The ISO received comments on the topics discussed at the February 25, 2021 stakeholder meeting from the following:

1. Bay Area Municipal Transmission group (BAMx)
2. California Public Utilities Commission – Staff (CPUC-Staff)
3. City of Palo Alto Utilities (CPAU)
4. GridLiance West (GLW)
5. LS Power Development LLC (LS Power)
6. Pacific Gas & Electric (PG&E)
7. Pattern Energy Group LP
8. Public Advocates Office (PAO)
9. San Diego Gas & Electric (SDG&E)
10. Silicon Valley Power (SVP)
11. South Western Power (SWPG)
12. Transmission Agency of Northern California (TANC)
13. TransWest Express LLC
14. Vistra
15. Basin and Range Watch

Economic Study Requests

1. GridLiance West (GLW)
2. LS Power Development LLC (LS Power)
3. Vistra
4. Western Grid Development (Western Grid)

Copies of the comments and economic study requests submitted are located on the 2021-2022 Transmission Planning Process page at: https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/2021-2022-Transmission-planning-process

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	Need for Continued Evaluation of the Previously Approved Projects BAMx applauds the significant progress that the CAISO made in the prior four planning cycles (2015-2019) in evaluating previously approved transmission projects. However, several projects still remain on hold. While much work has been done to evaluate previously approved projects as a one-time effort, part of the next year's Study Plan should include a formal process to continually monitor such previously approved projects. During the February 25th stakeholder meeting, the CAISO had indicated that they would do such an assessment on a case-by-case basis in the 2020-2021 cycle. We understand that some of the previously approved projects would continue to be needed given the load growth in certain areas and the need for those transmission projects given their effectiveness in addressing the wildfire impacts. However, that might not be the case for all previously approved projects. We recommend that the monitoring of the previously approved projects should include at least two aspects going forward. First, until the project starts construction it should be monitored to determine if there have been changes that would impact the project necessity and scope. While all approved projects should be monitored, special emphasis should be targeted for those that have been delayed beyond their initially proposed on-line dates, as well as those with on-line dates during the second half of the planning horizon. Secondly, stakeholders are seeing tremendous and chronic cost escalation after a transmission project is approved by the CAISO, at times up to 900%. This historic escalation appears to have had nothing to do with the mitigation of the risk of transmission lines causing wildfires. Such cost increases can materially impact the selection of the preferred alternative or overall scope of work. Therefore, if a project is expected to cost significantly more than when it was originally approved, it should cause an automatic re-assessment to determine whether it is still the best alternative to mitigate the reliability criteria violation.	The ISO will continue to review previously approved projects on a case by case basis.
1b	**Generation Retirements** In the past few TPP cycles, the CAISO has been assuming an arbitrary retirement of generating resources aged 40 years or more. In the Study Plan,	The comment has been noted.

No	Comment Submitted	CAISO Response
	the CAISO has indicated that it will not assume retirement based on a resource aged 40 years or more in order to align with the latest CPUC portfolio information. Since age is only one indicator of the continued viability of a generator, BAMx supports this generation retirement assumption. If a generator plays a key role from the reliability standpoint, alternatives to retirement should be investigated.	
1c	**Need Transparency in Generation Redispatch** The CAISO has identified that *PowerGem TARA* software is used for conducting steady-state contingency analysis2. For Category P3 and P6 types of contingencies, a system readjustment is performed between the first and second contingency3. BAMx requests the CAISO to post the *Excel* spreadsheets used by TARA software identifying the generators used for system adjustment for such analysis to the CAISO's secured portal. This data will provide additional clarity on the analysis and allow stakeholders to replicate the analysis, facilitating more meaningful feedback.	The CAISO will look into feasibility of providing this information.
1d	**Locational Guidance, Effectiveness, and Duration of Battery Storage Resources** BAMx has been promoting the remapping of battery storage to a highly congested area with high renewable curtailment as this can help to reduce congestion and renewable curtailment.4 The CAISO's past comprehensive battery re-mapping studies5 have demonstrated not only that transmission congestion and renewable curtailment can be further reduced by remapping or allocating battery to constrained areas, but also that the latter is more effective than the transmission alternatives.6 This lesson learned is important for studying all resource portfolios and scenarios going forward. In other words, it is pertinent to perform an additional layer of analysis to check whether any transmission upgrades triggered by a given resource portfolio could be eliminated or scoped differently by remapping the renewable and battery storage resources. We encourage the CAISO to have such processes built-in as it performs the policy-driven and economic assessments in the 2021-2022 TPP cycle. In the past, whether battery storage is sufficient to mitigate the reliability need, the CAISO typically has considered four-hour battery storage.7 So, if a six-hour battery storage project could mitigate a particular reliability violation, the additional cost of the two-hour storage is then compared to the cost of a	The comment has been noted.

No	Comment Submitted	CAISO Response
	competing transmission project. Instead, BAMx suggests that the CAISO should consider whether additional four-hour storage could be effective as an alternative mitigation to the transmission while obeying charging restrictions. This approach would be consistent with the CPUC recommendation of including only the "incremental" interconnection cost8 and not the full capital cost of the energy storage projects that are otherwise needed for system capacity purposes according to the CPUC-provided resource portfolios.	
1e	**Wildfire Impact Assessment** The CAISO as part of the 2020-2021 TPP conducted studies to assess the impact of various Public Safety Power Shutoff (PSPS) scenarios in the PG&E area. BAMx applauds those efforts. As BAMx has previously observed, a distribution-connected load may automatically be dropped due to the assumptions in the PSPS or wildfire event being studied.9 In any case, such load reduction should be taken into account. BAMx encourages the CAISO to work with SCE and SDG&E to also take into account plausible distribution circuit interruptions in its wildfire mitigation assessments of the SCE and SDG&E areas as part of the 2021-2022 TPP. BAMx also encourages the CAISO to continue to work with PG&E to investigate 2020 PSPS events that have occurred. We expect that such an effort should not be overly burdensome as it builds on the work just completed as part of the 2020-2021 Transmission Plan. We hope that this effort could be undertaken as part of the 2021-2022 TPP scope.	The comment has been noted.

2. California Public Utilities Commission – Staff (CPUC-Staff) Submitted by:		
No	**Comment Submitted**	**CAISO Response**
2a	1) **Overview of the generation and storage portfolios** CPUC Staff notes that key attributes of these resource portfolios being analyzed for this 2021-2022 Transmission Planning Process (TPP) have not been part of previous TPP cycles: • Commission approval to convey these portfolios to the CAISO's TPP process. This has ensured these portfolios have been vetted publicly and that party comments have been considered. The imprimatur of the Commission's decision also carries the clear understanding that CAISO staff recommendations that arise from its analysis of the portfolios may lead to CAISO Board authorization of transmission development. • Extensive mapping of generation resources, including the largest amount of battery storage ever studied within the TPP process as well as detailed methodology1 by which these resources are linked to specific locations. • Considerably higher amounts of renewable and storage resources compared with the portfolios studied in previous TPP cycles, as highlighted in CAISO's presentation (slides # 50-57).	The comment has been noted.
2b	2) **Consideration of out-of-state resources** In the CAISO's presentation on February 25, 2021, CAISO staff noted injection of MWs from wind resources outside the CAISO, which are assumed in the CPUC's base and policy-driven portfolios, will be studied separately at the Palo Verde and Eldorado substations. This analysis will assess the transmission implications inside CAISO resulting from potential procurement of these potential out-of-state (OOS) resources. CPUC Staff is curious whether the CAISO might consider conducting a special or "other" study to analyze the external transmission needed to deliver the MWs from these OOS reso the CAISO system. We recognize limitations on the CAISO's workload, and we would encourage the CAISO to limit the scope of such a special study and to utilize previous interregional project studies, if possible. CPUC Staff would find this analysis of the infrastructure required to deliver OOS resources to be extremely helpful.	The ISO has provided additional approaches in the May 14 stakeholder meeting and will in the July 27 stakeholder call related to treatment of the OOS wind in the 2021-2022 TPP.

No	Comment Submitted	CAISO Response
	• *We encourage the CAISO's review of possible opportunities for such an informational study of transmission needs outside the CAISO system, whether it might be conducted solely by the CAISO or jointly with another agency.* •	
2c	3) **Consider enhancing the interregional transmission process** The CAISO participates in a unique inter-regional transmission coordination process that meets FERC Order 1000 requirements, but the last two 2-year cycles have resulted in zero projects being brought forward to the second phase of analysis or approval. We encourage the CAISO to consider ways to enhance this process so that a broader range of benefits are considered within the analysis. The interregional coordination process should result in approval of projects that benefit California by enabling out of state resources identified within the IRP process. CPUC Staff notes the publication recently of two significant reports2 promoting expansion of interregional transmission. • *The CAISO should begin considering new concepts for interregional coordination in anticipation of possible FERC initiatives to expand transmission or enhance Order 1000 interregional processes.*	Interregional transmission coordination is one component of FERC Order 1000 which the CAISO implemented through common tariff language with the other FERC planning regions. This common tariff language is included as section 24.18 of the CAISO tariff. The CAISO cannot not unilaterally "enhance" the process outside of what is authorized by FERC. The ISO will consider the SWIP-N and TWE projects in the 2021-2022 TPP as described in sections 5a and 13e of this document.
2d	**4) Wildfire Mitigation Assessment** CPUC Staff appreciates the CAISO's assessment of wildfire risks to transmission facilities in southern California. This follows the similar assessment of wildfire risks in the PG&E area. The CAISO noted this study will include the modeling of scenarios for de-energizing transmission lines in High Fire Risk Areas (HFRA) to record the expected loss of load, assess power flow system performance and determine the amount of load reduction needed to continue reliable operations after each scenario. The CAISO will then develop mitigation options to identify critical facilities that could significantly reduce load loss if excluded from PSPS events. The CAISO may also consider new upgrades to mitigate wildfire risk.	The comment has been noted.

No	Comment Submitted	CAISO Response
	• *At a future stakeholder meeting, CPUC encourages the CAISO to provide more detail on the criteria for developing new upgrades based upon this wildfire risk assessment.* •	
2e	**5) Potential Mitigations to Transmission Constraints** Section 2.8.1 of the Study Plan discusses the CAISO's analysis of potential mitigations to transmission constraints using demand response, energy efficiency, renewables and storage. This section notes the methodology for use of these preferred resources as potential mitigation, which is explained in a 2013 White Paper. The 2017 evaluation of local capacity solutions for the Moorpark area in the LA Basis is cited as an example of this approach. • *It might be relevant to update this section by including recent examples from the 2020-2021 TPP where the CAISO identified storage as a mitigation options, which resulted in two previously identified transmission upgrades being put on hold.* Also, Section 2.8.1 of the draft Study Plan suggests that "in some situations the storage could be approved as a transmission asset" though the footnote explains that the CAISO's "SATA" stakeholder engagement remains on hold. • *Can the CAISO clarify with greater detail how and when the CAISO might consider storage as a transmission asset for the purposes of this TPP?* Also, in the CAISO's presentation on February 25, 2021, CAISO staff summarized (on slide #42) the possible "Corrective Action Plans" for mitigating reliability issues. The CAISO noted that it coordinates with Participating Transmission Owners and other Market Participants in seeking the lowest cost alternative to mitigate identified reliability issues. • *Approximately how many existing and planned Remedial Action Schemes (RAS) will the CAISO include in this TPP analysis?* • *Can the CAISO provide a list of existing or planned RAS on the Market Participant Portal?*	The comment has been noted. The SATA engagement remains on hold and will provide updates through the ISO policy stakeholder initiatives. The existing RAS are provided in Appendix A of the Study Plan.

No	Comment Submitted	CAISO Response
2f	**6) Modeling assumptions for generation** In Section 2.7.1 of the draft Study Plan, the CAISO identifies three levels for modeling new generation for the 1-year operating case, the 2-5-year planning cases and the 6-10-year planning cases. • Level 1 – under construction with in-service date identified (for years 1-5 study cases) • Level 2 – PPA with regulatory approval but not under construction (for year 5 study case) • Level 3 – planned resources in the CPUC's IRP portfolios (or for 6-10 years with applicable in-service dates) In the CAISO's presentation on February 25, 2021, CAISO staff noted these levels of modeling assumptions for generation have been consolidated "while keeping the original intent" of the assumptions made in previous TPP cycles. CPUC Staff seeks better understanding of these modeling assumptions for new generation. • *Does this change in the classification of levels have material impact on the analysis of the CPUC base case portfolio?*	This does not have any material impact on the analysis of CPUC base portfolio. These classifications provide clarity while maintaining the original intent as captured in the February 25, 2021 presentation.
2g	**7) Schedule for the 2021 – 2022 TPP planning cycle** Per Table 1.1-1 in the draft Study Plan, the CAISO will post the preliminary assessment of the policy driven and economic planning study results on November 15, 2021. CPUC Staff understand that this follows the typical TPP schedule. However, we want to note that by that date CPUC staff will likely have finished mapping resources to busbars for the base case resource portfolio for the 2022-2023 TPP. This mapping must be completed in the fall time period in order to then move through the CPUC's formal proceeding to allow for party comment and adoption by the Commission in time for the transmittal of the portfolios in February of 2022. CPUC Staff would not be able to incorporate the preliminary policy-driven results in the busbar mapping process if CAISO posts these TPP results in November.	Due to the extensive effort, time, and resources involved in developing the policy-driven study models, performing the studies and compiling the results as well as other policy-driven priorities such as updating the transmission capability estimates for use by the CPUC in developing the portfolios for the next planning cycle, it is difficult for the CAISO to commit to producing the results for the current planning cycle earlier. However, the CAISO intends to make results available to the CPUC as they become available as part of the collaborative bus bar mapping process.

No	Comment Submitted	CAISO Response
	• *CPUC Staff is interested in coordinating with CAISO to understand what flexibility exists to produce results earlier so that the CPUC can utilize the information to inform the portfolios transmitted to CAISO for the next TPP.*	
2h	**8) Backlog on Transmission Upgrades** CPUC Staff understands there are a large backlog of projects authorized in prior TPPs and not yet under construction by PTOs. • *CPUC Staff encourages the CAISO to consider some prioritization and transparency into the transmission upgrade queue to assist planners tracking delays and project changes.* •	The comment has been noted

3. City of Palo Alto Utilities (CPAU) **Submitted by: Tikan Singh**		
No	**Comment Submitted**	**CAISO Response**
3a	As outlined in the CPAU comments on the CAISO 2020-2021 Draft Transmission Plan, dated February 22, 2021, over the years several proposals have been considered by the CAISO, PG&E, and CPAU. The fundamental reliability issues faced by CPAU have remained unaddressed. In particular, the location of the three transmission lines serving Palo Alto in a single corridor does not provide adequate service reliability because a single event can (and has) cause the loss of all three lines. Although CPAU appreciates CAISO and PG&E's past co-operation on alternative ways to provide the desperately needed reliability improvement, it is important that alternative means to achieve the needed reliability be achieved now.	The comment has been noted. The ISO will evaluate the need for reinforcement based on the current applicable NERC reliability standards.
3b	There is an urgent need to identify a long-term solution to reliably serve the CPAU load. One such solution could be the *Ames to Palo Alto 115kV* transmission project described in the above-mentioned CPAU comments. This project would potentially replace the need for the CAISO-approved *Ravenswood-Cooley Landing 115kV Reconductoring* project and is expected to have similar capital costs (~$10-$20 million). In other words, the *Ames-Palo Alto 115kV* project not only increases the capacity and reliability of the 115 kV system serving Palo Alto, but also provides a 115 kV interconnection outside the common corridor near the airport flight path. We, therefore, urge the CAISO to consider evaluating the *Ames to Palo Alto 115kV* transmission project and revisiting some of the previously-approved projects' needs and scope as part of the 2021-2022 transmission planning cycle.	The comment has been noted. The ISO will evaluate the need for reinforcement based on the current applicable NERC reliability standards.

4. GridLiance West LLC (GLW)
Submitted by: Jody Holland

No	Comment Submitted	CAISO Response
4a	**Request for Expanded Renewable Siting In Accord with CPUC's Procurement Order** On February 11, 2021, the CPUC issued its Final Decision transmitting portfolios to the CAISO for use in the CAISO's 2021-2022 TPP. Before sending the final portfolios the CPUC added in 651 MW of geothermal resources to ensure the portfolios had diversity.1 600 MW of these geothermal additions were mapped to Imperial Valley and 51 MW to the Solano area. On February 22, 2021, the CPUC issued a staff report identifying substantial shortfall in resource adequacy starting in the next couple of years and growing by the year 2025, and the CPUC issued a ruling proposing emergency procurement by LSEs of resources. In this ruling the ALJ proposes procurement of 1000 MW NQC of geothermal resources by 2025 and 1000 MW NQC of long-duration storage. This is proposed to provide needed reliability during non-solar peak production, including to compensate for Diablo Canyon retirement as well as retirement of other OTC units. This 1000 MW of geothermal RA capacity by 2025 will greatly benefit the CAISO's operation, especially given the penetration of variable clean resources. However, given the current grid configuration it is unlikely that this geothermal can be interconnected and delivered to load without substantial system upgrades. GLW also expects that it will not be the most efficient solution to burden all the contracting with LSEs through the generation interconnection process, and that there may be system-related upgrades that would be cost effective for supporting the delivery of this geothermal energy to CA LSEs. In either case, near-term action is required to ensure delivery by 2025. As a result, GLW respectfully requests that the CAISO study not just 651 MW of geothermal as conveyed by the February 11, 2021 IRP decision but that the CAISO study 1000 MW of geothermal energy on the grid in its 2021-2022 TPP. GLW also intends to file this request with the CPUC in response to the procurement ruling. Further, GLW recommends that up to 500 MW of the geothermal energy be mapped to Nevada geothermal resources, interconnecting to the GLW system.	The CAISO works closely with the CPUC on its resource portfolio development process by providing transmission information from the TPP and generation interconnection processes. Area-wide transmission upgrades needed for generation development are developed in the TPP process in coordination with the CPUC IRP. It is an iterative process. The February 22, 2021 CPUC staff report may invigorate geothermal generation development that could enter the generation interconnection queued. Local transmission upgrades can be directly linked to the generation projects through the interconnection process. In addition, the staff report will undoubtedly inform the next iteration of resource portfolio development.

