2018 Interconnection Process Enhancements

Issue Paper

January 17, 2018

Table of Contents

1. Introduction

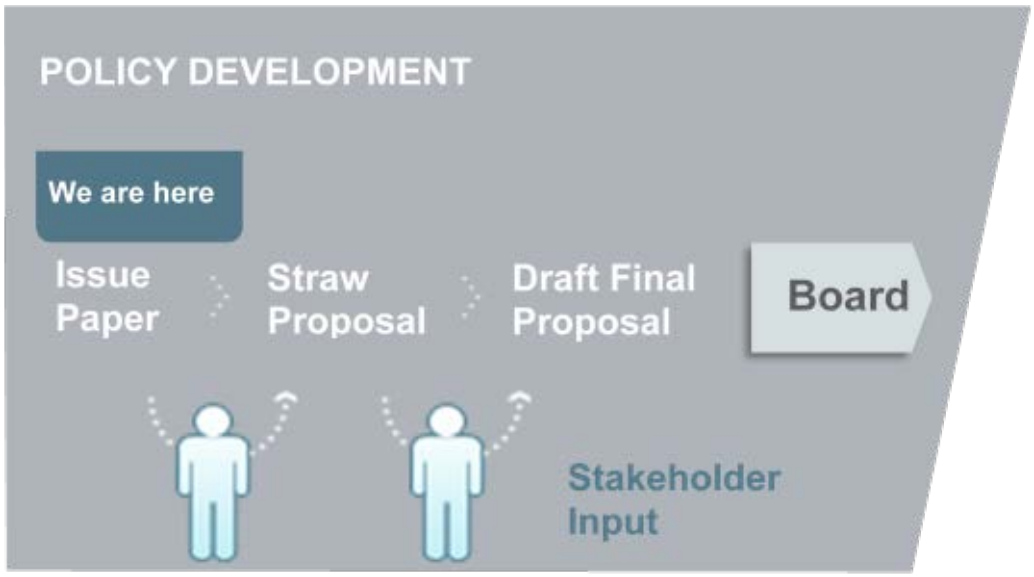
Previous iterations of the California Independent System Operator's (CAISO) Interconnection Process Enhancement (IPE) initiative focused on several enhancements to the CAISO's interconnection and deliverability allocation procedures. 2018 IPE will likely address some substantial concepts, but also a myriad of minor concepts that have not been addressed in some time. This issue paper reviews topics currently being considered to be include in this stakeholder initiative. These topics include both stakeholder and CAISO staff suggestions. They fall into six broad categories: deliverability, energy storage, generator interconnection agreements, interconnection cost responsibility and financial security, interconnection requests, and modifications.

2. Stakeholder Process

The CAISO is at the "Issue Paper" stage in the 2018 IPE stakeholder process. Figure 1 below shows the current status within the overall 2018 IPE stakeholder process.

The purpose of the issue paper is to provide the proposed scope of the enhancements that are under consideration in this initiative. The issue paper also details each of the proposed enhancements and the relevant issues under consideration for the development of the proposed enhancements. In a few instances, for ease of understand, specific proposals are included. The CAISO seeks additional input through stakeholder feedback on these items.

Figure 1: Stakeholder Process for 2018 IPE Stakeholder Initiative



Due to the substantial number of issues in this paper, the CAISO has not yet developed a schedule for the 2018 IPE initiative. Once we finalize the scope of the initiative, we will be able to determine the issues that will be included in this year's process and the timing for development.

3. Scope

Category	Topic
Deliverability	Transmission Plan Deliverability Allocation
	Balance Sheet Financing
	Change in Deliverability Status to Energy Only
	Energy Only Projects' Ability to Re-enter the Queue for Full Capacity
	Options to Transfer Deliverability
	Transparency on Availability of Deliverability
	Commercial Viability Criteria – Continuous Compliance Obligation
	Interim Deliverability Status
	Effective Load Carrying Capacity
	Delayed or Cancelled TPP Approved Projects
	Eligibility for Participating in the Annual Capacity Process
Energy Storage	Distributed Energy Resources
	Replacing Entire Existing Generator Facilities with Storage
	Deliverability Assessment for Energy Storage Facilities
Generator Interconnection Agreements	Suspension Notice
	Affected Participating Transmission Owner
	Clarify New Resource Interconnection Requirements
	Ride-through Requirements for Inverter-based Generation
	Affected System Options
Interconnection Financial Security and Cost Responsibility	Maximum Cost Responsibility for Network Upgrades and potential Network Upgrades
	ITCC for Non-Cash Reimbursable Network Upgrade Costs
	Financial Security Postings and Forfeitures
	Queue Clearing Measures
	Shared Stand Alone Network Upgrades and Stand Alone Network Upgrade Posting Criteria Issues
	Clarification on Posting Requirements for PTOs
	Reliability Network Upgrade Reimbursement Cap
Interconnection Requests	Study Agreements
	Higher Bar to Entry
	Master Planned Projects
	Project Name Publication
	Interconnection Request Application Enhancements
	FERC Order No. 827
Modifications	Timing of Technology Changes
	Commercial Viability – PPA Path Clarification
	PPA Transparency
	Increase Repowering Deposit
	Clarify Measure for Modifications After COD
	Short Circuit Duty Contribution Criteria for Repower Projects
	Material Modifications for Parked Projects

4. Deliverability

Under this topic, the CAISO seeks to clarify existing deliverability issues and modify some of the current methodologies so there is better alignment with the procurement landscape in California. In the 2017 GIDAP Enhancement Initiative initiative, which has been filed with FERC,[1] the processes related to parking and tendering of Generator Interconnection Agreements (GIA) within the Transmission Plan Deliverability (TPD) allocation process were addressed. The 2017 GIDAP Enhancement Initiative was a narrowly defined, expedited initiative in order to obtain a FERC ruling before the next TPD allocation takes place in March 2018. In the 2017 GIDAP Enhancement Initiative, the CAISO committed to continue the discussion of issues related to the TPD allocation issues in 2018 IPE.

