of these improvements the model can better quantify COI congestion. While the model is still showing a lot less congestion on PACI & NOB paths as compared to actual congestion documented per CAISO DMM reports¹ from last several years, the recent model improvements are a step in the right direction. We support CAISO's recommendation to further study COI congestion in this planning cycle. We also recommend that CAISO perform an economic study for SWIP-North</p>	<p>The comments have been noted.</p> <p>COI corridor congestion was selected to receive detailed analysis in this planning cycle, and the SWIP-North project was considered as a potential mitigation. The detail of the analysis can be found in the draft TPP report.</p>

No	Comment Submitted	CAISO Response
	<p>transmission project, a path that is parallel to the existing COI path. It is estimated that the SWIP-North project reduces COI flows by ~300 MW or more and, based on CAISO's prior TPP analysis, reduces congestion hours on COI by 39%.</p> <p>As CAISO completes its economic analysis, we would like to make the following recommendations for CAISO to include in its analysis:</p> <p>(1) For COI congestion analysis, CAISO should not use 4800 MW as the limit (or associated lower nomogram limit) for COI path. 4800 MW is the full path rating limit, but CAISO's share of this is only 3200 MW (limit of PACI scheduling interface²) with the remaining 1600 MW belonging to members of Transmission Agency of Northern California (TANC), an entity outside CAISO. In addition, as CAISO has noted in its prior TPP presentations, 1200 MW out of the 3200 MW PACI scheduling limit comprises of Existing Transfer Capabilities (ETCs) and Transmission Ownership Rights (TORs) that are owned by entities outside CAISO. This leaves only about 2000 MW out of the total 4800 MW on COI that is available to CAISO and this is what it should use for its economic analysis. The other 2800 MW should be modeled with a large hurdle rate such that it becomes mostly unavailable to CAISO system. If CAISO does not correctly capture these scheduling realities, and makes more than 2000 MW on this path available for itself, economic analysis will artificially reduce COI congestion.</p> <p>(2) For the SWIP-North economic study, CAISO should calculate all benefits of a 1000 MW transmission capacity from Midpoint to Harry Allen, free of any wheeling charges. Further, CAISO should ensure that the existing transmission path from Robinson Summit to Harry Allen ("ON Line") is limited to 1000 MW in the base case and is increased to 2000 MW only in the case with SWIP-North. As explained in our submittals to CAISO, SWIP-North will not only create a new 2000 MW path from Midpoint to Robinson Summit but a few terminal upgrades associated with the entire build out of SWIP will also increase transmission capacity of ON Line from 1000 to 2000 MW. A total of 1000 MW of transmission capacity from Midpoint to Harry Allen is offered for CAISO use as part of this project.</p> <p>(3) CAISO should correctly model new renewable generation for SWIP-North economic study. Currently there is over 7000 MW of new renewable generation</p>	

No	Comment Submitted	CAISO Response
	<p>in Idaho Power Company's interconnection queue with a significant portion being wind generation.³ Among these generators is a 1050 MW wind project, Lava Ridge Wind⁴, which is being developed by an affiliate of LS Power for a planned COD of 2024. Lava Ridge intends to execute a Pseudo PGA with CAISO for all or most of its capacity so it can be delivered to CAISO LSEs as a Bucket 1 Resource Adequacy resource. CAISO should correctly model Lava Ridge and other new renewable resources in its SWIP-North economic study case.</p> <p>(4) CAISO should not only quantify production cost savings but should also capture these additional benefits of SWIP-North to CAISO ratepayers:</p> <p>(a) Financial benefits of improving Day Ahead scheduling capability and thereby alleviating existing Day Ahead financial congestion that is common place for CAISO's PACI, COI, NOB paths.</p> <p>(b) GHG reductions and associated savings to CAISO that can be offered by diverse new and existing renewable supply at the other end of SWIP-North.</p> <p>If California continues to build solar and storage, CAISO's studies have noted an increase in thermal generation, and thus GHG emissions, to ensure battery storage resources are charged to meet the net demand evening ramp.⁶ If this in-state storage can be charged by out-of-state (OOS) wind such as from Idaho, this will allow the gas fleet to be retired as scheduled, or used less, thereby offering GHG emission reductions. SWIP-North will enable an incremental 1000 MW of transmission capacity that can be used to import/export generation resources into/from CAISO. CAISO's prior TPP analysis has shown that "SWIP - North may allow more exports from California to other regions when there are renewable energy surplus within California". This will certainly help reduce GHG emissions in California by allowing more renewable generators to remain online and displacing fossil fuel generation. CAISO should quantify GHG reductions and renewable curtailment reductions from SWIP-North. An approach CAISO can take in quantifying these benefits would be similar to how CAISO calculates similar benefits for its Quarterly EIM benefits analysis. As per CAISO's Q3 2020 Western EIM report⁷ total avoided renewable curtailment volume in MWh</p>	

