Deliverability Assessment Methodology Revisions Draft Final Proposal

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Stakeholder Call
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- Please try and be brief and refrain from repeating what has already been said so that we can manage the time efficiently.

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CAISO Policy Initiative Stakeholder Process

We are here

Agenda

- Introduction and summary of key issues
- Discussion and Draft Final Proposal
- Schedule

What is the purpose of the ISO's deliverability methodology?

- To test that the transmission system can reasonably ensure that resource adequacy capacity can be delivered to load during stressed system conditions.
- These resources first have to meet basic interconnection requirements so that they can be reliably interconnected, and could choose to operate energy-only without seeking deliverability and providing resource adequacy capacity.

ISO Deliverability Background

- Developed in 2005, accepted by FERC and CPUC, and began use in 2006, with considerable guidance from PJM's model and recognizing MISO uses a similar approach
- A comprehensive review was conducted in 2019 and 2020 in response to the changing resource fleet and peak shift
  - Led the current "high system need" (HSN) and "secondary system need" (SSN) approach
- Other adjustments have been made since:
  - Aligned with a relaxation of a WECC standard, adjusted the dispatch levels for storage.
- Requests for another review were initiated through the ISO policy catalog, raising a number of new concerns not expressed in the earlier review
- The ISO produced an update paper in December 2022, indicating a target of March 31 for an issue paper – subsequently released on May 31.

How are the transmission needs identified and managed?

- The transmission planning process approves larger "area" deliverability upgrades for preferred zones, and that capacity is then allocated among the resources that move forward.
- The generation interconnection process identifies:
  - Smaller "local" deliverability upgrades that depend on the specific resources inside the zone
  - Reliability requirements needed to allow the resource to physically connect and be energized (that alone would provide no assurance that the resources can be relied upon in stressed conditions.)
  - Interconnection requirements

	Straw Proposal	Changes in draft final proposal
1	**Study of High System Need and Secondary System Need:** Remove the "secondary system need" study from interconnection process deliverability studies, monitor in planning studies	➢ No change from straw proposal – remove from interconnection process deliverability studies. ➢ Additional technical study data reported demonstrated validity of approach
2	**Dispatch levels:** Straw proposal is to retain current dispatch assumptions based on current exceedance methodologies, and revisit exceedance methodology values as CPUC "slice of day" methodology and related exceedance based approach evolves.	➢ No change from straw proposal - no change to current dispatch levels. The current methodology is reasonable.
3	**Simultaneous dispatch:** Straw proposal is to shift the discussion of demarcating local capacity and system capacity to the ISO's IPE effort. Also, raise the 5% distribution factor threshold for 500 kV line overload constraints to 10%.	➢ No change from straw proposal - raise the 5% distribution factor threshold for 500 kV line overload constraints to 10%.
4	**Study of n-2 contingencies on double circuit towers:** The straw proposal proposed providing "conditional" deliverability to resources waiting for the n-2 related deliverability upgrades to be completed, provided they would not cause cascading outages.	➢ Draft final proposal clarifies that the ISO would award full capacity deliverability status (or partial as the case would be) to resources only waiting for the non-cascading n-2 related deliverability upgrades to be completed. ➢ Draft final proposal provides additional explanations and clarifications regarding the ISO's risk tolerance and considerations
5	**ADNU/LDNU Guidelines:** Straw Proposal sought comment on the need to revise guidelines for identifying Area Deliverability Constraints (ADC) given the concern that the amount of Area Deliverability Network Upgrades (ADNU) were restricting generators from Deliverability allocations.	➢ Draft final proposal proposes to change criterion ADC-C4 to shift the current $20 million threshold to $60,000/MW for the total delivery network upgrade CCC@ ➢ eating area deliverability network upgrades and local network upgrades in the concurrent interconnection process enhancements stakeholder process.
6	**Delayed deliverability upgrades:** Straw Proposal proposed "conditional" deliverability if deliverability upgrades are delayed by PTO.	➢ Draft final proposal recommends moving this issue to the interconnection process enhancements efforts, as it is an issue in getting projects online, and is not actually a methodology issue.