No	Comment Submitted	CAISO Response
	As indicated above, the portfolios transmitted to the CAISO on February 11 show 600 MW of the geothermal resources for study being interconnected to IID. This 600 MW of capacity on IID may translate to well less than 600 MW NQC because they will not be interconnected to the CAISO grid. Rather they will require firm transmission delivery to the CAISO import points, and the LSEs will need to obtain Maximum Import Capability (MIC) capacity in order to count these resources towards the CAISO's RA requirement. Transmission service from IID to the CAISO is limited, and there is very little – if any – excess MIC available from IID imports to support using any geothermal capacity in IID towards the CAISO's RA requirement. Geothermal fields in Dixie Valley portion of Nevada and other areas in NV are ripe for development. Capacity from these resources can be directly connected to the CAISO grid by direct interconnection to the VEA/GLW footprint. GLW is also submitting with this recommended change in quantity of geothermal under study (and the location of that incremental geothermal energy) an economic study request to study an interconnection between GLW and the Oxbow line (SRC2), which would provide relief from congestion/overloads downstream in the Bishop, CA area. Developing infrastructure to directly connect additional geothermal assets to serve CAISO's RA needs and allow LSEs to fill this procurement requirement will likely be efficient. • For the reasons stated above GLW respectfully requests the CAISO to add to its study plan 500 MW of additional geothermal capacity interconnected via the SRC2 project detailed in the GLW economic study request.	
4b	**Request for Not Over Relying on RAS or SPS Schemes in the 2021 – 2022 TPP in Lieu of Cost-Effective Infrastructure Upgrades** While the draft plan lists RASs the CAISO intends to enforce in the 2021 – 2022 TPP, it is GLW's experience that the CAISO expands or refines the definition of that set of schemes in the conduct of its studies. For example, at this time no RAS schemes are listed in the appendix for the GLW facilities, yet in the past TPPs the CAISO has indicated that rather than upgrading elements the CAISO would instead plan to RAS facilities. As such the RAS schemes assumed in the planning process seem to extend well beyond the RAS schemes actually defined and in place at the CAISO for operations. GLW is concerned that some	The study plan lists existing RASs. Almost all new RAS facilities considered in the planning process have already been identified and determined to be feasible in the generation interconnection study process. However, the CAISO acknowledges that RAS should be relied upon only after careful consideration of the RAS guidelines, other alternatives. In addition, the CAISO is currently reviewing and updating its RAS guidelines, and will be seeking stakeholder feedback before finalizing any updates.

No	Comment Submitted	CAISO Response
	beneficial upgrades otherwise identified in the TPP get dismissed through presumed RAS alternatives – alternatives that may not be defined or included in the assumptions sets. • GLW commented on the potential overuse of RAS in response to the CAISO's Draft 2020-2021 Transmission Plan and asked at that time for dedicated discussion about the use and expansion of those mechanisms in planning.4 We summarize our concern and request again in these comments for the purposes of the CAISOs 2021-2022 TPP. At the levels of renewable build out called for in the Base Case and Policy Change Case portfolios, the CAISO's transmission grid is becoming increasingly taxed. The reliance on RAS and SPS schemes continues to grow. Especially in light of the WECC August heat storm events and the catastrophic outcomes of outages demonstrated in the ERCOT region this month, careful consideration should be given to the trade-offs of presuming RAS solutions over infrastructure development. Continuing to stress the grid by choosing RAS and SPS schemes does not afford the CAISO grid users the benefits of transmission enhancements, and it denies them the benefit of the energy deliveries that have to be curtailed by the CAISO under stressed conditions. The impacts of curtailment schemes and not enforcing contingencies has growing real-world significance. NERC and WECC standards including TPL-001-4 concerning the long-term reliability of the transmission grid must be carefully considered in relationship with CAISO's current practices to use RAS and SPS to drop load, curtail generation, and delay long-term transmission solutions in light of future green goals and mandates. For these reasons we request that the CAISO hold a dedicated discussion of the merits of its planning choices regarding the use of RAS and SPS approaches to avoid upgrades, even when such schemes are technically allowed by published standards. We also ask for more clarity in the study plan about when RAS solutions that are not vetted in the assumption set will be presumed to alleviate the need for upgrades in the face of congestion or other system needs.	

5. LS Power Development LLC (LS Power) Submitted by: Sandeep Arora and Renae Steichen		
No	**Comment Submitted**	**CAISO Response**
5a	**1. CAISO should conduct a transmission needs analysis for delivering to the CAISO boundary the 1062 MW of out-of-state (OOS) wind in the California Public Utilities Commission (CPUC) Base Case Portfolio, not just transmission needs within the CAISO boundary.** a) CAISO should evaluate potential transmission needs to deliver OOS wind to the CAISO boundary. If CAISO only plans its system assuming that OOS generation resources appear at an existing CAISO injection point, the CAISO will not produce a transmission plan that responds to the CPUC's policy directive. The transmission plan must identify transmission solutions needed to bring the generation to CAISO load. Otherwise, the transmission plan will fall short of providing a way for these resources that help diversify the renewable fleet and address in-state reliability concerns to be deliverable. CAISO's proposed approach of only studying delivery at existing CAISO injection points falls short by leaving a deliverability gap that renders the analysis of OOS resources meaningless. CAISO should identify the more efficient or cost-effective transmission solutions to allow delivery of OOS resources that can be counted as Full Capacity Deliverability Status, which may include transmission solutions that extend the existing CAISO Balancing Authority Area footprint out from existing boundary stations (similar to boundary extensions made possible by Harry Allen to Eldorado project & Colorado River to Delaney project). CAISO has historically relegated evaluation of OOS transmission projects to the Interregional Transmission Planning (ITP) process, which is inconsistent with the policy guidance provided by the CPUC including the recent CPUC resource portfolio and the state's near-term and long-term carbon reduction and renewable energy goals. The CPUC's Base Case Portfolio identifies a clear regional policy need for OOS wind. The CPUC's final decision D.21-02-008 on Transferring Electric Resource Portfolios to CAISO for 2021-2022 Transmission Planning Process (Decision) includes 1062 MW of OOS wind in the Base Case Portfolio.1 CAISO's Tariff section 24.4.6.6 on Policy-Driven Solutions notes that "CAISO will determine the need for, and identify such policy-driven transmission	The ISO has considered the SWIP-N project as to how the ISO might consider the project within the 2021-2022 TPP cycle. Through its 2020-2021 TPP, the ISO met its Order 1000 interregional coordination requirements associated with the ITPs submitted in the current interregional coordination cycle and as such, no further Order 1000 consideration of the ITPs will be performed during the 2021-2022 TPP cycle. However, the CPUC Rulemaking 20-05-003 issued on February 17, 2021 does include certain out-of-state (OOS) portfolios for resources from Wyoming and New Mexico. That rulemaking stated that the ISO's consideration of these OOS resources could be represented by a resource injection at Eldorado for Idaho/Wyoming wind and Palo Verde for New Mexico wind. Since the FCDS assessment is intended to mean within the ISO interconnected system and not from Idaho/Wyoming or New Mexico to California, this approach is consistent with past methodology that the ISO has utilized when considering OOS wind. Regarding the 2021-2022 TPP, the ISO has rethought what it stated in the SWIP-N evaluation plan, specifically with regard to assessing whether system upgrades are required for Idaho/Wyoming wind and how much of the Idaho/Wyoming portfolio the transmission system can accommodate without upgrades. Based on the CPUC's rulemaking, the ISO believes that consideration of the OOS portfolios should focus on meeting the FCDS requirements as discussed in the rulemaking. In addition, the ISO has provided additional approaches in the May 14 stakeholder meeting and will in the July 27 stakeholder call related to treatment of the OOS wind in the 2021-2022 TPP.

No	Comment Submitted	CAISO Response
	solutions that efficiently and effectively meet applicable policies under alternative resource location and integration assumptions and scenarios, while mitigating the risk of stranded investment."2 Further, it lays out criteria to consider, including commercial interest in the applicable geographic area,3 results and identified priorities of the CPUC's resource planning process, and the potential for a particular transmission solution to provide access to resources needed for integration, such as pumped storage in the case of renewable resources. The only way to develop a transmission plan that is responsive to the CPUC policy guidance is for CAISO to evaluate interregional projects which help meet CAISO regional needs (i.e., policy, reliability, and/or economic), and recommend these projects for approval under the Regional Transmission Planning framework. CAISO's tariff provides the basis for the transmission plan to accommodate this change: Tariff section 24.13 states that the CAISO may consider potential interregional solutions to regional needs during Phase 2 of the Transmission Planning Process, and this is not limited to only economic, or only reliability, or only policy needs. While OOS transmission could at least in theory be built on a merchant model and sell transmission service to deliver OOS wind, this would significantly limit the benefits of a new import path to CAISO. A new import path controlled by CAISO will help manage flows on other parallel import paths, relieve congestion issues, allow CAISO to access new pool of resources through and address any grid emergencies especially for days like Aug 2020. By studying OOS transmission as a regional project, CAISO could more accurately take into account policy, economic, reliability benefits, access other diverse OOS renewables, and also be able to export excess California solar. Furthermore, reliance on the merchant model rather than considering new transmission that extends beyond the current CAISO boundary to access such OOS renewables increases the risk that those valuable resources will never be developed and will never be delivered to the current CAISO boundary. The Draft Study Plan states that no further consideration of the ITPs will occur during the 2021-2022 TPP. If CAISO continues to confine its consideration of interregional projects to the ITP, it risks further delays in online dates and delivery of OOS wind, in addition to failing to recognize that a project which	

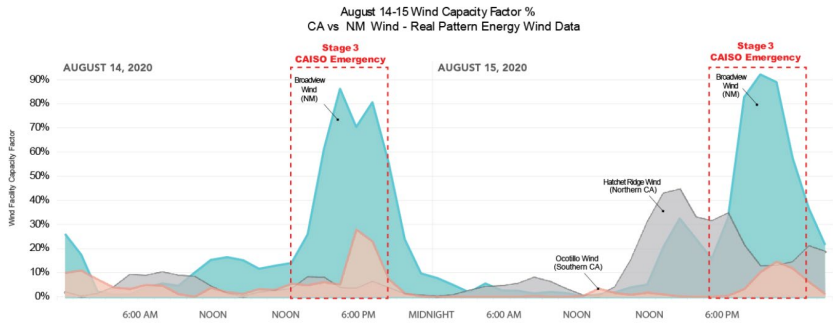
No	Comment Submitted	CAISO Response
	expands the footprint could primarily serve a regional need, and after placed in service could in fact be within the region. Therefore, LS Power suggests language be added to the Study Plan acknowledging and committing to the need to consider transmission solutions to deliver OOS wind: • In 3.3 Renewable Portfolios to be Studied, add "In evaluating deliverability of OOS wind, CAISO will evaluate OOS interregional transmission solutions submitted to the CAISO to identify the more efficient or cost-effective solution as a CAISO regional policy-driven transmission project to allow delivery of OOS resources." Given the policy need for OOS wind, LS Power highlights there is a clear case for evaluating OOS transmission to meet CAISO needs. The need to consider delivery of OOS resources is even more important in this cycle given the recent CPUC Administrative Law Judge ruling for procurement of 7500 MW by 2026.4 California needs more capacity, and increasing access to diverse OOS resources could improve reliability and cost effective procurement. Failure to consider advanced development interregional transmission projects in the near term will significantly hamper the ability to comply with the ALJ ruling, as it is simply too late to propose new transmission projects to complete by 2026. CAISO may also need to consider creating new injection points to the CAISO grid if interregional transmission solutions are found needed to meet regional needs and to address CPUC's policy guidance.	
5b	b) LS Power recommends that CAISO conduct three (3) study scenarios for 1062 MW of OOS wind from different locations: Wyoming, Idaho, and New Mexico. Each study should consider transmission required to deliver to the CAISO boundary (as noted above). For instance, the studies for New Mexico wind should include injection at Palo Verde substation and Eldorado *or* Harry Allen substation to be injection points for OOS wind from Idaho and Wyoming. While the CPUC Decision did not note Harry Allen as an injection point, given the completion of the new DesertLink 500 kV transmission line that now extends the CAISO boundary from Eldorado to Harry Allen, CAISO should also consider injection at Harry Allen. ITP projects that were submitted to CAISO in the last ITP request window should be studied for as potential transmission solutions to deliver OOS wind from these locations.	For purposes of approximately representing impacts on the CAISO controlled grid, modeling resources coming from Wyoming and Idaho at either Eldorado or Harry Allen should not be expected to produce significantly different results. Also, the previous ITP process has been concluded. The ISO has provided additional approaches in the May 14 stakeholder meeting and will in the July 27 stakeholder call related to treatment of the OOS wind in the 2021-2022 TPP.

No	Comment Submitted	CAISO Response
5c	**2. CAISO should evaluate potential policy projects including the combined reliability, policy, and economic benefits, as directed by the CPUC.** The CPUC's final Decision included several statements about the need to consider reliability, policy, and economic benefits combined, not just in silos as separate studies, when evaluating projects to recommend for approval. The Decision's Finding of Fact 6 states, "Transmission solutions to support both policy and reliability goals combined with ratepayer savings can provide significant benefits to California." Additionally, Conclusion of Law 3 states, "Based on analysis conducted by Commission staff thus far, utilizing the electric resource portfolio that meets the 46 MMT GHG emissions target as a reliability and policy-driven base case in the TPP will likely result in the need for new transmission investment to make the portfolio deliverable. Transmission projects should be evaluated for reliability, policy, and economic benefits." Therefore, LS Power suggests CAISO include language in the Study Plan acknowledging and committing to this evaluation: In 3.1 Public Policy Objectives section, add - "Transmission solutions to support both policy and reliability goals combined with ratepayer savings can provide significant benefits to California. Therefore, transmission solutions evaluated for policy needs will also be evaluated for the reliability and economic benefits they provide to ensure that any projects found needed to meet state policy objectives reflect the guidance from the CPUC to consider their combined benefits."	The CAISO does consider the combined policy, reliability and economic benefits when evaluating policy-driven projects to recommend for approval in accordance with the BPM for the Transmission Planning Process. Section 4.6.1(f) of the BPM indicates that the extent to which the transmission solutions will be needed to meet Applicable Reliability Criteria or to provide additional reliability or economic benefits to the CAISO grid is one of the criteria the CAISO uses to determine the need for policy-driven transmission solutions.

6. Pacific Gas and Electric (PG&E) **Submitted by: Mike Pezone**		
No	**Comment Submitted**	**CAISO Response**
6a	**Develop and Conduct Study to Assess In-State Congestion** For a few hours in mid-August 2020 there was not sufficient capacity on the transmission system to both serve load and move imports through California from the northwest to the southwest. PG&E seeks to understand the load levels in which exports cannot be maximized. This is implied in the future year study assumptions in which PG&E is unable to export 4,000 MW to SCE due to future year load levels in our service territory. Therefore, PG&E requests that the CAISO develop and conduct a study replicating the conditions of the August 2020 heatwave to identify at which load levels exports cannot be maximized. Such an analysis will improve the understanding of what the transmission system would require so that imports could flow through California from the North to the South on the highest demand day in the evening peak period while also serving load. Ultimately, information from a study like this would inform policymakers on what is needed to eliminate the risk of rolling blackouts across California. PG&E expects the costs of such upgrades to be high and requests such a study to inform related policy discussions.	The comment has been noted.
6b	**CPUC Procurement Mandate** The Administrative Law Judge for the CPUC released a ruling with a CPUC Staff proposal for the replacement system power need between 2024-2026 due to Once Through Cooling and Diablo Canyon Power Plant retirements. The Staff analysis shows there is a total of 7,410 MW of incremental system RA needed by 2026. PG&E would like to better understand how the assumptions of this procurement need is being evaluated in the Transmission Planning Process to ensure that adequate transmission is in place to support the incremental resource integration needs.	The ISO continues to coordinate with the CPUC on the procurement and the portfolios provided for assessment in the 2021-2022 TPP.
6c	**Include an Additional Sensitivity Case** The 2021-2022 CAISO Draft Study Plan includes three sensitivity scenarios for the Reliability Study which covers the high CEC load forecast and the high renewables with minimal gas generation scenarios. PG&E recommends adding one more sensitivity scenario to simulate the existing summer setup	This sensitivity is not included in the final study plan. However, ISO will work with PG&E to evaluate and potentially perform a sensitivity for the areas with summer setups.

No	Comment Submitted	CAISO Response
	removal in year 5 summer peak case (2026 case). The intent of this additional scenario is to evaluate the comprehensive system impact from P1-P7 contingency analysis if these summer setups are removed, as well as to identify the summer setups critical characteristics.	

7. Pattern Energy Group LP Submitted by: Julie Gill		
No	**Comment Submitted**	**CAISO Response**
7a	Pattern Energy commends the CPUC for identifying a high value for regional wind as a core part of CAISO's planning process, and would like to confirm our understanding that the CAISO has been directed study both Palo Verde and El Dorado interties without discrimination as a preferred injection point has not been pre-determined, as noted clearly in the following portion of the February 11, 2021 decision: "…CPUC staff is not able to determine at which busbar location injection would best meet policy goals while minimizing costs to ratepayers. For this reason, CPUC staff appreciates CAISO reply comments, which indicated the possibility of studying the full amount at both injection points to accommodate this rare situation. Although the dashboards include only one location to prevent double counting, CPUC staff note that a single injection point has not been selected for the purposes of the TPP base case assessments." (Page 69 of the February 11, 2021 Final Decision Attachment A.) Pattern Energy understands that the decision to study both Palo Verde and El Dorado was confirmed in the February 25, 2021 meeting on the draft study plan. However, Pattern Energy would like to confirm this direction to study both, as there was a stakeholder comment at the meeting suggesting a pre-determined constraint through Riverside Palm Springs—if possible, please confirm in response to these written comments that both injection points will be studied equally, as Pattern understands that the RESOLVE model satisfied the transmission constraints and still sited 1,062 MWs of out-of-state (OOS) wind for delivery to the Riverside Palm Springs area.	The CAISO confirms both the Palo Verde and El Dorado injection points will be studied in the policy-driven assessment.
7b	Pattern Energy would like to again commend the CPUC and CAISO for integrating these essential and shovel ready projects into the core analysis for California to meet its greenhouse gas reduction goals quickly, reliably, and cost effectively. Pattern Energy is well equipped to comment on the value to California customers provided by regional resource diversity, as Pattern is one of the state's largest suppliers of renewable power with over two thousand megawatts of wind energy contracted to or currently serving California IOUs, CCAs, and municipal utilities and over 30 Million California customers in	The comment has been noted.