No	Comment Submitted	CAISO Response
	<p>for 2020 year to date (Q1-3) was calculated to be 271,802MWh, equivalent to 116,332 tons of CO2 avoided. This uses the assumption that avoided renewable curtailments displace production from other resources at a default emission rate of 0.428 metric tons CO2/MWh. We recommend similar approach be used in quantifying these environmental benefits for projects like SWIP-North. CAISO should capture these benefits as it works on finalizing the Transmission Plan.</p> <p>(b) Renewable capacity capital cost savings: In CAISO's studies, SWIP-North has shown to help reduce renewable curtailments in CAISO footprint by providing a conduit to export surplus renewable energy from California. As renewable curtailments are reduced, there will be capital cost savings as CAISO Load Serving Entities will not need to build incremental renewables to meet same RPS goals. These capital cost savings should be captured.</p> <p>(c) Load Diversity and Flexible Reserve Capacity savings. CAISO should estimate the Resource Adequacy/Capacity value of SWIP-North based on load diversity (seasonally and hourly) between Idaho and Southern California. Recent historical load shapes to determine the reduction in peak requirements should be used for this analysis. Value of reduction in peak capacity requirements based on prevailing costs of capacity in Southern California and Idaho should be estimated. Enabling 1000 MW of transmission capacity from CAISO to neighboring regions will allow the flexible ramping requirement for CAISO and the regions to be reduced as they will be able to take advantage of the diversity of resources and shape of the load. These diversity saving benefits should be accounted for. CAISO's Quarterly EIM reports capture these benefits and this is an approach that CAISO Transmission Planning can use as well for this study.</p> <p>(5) Energy Imbalance Market (EIM) & Extended Day Ahead Market (EDAM) benefits A new 1000 MW transmission path between CAISO, NV Energy, and Idaho Power Company can potentially allow for significant incremental EIM transactions and in future EDAM transactions. The EIM market continues to be a huge success with all participating entities reaping benefits as noted in quarterly benefit reports, including \$119.32 million in economic benefits in Q3</p>	

No	Comment Submitted	CAISO Response
	<p>2020 alone.⁸ As previously shown in studies conducted by E3, incremental availability of transmission between EIM entities helps further enhance these benefits. In the past, CAISO has not used EIM benefits for transmission investment decisions, however now that the EIM markets have been in place for several years, the risk of existing entities leaving the markets is extremely low, therefore CAISO should attempt to quantify this additional economic benefit that new transmission projects such as SWIP-North can provide.</p> <p>(6) Other benefits: A new transmission line such as SWIP-North which parallels several existing 500 kV bulk transmission paths connecting northern part of WECC to southern provides several additional benefits that go beyond traditional economic studies. These benefits should however be quantified so all lead agencies in California and the ratepayers can get a complete picture on the value of such transmission lines.</p> <p>a) Potential solution to prevent blackouts during heatwave situations</p> <p>As witnessed during August 2020 blackout events, the supply conditions within California & Desert Southwest were extremely tight especially during the evening peak hours. As shown by preliminary analysis conducted by WECC9, while Desert Southwest was experiencing heatwave and supply shortages, Pacific Northwest was not in such dire situation. If there was enough transmission capability available, California could have potentially imported energy from Pacific Northwest. Given this, a natural question that is posed is what value would a new transmission line have provided for days like this? SWIP-North, which provides an alternate 1000 MW path to allow flow from Pacific Northwest & PacifiCorp East into CAISO may have potentially prevented load shedding events in California.</p> <p>b) Wildfire risk mitigation:</p> <p>We recommend that CAISO evaluate the wildfire risk mitigation benefits of SWIP-North. It is known that the COI corridor and the 500 kV transmission lines north of COI corridor fall under high wildfire risk category. This was evident based on the August heatwave events where fire underneath one of the lines in</p>	

No	Comment Submitted	CAISO Response
	<p>this corridor lead to de-rate on COI path by 650 MW.10 A new transmission line like SWIP-North, with its right of way from Idaho to Nevada has relatively low wild fire risk. Such a diverse transmission path, which can allow energy to be re-directed towards CAISO in the event existing COI corridor is congested or its limit reduced, provides benefits to CAISO ratepayers. This benefit should be captured in CAISO's analysis.</p>	
4c	<p>(3) Policy studies should address the OOS transmission question Every year in the TPP process CAISO performs policy studies based on portfolios submitted to it by CPUC. While CPUC portfolios may contain information on OOS renewables from Wyoming, New Mexico or Idaho, CAISO studies are limited to only analyzing the impacts of these OOS renewables to inside CAISO transmission system. We see this as a fatal flaw and recommend that this be corrected in this and future TPP studies. If CAISO only studies impact of OOS renewables on in-state transmission, then this study doesn't help address the question as to which new OOS transmission works the best to be able to deliver these MWs to CAISO boundary stations. CAISO should work closely with CPUC and analyze different OOS portfolios and transmission solutions so it can present its findings to stakeholders and all lead agencies and a decision can be taken on selecting a "least regrets" transmission solution. This needs to be done in this TPP cycle, keeping in mind the long lead time it takes to build new transmission and that the uncertainty on OOS transmission availability has been causing to California LSEs who would like to contract with OOS renewables hesitate because of this lack of CAISO decision making. With the expectation of heatwaves in future and upcoming Diablo Canyon and OTC retirements in 2024 and 2025, it is imminent that a decision on new OOS transmission be taken soon so that OOS renewables can provide a diverse solution in replacing Diablo Canyon and other in-state OTC units.</p>	<p>Consistent with the CPUC IRP portfolio submissions to the CAISO 2020-2021 transmission planning process, the CAISO has assessed the impacts within the CAISO for the out of state wind in the portfolios.</p>