DISCUSSION AND DRAFT FINAL PROPOSAL

Overview

1. Study of High System Need (HSN) and Secondary System Need (SSN)
2. Dispatch levels
3. DFAX threshold of 5% and 10%
4. The study of n-2 contingencies
5. ADNU/LDNU guidelines
6. Delayed deliverability upgrades

Study of High System Need (HSN) and Secondary System Need (SSN)

Currently two study scenarios:

- highest system need (HSN) scenario
  - The load, generation dispatch, and imports correspond to when the system RA need is the highest during the year
- secondary system need (SSN)
  - under higher gross load conditions when solar is dropping off
- The ISO proposed to stop studying the SSN scenario in generation interconnection studies

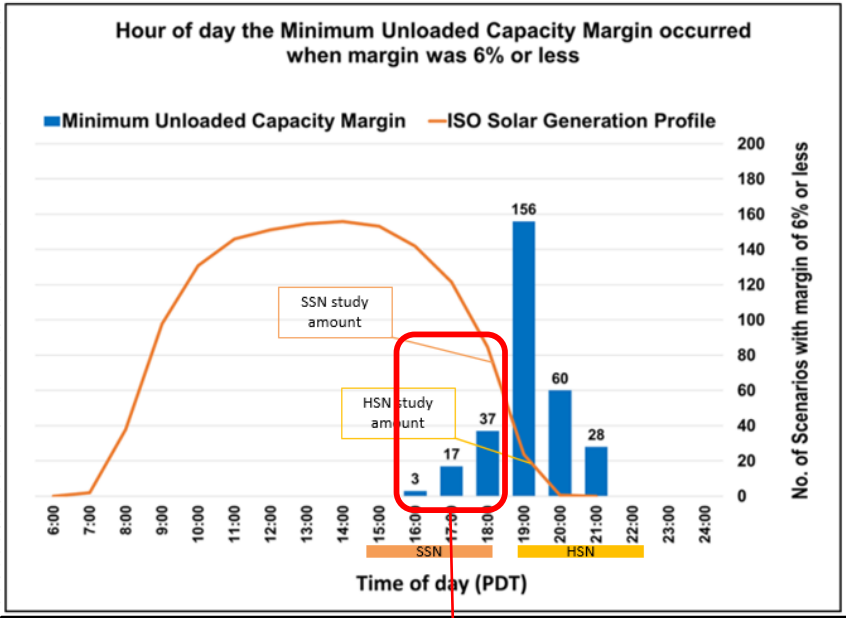
Stakeholder Input on the SSN

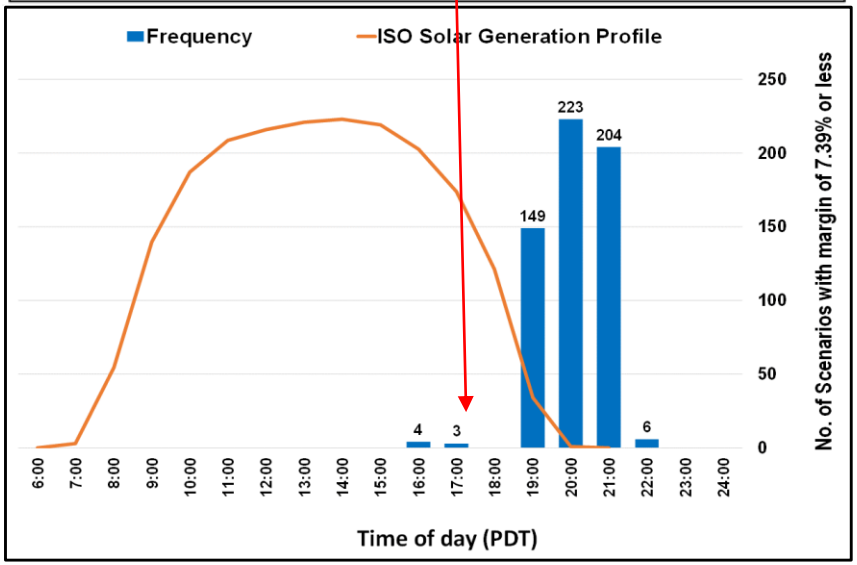
- *Requested that the ISO demonstrate that a single HSN analysis can reliably ensure that resources are deliverable to the aggregate of demand for every hour of the day*

- *Requested that the ISO provide 2023 Summer Assessment study results with normal hydro assumptions*