No	Comment Submitted	CAISO Response
	aggregate, via contracts that have won competitive procurements with Load Serving Entities. Pattern Energy can also comment on the viability of new transmission to cost-effectively help reduce greenhouse gas emissions, as the company which constructed the Trans Bay Cable in California, Western Interconnect in New Mexico to serve 544 MW of wind energy to California, as well as the company which is currently constructing Western Spirit to serve over 1,050 MW of wind energy contracted and/or available to serve California by December 2021, and is developing more than 3,000 MW of wind which can deliver to California across the SunZia line and into the Palo Verde hub by 2025. All of the in-state and out-of-state wind developed and operated by Pattern Energy is full Product Content Category One RPS compliant power for California LSEs, and also has the benefit to customers of full 100% PTC value, even in the 2025 period being studied by CAISO. As a comment on the importance of integrating across the region to meet California GHG reduction goals reliably and cost-effectively, Pattern would like to share the graph below, which indicates the performance and output of real wind products from three of Pattern Energy's facilities during the 2020 August black-outs, one wind facility in Northern CA, one in Southern CA, and one in New Mexico, all with full deliverability to the California system. The graph shows how complimentary load profiles from regional diversity can help with reliability.  	

8. Public Advocates Office (PAO)
Submitted by: Kanya Dorland

<table>
<tr><th>No</th><th>Comment Submitted</th><th>CAISO Response</th></tr>
<tr><td>8a</td><td>RECOMMENDATIONS AND COMMENTS
A. Request for Additional Information on Special Protection Schemes
Cal Advocates requests information on the reasons for the existing installed special protection schemes (SPS) on the CAISO-controlled grid, as well as the impacts of the SPS. Cal Advocates seeks to understand the issues that the SPS are addressing and to understand if existing SPS drop generation and/or load when deployed. The Draft 2021-2022 Study Plan includes an appendix with general information on existing installed SPS by participating transmission owners (PTOs) in tables A6-1 to A6-3.2

These tables provide information on only the CAISO planning area and the names for the installed SPS. Cal Advocates requests the CAISO provide expanded SPS information tables that include the reasons for each installed SPS, as well as the costs and impacts of SPS on transmission system operations in the final 2021-2022 Study Plan or on the CAISO Transmission Planning Process (TPP) web page. Table 1. below serves as a SPS information table template.

Table 1 - CAISO Grid Special Protection Schemes (SPS) Template
<table><tr><th>Participating Transmission Owner</th><th>Area</th><th>SPS Name</th><th>SPS Justification(s)</th><th>Cost for SPS in $</th><th>Drops Generation and/or Load in MW</th><th>System Impact in $ & Other Impacts in $</th></tr><tr><td>PG&E</td><td>Central Cost/Los Padres</td><td>Mesa & Santa Maria Undervoltage SPS</td><td></td><td></td><td></td><td></td></tr></table></td><td>The CAISO will look into feasibility of providing more information related to exiting SPS in TPP.</td></tr>
<tr><td>8b</td><td>B. Requests for refinements to the proposed Wildfire Mitigation Assessment for Southern California Background.
The Draft 2021-2022 Study Plan states that the CAISO intends to conduct studies “to assess the potential risks of de-energizing” transmission lines in Southern California Edison Company (SCE) and San Diego Gas & Electric Company’s (SDG&E) service territories. The CAISO will develop scenarios</td><td>The CAISO will work with SCE and SDG&E on the development of these study scenarios.</td></tr>
</table>

No	Comment Submitted	CAISO Response
	that involve de-energizing some transmission lines in High Fire-Threat Districts and will consult with SCE and SDG&E to identify areas "that have been prone to past [Public Safety Power Shutoff] or wildfire events."	
8c	1. CAISO's assessment of the transmission system should acknowledge that de-energization of distribution circuits reduces load on the transmission system. Turning off distribution circuits for de-energization events will substantially diminish the load on the transmission system, reducing the likelihood of transmission congestion or overloads. Therefore, in considering any de-energization scenario, it is essential to account for the load reduction on the transmission system due to distribution level shutoffs. To illustrate this point, based on Pacific Gas and Electric Company's (PG&E) responses to Cal Advocates' data requests, it appears that PG&E de-energized about 10 miles of distribution circuits for each mile of transmission circuit affected during large de-energization events. Additionally, based on three large de-energization events from 2019, only 20 to 35 percent of load loss was solely attributable to the de-energization of PG&E transmission lines in fire weather.6 The CAISO or Cal Advocates should be able to obtain equivalent data from SCE and SDG&E for use in the proposed Wildfire Mitigation Assessment for southern California.	The comment has been noted.
8d	2. CAISO's assessment should develop realistic scenarios based on past events. The CAISO should develop realistic scenarios by considering the geography and load impact of past de-energization events. SDG&E conducted significant deenergization events in the past four years, with the largest occurring in 2020. SCE also conducted several large de-energization events in 2019 and 2020, as well as small events in 2017 and 2018. These events should provide an adequate historical record to develop scenarios that identify the specific transmission facilities that are likely to be turned off during extreme weather events. For example, SDG&E triggered its largest deenergization event on December 2-4, 2020. During this event, 43 SDG&E weather stations registered record high winds and 126 weather stations (out of 220) registered wind speeds at the 99th percentile for its location. Therefore, it is reasonable to view this event as representing an outer bound of extreme wind in SDG&E's service territory. A reasonable approach to the study is to	The comment has been noted.

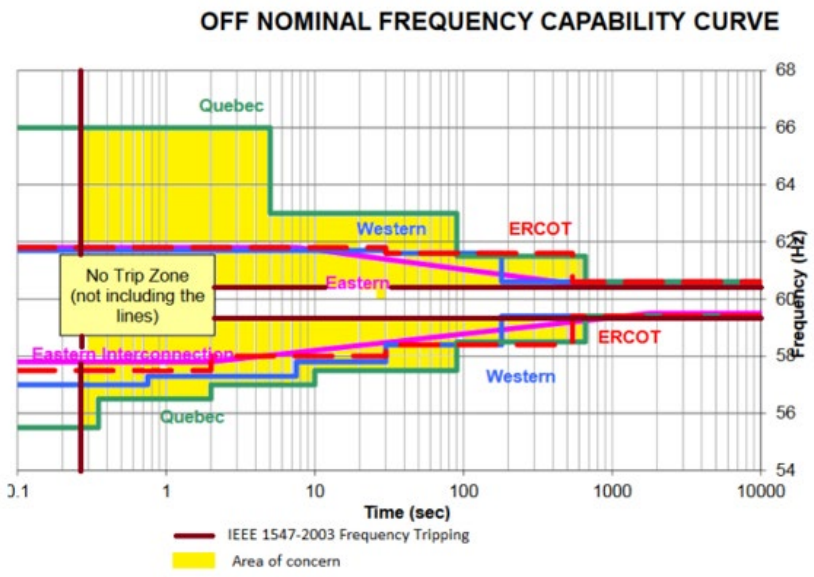
No	Comment Submitted	CAISO Response
	base scenarios on the three largest or longest de-energization events that each utility has executed. The CAISO should obtain data from each utility on the dates of these events, the specific circuits affected, and the typical load on each circuit. For scenarios that are based on 2019 de-energization events, it is also important to account for recent grid hardening and sectionalization measures. Recent and planned wildfire mitigation measures will continue to narrow the scope of deenergization events in the future.	
8e	3. CAISO's assessment should not assume that extreme fire weather will occur uniformly across a service territory or that de-energization events will be applied simultaneously to all High Fire-Threat Districts. The CAISO should bear in mind that de-energization events vary in their geographic scope, depending on weather patterns. The extreme winds that drive utilities' de-energization decisions are often highly localized: specific mountain slopes or canyons can have much stronger winds than surrounding areas. Therefore, each event is unique. The study scope should include several scenarios with different geographical scopes, based on the expectation that extreme fire weather conditions may occur in various parts of southern California, but are unlikely to occur everywhere simultaneously. Scenarios that assume all transmission facilities in High Fire-Threat Districts are de-energized simultaneously are not realistic and should be avoided in the assessment	The comment has been noted.
8f	4. CAISO's Assessment should use common terms. Finally, to avoid confusion, the CAISO should attempt to use terminology that is consistent with the language used in California Public Utility Commission (Commission) proceedings. For example, the Draft 2021-2022 Study Plan and the accompanying presentation refer to "High Fire Risk Areas," whereas "High Fire-Threat Districts" is the correct term. The map shown in the Draft 2021-2022 Study Plan presentation is also the Commission's High Fire-Threat District (HFTD) Map, which the Commission adopted in Rulemaking 15-05-006.	The comment has been noted.

9. San Diego Gas & Electric (SDG&E) Submitted by: Alan Zoe		
No	**Comment Submitted**	**CAISO Response**
9a	SDGE would like to reiterate our comments submitted for the 2020-2021 TPP on 2/25/21 regarding the prevalence of RAS in SDGE's system. The overall reliability, ability of operators to operate excessive RAS, and loss of resources are among the issues to consider when recommending RAS as a TPP mitigation. There is a large amount of Off-Shore Wind (OSW) referenced in the 2021-2022 TPP process so far. With the high amounts of OSW sharing gen-ties, CAISO should assess the implications with regards to MSSC and N-1 BAL reliability in addition to transmission. It could be the case in the future that the new MSSC is OSW and we should plan for this scenario. Frequency setting of legacy BTM-PV inverters Historically, the CAISO and PTOs have not properly factored in their composite load models how legacy inverters, such as the ones installed before the IEEE1547-2018 standard or the newer Rule 21 requirements, would react during a low frequency event. Legacy inverters that followed mainly the IEEE1547-2003 standard did not have ride through capabilities and were designed to trip 59.3 Hz after 10 cycles (0.16 s). The following NERC report shares the same concerns on legacy inverter and their potential unpredicted behavior if not modeled properly in the TPP models. https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/Distributed_Energy_Resources_Report.pdf The voltage and frequency performance of DER is currently not coordinated with BPS requirements. DER resources are not explicitly modeled as generating resources in operating and planning analysis tools either in real-time or off-line studies. Therefore, an event that causes a large amount of DER to isolate from the power grid could result in unpredicted BPS behavior. Similar issues apply for frequency ride-through. In WECC, the largest credible generation contingency is the outage of two nuclear units at the Palo Verde plant. This could result in a loss of 2,740 MW with a resulting frequency decline	The comment has been noted. The ISO performs dynamic stability studies, including those of extreme events, such as loss of two Palo Verde units or WECC system separation. We model DER as aggregated, and in the planning studies we assume that 30% of the DER have legacy inverters with requirements according to the IEEE 1547-2003 Standard, and 70% are new DER with requirements according to the IEEE 1547-2018 Standard. We model DER parameters according to the NERC SPIDER WG DER Parameterization Guideline. According to the Guideline, tripping of aggregate DER is set at 57.5 Hz for low frequency and 61.5 Hz for high frequency. Due to these settings, we did not observe large loss of DER for frequency excursions. However, we observed DER loss for low or for high voltage. We agree that during extreme events DER that have settings according to IEEE 1547-2003 may trip, but in our studies we assume that it will not be a large amount, since all new inverters have settings according to the new Standard. We noted your comment and will consider performing sensitivity studies of extreme events with higher settings for under-frequency tripping.

<table>
<tr><th>No</th><th>Comment Submitted</th><th>CAISO Response</th></tr>
<tr><td></td><td>of 0.29 Hz, or a 59.71 Hz nadir (BAL-003-1 interconnection frequency response obligation (IFRO) calculation for WECC). This is above the IEEE 1547 separation point of 59.3 Hz. However, the WECC Off-Nominal Frequency Plan begins tripping at 59.5 Hz and continues tripping down to 58.3 Hz. If UFLS event occurred, DER are likely to trip off-line at 59.3 Hz, dramatically increasing perceptible load on the BPS and further depressing frequency. It is important to recall that IEEE 1547 specifies minimum performance requirements: DER equipment manufactures may exceed 1547 trip requirements resulting in DER tripping before 59.3 Hz is reached. This implies that significant DER separation could occur at frequencies higher than 59.3 Hz, but all separation would occur by 59.3 Hz

If a system event occurs, be it a voltage or frequency excursion, and that excursion exceeds the inverter isolation settings, it is likely that a significant amount of DER may automatically disconnect. This can instantaneously and significantly increase net load during such an event, thereby exacerbating the underlying disturbance that caused the voltage or frequency excursion. The impact of the change in net load is proportional to the amount of DER that isolates from the power grid. As DER penetration increases, the effects of this sudden load surge on the BPS increase

PRC-024-2 frequency ride-through requirements are designed such that UFLS schemes will operate before generators begin to disconnect from the BPS. Smaller DER installations, under 30 kW, can begin disconnecting from the BPS without respect to coordination with the area UFLS. When DER disconnect, BPS net load will increase. This will further depress frequency, potentially leading to premature system instability</td><td>Also, it should be noted that during extreme events, not only generation may trip for low frequency, but also load is reduced, some by under-frequency load shedding, and some due to dependency of load on frequency and on voltage and partial tripping of composite load for under-voltage.</td></tr>
<tr><td>9b</td><td>Table 4.2: Frequency Ride-Through Conditions
(DER must isolate when these conditions are met)
<table><tr><th>DER Size</th><th>Frequency Range (Hz)</th><th>Clearing Times (sec)</th></tr><tr><td rowspan="3">≤ 30 kW</td><td>> 60.5</td><td>0.16</td></tr><tr><td>< 59.3</td><td>0.16</td></tr><tr><td>> 60.5</td><td>0.16</td></tr><tr><td rowspan="2">> 30 kW</td><td>< 59.8 – 57.0 adjustable</td><td>0.16 – 300 adjustable</td></tr><tr><td>< 57.0</td><td>0.16</td></tr></table></td><td>We model DER as aggregated and model DER parameters according to the NERC SPIDER DER Parameterization Guideline. See response to the previous comment.</td></tr>
</table>

No	Comment Submitted	CAISO Response
9c	 **Figure 4.2: NERC PRC-024-1 and IEEE 1547-2003 and Frequency Ride-Through**	See the response to the previous comments.
9d	SDG&E's recommendation is for the CAISO and the PTOs to model both the legacy inverters (IEEE1547-2003) and the new inverters (IEEE1547-2018) in the planning models. The number of legacy inverters could be estimated by using data from the "California Distributed Generation Statistics". As of 2020, the website was showing of the ~8000 MW of BTM-PV installed today in California, ~5000 MW were installed before the first round of smart inverter requirements rolled out on 9/8/2017 (i.e. legacy inverters). If needed, this data can be further improved and disaggregated at the PTO level	ISO models DER as aggregated with 30% of the legacy inverters and 70% of the new inverters. We will consider performing sensitivity studies where we will disaggregate the old and new inverters to investigate how many of the DER will trip.

10. Silicon Valley Power (SVP)
Submitted by: Albert Saenz

No	Comment Submitted	CAISO Response
10a	As we explain below, the CAISO and PG&E must expeditiously approve mitigation plans and a comprehensive action plan to serve the significant load growth the CEC forecasted in the South Bay. **CEC and SVP Expect a Significant Load Growth Over the Next Several Years** As the CAISO is aware, SVP's load is expected to grow considerably in the next several years, primarily driven by hyper-scale data centers. CEC's latest adopted California Energy Demand Update (CEDU) 2020-2030 managed forecast (Demand Forecast 2020) accurately captures SVP's currently expected rapid load growth. In Table 1, we provide a comparison of the 1-in-10 Summer Peak load for SVP modeled in the CAISO 2020-2021 TPP with the CEC's Demand Forecast 2020 adopted in January 2021. CAISO 2020-2021 TPP was based upon the 2019 IEPR final report (adopted on February 20, 2020). The CEC's Demand Forecast 2020 would be used by the CAISO in its 2021-2022 TPP. The CEC's recently adopted forecast is significantly higher. For example, the CAISO modeled SVP's 1-in-10 Summer peak load at 657MW (=672MW minus 14.6MW of energy efficiency) in the year 2025 in the 2020-2021 TPP, whereas the CEC's Demand Forecast 2020 now shows SVP's peak load in 2025 at **1,011MW**, which is even higher than the SVP peak load of **865 MW** that the CAISO modeled under the *SVP High Load sensitivity* case for the year 2030. **Table 1: A Comparison of 1-in-10 SVP Summer Peak Load (MW) Modeled in CAISO 2020-2021 TPP Cases Vs. in CEC Adopted Baseline Demand Forecast 2020** Scenario / Year / CAISO 2020-2021 TPP* / CEC Adopted 2020-2030 CEDU *Base* / 2022 / 624 / 743 *Base* / 2025 / 657 / 1,011 *Base* / 2030 / 670 / 1,176 *SVP High Load Sensitivity* / 2030 / 865 *Adjusted for energy efficiency amounts	The 2021-2022 TPP cases capture the higher SVP loads based on the latest CEC forecast. The mitigation plans will be developed in-line with the results seen in the latest analysis.
10b	A Significant Number and Levels of Reliability Violations on the CAISO Controlled Grid Critical Facilities Serving SVP Load Are Expected In the Near-Term	The comment has been noted. As mentioned in the SVP comment, ISO is already working with PG&E on developing the mitigation scope for some of the facilities identified in the SVP comments. In addition, based

No	Comment Submitted	CAISO Response
	The CAISO 2020-2021 Draft Plan noted multiple Category P1, P2, and P7 overloads on the Los Esteros-Nortech 115 kV line in both the short and long term.2 To mitigate these overloads, the CAISO has indicated that it is working with PG&E to develop a project which could include reconductoring the 115 kV line. SVP welcomes the coordination between the CAISO and PG&E to upgrade PG&E's south bay area transmission system, which is where SVP load exists. SVP conducted a preliminary reliability assessment using the 2020-2021 TPP GBA 2025 Summer Peak power flow case as the starting case. SVP assumed certain topology changes to update the SVP network to the 2026 Summer configuration and scaled the SVP load to 1,011MW consistent with the CEC Demand Forecast 2020 (see Table 1). As shown in Table 2, this assessment indicates that the P1, P7, and P6 overloads on the Los Esteros-Nortech 115 kV line and additional PG&E transmission facilities serving the SVP load are expected to be even worse as early as 2025 than those envisioned in 2030 under the *SVP High Load sensitivity* case studied in the 2020-2021 Plan.3 These PG&E facilities include the Newark-Northern Receiving Station (NRS) 115kV line, the Newark-Zanker-Kifer 115kV line, and the FMC-Kifer 115kV line the as shown in Table 2 below. For the year 2025, SVP's preliminary assessment using the latest CEC load forecast shows that the P1 contingency of the loss of the SSS-NRS 230 kV causes **39%** overload on the Los Esteros-Nortech 115 kV Line, which is significantly higher than the **2%** and **25%** overloads identified under the two SVP load scenarios in 2030.	on the 2021-2022 TPP analysis, ISO will further refine and expand the scope of upgrades as needed.