5. Pacific Gas and Electric Company (PG&E) Submitted by: Matt Lecar		
No	Comment Submitted	CAISO Response
5a	<p>PG&E asks the CAISO to modify the representation of benefit to cost ratios in economic transmission projects that include LCR reduction.</p> <p>In the CAISO's TPP Process for evaluating Economic Transmission Projects that include LCR reductions, the CAISO has relied on three scenarios to determine whether the transmission project should be compared against the price spread between System and Local RA, the CPM soft offer cap, or compare against an existing Reliability Must Run contract. Typically, the CAISO picks the scenario it believes fits the circumstances of the project and only provides an economic assessment of that scenario. PG&E asks the CAISO to instead provide the results from all three scenarios in the review of each economic project, including the Metcalf 500/230 kV Transformers Dynamic Series Reactor project, with the CAISO specifying which scenario it believes it applies. This way, stakeholders can provide information to the CAISO as to why that particular scenario the CAISO has selected may be incorrect and the CAISO will not need to conduct additional analysis during the final approval phase of the process.</p>	<p>With the current CPUC IRP base portfolio indicating no retirement of gas-fired resources will all of the gas-fired resources required for system needs, the CAISO will continue to use the publicly available information from the CPUC to assess the local capacity economic alternative analysis. The CAISO will continue to assess if changes are required in future planning cycles.</p>
5b	<p>PG&E supports the CAISO's efforts to evaluate historic PSPS event information to assess potential mitigations for the 2020-21 TPP cycle.</p> <p>Overall, PG&E is supportive of the CAISO's inclusion of a PSPS risk assessment in the Transmission Planning Process. PG&E welcomes the opportunity to support the CAISO's identification of approved and potentially new projects that mitigate PSPS risk.</p>	<p>The comment has been noted.</p>
5c	<p>PG&E categorizes the <i>All Tiers 2 & 3</i> and <i>All Tier 3</i> scenarios in the PSPS Impact Assessment as extreme. PG&E considers the two additional scenarios developed with information from PG&E as more reasonable, yet conservative.</p> <p>PG&E applauds the CAISO's effort to assess and mitigate PSPS risk. PG&E is working diligently to make PSPS events less frequent and shorter in duration with quicker restoration times. With that goal in mind, PSPS criteria continues to evolve in response to wildfire risk.</p> <p>PG&E considers the five scenarios presented and compared in the November 17th stakeholder meeting as fairly conservative with the scenarios labeled "<i>All</i></p>	<p>The comment has been noted.</p>



No	Comment Submitted	CAISO Response
	<p><i>T2&3</i> & <i>All T3</i> as extreme.1 The two scenarios based on information supplied by PG&E are more reasonable, yet conservative.</p> <p>PG&E looks forward to continued collaboration with the CAISO on this important effort and welcomes the CAISO studying the 2020 PSPS events as additional scenarios.</p>	

6. Public Advocates Office (PAO) Submitted by: Jerry Melcher		
No	Comment Submitted	CAISO Response
6a	<p>1. CAISO should provide comprehensive data when identifying battery storage as a transmission mitigation solution in the Base portfolio. At the November 17th TPP stakeholder meeting, the CAISO provided an overview of its policy-driven transmission assessment. The CAISO utilized the CPUC's recommended storage mapping to model generic battery storage in the power flow cases study. For the CPUC Policy-driven Base portfolio, unlike the two sensitivity portfolios, the CPUC did not map generic battery storage (up to 2,157 MW/5,504 MWh) to specific locations and recommended that the CAISO apply the resource at locations where it can mitigate identified transmission issues. Although the CAISO provided the generic resource and battery storage mapping in the two Sensitivity portfolios, it did not provide any details of the storage resource mapping in the Base portfolio. Cal Advocates recommends the CAISO provide the details on the battery storage capacity the CAISO has mapped in the CPUC's Policy-driven Base portfolio to mitigate transmission issues. Specifically, the CAISO should provide this data by renewable transmission zone and by local capacity areas (LCR) areas and sub-areas.</p>	<p>The CAISO did not map the entire battery storage in the base portfolio. Consistent with the guidance from the CPUC, the CAISO did consider, and where appropriate recommend, battery storage as a mitigation for transmission issues identified in the base portfolio. Please see the reliability assessment recommendation presentations for PG&E and SDG&E areas.</p> <p>The CAISO also notes that the CPUC, in collaboration with the CEC and CAISO, has mapped the battery storage in all portfolios for the 2021-2022 transmission planning process including the base portfolio.</p>
6b	<p>2. The CAISO should evaluate the lowest-cost solution, including battery storage, for all the transmission projects that are currently on hold. During the November 17th stakeholder meeting, the CAISO presented the analysis conducted on the following three (3) Pacific Gas & Electric Company (PG&E) projects that were previously placed on hold.⁴</p> <ol style="list-style-type: none"> 1. Wheeler Ridge Junction Project (estimated capital cost of \$250-\$300 million); 2. Moraga-Sobrante Reconductoring Project (estimated capital cost of \$10-\$20 million); and 3. North of Mesa Project (estimated capital cost of \$114-\$144 million). <p>Cal Advocates supports the CAISO's proposed re-evaluation for these projects where the project need and/or estimated project cost have changed. For the Wheeler Ridge Junction Project, the overloaded circuits and the reliability contingencies that were driving the need for the project have changed. Therefore, Cal Advocates recommends that the CAISO conduct additional analyses to determine if the Wheeler Ridge Junction Project continues to be the most cost-effective solution to mitigate the identified overloads on the system. CAISO should also evaluate low-cost solutions for the Moraga-Sobrante Reconductoring Project.</p>	<p>The CAISO has continued to assess the on-hold project. The CAISO has recommended that the Moraga-Sobrante reconductoring project remain on hold for further review in the next planning cycle. For the Wheeler Ridge Junction project and the North of Mesa project the CAISO has recommended in the Draft 2020-2021 Transmission Plan for the procurement of storage as a part of the mitigation plan for the identified reliability constraints.</p>