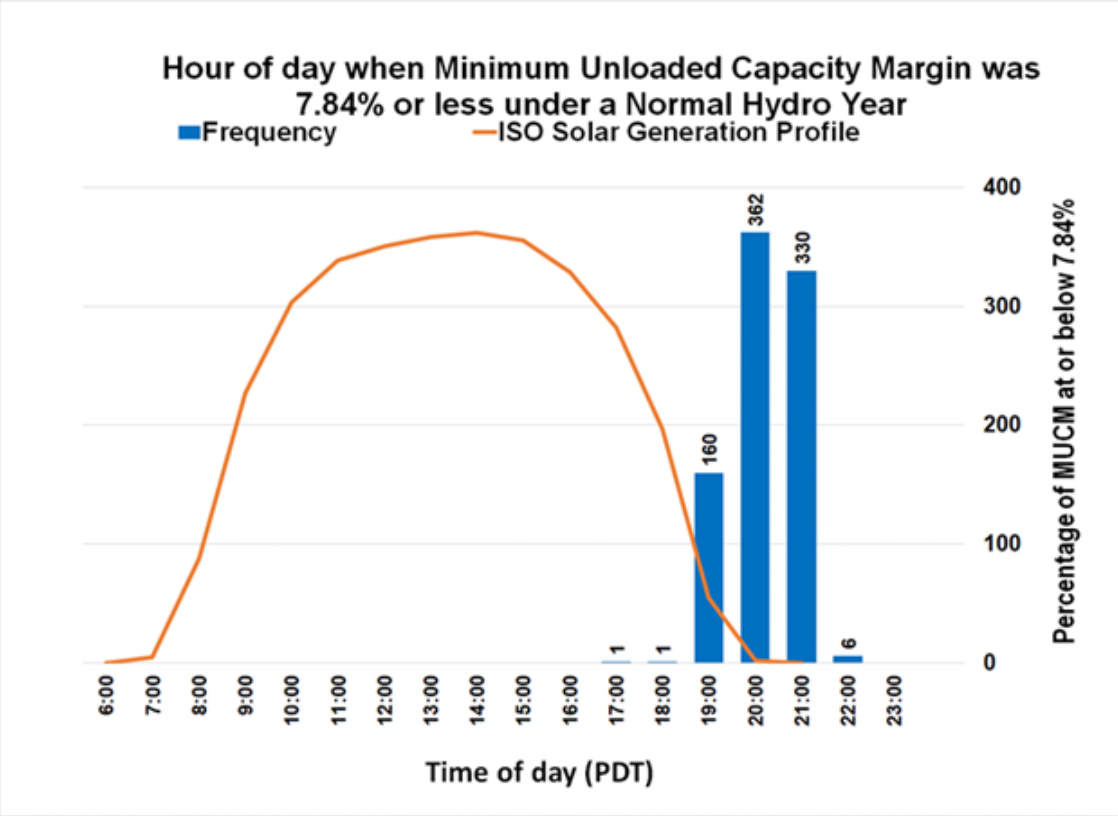
Original basis for HSN and SSN Scenarios has shifted:

- Original 2019, 2020 analysis saw risk in the post solar window as well as in the ramping period.
- The 2023 analysis no longer identifies the risk during the ramping period as the fleet evolves – the risk is shifted out to the post solar window.





Sensitivity simulation run of 2023 with normal hydro conditions confirmed expectations



Proposal on the SSN study

- The ISO proposes to remove the SSN study from generation interconnection deliverability studies.
- The ISO proposes continuing to perform the SSN study in the TPP as a screening tool for further analysis.

Dispatch levels

- The study tool looks at thousands of system dispatch scenarios that could occur on the planned system
- Each scenario is looked at one at a time, but focuses on the portion of the transmission system that is most stressed in that scenario
- Wind and solar generators are dispatched up to their 20% exceedance level in the HSN study.
- Other generators are dispatched up to their NQC level.
- The ISO did not propose changes in the straw proposal

Stakeholder Input on Dispatch Levels

- *The earlier comment that the dispatch levels for RA resources be set at their NQC levels and no higher was repeated.*
- *One stakeholder was under the impression that typically a higher level of generation dispatch is modeled in the deliverability assessment due to concerns about congestion and/or renewable curtailments.*
  - *They also commented that ISO should allow for reasonable redispatch to mitigate overloads.*
- *Another comment was that the CPUC staff have already issued preliminary 24-hourly values and encouraged the ISO to begin contemplating how it will use these values in its dispatch assumptions.*