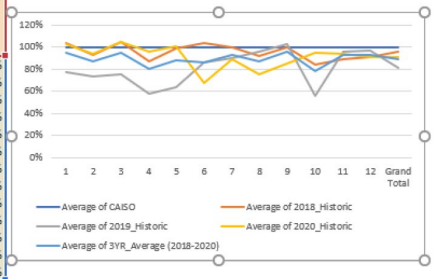
<table>
<tr><th>No</th><th>Comment Submitted</th><th>CAISO Response</th></tr>
<tr><td></td><td>
Table 2: A Comparison of Loadings (%) on the Critical Facilities Serving SVP Load in 2030 Identified by CAISO in 2020-2021 TPP and SVP's Preliminary Assessment for Year 2025
<table>
<tr><th>Overloaded Facility</th><th>Contingency</th><th>Category</th><th>Base Summer Peak 2030 with SVP load at 670MW*</th><th>SVP High Load Sensitivity Summer Peak 2030 with SVP load at 865MW*</th><th>Summer Peak 2025 Case with SVP load at 1,011MW**</th></tr>
<tr><td>Los Esteros-Nortech 115 kV Line</td><td>SSS-NRS 230 kV same as outage of SVP's PST or NRS T2</td><td>P1</td><td>102%</td><td>125%</td><td>139%</td></tr>
<tr><td>Los Esteros-Nortech 115 kV Line</td><td>LS ESTRS 230kV - Middle Breaker Bay 8</td><td>P2</td><td>102%</td><td>124%</td><td>139%</td></tr>
<tr><td>Los Esteros-Nortech 115 kV Line</td><td>Los Esteros - Trimble & Los Esteros - Montague 115 kV</td><td>P7</td><td>88%</td><td>110%</td><td>121%</td></tr>
<tr><td>Newark-NRS #1 115kV Line</td><td rowspan="4">Newark - Los Esteros & Los Esteros - Metcalf 230 kV Lines</td><td rowspan="4">P7</td><td>97%</td><td>Diverge</td><td>147%</td></tr>
<tr><td>Newark-NRS #2 115kV Line</td><td>80%</td><td>Diverge</td><td>130%</td></tr>
<tr><td>Newark-Zanker-KRS 115kV Line</td><td><100%</td><td>Diverge</td><td>112%</td></tr>
<tr><td>San Jose A-San Jose B 115kV Line</td><td><100%</td><td>Diverge</td><td>106%</td></tr>
<tr><td>Newark-NRS #1 115kV Line</td><td rowspan="4">Phase Shifter Path and Los Esteros-Nortech 115kV Line</td><td rowspan="4">P6</td><td><100%</td><td><100%</td><td>160%</td></tr>
<tr><td>Newark-NRS #2 115kV Line</td><td><100%</td><td><100%</td><td>151%</td></tr>
<tr><td>Newark-Zanker 115kV Line</td><td><100%</td><td><100%</td><td>121%</td></tr>
<tr><td>FMC-Kifer 115kV Line</td><td><100%</td><td><100%</td><td>107%</td></tr>
<tr><td>Los Esteros-Nortech 115kV</td><td rowspan="2">Phase Shifter Path and San Jose B-FMC 115kV</td><td rowspan="2">P6</td><td><100%</td><td><100%</td><td>159%</td></tr>
<tr><td>Newark-NRS #1 115kV</td><td><100%</td><td><100%</td><td>103%</td></tr>
</table>
*Source: 2020-2021 CAISO Reliability Assessment – Preliminary Study Results, PG&E Greater Bay Area, CAISO 2020-2021 TPP, August 15, 2020.
**Source: SVP Preliminary Assessment
</td><td></td></tr>
<tr><td>10c</td><td>Significant Rapid Load Growth in SVP-San Jose Area Requires Timely Comprehensive Actions
In addition to the SVP internal load, the load surrounding SVP's system in the San Jose sub-area is expected to grow rapidly in the near-term. For example, Microsoft has proposed to construct and operate the San Jose City Data Center (99MW) connected to Los Esteros Substation.4 Therefore, several P1, P7, and P6 overloads on the Los Esteros-Nortech 115 kV Line and Newark-NRS #1 & #2 115kV lines identified under the SVP's Preliminary Assessment in the year 2025 (Table 2) would be even worse with the interconnection of the San Jose</td><td>ISO has added an additional Sensitivity to capture the issues identified in the comment. ISO will be working closely with both SVP and PG&E to approve upgrade and/or propose action plans for the issues that will be identified in the 2021-2022 TPP cycle.</td></tr>
</table>

No	Comment Submitted	CAISO Response
	Data Center. The necessity to plan for projects to alleviate future overloads is critical given the timing of the SVP-San Jose new loads. We believe it is important for the CAISO to timely develop and approve a plan to relieve the overloads delineated above. SVP is concerned that even if CAISO had already identified and approved transmission projects, they would not be completed in time to eliminate expected planning criteria violations. **Since any reinforcement of the transmission grid in the SVP/San Jose area will probably take significant time to construct, it is critical for CAISO and PG&E to approve mitigation plans and a comprehensive action plan expeditiously.** SVP expects to work closely with PG&E and the CAISO in such efforts. SVP appreciates the opportunity to comment on the Draft 2020-2021 Transmission Plan and acknowledges the significant effort of the CAISO staff in its development. We look forward to working with PG&E and the CAISO to develop the needed transmission projects.	

11. South Western Power (SWPG) **Submitted by: Ravi Sankaran**		
No	**Comment Submitted**	**CAISO Response**
11a	SWPG's comments are limited to confirming that the CAISO intends to study, with equal emphasis, renewable wind generation sources outside of California which import both to the Palo Verde and the El Dorado interties. The CPUC's instructions regarding this in its February 11, 2021 decision seem clear: "…CPUC staff is not able to determine at which busbar location injection would best meet policy goals while minimizing costs to ratepayers. For this reason, CPUC staff appreciates CAISO reply comments, which indicated the possibility of studying the full amount at both injection points to accommodate this rare situation. Although the dashboards include only one location to prevent double counting, CPUC staff note that a single injection point has not been selected for the purposes of the TPP base case assessments." (Page 69 of the February 11, 2021 Final Decision Attachment A.) SWPG believes the CAISO has confirmed this during its February 25, 2021 meeting on the draft study plan, but regardless is filing these clarifying comments in part due to verbal comments during the call by one or more other stakeholders indicating that the Commission had found constraints related to out-of-state wind injections to the Riverside Palm Springs area which would render the wind imported to that region to be more expensive for buyers. SWPG believes this to not be the case, that instead the RESOLVE model satisfied the transmission constraints and still sited 1,062 MWs of out-of-state (OOS) wind for delivery to the Riverside Palm Springs area.	The CAISO confirms both the Palo Verde and El Dorado injection points will be studied in the policy-driven assessment.
11b	Quite simply, SWPG encourages the CAISO to continue to study all viable sources for OOS wind delivery (e.g., to Riverside Palm Springs and to Eldorado areas) and to ensure that interties associated with each of the various locations of OOS be equipped to import such wind without significant constraints to importing and delivering to load centers. SWPG appreciates the CAISO's willingness to study both injection regions in its 2021-2022 Base Case and looks forward to the results of the study process.	Comment noted.

12. Transmission Agency of Northern California (TANC) Submitted by: Keith Johnson		
No	**Comment Submitted**	**CAISO Response**
12a	**1. The CAISO should use historic total transfer capability data when modeling the California-Oregon Intertie.** Over the last several years there have been significant improvements in how the COI path is modeled in the CAISO's production cost model ("PCM") to account for typical derates that occur due to maintenance outages north and south of the California Oregon border. However, the COI total transfer capability ("TTC") limits modeled in the CAISO PCM are still high when compared to actual historic COI TTC limits. TANC has compared the values the CAISO used in its PCM to the actual COI TTC that has occurred over the past three years. The two figures below compare the average monthly COI TTC modeled in the CAISO PCM to the average actual monthly COI TTC that occurred over the past three years. The COI TTC modeled in the CAISO PCM is close to that occurring in 2018, which is an improvement to the model. However, when compared to the three-year average, the COI TTC modeled in the CAISO PCM still appears high. This would be most significant during the hotter months when the demand in California remains high and the solar resources become unavailable.	The CAISO's planning PCM considered derations of COI path rating due to repeatable, normally annual, scheduled maintenance. Both the derations and scheduled maintenances information were provided by COI facility owners. The historical profiles of path limit include derations due to different types of events that can be beyond annual repeatable scheduled maintenances. Directly using historical profiles of path limit therefore would overstate the deration, or understate the path limit, in planning PCM.

Month	Average of CAISO	Average of 2018_Historic	Average of 2019_Historic	Average of 2020_Historic	Average of 3YR_Average (2018-2020)
1	100%	104%	77%	102%	94%
2	100%	93%	73%	94%	87%
3	100%	104%	75%	104%	95%
4	100%	87%	58%	95%	80%
5	100%	99%	63%	101%	88%
6	100%	104%	86%	68%	86%
7	100%	99%	90%	89%	93%
8	100%	91%	95%	75%	87%
9	100%	100%	102%	85%	96%
10	100%	84%	56%	95%	78%
11	100%	89%	95%	94%	93%
12	100%	90%	97%	91%	93%
Grand Total	100%	96%	81%	91%	89%



Understandably, this is a complex problem due to the variable nature of the maintenance outages and the degree that outages might impact the COI TTC. To simplify the problem while also achieving a practical model for COI, TANC suggests that the CAISO use an average of historic COI TTC data when modeling COI starting from 2018. This would provide a more accurate model for COI while also accounting for the improvements made in operations since 2018 by the CAISO's operations group. A similar methodology might also be used for

No	Comment Submitted	CAISO Response
	other paths for import and export capability of the CAISO's system. TANC notes that due to the aging conditions of the 500-kV lines and equipment, and its own planning for future work, outages for replacement and maintenance work can be expected to increase in the next 10-year period compared to recent experience.	
12b	**2. The CAISO's planning and operations groups should review projects where production cost model studies do not fully assess the economic benefits.** The CAISO's PCM does not adequately assess the benefits of projects that improve the COI TTC under outage conditions. In the past, projects identified in the CAISO's reliability studies that would significantly improve the COI TTC under maintenance outage conditions have been determined to have low economic benefits. For example, the PCM study of the Round Mountain-Table Mountain Remedial Action Scheme indicated a low economic benefit under normal operating conditions even though the Remedial Action Scheme would improve the COI TTC during most maintenance outages located in Northern California. The economic benefits of improving COI TTC during outage conditions are not captured in the production cost simulation because the assumptions for COI TTC are fixed and do not reflect the economic benefits from the improved transfer capability under outage conditions. It is unclear how the benefits of such projects could be accurately modeled in the PCM studies and it might be beyond the current software capabilities. TANC suggests that the CAISO's planning and operations groups consider alternative approaches to identify the economic benefits of such projects. With a better understanding of the hard to quantify benefits of such projects, the CAISO may be able to identify beneficial projects that might otherwise be missed.	The comment has been noted.
12c	**3. The CAISO should use a scenario with a more conservative load forecast in the production cost model studies.** The CAISO's reliability studies model either 1-in-5 (Bulk System Studies) or 1-in-10 (Local Area Studies) weather years. The PCM for the economic studies uses a 1-in-2 weather year and a mid-demand baseline with a mid-Additional Achievable Energy Efficiency savings load forecast. With recent concerns pertaining to available resources during the warmer months, TANC suggests that the CASIO use a scenario that includes a more conservative load forecast	The CAISO planning PCM models load with load profile that represents hourly load of 8760 hours. The load profile is adjusted to match both the consumed energy and peak demand as identified in the CEC load forecast. CEC load forecasts with 1-in-5, and 1-in-10 peak have the same total energy as the 1-in-2 forecast.

No	Comment Submitted	CAISO Response
	in the PCM such as a 1-in-5 weather year that is used in the Bulk System reliability studies. This would test the sensitivity of the study results to load forecast variation and address potential impacts of climate change.	

13. TransWest Epress LLC **Submitted by:**		
No	**Comment Submitted**	**CAISO Response**
13a	TransWest Express LLC ("TransWest") appreciates the opportunity to comment on the Draft 2021-2022 Transmission Planning Process ("TPP") Unified Planning Assumptions and Study Plan ("Draft Study Plan") prepared by the California Independent System Operator ("ISO"). TransWest comments address two sections of the Draft Study plan, Section 3 – Policy Driven RPS Transmission Plan Analysis and Section 5 – Interregional Coordination. TransWest comments are specifically focused on the Study Plan associated with the portion of the resource portfolios that pertain to the 1,062 MW of Full Capacity Delivery Status (FCDS) Wyoming wind resources in the base portfolio and the 1,500 MW of FCDS Wyoming wind resources in the Sensitivity 1 portfolio.	Please see response below.
13b	These FCDS Wyoming wind resources are specifically included within the California Public Utility Commission's (CPUC's) February 17, 2021 Decision (D21-02-008) Transferring Electric Resource Portfolios to the ISO for 2021-20222 TPP. The elevation of this critical step in the TPP to a formal CPUC Decision is a welcomed enhancement in the application of the long-standing memorandum of understanding between the CPUC and the ISO. Understandably the February 18, 2021 Draft Study Plan did not outline the specific analysis planned for the 2021-2022 TPP based on the February 17, 2021 Decision.	The CAISO will follow the guidance regarding the 1062 MW of OOS resources the CPUC provided on page 68 of Attachment A of the February 17, 2021 Decision. In addition, the ISO has provided additional approaches in the May 14 stakeholder meeting and will in the July 27 stakeholder call related to treatment of the OOS wind in the 2021-2022 TPP.
13c	TransWest has sponsored and submitted the TransWest Express Transmission Project (TWE Project) as an inter-regional transmission project (ITP) in each of the three two-year Interregional Transmission Planning Coordination cycles. In each of these planning cycles, the ISO has led the coordination effort with the other planning regions. The June 2020 ITP Evaluation Process Plan1stated "the CAISO has not fully considered how it may study the TWE project in the 2020-2021 (TPP) planning cycle. However, it is expected that the 2020-2021 planning process will likely consider all three segments of the TWE Project as a single 1500 MW project in the context of an "informational" policy analysis. The 2020-2021 planning process will focus on reliability assessment and production cost simulations." These assessments, simulations and/or evaluations of the TWE Project were not conducted as part of the 2020-2021 TPP2. TransWest understands that ultimately ISO planning staff resources were not budgeted nor	The comment has been noted.

No	Comment Submitted	CAISO Response
	available for the ITP evaluation and there were concern amongst the planning staff that the 1,500 MW in the 2020-2021 TPP sensitivity portfolio were identified as Energy-Only resources3	
13d	TransWest agrees with the statement within the Draft Study Plan that the resource portfolios do not provide the granularity needed to perform transmission analysis. Since Wyoming resources are located outside of the scope of the busbar mapping geographical scope performed by the CPUC and California Energy Commission. TransWest has provided bus bar mapping information to the CAISO in the form of detailed power system models used in the WECC Path Rating process and also provided to Northern Grid through the TWE Project ITP submittal. Similar data, although not system modeling information was also provided to the CPUC staff as part of their Modeling Advisory Group Workshop on out-of-state resources conducted in 2020. TransWest looks forward to working with the ISO to support the CAISO's ITP evaluation of the TWE Project in the 2021-2022 TPP.	The comment has been noted.
13e	TransWest recommends the CAISO post and share Year 2 Annual Interregional Information about the CPUC Decision to transfer a base case portfolio for the 2021-2022 TPP with 1,062 MW of Wyoming wind resources to inform the other regional and local planning entities. Specifically, Northern Grid, the Los Angeles Department of Water and Power and NV Energy would likely find this information useful to further coordinate respective transmission planning processes at the regional and local level. As FERC and other entities recognize, long-distance, interregional transmission investment requires significant scale to be economic. Cost and risk sharing amongst transmission providers, through the TWE Project or other initiatives, would allow the CAISO to facilitate the 1,062 to 1,500 MW of Wyoming wind resources in the 2021-2022 TPP portfolios at a lower cost than a stand-alone CAISO regional transmission project.	The ISO has considered the TWE project as to how the ISO might consider the TWE project within the 2021-2022 TPP cycle. Through its 2020-2021 TPP, the ISO met its Order 1000 interregional coordination requirements associated with the ITPs submitted in the current interregional coordination cycle and as such, no further Order 1000 consideration of the ITPs will be performed during the 2021-2022 TPP cycle. However, the CPUC Rulemaking 20-05-003 issued on February 17, 2021 does include certain out-of-state (OOS) portfolios for resources from Wyoming and New Mexico. That rulemaking stated that the ISO's consideration of these OOS resources could be represented by a resource injection at Eldorado for Idaho/Wyoming wind and Palo Verde for New Mexico wind. Since the FCDS assessment is intended to mean within the ISO interconnected system and not from Wyoming or New Mexico to California, this approach is consistent with past methodology that the ISO has utilized when considering OOS wind.