No	Comment Submitted	CAISO Response
	<p>For the North of Mesa Project, the CAISO should first evaluate whether the low-cost solution, such as the installation of 100 megawatt (MW) of Battery Energy Storage System (BESS) is adequate to meet the CAISO planning standards. Only when the standalone BESS solution is found to be inadequate should the CAISO explore incremental or alternative transmission mitigation solutions.</p>	
6c	<p>3. The CAISO should post the details of the 2020-2021 TPP Request Window Applications on the CAISO secured portal as soon as possible. In each TPP cycle, the CAISO evaluates and considers alternative mitigation plan proposals submitted through the request window by Participating Transmission Owners (PTOs) and other interested parties. The CAISO's November 17th presentation included references to the transmission request window applications on several occasions, including the listing of the request window projects⁵ or candidate solutions like the Local Capacity Requirements Potential Reduction Study.⁶ As of November 25, 2020, the CAISO has not posted any Request Window Submissions for 2020-2021 TPP. Consequently, it is not possible for stakeholders to weigh-in on the need for these request window projects without having the opportunity to evaluate these projects. Therefore, it is recommended that the CAISO posts these original Request Window Submissions on the CAISO's secured TPP portal as soon as possible so stakeholders can review them.</p>	<p>Request Window submissions have been posted on the CAISO Market Participant Portal.</p>
6d	<p>4. The Wildfire Impact Assessment should account for the effects of distribution circuit outages. In its October 8, 2020 comments filed in response to the September 24, 2020 CAISO TPP 2020-2021 stakeholder meeting, Cal Advocates raised the concern that the CAISO's Wildfire Impact Assessment suffered from serious flaws in the study design and scope. The most recent version of the CAISO's Wildfire Impact Assessment has improved, but has not addressed Cal Advocates' fundamental concern: any analysis of wildfire-related de-energization events must account for distribution-level shutoffs and the resulting load reductions.</p> <p>The Wildfire Impact Assessment now includes a scenario that reflects PG&E's recent wildfire mitigation work. This scenario is based on the transmission lines shut off in the October 26, 2019 de-energization event, excluding transmission lines where PG&E has since performed mitigation. This is significantly more realistic than the scenarios presented previously.</p>	<p>The CAISO coordinates with the transmission owners in conducting the wildfire risk assessments. As part of the transmission planning process the focus of the study is on the transmission impacts associated with potential wildfire scenarios. The distribution owners continue to assess the distribution impacts associated with wildfire scenarios.</p>

No	Comment Submitted	CAISO Response																												
	<p>However, the CAISO is still not accounting for the fact that wildfire-related de-energization events typically involve de-energizing distribution circuits, which results in lost load.</p> <p>Cal Advocates obtained data from PG&E on the load impacts of PG&E's 2019 de-energization events. On average in these 2019 events, lost load was primarily (38 percent) associated with de-energization of distribution circuits due to local weather conditions. The next largest amount of lost load (33 percent) was from circuits that were affected by de-energizations at both the transmission and distribution levels. Only 29 percent of lost load was solely caused by de-energization of transmission lines.</p> <p>In addition to average data for 2019, Cal Advocates requested data on load impacts in PG&E's two largest de-energization events in 2019. These two large events occurred on October 9-12, 2019 and on October 26-29, 2019. This data is summarized below in Table 1.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d9ead3;"> <th colspan="4">Table 1: Causes of Lost Customer Load</th> </tr> <tr style="background-color: #d9ead3;"> <th colspan="4">Lost load by cause</th> </tr> <tr style="background-color: #d9ead3;"> <th></th> <th colspan="3">Customer was de-energized due to:</th> </tr> <tr style="background-color: #d9ead3;"> <th></th> <th>De-energization of transmission lines</th> <th>De-energization of local distribution circuit</th> <th>Both distribution circuit and transmission line de-energized</th> </tr> </thead> <tbody> <tr> <td>Average of 2019 events</td> <td>29 percent</td> <td>38 percent</td> <td>33 percent</td> </tr> <tr> <td>October 9-12, 2019</td> <td>20 percent</td> <td>52 percent</td> <td>28 percent</td> </tr> <tr> <td>October 26-29, 2019</td> <td>35 percent</td> <td>29 percent</td> <td>36 percent</td> </tr> </tbody> </table> <p>Source: PG&E responses to Cal Advocates' data request.¹⁰</p> <p>Table 1 shows that transmission lines are not the predominant cause of customer outages in these events. Only 20 to 35 percent of lost load is solely attributable to the de-energization of transmission lines in fire weather conditions.</p> <p>Based on this information, the design of the CAISO's Wildfire Impact Assessment remains flawed. A more informative analysis of wildfire-related de-</p>	Table 1: Causes of Lost Customer Load				Lost load by cause					Customer was de-energized due to:				De-energization of transmission lines	De-energization of local distribution circuit	Both distribution circuit and transmission line de-energized	Average of 2019 events	29 percent	38 percent	33 percent	October 9-12, 2019	20 percent	52 percent	28 percent	October 26-29, 2019	35 percent	29 percent	36 percent	
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No	Comment Submitted	CAISO Response
	energization events must consider the most important consequence of these events: thousands of customers lose power when their electric utility shuts off the distribution circuit that serves their homes or businesses.	