Discussion on Dispatch Levels

- The ELCC-based NQC values for solar and wind resources are based on stochastic simulations.
- The values represent a theoretical equivalent generator.
- For example, a 100 MW wind generator is deemed to provide the same average contribution to overall reliability across a period of time as a 14 MW generator that is able to produce 14 MW in all hours.
- In reality, the individual wind generator will be producing 0 MW in many hours, but many hours it will produce much more than 14 MW.
- If it were transmission constrained to only 14 MW of output, e.g. putting the 100 MW wind generator behind a 14 MW transmission line, it would no longer be equivalent to a 14 MW perfect generator.

Discussion on Dispatch Levels

- The purpose of the On-Peak Deliverability study is to ensure that resources are deliverable during high load and resource shortage conditions. The market impacts of transmission constraints and congestion during ample supply conditions are beyond the scope of the on-peak deliverability study.

- Overloads are not allowed above applicable emergency facility ratings. Therefore, redispatch must be done before the contingency occurs, so that redispatched amount is not available to serve loads under resource shortage conditions.

Discussion and Proposal on Dispatch Levels

- The ISO notes that the CPUC is developing exceedance values as part of its slice-of-day implementation.
- The ISO will continue to monitor development of NQC values, and evaluate the need for further updates to its deliverability methodology.
- The ISO is not proposing any changes to dispatch levels and believes that its methodology for determining dispatch levels in the deliverability studies is reasonable.

DFAX threshold of 5% and 10%

- In response to stakeholder comments on the Straw Proposal, the ISO proposes to raise the current 5% DFAX threshold for 500 kV line overload constraints to 10%.
- This is expected to be a more practical threshold for including the generators that have a significant impact on the 500 kV line overload constraint and exclude generators that have an insignificant impact on the high capacity and low impedance 500 kV constraint.

Stakeholder Input on the ISO's proposal to raise the DFAX threshold for 500 kV lines

- *Almost all stakeholders agree with the ISO's proposal*

- *It was suggested to also raise the DFAX threshold for 500/230 kV transformers and for 230 kV lines*

Discussion and Proposal on the ISO's proposal to raise the DFAX threshold for 500 kV lines

- The rating of 500/230 kV transformers are typically around 1100 MVA, and the rating of 230 kV lines are typically less than 1000 MVA. The rating of 500 kV lines are typically over 2000 MVA.
- In addition, the impedance of 500/230 kV transformers and 230 kV lines tend to be significantly higher than 500 kV lines.
- The reasoning for increasing the DFAX for 500 kV lines is because of their low impedance and high ratings. The same reasoning does not equally apply to 500/230 kV transformers or 230 kV lines.

The study of n-2 contingencies

- The Straw Proposal recommended continuing with the study of n-2 contingencies as is done today, and to shift the application of those results on a risk-based approach to better balance the need to reasonable access Resource Adequacy capacity during shortfall situations and to avoid additional delays associated with the time required to mitigate n-2 contingencies.
- Pursuant to NERC Reliability Standard FAC 002 and TPL-001 common mode n-2 contingency analysis and corresponding mitigation is required in generation interconnection studies.
- Excessive reductions of output on a sustained basis to manage the risk of an n-2 contingency contradict the premise that the resources should be available to serve load.

Stakeholder input on the study of n-2 contingencies

- *Stakeholders supported the ISOs proposed changes to the treatment of n-2 contingencies.*
- *Some stakeholders commented that n-2 contingencies should only be considered in the transmission planning process.*
- *Some stakeholders supported the consideration of n-2 contingencies in the deliverability studies, but only in the transmission planning process and not in the deliverability studies in the generation interconnection process.*

Stakeholder input on the study of n-2 contingencies

- *Some stakeholders suggested that benefit to cost studies should inform consideration of n-2 contingencies, and that other non-resource adequacy capacity can be relied upon, or the planning reserve margin be increased to mitigate the risk of RA capacity not being available.*
- *Stakeholders requested additional system capacity information, such as the amount of deliverability that could be made available through the relaxation of non-cascading n-2 mitigating requirements, or the amount of additional deliverability that could be made available by relaxing n-2 constraints altogether.*
- *One stakeholder suggested temporarily relaxing mitigation requirements for other "low risk" contingencies beyond the proposed non-cascading n-2 contingencies.*