No	Comment Submitted	CAISO Response
		Regarding the 2021-2022 TPP, the ISO has rethought what it stated in the evaluation plan, specifically with regard to assessing whether system upgrades are required for New Mexico or Wyoming wind and how much of either portfolio the transmission system can accommodate without upgrades. Based on the CPUC's rulemaking, the ISO now believes that our consideration of the OOS portfolios should focus on meeting the FCDS requirements as discussed in the rulemaking. In addition, the ISO has provided additional approaches in the May 14 stakeholder meeting and will in the July 27 stakeholder call related to treatment of the OOS wind in the 2021-2022 TPP.
13f	In addition to sponsoring the TWE Project as an ITP, in December 2020 TransWest submitted an application to the Federal Energy Regulatory Commission ("FERC") for authority to sell transmission service rights at negotiated rates on the TWE Project (Docket No. ER21-645-000). On February 26, 2021 FERC issued an Order Granting Application. Under the FERC ordered initial capacity allocation process, TransWest will seek to allocate up to 100 percent of the TWE Project capacity to one or more transmission customers through an open solicitation process.	The comment has been noted.
13g	The Draft Study Plan includes the Eldorado 500 kV substation as the assumed injection point for Wyoming wind resources in the CPUC transferred portfolio and potentially other Rocky mountain region resources including Idaho. The CAISO should also consider the Harry Allen / Crystal 500 kV substation complex as a potential injection point due to the recent 3,450 MW expansion of the CAISO Network to the Harry Allen /Crystal 500 kV substation complex with the completion of the Harry Allen – Eldorado 500 kV Line. As the ISO planning staff is aware, TransWest has requested a TWE Project interconnection to the CAISO controlled Harry Allen Eldorado 500 kV facilities near the Crystal substation. In addition, the two other ITPs that have identified delivering Wyoming and other Rocky Mountain resources into the CAISO network have also identified the Harry Allen / Crystal 500 kV substation complex as their targeted CAISO injection point4. The CAISO investment in the Harry Allen – Eldorado 500 kV line should be leveraged to reduce the risk of stranded transmission assets to access Wyoming and other Rocky Mountain resources.	See response to 5b.
13h	TransWest supports the ISO's planned analysis of both the Harry Allen/Eldorado and Palo Verde injection points for remote renewable resources	The comment has been noted.

No	Comment Submitted	CAISO Response
	to provide information to clear up the uncertainty of the transmission implications the CPUC and ISO staff considered while developing the 2021-2022 TPP portfolios. TransWest appreciates that the ISO can perform additional policy-driven analysis beyond the TWE Project ITP evaluation as part of the FCDS Wyoming wind resources included in the base case and sensitivity 1 portfolios. Information from the Palo Verde analysis will be useful in informing future IRP analysis and TPP portfolios.	

14. Vistra Submitted by: Cathleen Colbert		
No	**Comment Submitted**	**CAISO Response**
14a	**Model Battery Energy Storage by Use Case** Vistra submitted comments to the CAISO's 2020-2021 Transmission Planning Process ("TPP") Preliminary Policy & Economic Assessment results raising areas for improvement in the production cost simulation (PCM) that would benefit from additional review and improvements by the CAISO. We raised that storage developers build energy storage resources to meet different use cases generally among three major types where the logic differs for when the resource would charge or discharge. We provide an explanation of co-located storage operations, use-limited stand-alone storage only providing ancillary services, and stand-alone storage performing energy arbitrage and ancillary service provision. The PCM should ideally adopt modeling parameters that are aligned with the expected business use. Please see our comments at http://www.caiso.com/Documents/VistraComments-2020-2021TransmissionPlanningProcess-Nov172020StakeholderCall.pdf.	The comment has been noted. The CAISO planning PCM considers battery models consistently with the assumption and recommendation of the CPUC IRP.
14b	**Improvements to Battery Energy Storage Replacement Cost Estimate** Vistra analyzed the CAISO's approach for estimating storage replacement incremental costs currently in use and has several recommendations. In the 2019-2020 Transmission Planning Process Stakeholder Meeting in September 2019 the CAISO proposed to incorporate the flat average cost for each MWh in the PCM for storage. The CAISO acknowledged that "Further refinement to the approach and parameters of modeling these characteristics of batteries will be continued in future planning cycles". Vistra requests the 2021-2022 TPP cycle revisit and adopt refinements to the approach as this is the appropriate, needed time do so with practical experience and improved information. Vistra proposes recommended changes to (1) update replacement cost estimate with 2020 study value highlighted below in yellow and (2) update Depth of Discharge input highlighted below in green, as described below.	The comment has been noted.

No	Comment Submitted	CAISO Response
	CAISO Approach **Average Cost Approach to Replacement Costs (Status Quo)** **Input** | **Value** | **UOM** | **Source** Replacement Cost | 189,000 | $/MWh | From HydroWires DOE 2019 Cycle Life | 3,500 | cycles | From HydroWires DOE 2019 DOD | 80% | % | From HydroWires DOE 2019 Life | 10 | Year | From HydroWires DOE 2019 Denominator @ 2 input | 2 | | CAISO **Status Quo** | $ 33.75 | $/MWh |	
14c	We submit the following recommendations. 1. *Use updated studies that go beyond 2025:* In the September 2019 meeting the CAISO raised that updates to the inputs used in this formula would be used if, for example, forecast for future years become available. One of the major authors of the HydroWires report that is used by the CAISO to calculate the $/MWh value is Pacific Northwest National Laboratory (PNNL). PNNL published an updated report, 2020 Grid Energy Storage Technology Cost and Performance Assessment1, in December 2020 that expands the forecasts to 2030 and revises its analysis based on more recent and accurate information. In the PNNL 2020 study, for the year 2030 the 400 MWh storage block cost has been revised to $99,000/MWh, shown in the table below in yellow blocks. We request the CAISO explore more recent research and propose updated cost values that are applicable beyond 2025 for 2030. For example, we illustrate the change in flat average replacement costs using the PNNL's study installed cost estimate to more accurately estimate current expectations of replacement costs: **CAISO Approach updated for PNNL 2020 Values** **Average Cost Approach to Replacement Costs** **Input** | **Value** | **UOM** | **Source** Replacement Cost | 99,000 | $/MWh | From PNNL 2020 Cycle Life | 3,500 | cycles | From PNNL 2020 DOD | 80% | % | From PNNL 2020 Life | 10 | Year | From PNNL 2020 Denominator @ 2 input | 2 | | CAISO | **Replacement Costs** **Status Quo** | $ 33.75 **W/ PNNL 2020 values** | $ 17.68	The comment has been noted. The CAISO will review the PNNL report.
14d	2. *Depth of Discharge should be 100%:* All the operating and cost parameters are interrelated to forecasting at what point in time the replacement cost is expected to be incurred. The CAISO 2019 presentation stated, "Dispatchable energy of batteries needs to be modeled to be less than the energy capacity	The CAISO planning PCM models battery with its installed capacity. The DoD is only used in the variable cost calculation.

<table>
<tr><th>No</th><th>Comment Submitted</th><th>CAISO Response</th></tr>
<tr><td></td><td>due to the depth of discharge (DoD, or cycle depth)”2. In our experience, we do not agree that the Master File registered maximum capacity (Pmax) should be adjusted with Depth of Discharge below 100%. The ability to reliably deliver the Pmax is a function of how the battery asset as a whole is built. For instance, Vistra is bringing online a battery energy storage asset made up of three resources that together have 1200 MWh of capacity value at 100% DOD, we believe this technical ability is available to any project. We illustrate the improvement to replacement cost estimate below:
<table>
<tr><td colspan="4">CAISO Approach updated for PNNL 2020 Values & 100% DOD</td></tr>
<tr><td colspan="4">Average Cost Approach to Replacement Costs</td></tr>
<tr><td>Input</td><td>Value</td><td>UOM</td><td>Source</td></tr>
<tr><td>Replacement Cost</td><td>99,000</td><td>$/MWh</td><td>From PNNL 2020</td></tr>
<tr><td>Cycle Life</td><td>3,500</td><td>cycles</td><td>From PNNL 2020</td></tr>
<tr><td>DOD</td><td>100%</td><td>%</td><td>From PNNL 2020</td></tr>
<tr><td>Life</td><td>10</td><td>Year</td><td>From PNNL 2020</td></tr>
<tr><td>Denominator @ 2 input</td><td>2</td><td></td><td>CAISO</td></tr>
</table>
<table>
<tr><td></td><td>Replacement Costs</td></tr>
<tr><td>Status Quo</td><td>$ 33.75</td></tr>
<tr><td>W/ PNNL 2020 values</td><td>$ 17.68</td></tr>
<tr><td>W/ PNNL 2020 values & 100% DOD</td><td>$ 14.14</td></tr>
</table></td><td></td></tr>
<tr><td>14e</td><td>By adopting these two recommendations the CAISO can greatly improve the accuracy of what its current approach is intending to estimate – current expectations of replacement costs as function of expected operations. The updated cost estimate at ~$14/MWh is more in line with industry expectations than the existing approach. We respectfully urge the CAISO to update the replacement cost estimate accordingly to better represent battery economics in this TPP cycle.</td><td>Please refer to the responses to comments 14c and 14d.</td></tr>
<tr><td>14f</td><td>Updating Variable O&M Parameters
Vistra understands that CAISO uses the operating parameters and Variable Operations and Maintenance adders from the PCM Anchor Data Set 2030 version 1.0 released by WECC on June 30, 2020. Vistra has observed that certain Variable Operations & Maintenance adders in the WECC Anchor Data Set are meaningfully different than Master File and CAISO default O&M values. We request the CAISO review the O&M adders by technology type to confirm the validity of these values. Using either the registered or as bid values would more accurately represent operational reality. If the CAISO modelling approach can only support the default O&M adders, we request the CAISO revise the values it is using for the O&M adders as shown in the Market Instruments BPM in Exhibit 4-2, Default O&M Cost Adders.</td><td>The CAISO planning PCM used the same VOM assumptions for thermal generators as in the ADS PCM 2030, which were developed based on recent years operational data with considering the trend of cycling change.

The table provided in the stakeholder comment was used for different purpose in the CAISO’s market operation and was developed in 2012. The CAISO’s planning team will coordinate with the market operation team to review the data in this table.</td></tr>
</table>

<table>
<tr><th>No</th><th>Comment Submitted</th><th>CAISO Response</th></tr>
<tr><td></td><td>Exhibit 4-2: Default O&M Cost Adders effective April 1, 2012 ($/MWh)
<table>
<tr><th>Generation Technology</th><th>Recommended VOM Cost Adder ($/MWh)</th></tr>
<tr><td>Solar</td><td>$0.00</td></tr>
<tr><td>Nuclear</td><td>$1.00</td></tr>
<tr><td>Coal</td><td>$2.00</td></tr>
<tr><td>Wind</td><td>$2.00</td></tr>
<tr><td>Hydro</td><td>$2.50</td></tr>
<tr><td>Combined Cycle and Steam</td><td>$2.80</td></tr>
<tr><td>Geothermal</td><td>$3.00</td></tr>
<tr><td>Landfill Gas</td><td>$4.00</td></tr>
<tr><td>Combustion Turbine & Reciprocating Engine</td><td>$4.80</td></tr>
<tr><td>Biomass</td><td>$5.00</td></tr>
</table></td><td></td></tr>
<tr><td>14g</td><td>Resource Operating and Cost Parameter Improvements
Vistra has observed that there may be inconsistencies between a generation unit's actual operating characteristics as registered in Master File and the operating and cost parameters included in the WECC Anchor Data Set. For example, minimum operating capacity values, minimum on time, minimum off time, and proxy cost values appear to be disconnected from registered or as bid values. We request the CAISO review the source data and confirm the basis for the values used in the WECC Anchor Data Set. If CAISO also identifies these inconsistences, Vistra requests that the CAISO pursue updates to the data sets to improve accuracy of inputs driving model outcomes.</td><td>The actual operational parameters and characteristics of individual generators are deemed confidential information, and should not be used in the planning PCM. Therefore, WECC ADS PCM developed generic data for generators based on class average of historical operational data.</td></tr>
<tr><td>14h</td><td>Modelling Line Rating Recommendations
Vistra has observed transmission line ratings in the Transmission Planning Process models where the line ratings are established at higher transmission line ratings than we frequently see in operations. In some cases, the dynamic line ratings observed for normal rating and emergency rating for operations are meaningfully short of the high-end values that we believe the CAISO is using to model the system. Vistra requests that the CAISO model line rating values that are consistent with seasonal dynamic line ratings used in operations. This will more accurately represent reality in the models and allow the CAISO to better identify needed transmission upgrades.</td><td>The line ratings used in the TPP are consistent with the ratings stablished in the Transmission Registry by the transmission owners. The CAISO will look into any discrepancies during development of base cases.</td></tr>
</table>

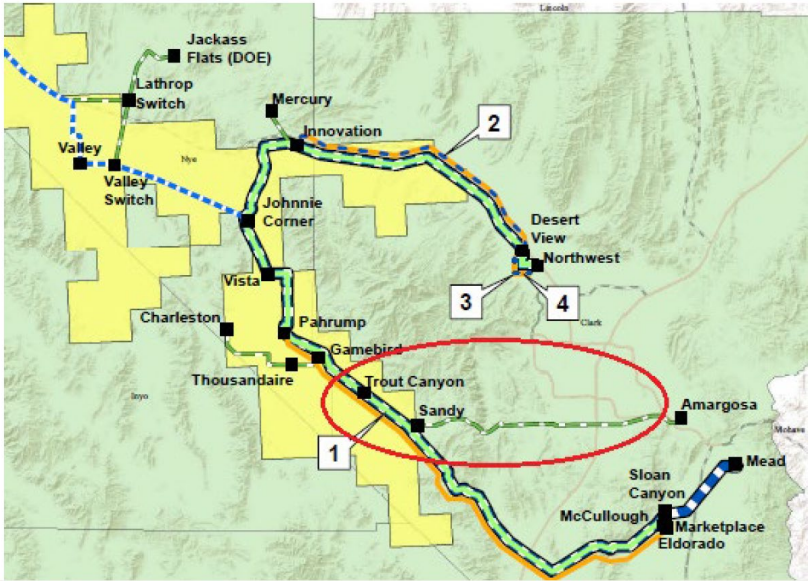
15. Basin and Range Watch **Submitted by: Kevin Emmerichg**		
No	**Comment Submitted**	**CAISO Response**
15a	I want to become a stakeholder in this 2021-2022 Transmission Planning Process: Draft Study Plan. I did not know about the meeting on March 11th but have several concerns about the Gridliance Plan. Please respond and tell me how I submit official comments. I also would like a contact and phone number for guidance because this is a complicated process. I understand there will be another meeting in September. How do I submit a letter outlining our concerns about this plan and how it would impact our local environment and property values? When I called CAISO, they would not give me contact info, but this email. The press release in in this article: https://pvtimes.com/news/california-eyes-nevada-power-97269/?fbclid=IwAR2H0i6RrFYoXUpXUwmO6eNeC5B_3cvTCljdkzof5f_XIOypKz93r3u12I8 The public utilities commission in California identified more than 2,000 megawatts of renewable generation in southwestern Nevada. The California Independent System Operator, which Valley Electric Association Inc. had joined in 2013, will now launch a study of the CPUC plan and the transmission capacity needed to deliver power from Nevada. This will upgrade to the Gridliance Transmission line which will enable several thousand acres of large-scale renewable energy projects on sensitive desert lands and habitats. The renewable energy would surround Mt Charleston, a popular recreation area and the residential areas of Pahrump, Johnnie, Amargosa Valley, Cold Creek, Indian Springs and the Las Vegas Paiute reservation would all be subjected to a big potential build out of large-scale solar projects. Impacts from large-scale renewable energy include:	Stakeholders can obtain CAISO market notices of transmission planning process meetings and other relevant information by following the instructions on this page to subscribe to the daily briefing: http://www.caiso.com/dailybriefing/Pages/default.aspx

No	Comment Submitted	CAISO Response
	1. Fugitive dust in arid land regions. Large-scale solar bulldozes desert pavements and biological soil crusts and creates dust problems for years and mitigation commonly fails. Public health is at risk from this. 2. Impacts to scenery and property values: These projects will cover up to 10 square miles and are visible for miles. Often this diminishes property values on adjacent lands. 3. Access to public lands: Once a large scale solar project is built, all public access is cut off. This will hurt local tourism economies. 4. Destruction of natural habitat and endangered species: Just in the South Pahrump Valley, there are plans to develop close to 20,000 acres for big solar projects. This will have irreversible biological impacts. WE estimate that if the plans are fully built, we will see 2,500 of Federally Threatened desert tortoises habitat removed, 800,000 Mojave yucca plants, some over 600 years old destroyed, 20,000 Joshua trees removed, 2,500 rare cactus called Parish Club cholls killed and the list goes on and on. 5. Native American cultural sites and archeology sites get completely destroyed by big solar projects. We again would like to become stakeholders in this process. I would like to be able to submit a big comment with supporting documents.	The purpose of the CAISO transmission planning process is to identify the need for transmission system upgrades. The processes for permitting the construction of transmission and generation facilities and considering the environmental impacts are the responsibility of State and local government agencies like the Nevada Public Utilities Commission.