7. San Diego Gas & Electric (SDG&E) Submitted by:		
No	Comment Submitted	CAISO Response
7a	<p>1. All impacts for allowing RAS as an acceptable mitigation need to be considered With much of the mitigation being proposed coming in the form of RAS instead of transmission projects, the cumulative reliability risks will increase. Specifically, CAISO's methodology does not consider the effect of a generation trip RAS on the planned resource stack. To illustrate this issue, consider a peak summer day where resources are scarce (similar to what happened many times this past Summer). If conditions are such that RAS trips generation, the CAISO BA will be short on resources and there may be a risk of load curtailment. This represents an N-1 reliability issue and the result would effectively be moving the transmission issue to balancing/resource issue. The likelihood of such a scenario increases as more RAS solutions are implemented.</p> <p>The traditional concerns regarding RAS still apply. There is a higher risk for SOL violation due to increased system complexity and the level of analysis required. Additional post-contingency with RAS operation evaluation/analysis (i.e., prolonged restoration) are typical with RAS. They represent greater potential for unintended consequences or mis-operation. In any system with an abundance of RAS schemes, multiple RAS interactions and coordination requirements will need to be managed.</p>	<p>A condition required for RAS to trip a generator is a forced outage on a transmission facility that is part of that RAS. The forced outage rate of transmission facilities are an order of magnitude less than that of thermal generators and the amount of generation that can be tripped by a RAS is limited per the ISO Planning Standards to stay below the impact of generation being lost for its own reasons. The CAISO will continue to review RAS applications and is considering reviewing the reliance of RAS overall.</p>
7b	<p>2. The locational difference in interconnection costs need to be considered As CAISO includes more renewable resources and storage facilities in the transmission plan, interconnection costs and feasibility should be accurately represented. This includes locational differences, as costs will vary depending on factors such as capacity at the actual interconnection facility and zip code/city. For example, securing a vacant bay position at one of SDG&E's substations continues to be a challenge, as there are very few positions remaining.</p>	<p>The comment has been noted.</p>
7c	<p>3. ITC implications Due to the high penetration of renewables, potential impact to ITC incentives needs to be understood. For an energy storage project, ITC's are largely dependent on what percentage of charging energy came from renewable resources. As different strategies regarding storage are considered, there may</p>	<p>The comment has been noted.</p>

No	Comment Submitted	CAISO Response
	<p>be options that require a project to reduce the amount of renewable energy used to charge in order to support grid reliability. This will decrease the ITC and the resulting increase in revenue requirements from capital costs need to be considered in CAISO's economic analysis of alternatives.</p>	
7d	<p>4. Broader impacts of off-nominal energy storage (e.g. battery) dispatch Expanding the points above, there may be scenarios where batteries are depended upon to support grid reliability. These instances take them off their ideal economic dispatch. The opportunity cost arising from any deviation from the ideal economic dispatch needs to be considered in CAISO's economic analysis of non-wires alternatives to potential transmission projects.</p> <p>It is also important to remember that battery storage capacity is limited (compared to a wires or longer-duration storage alternative) by its megawatt-hour rating, and grid reliability need may outlast the storage capability. For example, consider two 40MW batteries that have 4-hour storage capability. Under current RA rules, these batteries would count for 80MW of system RA. However, if these are used to mitigate a reliability issue that lasts longer than 4 hours, these batteries would need to be either dispatched one at a time or the simultaneous output of both resources reduced. Thus, depending on how long the reliability issue lasts, there may be less than 80 MW capability even though 80MW were counted towards system RA.</p>	<p>The comment has been noted.</p>
7e	<p>5. Capital costs of storage projects/non-wire alternatives CAISO made the comment that storage projects and other non-wire alternatives do not have full capital costs considered. SDG&E requests that CAISO clarify this point as all costs, both fixed and variable on a full and equivalent lifecycle basis, need to be accounted for when determining whether a non-wires alternative (such as a storage project) is more or less economical than a potential transmission project.</p>	<p>SDG&E's comment does not point to a particular document where the CAISO made such a comment. However, on Page 27 of the CPUC Staff Report: Modeling Assumptions for the 2020-2021 Transmission Planning Process Release 2 (TPP Sensitivity Portfolios) CPUC Energy Division March 30, 2020, the CPUC made the following statement:</p> <p>"Release 1 details the amount of battery storage RESOLVE found to be cost-effective to support reliability, GHG reduction, and renewable integration needs. Given these system benefits, the CAISO should not include the full capital cost of storage as an assumption in the assessment of storage as a transmission alternative that can mitigate reliability needs identified. The CAISO should however consider in its assessments the limitations of those storage units in serving system needs and account for those constraints where possible."</p>

8. Smart Wires Submitted by: Andrew Martin and Chris Ariante		
No	Comment Submitted	CAISO Response
8a	<p>Regarding PG&E's project submission to reduce Greater Bay Area (GBA) Local Capacity Requirement (LCR)</p> <p>During the September 25th TPP stakeholder meeting, PG&E proposed a project to reduce Greater Bay Area LCR following its sudden rise due to N-1-1 criteria adoption. PG&E's proposed solution included use of SmartValves to reduce flow on the constrained Metcalf transformers and to reduce Greater Bay Area LCR down to the next most limiting constraint (reduction of ~1350 MW). CAISO's latest analysis has confirmed the solution's impact is as designed by PG&E.</p> <p>CAISO's economic assessment that was conducted to value the ~1350 MW reduction indicates that there is no incentive to reduce GBA local capacity with <i>any</i> project at this time. Smart Wires acknowledges that this is due to the local and system weighted average capacity costs being roughly the same per <i>The 2018 Resource Adequacy Report</i> published by the CPUC. However, given the prior stakeholder engagement around this constraint following its identification in the 2021 Local Capacity Technical Study, Smart Wires believes stakeholders would benefit from additional commentary as to why a project to reduce GBA LCR should or should not be pursued.</p> <p>Use of historical weighted average capacity costs neglects the influence that local constraints have on the tails of capacity cost distributions. A sudden rise in local requirements, as identified for GBA, can have an outsized impact on procurement, and several million dollars' worth of local capacity costs could materialize before CAISO's methodology would adequately reflect the actual costs incurred on ratepayers. On the heels of the 2021 local capacity technical study results, the CPUC suspended 2022 and 2023 local procurement associated with the GBA LCR increase for these reasons. As such, Smart Wires request that additional data be provided to ensure the methodology utilized accurately captures the estimated cost of procurement and that procuring additional local generation is the most economical solution for ratepayers.</p>	<p>With the current CPUC IRP base portfolio indicating no retirement of gas-fired resources will all of the gas-fired resources required for system needs, the CAISO will continue to use the publicly available information from the CPUC to assess the local capacity economic alternative analysis. The CAISO will continue to assess if changes are required in future planning cycles.</p>