Discussion on the study of n-2 contingencies

- The ISO's consideration of the deliverability methodology requirements has consistently been based on the purpose of the Resource Adequacy program ensuring the capability to provide service in all but the most extreme conditions – and without relying on non-RA resources.
- NERC TPL-001-5 states the following as its purpose: "Transmission system planning performance requirements within the planning horizon to develop a Bulk Electric System (BES) that will operate reliably over a broad spectrum of System conditions and following a wide range of probable contingencies (sic)." The standard also requires as a general performance requirement: "The System shall remain stable. Cascading and uncontrolled islanding shall not occur."
- NERC Transmission Planning Standard TPL-001-5, Table 1 states that "Planned System adjustments such as transmission configuration changes and re-dispatch of generation are allowed if such adjustments are executable within the time duration applicable to the Facility Ratings." Therefore, redispatch of resources needed to mitigate flows above short-term emergency facility ratings must be done before the contingency occurs (precontingency redispatch).

Discussion on the study of n-2 contingencies

- *Stakeholders expressed concerns that it would be inconsistent and unduly discriminatory to temporarily relax the requirements for non-cascading outage mitigations while not also relaxing the requirements for cascading outages.*
  - However the two distinct sets of circumstances are different, the consequences are different, and the operational considerations and alternatives available to operating staff are also different.
  - The ISO has provided an expanded narrative in the draft final proposal explaining the differences in the risk-based ability to access constrained resources in stressed conditions
- *Stakeholders have also suggested that the ISO's reasoning is inconsistent in its application of the NERC planning standard by offering deliverability for resources waiting for non-cascading n-2 contingency mitigations measures to be developed.*
  - However, this is not the case: TPL-001-5 specifically anticipates that corrective action plans cannot always be put in place in the required timeframe, and is still compliant with the the standard, provided that the Transmission Planner or Planning Coordinator documents that they are taking actions to resolve the situation.

Discussion on the study of n-2 contingencies

- The ISO's current reliability and deliverability studies are required to ensure the reliability and deliverability of the resources interconnected. Establishing a bright line between the two studies can be challenging to ensure that there are no gaps.
- Removing n-2 contingencies from the deliverability studies would require major revisions to the reliability studies to ensure that precontingency redispatch is not unlimited, and attempting these process changes would inevitably raise duplication of effort between the reliability studies and deliverability studies.
- The ISO notes this is less of a concern in jurisdictions that do not allow remedial action schemes (RAS) or congestion management as mitigations in their reliability analysis.

Discussion on the study of n-2 contingencies

- With further review of the overall construct, the ISO agrees that it is not necessary to introduce a conditional deliverability term, as the approach is addressed through the methodology.
- The resource would receive Full Capacity Deliverability Status during the period where the only pending mitigation is for a non-cascading n-2 outage.

Proposal on the study of n-2 contingencies

- If an n-2 contingency results in an overloaded facility, but not cascading outages, then upgrades would be required but would not delay generation projects from becoming deliverable.
  - Generation projects would be eligible for FCDS during the development period of the transmission upgrades necessary to mitigate the n-2 contingency, assuming that no other constraints are binding.

- If a cascading outage risk is identified or if the n-2 contingency is considered always credible in the operations horizon, then the mitigation for that contingency would be required before the assigned or later generation projects behind that constraint could obtain FCDS.

ADNU/LDNU guidelines

- Transmission constraints identified in the On-Peak deliverability study are classified as Area Deliverability Constraints (ADC) and Local Deliverability Constraints.
- In that framework, constraints with large amounts of generation behind them that trigger large, high-cost network upgrades are classified as ADC, and corresponding Area Delivery Network Upgrades (ADNUs) are identified.
- This framework is designed to avoid the identification of excessive delivery network upgrades that would be considered required and allocated among all the interconnection customers in the area in that application window despite only being needed for generation amounts far beyond the expected amount of generation development in the ISO's long-term transmission planning process based on state agency input.