ECONOMIC STUDY REQUESTS

E1	**GridLiance West (GLW)** **Submitted by: Jody Holland**	
No	**Comment Submitted**	**CAISO Response**
E1	Summary GridLiance West (GLW) respectfully requests that the CAISO conduct two economic studies in this current 2021 – 2022 TPP. These requests are presented herein. The first, is to examine congestion on the GLW system associated with the generation from GLW baseline renewable generation and the generation from the CPUC's Base Case portfolio for the CAISO's 2021-2022 TPP and to study economic benefits of upgrades to facilities ("GLW Conversion and Upgrades") to alleviate the congestion. The second is to study congestion resulting from development of Nevada CAISO grid-connected geothermal generation interconnected through the Oxbow 230 kV transmission line or directly connected to the GLW system – geothermal generation being sought after by LSEs and further implicated by the February 22, 2021 CPUC Ruling mandating procurement of geothermal capacity – and the benefits of alleviating this congestion and providing a reliability loop to aid in the Bishop, California Control substation constraint ("Silverado Renewable Connection 2 or SRC2"). 1. GLW Conversion and Upgrade Project - Economic Study to Relieve Congestion/Curtailment of GLW-sited IRP Resources The CPUC Base Case portfolio for the CAISO's 2021-2022 TPP includes 2,024 MWs of solar resources on the GLW system.1 This siting was supported in part by the CAISO's analysis in its 2020-2021 TPP of the CPUC's Policy Sensitivity Case 2, seeking study of 2,170 MWs of renewable generation on the GLW system. In the CAISO's study of Policy Sensitivity Case the CAISO forecasted curtailment that would be necessary absent some GLW-area upgrades. The CAISO's analysis also found that upgrades were expected to alleviate the curtailment on the GLW system. In particular, the CAISO found that its "Option 3" set of upgrades had the most cost-effective results and were found to alleviate all the curtailment associated with the 2,170 MWs of additional renewable siting at GLW-estimated cost of $90 million.2 1.1. Study Request	The CAISO has carried all study requests forward as potential high priority study requests, mainly based on the previous cycle's congestion analysis. The congestion results in the 2021-2022 planning cycle will be considered in finalizing the high priority areas

No	Comment Submitted	CAISO Response
	GLW requests that the CAISO conduct economic, reliability and policy studies of upgrades to the GLW facilities given the CPUC's 2021-2022 TPP Base Case portfolio siting of 2,024 MWs, including studying the benefits of the CAISO's previously identified "Option 3" upgrades under the Base Case build out. Demonstration of the reliability, economic, and policy benefits of transmission solutions in lieu of congestion management and RAS mitigations are crucial to understanding how CAISO will implement the CPUC portfolio. 1.2 Project Description - GLW Conversion and Upgrade Project The GLW Conversion and Upgrade Project includes the following: 1) Conversion of the VEA Gamebird to Arden 138 kV path to 230 kV including: o Converting the Gamebird circuit to near Trout Canyon 138 kV to 230 kV; o Adding two 230 kV breakers to Trout Canyon; o Converting Trout Canyon to Sandy 138 kV to 230 kV; o Upgrading Sandy 138 kV substation to 230 kV and adding two 230/24.9 kV transformers; o Converting the Sandy circuit to near NVE Arden (proposed connection) 138 kV to 230 kV; o Adding three 230 kV breakers to NVE Arden; o Opening the existing 138 kV line to Amargosa; 2) A second 230 kV circuit between Innovation and Desert View substations; 3) A second 230 kV circuit between Desert View and Northwest substations; 4) Rebuild existing 230 kV circuit between Desert View and Northwest substations. The GLW Conversion and Upgrade Project is shown in Figure 1.	

No	Comment Submitted	CAISO Response
	Figure 1  1.3 Summary of Benefits of GLW Conversion and Upgrade Project The GLW Conversion and Upgrade Project is projected to have the following benefits: 1.3.1 Alleviation of Congestion and Curtailment The CAISO's Off-Peak analysis for its 2020-2021 TPP Policy Sensitivity Case 2 showed that the project relieved 100% of the curtailment associated with the study case. GLW's own analysis (discussed further in the following "Economic Benefits" section) also found significant reductions in annual curtailment as a result of the project being in place – not only reductions in congestion in the GLW area but also increased throughput alleviating curtailment through the broader WECC region 1.3.2 Economic Benefits GLW conducted production cost modeling analyses of the GLW Conversion and Upgrade project. GLW found in its analysis that these upgrades	

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<tr><th>No</th><th>Comment Submitted</th><th>CAISO Response</th></tr>
<tr><td></td><td>generate benefits well in excess of the CAISO's standard 1.3 benefits to cost ratio – essentially paying for the project's costs in one to two years.
The modeling was performed using GridView and the CAISO's topography, as well as the consistent IRP portfolios and IEPR input assumptions. Table 1. 4 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 shown below

Table 1 - Economic Analysis Results of GLW Conversion and Upgrade Project

<table>
<tr><th>CAISO</th><th>Base Case ($M)</th><th>With Gamebird – Arden 230kV Upgrade ($M)</th><th>Difference (Base – Upgrade) ($M)</th></tr>
<tr><td>Load payment</td><td>7,106</td><td>7,000</td><td>106</td></tr>
<tr><td>Generation profits</td><td>2,736</td><td>2,644</td><td>-92</td></tr>
<tr><td>Transmission revenue</td><td>200</td><td>255</td><td>54</td></tr>
<tr><td>Net Payment of CAISO Load Customer</td><td>4,169</td><td>4,101</td><td>69</td></tr>
</table>

Based on GridLiance's production cost modeling, inclusion of additional circuits between the GLW substations Innovation to Desert View and Desert View to NVE Northwest 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.

1.3.3 Delivery of Location Constrained Resources/Integration of New Generation Resources</td><td></td></tr>
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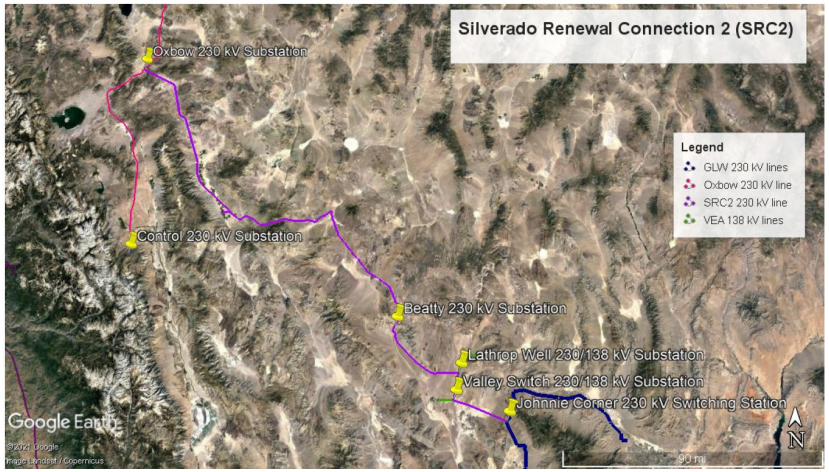
No	Comment Submitted	CAISO Response
	The GLW Conversion and Upgrade Project would increase the deliverability of resources within the GLW footprint. Although a dedicated deliverability assessment has not yet been performed with these projects presumed to be in place, the GLW Conversion and Upgrade Project alleviates deliverability bottlenecks that were identified in GI Queue Cluster12 and 13studiesand mitigated with congestion management, including overloads of Pahrump–Gamebird 230 kV, Gamebird –Trout Canyon 230 kV, Trout Canyon –Sloan Canyon230 kV, Pahrump –Innovation 230 kV,Innovation –Desert View 230 kV, Gamebird –Sandy138 kV,and Sandy–Amargosa 138 kV. 1.3.4 Resource Adequacy Benefits The GLW Conversion and Upgrade Project is expected to support CAISO Resource Adequacy by allowing both greater deliverability of interconnecting resources as discussed above in 1.3.3. In addition to solar resources presumed in the 2021 –2022 TPP the upgrades would support deliverability of storage assets co-located with solar or separately interconnected. It would also support deliverability of production-diverse wind resources should commercial interest or procurement result in a procurement shifting toward wind production over solar production. Lastly, the GLW Conversion and Upgrade Project will, in conjunction with the SRC2 project presented below, enhance deliverability of geothermal capacity from the Dixie Valley and surrounding CAISO-grid connected areas. 1.3.5 Reliability Benefits The GLW Conversion and Upgrade project would enhance reliability by increasing access to GLW-interconnected generation and storage capacity and ensuring these resources are available to meet CAISO bulk loads during shortage conditions. The project also reduces reliance on remedial action schemes by conversion of lowercapacity138 kV lines to higher capacity 230 kV and alleviates known grid bottle necks and weaknesses described in 1.3.3 above. The project as shown in GLW's production cost analysis to reduce curtailment in the service areas of the large California investor-owned	

No	Comment Submitted	CAISO Response
	electric utilities and other utilities, such as the Imperial Irrigation District and PacifiCorp, and throughout several balancing areas in the Energy Imbalance Market and the greater Western Interconnect. Thus, renewable resources as far away as the Pacific Northwest, including wind resources, had reduced curtailment with these grid enhancements to the Southern Nevada portion of the CAISO's grid. Improving the flow of energy by providing enhanced flow paths where constraints otherwise exist can have far-reaching grid and supply resilience improvements reaching far beyond the current CAISO practices of congestion managing base case overloads and applying RAS to contingencies. 2. Silverado Renewable Connection 2 - Economic Study to Reduce Curtailment at Southern Nevada Geothermal and Provide Loop for Control Substation Geothermal generation has vastly growing importance to the CAISO supply stack given increasing penetration of variable renewable generation and the impending retirement of Diablo Canyon Nuclear Generating Station and other once-through-cooling resources. Diablo Canyon's retirement leaves a substantial gap of baseload capacity that service system RA needs, and geothermal across the grid can serve that same purpose. The CAISO's consideration of additional geothermal assets located in the Nevada CAISO grid-connected region would ensure the grid can support LSE procurement by 2025 of substantial geothermal capacity to meet RA and renewable needs. GLW's second economic study request seeks CAISO analysis in its 2021-2022 TPP of benefits of enhancing interconnectivity to the Nevada CAISO grid-connected geothermal fields with baseload and dispatchable production capacity exceeding 1000 MW. These geothermal assets can be production ready within 18 months from final permitting approvals, making them readily available to meet the CPUC's proposed procurement deadline of 2025. Currently the Oxbow line can support hundreds of MW of additional geothermal capacity to the CAISO, however constraints at the Control substation near Bishop, CA drastically limit further resource adequacy deliveries from such resources. Absent alternatives, California LSEs are seeking power purchase agreements (PPAs) from geothermal assets in this	

No	Comment Submitted	CAISO Response
	region for delivery through NVE's grid, resulting in massive wheeling costs for those near 8760 deliveries. NVE's current wheeling and ancillary charges are $6/MWh, and contracting for transmission service for base-load (24x7) geothermal assets would cost $52,560/MW-year or $26M to deliver the 500 MWs recommended for siting in this region of Nevada. (While the Salton Sea area has been the foci of presumed geothermal asset development, such deliveries are hampered by IID-region transmission constraints and would also result in wheeling charges7 for CAISO LSEs.)8 In both instances of geothermal buildout in IID's Salton Sea area and in the case of siting in Nevada and delivery through NVE substantial costs for wheeling would be incurred and LSEs would unlikely be able to count the assets toward the CAISO's RA requirement given limitations on available Maximum Import Capabilities. Costs to CAISO LSEs could be substantially lessened by CAISO grid enhancements, alleviating wheeling charges and providing resilience enhancements within the CAISO grid, and the geothermal could also meet CAISO RA needs if interconnected directly through GLW. GLW respectfully requests the CAISO study the SRC2 project, which provides an alternate delivery path of the output of this high-quality capacity to the CAISO bulk system. 2.1 Study Request – SRC2 GLW requests that the CAISO study a new interconnection to Oxbow looping Nevada geothermal energy interconnections to the CAISO bulk system through GLW 2.2 Project Description – SRC2 The SRC2 includes the following: • A new substation in the Oxbow 230 kV line northwest of GLW's existing 230 kV system; • A new 230 kV circuit from that new substation to the VEA Beatty 138 kV substation; • Conversion of the VEA Beatty 138 kV substation to 230 kV and addition of two 230/24.9/14.4 kV transformers (25 MVA);	

No	Comment Submitted	CAISO Response
	• Conversion of the existing 138 kV line from Beatty – Lathrop Wells – Valley Switch – Johnnie Corner to 230 kV; • Addition of 230 kV high side substations to Lathrop Well and Valley Switch switching stations; • A new 230 kV substation at Johnnie Corner bisecting the Pahrump – Innovation 230 kV line. The SRC2 project is shown in Figure 2. Figure 2  2.3 Summary of Benefits of SRC2 SRC2 is expected to provide economic, renewable interconnection, and RA and other grid resilience and reliability benefits to the grid. 2.3.1 Alleviation of Congestion and Curtailment Generation developers' ability to interconnect Nevada CAISO grid-connected geothermal resources has been, and will continue to be, limited by the transmission equipment in Southern California if grid enhancements are not made. The transmission system in the Bishop, CA area within Southern California Edison's ("SCE") system has historically been subject to local	

No	Comment Submitted	CAISO Response
	congestion, voltage instability concerns, and operating conditions with very high system voltages. SCE manages these issues today via one or more RAS schemes that drop local generation to operate the system in a safe and reliable condition. Further, these local issues have prevented integration of even modest levels of new Nevada CAISO grid-connected geothermal capacity. The SRC2 project could enable further interconnect and significantly reduce the level of curtailment required of future resources. With the addition of 500 MW of geothermal capacity interconnected to the Oxbow 230 kV line, consistent with the GLW request that this geothermal be included in the CAISO's 2021 – 2022 TPP9, the SRC2 project is expected to result in significant cost savings CAISO load customers through reduced congestion and curtailment. 2.3.2 Delivery of Location Constrained Resources/Integration of New Generation Resources SCR2 will provide for the delivery of substantial levels of incremental Nevada CAISO grid-connected geothermal capacity. GLW's preliminary modeling indicates that additional interconnection of resources in this geothermal-rich region would otherwise be drastically curtailed given existing bottlenecks in the Bishop, CA area. The looped SRC2 project provides a networked corridor for the delivery of the output of incremental geothermal capacity 2.3.3 Resource Adequacy Benefits Of incremental renewable options available to the CAISO, geothermal offers the most needed generation profile. The grid does not yet have other areas with high geothermal potential that are readily able to satisfy the CAISO's RA shortfalls identified in the CPUC's February 22 Procurement ruling. 2021 – 2022 TPP portfolio capacity was primarily mapped to the Salton Sea area. However, this area does not directly connect to the CAISO grid, and it has very little – if any – excess Maximum Import Capability (MIC). LSEs cannot therefore use procured geothermal resources from this area to satisfy their RA needs and fill the CAISO's RA shortfall. Nevada geothermal assets connected to via NVE would have similar issues in filling the CAISO RA shortfalls. CAISO-grid interconnected geothermal resources through Nevada would provide incredible benefit to meeting the CAISO's RA needs and filling the gap that will be created when Diablo Canyon retires. 2.3.4 Reliability Benefits	

No	Comment Submitted	CAISO Response
	In addition to the RA benefits articulated above SRC2 provides additional reliability benefits by providing an alternate path for congested deliveries of existing and planned resources into Control. A loss of the Control to CAISO bulk area transmission or the lower Oxbow to Control will still enable delivery of Nevada CAISO grid-connected geothermal resources. Generation interconnection at Control will also be enhanced with the grid's ability to flow through the new looped SRC2 project 2.3.5 Renewable Build Out Benefit Increasing levels of geothermal procurement requirements can impose substantial costs on LSEs. Avoiding transmission grid investments to aid in the delivery of the geothermal energy through the CAISO grid only shifts the cost burdens into the PPAs of LSEs by requiring LSEs to pay for potential long generation intertie costs, to pay the wheeling fees of neighboring BAAs and to find alternate sources of RA given limited MIC supplies. GLW urges the CAISO to recognize the other cost savings that are available to CAISO loads by ensuring the bulk transmission system is properly upsized and interconnected to receiving these significant levels of geothermal energy. Conclusion GLW has proposed herein two study requests. The first directly results from the need to cost-effectively transmit the energy from CPUC IRP portfolio renewable resources transmitted in the IRP base case. The GLW Conversion and Upgrade Projects have been before the CAISO in one form or another through previous IRP sensitivity case studies and through generation interconnection studies. At this time it is appropriate for the CAISO to formally study these projects as part of its base case. The SRC2 project study is directly responsive to the CPUC's analysis of the anticipated 2025 RA and base load reliability shortfalls, proposed to be filled by geothermal energy. The CPUC is acting progressively to subvert what could otherwise be significant adverse reliability issues when Diablo Canyon retires and as CAISO load is served to an even greater extent from mid-day peaking energy sources. While the CPUC can, and is, considering procurement directives, they cannot ensure the grid infrastructure is sufficient to deliver new base-load energy to load centers. The CAISO must not delay in the study of grid solutions for geothermal generation sources. To this end GLW urges the CAISO to study SRC2, including the multifaceted benefits it	

No	Comment Submitted	CAISO Response
	will create. When the geothermal build out is necessary for RA purposes, it is critical for the CAISO to include RA benefits as well as congestion relief in assessing this project. GLW looks forward to working further with the CAISO and stakeholders on designing the proper study of SRC2 for this purpose.	