No	Comment Submitted	CAISO Response
	<p>Additionally, in the recent LCR study results presented by CAISO in the latest TPP stakeholder meeting on November 17th, the underlying assumption is that GBA has deficient local Net Qualifying Capacity (NQC) while other local areas have a net ~7 GW of surplus (slide 155, titled, "2030 Final LCR Needs"). This underlying assumption of GBA being deficient in future years runs counter to the near term capacity cost trends identified in <i>The 2018 Resource Adequacy Report</i>. Smart Wires also requests CAISO to comment on how to reconcile the difference between historical data and assumed future trends.</p>	

9. Transmission Agency of Northern California (TANC) Submitted by: Keith Johnson		
No	Comment Submitted	CAISO Response
9a	TANC is encouraged that the CAISO has used the ADS Production Cost Model ("PCM") 2030 v1.0 as a starting point for its economic assessment and rebuilt the CAISO system model in PCM with updated network topology, load forecasts and resource assumptions. The costs of congestion on the Pacific AC Intertie portion of the COI in the new model for the base portfolio have improved, but the hours of congestion are still low compared to historic annual Day-Ahead congestion hours. TANC believes that the improved economic modeling is a good step in the right direction and encourages the CAISO to continue to incorporate validated changes in the ADS PCM into the CAISO's planning PCM. TANC requests that the CAISO continue to look at the causes of Day-Ahead congestion, both operational and analytically, within the TPP modeling and identify potential mitigation measures to alleviate the congestion burden on ratepayers. TANC is willing to assist the CAISO in this endeavor, as appropriate.	The comment has been noted.
9b	TANC supports the CAISO's decision to include COI Corridor Congestion as a high-priority study area for which the CAISO will conduct a more detailed economic assessment and provide an updated assessment during the next TPP stakeholder meeting in February 2021.	The comment has been noted.
9c	TANC recognizes that the CAISO has made efforts to better recognize limitations associated with transmission outages. Scheduled and unplanned outages are major sources of limitations that will likely contribute to increased renewable curtailments in future years or exacerbate supply shortages at any time. TANC continues to monitor actual congestion compared to that forecasted by the CAISO and will seek to identify improvements in economic assessments to more accurately forecast future congestion. TANC encourages the CAISO to continue to improve its model and explore potential congestion forecast improvements.	The comment has been noted.

10. Vistra Submitted by: Cathleen Colbert		
No	Comment Submitted	CAISO Response
10a	<p>We are committed to engaging with the CAISO to ensure the long-term planning processes result in transmission upgrades needed to support California's policy goals in a "least regrets" way. We look forward to receiving more information about the economic assessments. Vistra requests the CAISO include in its list of economic planning study requests received No. 6, "Economic Study Requests to Reduce Local Capacity Requirements (LCR) Using Power Flow Control" that was submitted by SmartWires for various locations including South Bay – Moss Landing sub-area. As we mentioned in previous comments, we support adopting a different potential alternative to maintain reliability criteria within the Greater Bay Area and sub-areas by upgrading certain limiting transmission facilities instead of curtailing energy storage to remain within the current limits. For example, the "Moss Landing-Las Aguilas 230 kV" constraint could be upgraded allow for higher line rating so that CAISO can significantly reduce the sub-area LCR, allow for additional capacity to meet the remaining LCR from storage within the local area, and support increased levels of renewable integration. While the SmartWires proposed project may differ from our previous suggestion, we see merit in exploring the economics of the proposed study. This approach both furthers reliability needs and advances state policies to reduce harmful emission from energy sector through increased renewable and storage penetration, which merits including the No. 6 submitted economic study in the list of high-priority studies. We urge CAISO to closely evaluate whether upgrades to reduce LCR in local areas including the Moss-landing sub-area can be evaluated in the economic assessments as a high priority upgrade or study. With California's aggressive procurement and policies guiding development of new preferred and energy storage resources this is a critical study to assess to see if it identifies economic upgrades to ensure the build out of these resources is done in a way that the transmission system can reliably support their development</p>	<p>Smart Wires submitted economic study request to study the power flow control solutions to mitigate LCR constraints via power flow control. With the current CPUC IRP base portfolio indicating no retirement of gas-fired resources with all of the gas-fired resources required for system needs, the CAISO continued to use the publicly available information from the CPUC to assess the local capacity economic alternative analysis. Based on the price differential between the local and system RA in the publicly available information from the CPUC, the reduction of LCR within Greater Bay Area or sub-areas are not sufficient to justify these upgrades on an economic basis.</p>
10b	<p>While we recognize that the TPP methodology for modeling energy storage resources is set for the instant Phase 2 studies including the long-term LCR study, we continue to be concerned that the results are masking transmission upgrades needed to integrate storage resources being procured and developed in the near term. We continue to be concerned that the output of the economic study will undervalue the benefit side of the cost-benefit analysis in these</p>	<p>The comment has been noted.</p>