Stakeholder input on ADNU/LDNU guidelines

- *One stakeholder commented that the ISO should update all the dollar limits in the LDNU/ADNU criteria to account for construction inflation. The index applied to the RNU reimbursement limit could be used for this purpose as well.*
- *Since the ADNU cost allocations are based on MWs, and it's the MWs themselves (and not the number of projects) that largely trigger the need for upgrades, perhaps there should be a $/MW threshold.*

Discussion of ADNU/LDNU guidelines

- The RNU reimbursement limit determines how much of the allocated cost of an upgrade would be directly refunded to an interconnection customer.
- The ADNU/LDNU guidelines determine which upgrades are funded by interconnection customers and fully reimbursed and which upgrades are assessed for need in the open stakeholder transmission planning process. It is not a reimbursement limit.
- Also, the ADNU/LDNU metrics are intended to be guidelines, so continually updating them for inflation is not aligned with the idea that they are guidelines.

Proposal on the ADNU/LDNU guidelines

- The ISO agrees with the $/MW stakeholder comment and proposes to change ADC-C4 as follows:

The mitigation would cost more than ~~$20M~~ $60,000/MW for the total delivery network upgrade cost to be assigned to the projects in that Cluster and adjusted with the RNU reimbursement limit described in section 14.3.2(1) of GIDAP, Appendix DD.

- The ISO may also revisit criteria for delineating area deliverability network upgrades and local network upgrades in the concurrent interconnection process enhancements stakeholder process, which may result in further proposed changes.
- If so, the ISO would seek to aggregate recommendations from both processes to move through the BPM change management process.

Delayed deliverability upgrades

- Currently, a generator must wait for all reliability and deliverability network upgrades to be in-service before it can receive FCDS.
- As stated in the Straw Proposal paper, the ISO understands the disruptions resulting from delayed participating transmission owner (PTO) timelines for deliverability upgrades and proposed the idea of providing “conditional” deliverability when delivery network upgrades are delayed beyond their originally identified in-service date.

Stakeholder input on delayed deliverability upgrades

- *Generally, stakeholders supported the idea of providing deliverability when delivery network upgrades are delayed beyond their originally identified in-service date, and asked the ISO to provide more details on how this would be implemented.*

Discussion and proposal on delayed deliverability upgrades

- The ISO understands that delays to in-service dates for transmission upgrades needed for achieving deliverability status can sometimes result in resource development owners missing deadlines under their power purchase agreements (PPA).
- This can also result in the PPA counterparty not meeting RA requirements, forcing it to procure a different alternative resource at higher costs.
- However, the issue of delayed network upgrades beyond their originally identified in-service date includes reliability network upgrades and is not limited to delivery network upgrades.
- Further internal discussion and legal review within the ISO revealed that this is not simply a technical issue that is within the scope of the deliverability study methodology review initiative as the proposal inherently relaxed not only the criteria for deliverability, but in effect relaxed the need for the Resource Adequacy resources to meet minimum operational delivery needs.
- The issue of delayed reliability and delivery network upgrades delayed beyond their originally identified in-service date should be explored in the interconnection process enhancements, and will need to be coordinated with other policy venues and industry efforts to address concerns with the pace of resource and transmission development.

Initiative Schedule

Date	Milestone
November 6, 2023	Draft final proposal posting
November 13, 2023	Stakeholder call on draft final proposal
November 27, 2023	Comments due on draft final proposal
Winter 2023*	Board of Governors meeting

- None of the changes proposed in the draft final proposal require Board of Governor approval, as most of the proposed changes to the deliverability methodology are ISO management functions and will be documented in an updated methodology document.
- The ISO anticipates needing limited changes to the GIDAP Business Practice Manual.
- Implementation timelines for the proposed changes will need to be considered after the scope of the changes are finalized
- The schedule considers progress of the IPE Track 2 initiative due to overlapping issues in both initiatives.

Additional information

- Written comments are due by end of day **November 27, 2023**. Please submit your comments using the comment template available on the initiative webpage: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Generator-deliverability-methodology-review

- Visit initiative webpage for more information: https://stakeholdercenter.caiso.com/StakeholderInitiatives/transmission-planning-process-phase-3-revise-competitive-solicitation-project-proposal-fee

- If you have any questions, please contact isostakeholderaffairs@caiso.com