E2	LS Power Development LLC (LS Power) Submitted by: Sandeep Arora and Renae Steichen	
No	**Comment Submitted**	**CAISO Response**
E2	Economic Study Request and Economic Project Submission for SWIP-North LS Power hereby submits an economic study request to CAISO for the 2021-22 Transmission Plan. The request is to study congestion at CAISO's intertie interfaces with the Pacific Northwest, namely the California Oregon Intertie (COI), Pacific AC Intertie (PACI), Nevada-Oregon Border (NOB), PG&E Sierra intertie & Double Tap-Friars 138 kV. All of these congestion issues were prominent in CAISO's 2020-21 TPP and are therefore requested to be studied again. In addition to this request, LS Power is also hereby submitting its Southwest Intertie Project North (SWIP-North) for evaluation as an Economic project. SWIP-North will provide approximately 1050 MW5 of new transmission capacity to CAISO and will increase CAISO's transfer capability between Idaho Power/PacifiCorp (Midpoint 500kV), NV Energy (NVE) (Robinson Summit 500kV) and CAISO (Harry Allen 500kV). By virtue of the capacity exchanges with NVE that will occur automatically under the terms of the FERC-approved Transmission Use and Capacity Exchange Agreement (TUA) between LS Power affiliates and NVE, the SWIP-North project includes a capacity entitlement over the SWIP-South/ON Line project at no additional capital cost and free of any wheeling charges, such that completion of SWIP-North by CAISO will effectively create a new transmission path for CAISO from Midpoint to Harry Allen. Appendix 2 provides additional details of the SWIP-North path and the TUA. For the SWIP-North economic study, CAISO should also include in its model 1062 MW of Idaho wind consistent with the potential OOS wind identified in the CPUC's Base Case Portfolio. A detailed power flow model for SWIP-North will be separately emailed to CAISO. LS Power also recommends ensuring that the following changes are included for the SWIP-North economic study in this TPP cycle. Not including these will artificially reduce economic benefits of this project. These are briefly summarized here but are described more fully in Appendix 1. o Include all facility upgrades required to interconnect SWIP-North in the economic study model, including required upgrades to the existing ON Line 500 kV Transmission Line (Robinson Summit to Harry Allen). See Appendix 2 for details.	The CAISO has carried all study requests forward as potential high priority study requests, mainly based on the previous cycle's congestion analysis. The congestion results in the 2021-2022 planning cycle will be considered in finalizing the high priority areas

No	Comment Submitted	CAISO Response
	o Remove the $9/MWh NVE wheeling charge that is hardcoded in the ADS PCM model. This charge is not applicable to SWIP-North pursuant to the aforementioned TUA. o Correctly enforce COI path limits to capture only 3200 MW CAISO's share of COI/PACI in the study model, instead of the full 4800 MW limit of this path. o Quantify additional benefits of SWIP-N as outlined in CAISO's TEAM methodology - Capacity Benefits, Renewable curtailment reduction benefits and diversity benefits. A recently conducted study by Brattle Group shows these benefits as well, which we recommend CAISO use as guiding points to estimate these benefits. LS Power highlights that interregional cost allocation has already occurred on the overall SWIP path from Midpoint to Harry Allen that will enable ~2000 MW of 500 kV transmission for 506 miles. Pursuant to the FERC-approved TUA described in Appendix 2, the 231-mile ON Line portion of the path (Robinson Summit to Harry Allen) was placed into service in 2014, and has been paid for by NVE and LS Power. LS Power's project proposal for CAISO provides ~1050 MW of transmission capacity from Midpoint to Harry Allen (506 miles), for the cost of building only the 275-mile SWIP-North portion of the path (Midpoint to Robinson Summit). Nearly half of the total SWIP path has already been paid by other benefitting regions, meaning interregional cost allocation has already taken place. APPENDIX 1: SWIP-North Economic Benefits Study recommendations 1) SWIP-North line and all associated upgrades should be included - CAISO should ensure that the existing 500 kV transmission path from Robinson Summit to Harry Allen ("ON Line") is limited to 900 MW in the base case and is increased to 2250 MW only in the case with SWIP-North (1050 MW of which would be dedicated to CAISO under LS Power's proposal). In addition to the new 500 kV transmission line with 70% series compensation between Midpoint and Robinson Summit, the SWIP-North project also requires key upgrades to existing infrastructure including the addition of 70% series compensation on ON Line and phase shifting transformers at Robinson Summit on the existing Robinson Summit-Gonder and Robinson Summit-Falcon 345 kV lines. The main purpose of the phase shifting transformers is to redirect flows away from 345 kV system and shift these towards the 500 kV system. For details related to operating parameters for these phase shifting transformers, LS Power will	

No	Comment Submitted	CAISO Response
	schedule discussion with CAISO and NVE, so CAISO can appropriately model these in its economic study. All SWIP-North associated upgrades enable increased transfers in the north-to-south (N-S) direction from Midpoint to Harry Allen. 2) Wheeling charges should be removed - For the SWIP-North economic study, to correctly calculate economic benefits of a 1050 MW transmission path from Midpoint to Harry Allen, CAISO should model this new 1050 MW path free of any wheeling charges. We understand that the standard ADS PCM model includes a NVE wheeling charge of $9/MWh. Given the FERC-approved Transmission Use and Capacity Exchange Agreement in place between LS Power affiliates & NV Energy, which provides a direct connection between the LS Power facilities and CAISO at Harry Allen, such a wheeling charge does not apply. Including a wheeling charge will create an artificial hurdle across this path resulting in reduced SWIP-North N-S flows and underestimated benefits of SWIP-North. 3) COI path limits should be correctly enforced for CAISO's share of COI, and Day Ahead PACI congestion should be correctly captured - For the COI congestion analysis, CAISO used the full 4800 MW path rating as the limit for the COI path in its 2020-21 TPP study. As noted in our previous comments, CAISO's share of the 4800 MW path is only 3200 MW (limit of PACI scheduling interface7) 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 of the total 4800 MW COI path that is available to CAISO, and this is what CAISO should use as the COI limit for its economic analysis. The other 2800 MW should be modeled with a large hurdle rate such that it becomes mostly unavailable to the CAISO system. Not correctly capturing these scheduling realties makes 2800 MW on this path available for CAISO with little hurdle, artificially reducing COI N-S congestion. If this constraint is correctly modelled, the CAISO study should show PACI, NOB congestion close to historic levels as noted in CAISO DMM reports8 over last several years. 4) Additional economic benefits of SWIP-North - In addition to quantifying production cost savings, we recommend that CAISO also capture additional	

No	Comment Submitted	CAISO Response
	benefits of SWIP North identified by The Brattle Group9. These additional benefits are referenced in Table 4.2-1 of the 2020-21 Draft Transmission Plan and are in line with CAISO's TEAM methodology: 2.5.1 Resource adequacy benefit from incremental importing capability, 2.5.3 Deliverability benefit, 2.5.5 Public-policy benefit, 2.5.6 Renewable integration benefit. LS Power's recommendations on how these benefits should be quantified are provided below. The Brattle Study quantified some of these additional benefits as well, which we recommend CAISO use as guiding points to estimate these benefits. *i. Resource Adequacy (RA) benefit from incremental importing capability* SWIP-North provides RA benefits to CAISO since the following four conditions noted in CAISO's TEAM methodology are satisfied simultaneously: • SWIP-North will increase the import capability into the CAISO controlled grid in the study years. Absent SWIP-North, CAISO's import capability with Idaho Power & PacifiCorp East is limited and the import path between NVE-CAISO in the Sierra Region is congested. SWIP-North will enable a new 1050 MW import capability path between various BAAs. • As evident through CAISO's own stack analysis in CPUC proceedings, there is projected insufficient capacity to maintain resource adequacy in the CAISO BAA starting this year in 2021.10 • The existing import capability has been fully utilized to meet RA requirement in the CAISO BAA in the study years. A recent WECC analysis	

E3	Vistra Submitted by: Cathleen Colbert	
No	**Comment Submitted**	**CAISO Response**
E3	Vistra appreciates the opportunity to submit an economic study request to the CAISO for consideration in the 2021-2022 Transmission Planning Process (TPP). We request the CAISO evaluate transmission expansions to alleviate congestion on the Moss Landing – Aguilas 230 kV line in the Greater Bay area. Vistra appreciates the CAISO's efforts and consideration of this request Background In prior Transmission Planning Processes, the CAISO has identified congestion on the Moss Landing – Las Aguilas 230 kV line in the reliability assessment but adopted congestion management and nomograms as the mitigation solution for Moss Landing – Las Aguilas 230 kV line. In the economic assessment, the CAISO has identified congestion on this line as well, but at levels that have not spurred deeper analysis. We believe there is greater congestion that should be captured if modeling improvements are adopted to capture operational reality. In our separate comments submitted on the 2021-2022 TPP draft study plan, Vistra submits recommendations to more accurately capture operational reality of both transmission elements and the resources in the CAISO's models. If modeling improvements occur, then the congestion may be revealed in the results and merit further evaluation for an economic-driven project to alleviate the identified congestion. Study Request Vistra requests the CAISO conduct an economic study to identify solutions to relieve the transmission congestion on the Moss Landing – Las Aguilas 230 kV line in the Greater Bay Area to unlock multiple benefits including production cost savings, capacity benefits in local capacity requirements, and avoided renewable curtailment benefits among others. We suggest a transmission upgrade be modelled to evaluate the economic benefits that would result from re-rating the Moss Landing – Las Aguilas 230 kV line. We suggest modelling benefits achievable with a 800 MVA line upgrade	The CAISO has carried all study requests forward as potential high priority study requests, mainly based on the previous cycle's congestion analysis. The congestion results in the 2021-2022 planning cycle will be considered in finalizing the high priority areas

E4	Western Grid Development (Western Grid) Submitted by:	
No	**Comment Submitted**	**CAISO Response**
	Western Grid Development LLC ("Western Grid") appreciates the opportunity to comment on the CAISO's 2021-2022 Draft Study Plan and submit this economic study request **for the Pacific Transmission Expansion Project ("PTE" or "PTEP")**. The PTEP is a 2,000 MW controllable HVDC subsea transmission cable that the CAISO has found will allow existing supply available to the Diablo Canyon 500 kV switchyard or new sources of Offshore Wind (OSW) or other new clean energy to be delivered to the West LA Basin and reduce Local Capacity Requirements (LCR) need in the West LA Basin by 1,993 MWs, thereby displacing the need for the same capacity of local natural gas fired power plants. PTE is described in Section 4.8.8 of the CAISO's draft Transmission Report dated February 1, 2021 ("Draft 2020-2021 Report")1. The PTEP was studied in the 2019-2020 and 2020-2021 Transmission Planning cycles. For the 2021-2022 Transmission Planning Process (TPP), Western Grid again requests consideration of our "Option 1" configuration which includes Voltage Source Converter (VSC) stations as follows: • one 2,000 MW, 500 kV DC/500 kV AC converter station located at the northern terminus of the project near the Diablo Canyon 500 kV switchyard, • one 500 MW, 500 kV DC/220 kV AC converter station connected to SCE Goleta substation via a 3-mile underground AC cable, • one 1,000 MW, 500 kV DC/220 kV AC converter station connected at Redondo Beach, and • one 500 MW, 500 kV DC/220 kV AC converter station connected at Huntington Beach. We also ask that CAISO consider an alternate configuration (Option 1a) which interconnects to either (a) La Fresa 220 kV or (b) El Nido 220 kV substations instead of Redondo Beach. Western Grid will provide updated project cost estimates for one or both alternatives during Phase 2 of the 2021-2022 TPP. As more fully described in our comments below, Western Grid requests that CAISO study the PTEP as a transmission solution that will address State Public Policy needs, provide essential reliability and other economic benefits to	The CAISO has carried all study requests forward as potential high priority study requests, mainly based on the previous cycle's congestion analysis. The congestion results in the 2021-2022 planning cycle will be considered in finalizing the high priority areas

No	Comment Submitted	CAISO Response
	ratepayers for achieving a decarbonated future. As described fully below there are several areas of significant economic benefits that PTE Project will provide that should be recognized under the CAISO economic assessment. In addition to PTEP specific study requests described in detail below, Western Grid also requests that CAISO develop a comprehensive Grid Improvement Roadmap to inform the State of "no regrets" transmission solutions that will be needed to achieve State policies in 2030 and beyond. The Grid Improvement Roadmap should comprehensively identify new transmission that is needed and corridors that should be expanded to efficiently integrate the renewable resources that will be needed to meet SB100 goals, including promoting resource diversity, lowering GHG and benefitting disadvantaged communities. No regrets transmission upgrades that are identified in the Grid Roadmap study and perform well under a variety of resource futures should be approved in this 2021-2022 TPP. Western Grid urges the CAISO to lead this effort, perform the needed studies, propose and approve new transmission critical to the grid of the future in this 2021-2022 TPP. The studies we are requesting should address the following critical assumptions and adopt the described methodologies in the CAISO 2021-2022 Final Study Plan. 1. We request CAISO study the PTE as a solution for the CPUC Offshore Wind (OSW) Policy-Driven Sensitivity Portfolio The California Public Utilities Commission (CPUC) February 11, 2021 Decision in Rulemaking 20-05-003 TRANSFERRING ELECTRIC RESOURCE PORTFOLIOS TO CALIFORNIA INDEPENDENT SYSTEM OPERATOR FOR 2021-2022 TRANSMISSION PLANNING PROCESS includes a request that CAISO study transmission solutions for approximately 8.3 GW of OSW. We expect that OSW will require large transmission upgrades and reliability improvements to ensure deliverability of the OSW to load centers, including the LA Basin. The PTE should be considered as a solution to enabling OSW as envisioned in the CPUCs OSW Portfolio. We request that the CAISO compare the economic costs and benefits of OSW with and without the PTE Project. Other benefits of the PTEP should also be included in the CAISOs analysis, such as reducing congestion on Path 26 and reducing LCR need in the LA Basin. Further, we request that CAISO properly model and consider the benefits of using PTE's VSC for frequency support and	

No	Comment Submitted	CAISO Response
	for injecting VARs or absorbing VARs to and from the LA Basin to ensure deliverability (FCDS) of the OSW and offset the interconnection-related transmission upgrades that will be needed in the absence of the technology provided by PTE that is not achievable with traditional AC transmission solutions. Western Grid believes that PTE is an essential ingredient for OSW or any renewable resource serving the LA-area market, and for reducing reliance on local gas fired generation. Studying PTE in this TPP cycle will position CAISO well when it receives further policy guidance and direction with respect to the need for changes in the LA resource mix to meet State policies. Preliminary engineering performed by Western Grid has identified a logical and efficient way to connect OSW to the PTEP and CAISO Grid for delivery of OSW to the LA Basin. Western Grid can provide high level engineering and cost information to the CAISO if needed for its analysis. 2. We request CAISO study the PTE as a cost-effective solution for reducing curtailments, avoiding inefficient overbuild in the Base Portfolio Policy-Driven Assessment and, significantly reducing costs to customers. The State is embarking on developing thousands of MW of renewable energy projects at a cost significantly exceeding $30 billion. Yet, due to inadequate transmission, much of the renewable energy may not be able to meet System RA and certainly not LCR requirements. The State is not on an optimal resource expansion path and is instead heading toward “inefficiently over-building resources” while “under-building transmission”. At the February 25th stakeholder meeting, the CAISO presented the CPUC-provided Base Portfolio as shown in Figure 1	

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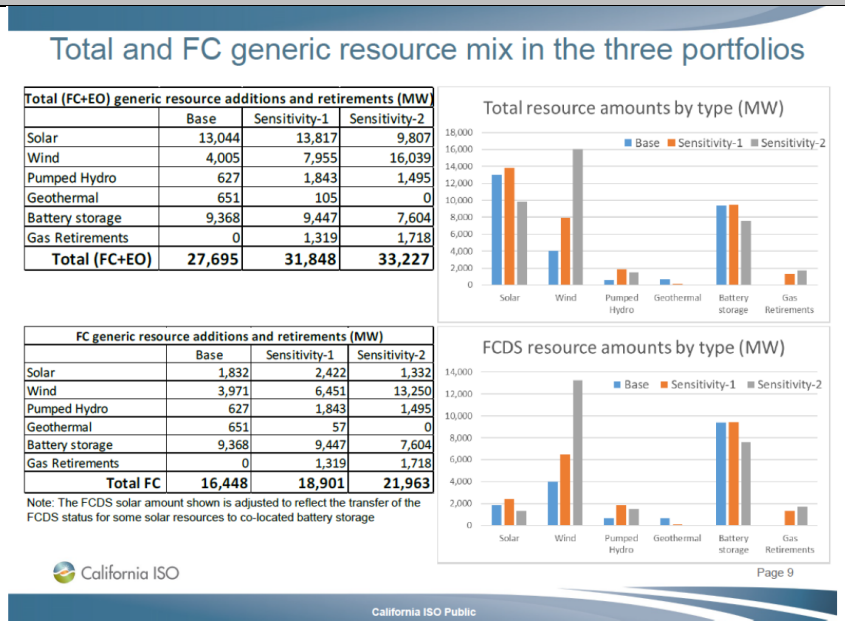

Total and FC generic resource mix in the three portfolios

Total (FC+EO) generic resource additions and retirements (MW)			
	Base	Sensitivity-1	Sensitivity-2
Solar	13,044	13,817	9,807
Wind	4,005	7,955	16,039
Pumped Hydro	627	1,843	1,495
Geothermal	651	105	0
Battery storage	9,368	9,447	7,604
Gas Retirements	0	1,319	1,718
Total (FC+EO)	**27,695**	**31,848**	**33,227**

FC generic resource additions and retirements (MW)			
	Base	Sensitivity-1	Sensitivity-2
Solar	1,832	2,422	1,332
Wind	3,971	6,451	13,250
Pumped Hydro	627	1,843	1,495
Geothermal	651	57	0
Battery storage	9,368	9,447	7,604
Gas Retirements	0	1,319	1,718
Total FC	**16,448**	**18,901**	**21,963**

Note: The FCDS solar amount shown is adjusted to reflect the transfer of the FCDS status for some solar resources to co-located battery storage

gure 1. CPUC Base and Sensitivity Portfolios to be Studied in the 2021-2022 Transmission Planning Process

The Base Portfolio includes 27,695 MW consisting of new Full Capacity (FC) plus Energy Only (EO) generic resource additions. However, as CAISO displays in the second table of their presentation, only 16,448 MW of that capacity is expected to interconnect with Full Capacity Deliverability Status (FCDS) and count towards the State's Resource Adequacy (RA) needs before discounting for Effective Load Carrying Capability (ELCC). This means that the difference of 11,246 MW of the State's procurement target will be interconnected as Energy Only (EO) resources that cannot contribute to the system or local reliability RA needs and are subject to curtailments during all hours of day. If these EO resources attempt to interconnect as FCDS projects, they will be required to pay for costly network transmission upgrades in order to gain FCDS and be able to count towards system or local RA. An incremental amount of transmission will be needed to make these new projects deliverable to the load pockets. Absent the addition of new transmission, the state will continue to be overly dependent on fossil-based resources to maintain the reliability of capacity-constrained regions such as the LA Basin. State policy calls for the transition away from fossil-based resources. The additional