No	Comment Submitted	CAISO Response
	<p>studies until the modelling parameters can be improved to more realistically represent congestion costs. For example, we do not believe the current modelling approach accurately represents the savings that can be realized from resolving the cost of congestion from a transmission project because the modelled congestion costs are systemically lower than we expect actual congestion costs to be in various locations on the system, once a significant number of storage projects are operational</p>	
10c	<p>Vistra urges CAISO to continue to consider feedback on how the storage modeling methods could be improved so that in the next iteration of the TPP the study results can more accurately identify need for transmission upgrades. We are concerned that the methodology being used to model energy storage resources in the 2020-2021 TPP studies does not adequately reflect the operational diversity within the set of storage assets being developed. Storage developers build energy storage resources to meet different use cases generally among three major types where the logic for when the resource would charge or discharge differs accordingly:</p> <ul style="list-style-type: none"> • Co-located storage: This configuration type is generally configured to allow the storage to store excess generation from renewable asset such as a solar resource to reduce curtailments and allow for renewable energy to be injected on the grid from stored energy during periods when the renewable is not producing due to its operational limitation. Under this scenario for charging logic, the CAISO can improve its co-located storage modelling by assuming that it will charge during hours where its co-located assets output exceeds its ability to inject on the CAISO controlled grid or during other hours for charging from the CAISO grid at prices less than \$0/MWh. Under this scenario for discharging, the CAISO can improve its co-located storage modelling by assuming that the storage resource would discharge during the other periods when neither its co-located resource is producing energy or the energy prices are below \$0/MWh. • Stand-alone use-limited storage to provide ancillary services: This configuration type is generally configured to have the ability to charge when most economic and then to hold that charge on the battery until called for an Ancillary Service event. Under this scenario for charging and discharging logic, the CAISO can improve its modelling of use-limited 	<p>The planning PCM in the 2020-2021 planning cycle modeled battery storage as stand-alone resource. The battery storage model in the planning PCM can be further refined with clarity of the battery development picture and the assumption in the CPUC IRP.</p>



No	Comment Submitted	CAISO Response
	<p>stand-alone storage by assuming that the storage asset charges when energy prices are less than or equal to \$0/MW and discharges when an AS event might be needed such as at energy prices greater than \$200/MWh.</p> <ul style="list-style-type: none"> Stand-alone storage to perform energy arbitrage: This configuration type is generally configured to have the ability to energy arbitrage where the primary purpose is to charge at prices just slightly less than the expected discharge prices accounting for roundtrip efficiency. For example, if the storage asset efficiency rate is 85% and the storage has a duration of four hours during a day where the fourth highest modeled energy price across the twenty-four hours is \$25/MWh, then the storage asset would be willing to charge during any hour with energy prices less than \$21.25/MWh. Under this scenario, the CAISO can improve its modelling of stand-alone storage performing energy arbitrage by assuming the storage asset charges at energy prices less than or equal to the N-th lowest projected price during the day times its efficiency rate where N represents the duration hours of the asset. Similarly, the discharge logic would assume it discharges when energy prices are at least at the N-th highest projected price during the day. 	
10d	<p>In addition to these three general use cases, there are still many variations in how storage resources are developed, built to operate, and can enter into bilateral contracts to meet charging needs. As we raised in prior comments on the CAISO's 2022 Local Capacity Requirements study manual, the capability of a specific energy storage resource to recharge is highly dependent on its specific situation. A more complex scenario to those above is one where during times of grid disturbances where charging energy is not available, an energy storage resource that is located near another resource type with which it holds a commercial agreement may recharge its battery with the out-of-market energy from for example a co-located or geographically proximate resource based on that agreement. These types of transactions can be effectuated in the day-ahead or real-time markets through inter-scheduling trades between the two resources.</p> <p>Specific to the final long-term LCR study results, Vistra thanks the CAISO for providing additional details on the methodology it is using to determine the maximum storage and maximum four-hour storage limits. Among the modelling</p>	The comment has been noted.

No	Comment Submitted	CAISO Response
	<p>assumptions explained at the November 17th call, Vistra found the static assumption of 85% efficiency would inaccurately reflect capabilities other than 85% and this value will be included in the Master File under ESDER4 and should be used in the planning studies once available. We respectfully request that the CAISO engage with storage developers and operators when developing its study assumptions for storage modeling to more accurately represent the expected operations of the asset as described below more fully.</p>	
10e	<p>In summary, Vistra respectfully requests the CAISO identify the No. 6 submitted economic study request to evaluate whether transmission upgrades are needed to reduce LCR in certain LCR areas or sub-areas as a high priority study and conduct an economic assessment of it. Further, we respectfully request the CAISO continue to work with stakeholders and consider storage developer and operators experience, including that provided above, when developing its study plan for the next iteration of the TPP.</p>	<p>The comment has been noted.</p>

11. Westlands Solar Park Submitted by: Daniel Kim		
No	Comment Submitted	CAISO Response
11a	<p>The Westlands Solar Park (WSP) appreciates the opportunity to provide these comments on the California Independent System Operator's 2020-21 Transmission Planning Process. WSP comments on the ISO's November 17, 2020 meeting discussing the preliminary policy and economic assessments. The primary focus of our comments is on the new Gates-Midway 500 kV line needed to mitigate an overload on the existing 500 kV line as shown in the on-peak deliverability results. The ISO's tariff supports classifying this new line as a Category 1 policy-driven solution. WSP sees a significant need for this new transmission line and regulatory certainty around Sensitivity Portfolio 1. Finally, we continue to observe issues with the resource portfolios studied that the ISO must consider when making determinations this transmission planning cycle. We call upon the ISO (and all regulatory agencies) to immediately begin planning for the electric grid and associated infrastructure that California will require to meet our carbon reduction goals and support the electricity requirements of a future thriving low-carbon economy.</p>	<p>The identified constraint was observed only in the sensitivity portfolio and not the base portfolio and as such, the upgrades have not been recommended in the Draft 2020-2021 Transmission Plan.</p>
11b	<p>Need for Transmission, Regulatory Certainty, and Tariff Support The policy-driven study results this cycle will be particularly important – Sensitivity Portfolio 1, the 2019 Reference System Portfolio, is being proposed as the Base Case for the 2021-22 TPP, with updates to the 2019 RSP including a more recent IEPR load forecast. The CPUC will transmit portfolios that are foundationally similar to the 2019 RSP for at least the next two transmission planning cycles. This provides the ISO with policy and regulatory certainty around transmission development needs so that the ISO should categorize the Gates-Midway line as a Category 1 line in this TPP cycle.</p> <p>This new 500 kV line is an important addition because the Central Valley will play an increasingly significant role in the solar development needed to meet the state's SB 100 mandates, and this requires new transmission lines in the region that must be planned and developed now. Given this significant transmission need emerges from studies of the more policy-certain Sensitivity 1, the ISO must seriously consider classifying this upgrade as a Category 1 transmission solution that can proceed as a least-regrets policy-driven solution. The new Gates-Midway 500 kV line meets all the criteria the ISO tariff considers for qualifying as a Category 1 project.² Commercial, regulatory, and</p>	<p>The CAISO will assess the portfolios to be submitted into the 2021-2022 transmission planning process during that planning cycle to determine if there are any policy-driven upgrades required.</p>

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	<p>environmental reasons support a Category 1 finding. There is strong commercial interest in the region which will likely grow if new transmission is planned. The Central Valley will play an important role in California's energy future because the limited environmental impact of developing solar and transmission resources on disturbed lands rather than sensitive desert environments, and California policies and laws like the Sustainable Groundwater Management Act will only increase the amount of disturbed lands that can be developed. In addition, there are many proponents of more aggressive emissions targets, such as a 38 MMT emissions target to accelerate the 2019 RSP decarbonization target of 46 MMT, which makes the finding of a new major transmission line under the 46 MMT target a least-regrets need with little risk of stranded investment. No other proposed mitigation would provide similar benefits to this new 500 kV line – Remedial Action Schemes are largely the ISO's solution for overloaded facilities but a RAS will not increase the transfer capability needed in the region. Finally, this upgrade would unlock a significant amount of deliverable megawatts in a renewable zone, one that could be further expanded in the future, and one that would bring a lot of value to a market currently struggling for more resource adequacy resources.</p>	
11c	<p>Planning Around Resource Portfolio Concerns</p> <p>The fact this TPP's Sensitivity 1 is likely next year's Base Case highlights some of the issues with the early stages of the Public Utilities Commission's Integrated Resource Planning process, an evolving planning process that has struggled to reflect the most up-to-date assumptions and modeling results in base case portfolios transmitted to the ISO. Of course, the ISO studies the portfolios provided, but the ISO has the responsibility to ensure reliability and plan for future grid needs, so it cannot let issues in the IRP hold up the needed development of the grid. The CPUC's recommended portfolios are starting to catch up to more current portfolios and planning assumptions, but the ISO should act on early signs of need such as significant findings in the policy-driven studies.</p> <p>LSA and SEIA submitted a compelling comment earlier this year arguing that the last TPP cycle showed a need for Category 1 transmission upgrades.8 WSP shares the concerns expressed in that comment and finds the issues addressed still relevant in this TPP cycle. The amount of renewable curtailment being</p>	<p>The CAISO will assess the portfolios to be submitted into the 2021-2022 transmission planning process during that planning cycle to determine if there are any policy-driven upgrades required.</p>

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	<p>observed on the system today is already alarming, and it continues to grow. And energy-only assumptions included in IRP portfolios are concerningly high and not reflective of what load-serving entities are procuring or what interconnection customers are requesting, which is problematic for transmission planning because assuming more EO than will appear on the system likely underrepresents the impact that new generation resources will actually have on the grid. Because the unfounded EO assumptions are likely underrepresenting the grid impact of the future resources planned for, which only delays the inevitable need for transmission expansion rather than avoiding it, the ISO must seriously consider recommending any new transmission lines appearing in studies now as needed to mitigate overloads and avoid excessive curtailment of renewables needed for state policy goals.</p>	
11d	<p>Conclusion – Reaching California GHG Goals, 2030 and Beyond</p> <p>Again, WSP sees a strong need for increased transmission capacity in the Central Valley and believes the TPP must identify new Category 1 transmission solutions that will significantly increase the region’s transfer capability. WSP supports the ISO taking immediate action to begin planning for a new 500 kV Gates-Midway line, at minimum, because these upgrades will be needed to meet the state’s 2030 renewables requirement. Furthermore, based on studies from the SB 100 implementation report and the CARB decarbonization studies, the state will need multiple new transmission upgrades to meet our ambitious 2045 emissions mandate. And the amount of new solar expected by 2045 in current IRP planning⁹ – over 67,000 MW – is nearly five times the amount of baseline solar assumed by the IRP in 2020 and involves a rapid escalation in new resources coming online between 2030 and 2045. Without significant in-state transmission upgrades to increase the system’s transfer capacity, there is no way the amount of solar appearing in the IRP can be developed. Planning for long lead time infrastructure projects needs to begin immediately, and new transmission cannot come soon enough as renewable resources are already facing increasing levels of curtailment.¹¹ As a state we cannot wait much longer to begin the planning and permitting process for least-regrets transmission facilities that will be required under any potential low-carbon future.</p>	<p>The identified constraint was observed only in the sensitivity portfolio and not the base portfolio and as such, the upgrades have not been recommended in the Draft 2020-2021 Transmission Plan. The CAISO will assess the portfolios to be submitted into the 2021-2022 transmission planning process during that planning cycle to determine if there are any policy-driven upgrades required.</p>



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	<p>Issues with the IRP and the inherent conservative nature of grid planning may require that the ISO soon extend beyond a 10-year study horizon to adequately prepare for California's ambitious emissions reduction goals. Current planning efforts are leaving less than a decade for transmission approval and development, which is insufficient time for long lead time development to take place. When a policy-driven study of regulatory-certain portfolios shows the need for a significant new transmission line, the results must be taken seriously and brought forward for development. Such is true of the new Gates-Midway 500 kV line resulting from the 2019 RSP.</p>	