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	targeted procurement of EO resources to reach the State's RPS and emissions target without detailed consideration of the benefits of added transmission capacity will lead to a costly resource overbuild / transmission underbuild situation wherein the EO resources have to be curtailed or sold off out-of-state. Further, the State will not be able to reduce the need for fossil-based resources in California's capacity constrained regions. Since transmission has a 10 year or more lead-time, the CAISO has repeatedly warned that transmission planning must start immediately. And, this detailed cost-benefit analysis needs to be addressed by CAISO in the 2021-2022 TPP Policy-driven studies. The current Policy study method of the TPP, as we understand it, will be to evaluate the transmission needed to accommodate the CPUC Base Portfolio by treating the CPUC Portfolio as fixed and not subject to modification or improvements. This begs the question; What if there is another cost-effective solution that results in lower overall costs? We ask the CAISO to analyze the PTE in the context of achieving lower overall costs by investing in transmission solutions and avoid overbuilding generation that does not provide full value to customers. Western Grid believes that CAISO's Policy assessment should study and identify ratepayer net benefits for transmission investments that can make more capacity fully deliverable and avoid costly overbuild. We illustrate our request through a hypothetical but realistic example: 1. The CPUC portfolio targets procurement of FC + EO of 13,044 MW of new Solar resources paired with 9,368 MW of Battery Storage to achieve the Base Portfolio criteria. Per Figure 1, this translates into 1,832 MW of Solar and 9,368 MW of Battery Storage with FCDS. Assume that the ELCC for Solar is ~30% and for Battery Storage is ~95%. This translates into 550 MW of Solar and 8,900 MW of Battery Storage counted towards system RA needs (9,450 MW total or about 42.2% of the 22,412 MW of Solar plus Battery Storage built can be counted towards RA.) 2. Assume that the cost of the CPUC renewable portfolio is $1,000 per kW. 3. 22,412 MW of Solar plus Battery Storage needs to be built to get 11,200 MW of FCDS and the cost for transmission upgrades needed for FCDS interconnection is $250 per kW. With the current TPP study process ("Status Quo"):	

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	(a) The total Solar plus Battery Storage build cost of the CPUC portfolio is 22,412 MW x $1,000/kW x 1,000 kW/MW = $22.4 billion. (b) The total interconnection cost for transmission upgrades is 22,412 MW x $250/kW x 1,000 kW/MW = $5.6 billion. This is the transmission cost to interconnect 9,450 MW of RA. (c) The total cost to ratepayers would equal to (a) + (b) = $28 billion or $3 million per MW of RA. (d) An additional unknown consequence from this option are curtailments during solar hours and confirmation of whether the excess solar energy will be able to be stored in the paired battery energy storage system. (e) Furthermore, as CAISO found in last year's TPP, 3,287 MW (out of 4,252 MW) of battery energy storage systems may not be deliverable during on-peak deliverability hours. And, after CAISO re-mapped the 3,287 MW of battery storage, it only resulted in 2% decrease in renewable curtailments (21,534 MWh vs. 23,686 MWh). Proposed Comprehensive Approach (Study Transmission Alternatives to Overbuild): In the last two cycles of TPP studies, CAISO concluded that the PTE could reduce the need for 1,993 MW of Local RA that is currently being served with fossil-based resources in the LA Basin. We conclude from this result that with the PTE, the HVDC transmission solution provides FDCS for 1,993 MW of the 9,450 MW compared to the "without PTE" case described above because flows on the DC cable can be controlled to flow MW for MW when needed. Thus, with PTE, the number of renewable energy projects that the State's load serving entities would need to procure would be equal to 19,664 MW. Calculation: 1993 MW + (9450-1993)/42.2% = 1993 + 17,671 = 19,664 MW. This is 2,748 MW less compared to the 'without' PTE transmission solution. In other words, the PTE transmission solution reduces overbuild by over 2,700 MW. The CPUC renewable portfolio from a resource procurement perspective is reduced from 22,412 MW to 19,664 MW. Thus, the cost of a solution with the transmission investment is $26.1 billion compared to $28 billion or a savings of $2.1 billion2. This results in a per MW cost of RA of $2.5 million which is lower than the overbuild scenario where the per MW cost of RA was $3 million.	

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	Further, the PTE solution not only firms up system RA but will provide or replace local RA which is much more valuable and can save ratepayers a significant amount of money that should not be dismissed or ignored. Additional savings for the local RA reduction, reduced curtailment, emissions, and production costs are additional benefits that we request CAISO to include in its Policy-driven studies. Using this comprehensive approach, we are asking CAISO to not treat CPUC's Base and Sensitivity Portfolio's as "givens" but rather to evaluate the cost-effectiveness that transmission solutions such as PTE can provide. We believe the State needs to earnestly look at transmission alternatives that can decrease the capacity procurement costs currently being paid by ratepayers and this will only happen if CAISO studies the benefits of increasing transmission capacity to replace the overbuild and EO capacity prone to curtailment provided in the transmitted CPUC portfolios. Western Grid posits that the PTE can reduce the amount of renewable energy projects required by the CPUC while satisfying the CAISO's System and Local RA requirements to prevent conditions similar to last summer that resulted in rotating outages at a lower overall cost to ratepayers-- especially if you consider the cost to ratepayers for the Emergency Procurement recently ordered by the CPUC3. To achieve an optimum outcome, the CAISO should not consider the CPUC portfolio as a sunk cost and should exercise some flexibility to study prudent and cost-effective solutions to ratepayers. It is not only conceivable, but highly probable that the PTE will reduce our dependency on fossil-based resources while at the same time reducing the overall procurement cost of renewable energy resources and RA. This study approach should be used as opposed to the current method of locking in the CPUC portfolio and the fossil-based resources as a fixed or sunk cost and then determining the additional transmission cost needed to achieve the policy. This sequential approach does not produce an optimum result and the current TEAM adopted by the CAISO TPP provides for studying the benefits of transmission alternatives as we describe herein. We provide further explanation in item #4 below. 3. We request the CAISO use realistic capacity values when calculating PTEP LCR Reduction Benefits We appreciate that in the Draft 2020-2021 Report, the CAISO again determined that the PTEP will provide net 1,993 MW's of Local Capacity Requirement (LCR) reduction benefits by reducing the LCRs in the LA Basin and, ultimately,	

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	reducing the need for 1,993 MW's of existing gas plants in the West LA Basin and Big Creek/Ventura area with PTE in service. *Draft 2020-2021 Report at page 327.* Given the CAISO's analysis, the PTE could also fill the shortage of RA capacity in Southern California because PTE will enable delivery of new RA capacity from outside the region. This need was recently demonstrated on August 14 and 15, 2020 when the region was short of local capacity and drove the marginal cost of energy to skyrocket levels for the entire CAISO. In the 2020-21 TPP, the CAISO applied a very conservative value to the LCR benefits quantified in the planning assessments. In this regard, the CAISO stated that "*While future IRP efforts are expected to provide more guidance and direction regarding expectations for the gas-fired generation fleet at a policy level, without that broader system perspective available at this time, the CAISO has taken a conservative approach in assessing the value of a local capacity reduction benefit when considering a transmission reinforcement or other alternatives that could reduce the need for existing gas-fired generation providing local capacity. In this planning cycle, the CAISO therefore applied the differential between the local capacity price and system capacity price to assess the economic benefits of reducing the need for gas-fired generation when considering both transmission and other alternatives."* A critical shortcoming of the CAISO's Draft 2021-2022 Study Plan is that it will continue to undervalue the LCR benefit for PTE and other transmission solutions. Based on the publicly available FERC EQR data reflected in Table 1, the weighted average price of local capacity contracts in the Western LA Basin is about $16.68/kW-month5. Even if the contract prices for the three Once Through Cooling ("OTC") units planned for retirement and shown in Table 2 are included, the average weighted price for gas-fired generation in the Western LA Basin is about $9.80/kW-month (Table 3). This is based on an analysis of the publicly available FERC EQR data for existing LCR contracts totaling roughly 3,313 MW's of existing gas plants in the LA Basin. By way of comparison, the LCR contract price needed to cover the PTE cost is approximately $7.35/kW-month6. Obviously, our dependence on fossil-based resources and the corresponding price of LCRs will only rise in the future as the CPUC starts to plan for the retirement of the non-OTC gas units, particularly since there is no clear resource that can replace the reliability and flexibility currently provided by the gas plants other than an HVDC VSC circuit like PTE's with its associated converter stations.	

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Table 1. 2020 Average Capacity Cost for Western LA Basin Gas-fired Resources (not including retiring OTC units)

Western LA Basin Generators (natural gas-fired)	2020 Avg Capacity Cost ($/kW-Month)	NQC (MW)	$/YEAR
El Segundo Energy Center	19.98	522.34	$125,238,602
Malburg power plant	27.30	134	$43,892,611
Walnut Creek Units	17.08	478.8	$98,112,519
Long Beach Peakers (Hinson)	4.49	202	$10,894,800
Harbor	5.00	100	$4,500,00
Total	14.77	1437.14	$282,638,532
Weighted Average Cost	16.68		

Table 2. 2020 Average Capacity Cost for Western LA Basin Gas-fired Resources (retiring OTC units)

Retiring OTC Generators in Western LA Basin	2020 Avg Capacity Cost ($/kW-Month)	NQC (MW)	$/YEAR
Alamitos*	12.17	349.75	$51,062,916
Huntington Beach*	3.65	677.4	$9,890,040
Redondo Beach	8.40	Variable	$69,142,230
Total	8.07	1876.15	$106,896,806
Weighted Average Cost	4.82		

Table 3. Summary 2020 Average Capacity Cost for Western LA Basin Gas-fired Resources

	2020 Avg Capacity Cost ($/kW-Month)	NQC (MW)	$/YEAR
Total Table 1 and Table 2	12.26	3313.29	$389,535,338
Weighted Average Cost	9.80		

Western Grid submits the CAISO TPP will not achieve its objective of providing helpful information to State policy makers and regulatory agencies by continuing to use "conservative" (i.e. – unrealistic) values for local capacity and not addressing the host of reliability issues facing the State. A more global perspective and evaluation of transmission benefits for all projects including the PTE is the underlying intent of the TPP. The TPP should evaluate the CPUC's Base procurement portfolio in the context of providing an overall lower cost solution to ratepayers while addressing ***all*** reliability issues and avoid the

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	piecemeal approach currently in place. Otherwise at best, reliability issues will be resolved incrementally and at higher cost to ratepayers. For instance, it is widely known that California's RA requirement is inadequate and insufficient to adhere to SB 100, is subject to changes in the Planning Reserve Margin (PRM) and changes to rules for how imports and intermittent resources can fulfill requirements. Western Grid believes that CAISO should continue to consider the PTEP as an economic alternative to local capacity including any policy objectives with or without actionable direction from the Commission. This is consistent with its current TEAM. CAISO's final 2021-2022 Study Plan should address how and when to begin planning for reduced reliance on fossil fuels. We agree with and support CAISO's previous comment to the Commission that transmission solutions can have long lead times and, therefore "planning for transmission-dependent projects should start as soon as possible."7 Indeed, if the State is to reach its 2030 and 2045 GHG SB 100 requirements in a reliable and least-cost manner, the CAISO must begin planning now for transmission solutions that reduce LCRs currently provided by gas-fired resources. In order to do so, CAISO will need to change its conservative assumptions and use realistic capacity values for that replacement in its economic analysis. 4. We request the CAISO include the other benefits of PTEP as described in the CAISO's Transmission Economic Assessment Methodology (TEAM). Per the CAISO's TEAM published in November 20178, CAISO expanded the benefit framework of TEAM to other benefits but has not yet included such quantification in their economic assessments. Western Grid requests that CAISO include the expanded TEAM benefit framework in their economic study process, specifically: a) Deliverability Benefit Consistent with Section 2.5.3 of TEAM, *"Transmission upgrade can potentially increase generator deliverability to the region under study through the directly increased transmission capacity or the transmission loss saving."* As we illustrated in Section 2 above, the PTE increases the deliverability of existing and planned renewables by allowing otherwise curtailed renewables to count for 100% qualifying capacity toward the Resource Adequacy. PTE can take system resources that are classified as "Energy Only" and deliver this energy between NP15 and SP15. PTE enables existing and future "Energy Only" resources to be fully deliverable RA capacity and avoids the cost of the	

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	overbuild and related transmission costs needed to procure the Base Portfolio. In effect, the PTE has the potential to reduce the procurement MWs needed in the Base Portfolio. It is clear that the CPUC does not address deliverability in the Portfolios provided to CAISO in the IRP process; therefore, it is only logical that CAISO illuminates deliverability within the TEAM analysis. b) Public-Policy Benefit Also described in Section 2.5.5 of TEAM, *"When there is a lot of curtailment of renewable generation, extra renewable generators would be built or procured to meet the goal of renewable portfolio standards (RPS). The cost of meeting the RPS goal will increase because of that. By reducing the curtailment of renewable generation, the cost of meeting the RPS goal will be reduced. This part of cost saving from avoiding over-build can be categorized as public-policy benefit."* In prior studies, CAISO only counts the energy cost savings of the reduced curtailments between the project cases. Western Grid believes that this aspect of TEAM is not properly counted as a benefit in CAISO's economic assessments and as described in Section 2 above, can result in significant benefits that are entitled to be counted for the benefit of transmission solutions such as PTE. **Compliance with SB100:** Western Grid also requests that CAISO evaluate the PTE as a transmission solution that enables the State to comply with SB 100. There are approximately 3,658 MW's of gas fired plants in the Western LA Basin alone that will need to close by 2045 under the requirements of SB 100. The CAISO and major load serving entities have urged the CPUC to start deliberately planning for the shutdown of these gas plants as soon as possible. Therefore, using PTE to allow closure of 1,993 MW's of gas plants in the LA basin by 2028 or 2029 is an appropriate start on this long overdue and challenging effort. The Draft 2021-2022 Study Plan fails to identify this benefit assessment as part of its TEAM or economic studies. PTE can not only displace LCR provided by existing gas-fired generation, but more importantly it is a viable transmission solution that enables the replacement of gas fired plants throughout the State (i.e. – system capacity benefit) and CAISO's economic studies should quantify benefit of avoiding the significant continued operational and maintenance and other costs to keep these plants running. The planning objective must be to provide reliable service at the lowest cost and that will never happen if large cost categories are ignored.	

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	c) PTEP provides transmission capability for the increased RA requirements ordered by the State. Several recent changes warrant a fresh look at the impacts on RA that can be addressed by PTE. These changes include: (1) the increase in the Planning Reserve Margin (PRM), (2) the changes in resource availability throughout the west combined with the reduced accounting of imports for Resource Adequacy, (3) the updated effective capacity or ELCC accounting, (4) the State's updated Demand forecasts, and (5) the planned retirement of the Diablo Canyon Nuclear Plant. These rule changes and events all have one commonality; they all increase the RA capacity need. The PTE is designed to access system resources from all WECC regions north of Path 26, including the northwest or from Nevada and other Balancing Authority Areas (BAAs) east of CAISO, and make them deliverable to California load pockets including LA Basin. PTE creates a parallel transmission highway to Path 26 which is a current bottleneck for energy to flow between the Southern and Northern regions of the State. *The CAISO's prior economic study demonstrates the congestion reduction benefits of PTE but has failed to properly value this benefit because the production cost results only quantify energy costs savings.* The current energy cost savings calculation is flawed because CAISO's basecase (with heavy curtailments in the Base Portfolio) begins with a negative or low-price energy cost for load. When projects such as PTE eliminate congestion and curtailments, the energy price to load increases because the system marginal energy costs now increase once the over-supply or congestion conditions are mitigated. This erroneous result provides a disincentive for the State to view transmission as a viable alternative to depressed market pricing. Ratepayers through their PPAs are likely still paying for curtailed energy as deemed delivered along with replacement energy at CAISO market prices and so the benefits of transmission will never be identified in the current application of TEAM. We request CAISO to re-evaluate the current application of its TEAM model to better account for the cost benefits from enhancing the grid and increasing import capability of Resource Adequacy, including the import capability between the Northern and Southern regions of the State. You do not have to look far to find a real-world example of how these benefits can play out in California. In 2008, the CPUC approved the need of the Sunrise Powerlink. At the time, the proponent of the project had made a commitment to	

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	displace the need for fossil-based resources that satisfied the LCR of the region with renewable energy resources. a. Today, the Sunrise Powerlink has facilitated the development of over 1000MW of renewable energy in the Imperial Valley. The Sunrise Powerlink has enabled the renewable energy development in the Imperial Valley to be fully deliverable to the once capacity constrained region of San Diego. b. Today, the Sunrise Powerlink has furthered the state's Public-Policy objectives by facilitating the retirement of fossil-based OTC resources and lessoning the states dependency on fossil fuel resources, while at the same time, facilitating the ability of the grid to deliver clean renewable energy resources. c. Today, the Sunrise Powerlink is also poised to facilitate the growing needs of resource adequacy in the region. As the state moves forward to decarbonize the transportation sector, there will be a growing need to be able to deliver clean carbon free resources such as wind and solar power. 5. Other PTE Benefits a. Grid Reliability: The PTE will provide reliability support to the Big Creek/Ventura area of SCE, specifically within the Goleta area. The Goleta area is subject to voltage collapse issues under a double line (N-2) outage of the two 220 kV lines feeding Goleta substation from Santa Clara substation. Western Grid suggests that CAISO did not properly evaluate or consider in its modeling the full capabilities of PTE's HVDC VSC technology. The proposed PTE will mitigate Goleta's voltage collapse issue by providing up to 500 MW into Goleta in the event of an outage. Further, as noted in the CAISO 2020 Local Capacity Technical Study, page 165, the Elwood generating station *"will only be allowed to retire after suitable replacement is in place at or near the same bus (Goleta)"*. The PTEP is proposed to have a direct connection to Goleta substation and would serve as a viable replacement for the Elwood generating station and eliminate the need for Elwood to be under a Reliability Must Run ("RMR") contract. With respect to the "flexibility" of gas fired plants, the PTE with its associated converter stations can provide greater grid support than gas fired generation. The PTE converters with their grid forming attributes, can respond much faster than the synchronous generators used on gas fired units. The faster response applies both in reaction time and impact for AC voltage control	

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	and frequency stabilization while providing effective short circuit capacity and system damping requirements. b. Wildfire mitigation: The PTE will reduce the risk of another wildfire cutting off electric service to the LA coastal area. The PTE with its associated subsea cables would have enabled CAISO to by-pass the problematic transmission areas interrupted by the wildfires. *With PTE, CAISO could have kept the lights on in the LA Basin even without the local gas plants being 'on-line' when service from the terrestrial lines from the east were cut off last summer.* With the vast number of MW's in the CPUC resource portfolio assumed to be coming from solar and batteries that will be located in the interior part of the State and which will require additional terrestrial transmission to reach the coastal population, it makes economic and technical good sense to have at least some capacity delivered by subsea cables that do not involve dealing with the same wildfire risks. Therefore, we ask the CAISO to analyze and give due consideration to this important benefit. Avoiding service interruptions due to wildfires provides a benefit that cannot be over-valued.	