In the consideration of further enhancements to the TPD allocation process in the 2018 IPE initiative, the CAISO suggests the following basic criteria, consistent with what was established in the 2017 GIDAP Enhancement Initiative process:

- Limit risk to the Participating TOs (PTOs)
- Limit the impact that one Interconnection Customer's choice have on other Interconnection Customers
- Ensure the most viable projects proceed appropriately
- Allow those projects that have executed a Power Purchase Agreement (PPA) or are in a short-list process greater opportunity to obtain deliverability
- Provide Interconnection Customers reasonable time to market their projects with minimal financial impact or risk.

There are eleven (11) proposed topic areas related to deliverability:

- Transmission Planning Deliverability Allocation - 4.1
- Commercial Viability Criteria for TPD Allocation - 4.2
- Participating in the Annual Full Capacity Deliverability Option - 4.3
- Change in Deliverability Status to Energy Only - 4.4
- Energy Only Projects Ability to Re-enter the CAISO Queue for Full Capacity - 4.5
- Options to Transfer Deliverability - 4.6
- Transparency on Availability of Deliverability - 4.7
- Commercial Viability Criteria – Continuous Compliance Obligation - 4.8
- Interim Deliverability Status - 4.9

[1] Jan 9, 2018 Tariff Amendment - 2017 Expedited Generator Interconnection Deliverability and Allocation Procedures Enhancements (ER18-626)

- Effective Load Carrying Capacity - 4.10
- Cancelation or Delay of CAISO Approved Transmission Projects - 4.11

4.1 Transmission Plan Deliverability Allocation

TPD is the transmission capacity needed to make a generator's output deliverable to the aggregate of load on the CAISO Controlled Grid during peak conditions. TPD is required for a project to be designated Full Capacity Deliverability Status (FCDS). As such, TPD is a critical component for a generator to be eligible for resource adequacy.

The CAISO allocates TPD, if available, to generating projects according to the interconnection customer's demonstration of having met the criteria identified in Section 8.9.2 of Appendix DD of the CAISO tariff. The current TPD allocation process provides two annual opportunities for all interconnection customers following the Phase II interconnection studies and after 1 year of parking. With the anticipated FERC approval of the 2017 GIDAP Enhancement Initiative, a third annual opportunity will be available for interconnection customers meeting certain criteria (following a 2nd year of parking) to seek an allocation of TPD. If a project does not qualify for a TPD allocation following these three opportunities, the project must convert to energy only or withdraw.

The TPD allocation process works well during periods that procurement opportunities exist. However, renewable procurement has recently slowed significantly resulting in few projects meeting the criteria to qualify for a TPD allocation. It is possible that future procurement of renewables will not require FCDS, but until that issue is decided upon, interconnection customers believe they must have FCDS to compete for a PPA in the procurement processes of Load Serving Entities (LSE).

California Public Utilities Commission Integrated Resource Planning Process

The California Public Utilities Commission's (CPUC) Integrated Resource Planning (IRP) process is the "umbrella" planning proceeding to consider all of the CPUC's electric procurement policies and programs and will ensuring safe, reliable, and cost-effective electricity supply. The IRP will be used to guide LSE future renewable procurement.

On December 28, 2017, the CPUC released a Proposed Decision setting IRP filing requirements for their jurisdictional LSEs.[2] With regard to renewables, the CPUC staff had contemplated early procurement of renewable resources to take advantage of production and investment tax credit. However, the Proposed Decision declined to authorize early procurement on the basis that cost savings from tax credits were "highly uncertain" and declining renewable costs may outweigh any tax savings.[3] Furthermore, modeling conducted during the proceeding showed minimal need for renewables until 2026 after consideration of "banked" renewable

[2] California Public Utilities Commission Proposed Decision of Commissioner Randolph, *Decision Setting Requirements for Load Serving Entities Filing Integrated Resource Plans*, Rulemaking 16-02-007, December 28, 2017. ("Proposed Decision")
[3] Proposed Decision, p. 81.

energy credits (RECs) from renewables that were previously procured.[4] The CPUC conducted prior analysis suggesting that banked RECs by investor owned utilities may allow them to meet four percent of the load in 2030.[5]

The Proposed Decision's IRP will be based on a two-year cycle where "[a]t the end of each two-year cycle, the [CPUC] will authorize procurement, where appropriate, that is necessary to occur within the next 1-3 years, to meet the targets and needs identified in the IRP process. The first such procurement authorization, if needed, is anticipated to come near the end of 2018 at the end of the first IRP cycle."[6] The IRP will have significant impacts on interconnection customer's ability to obtain PPAs for their projects.

Stakeholder input on potential further enhancements to the TPD allocation process

First Solar believes that TPD is an attribute that should be allocated as projects receive PPAs and all interconnection customers should have an opportunity annually to secure available deliverability based on firm criteria. First Solar does not believe it is prudent in the current procurement environment to force projects to convert to energy only when their opportunities for parking are exhausted. First Solar suggests that projects retain the possibility to obtain deliverability and then only once a project is shortlisted or officially obtains a PPA, are they eligible for a TPD allocation.

The CAISO is concerned that until clear direction exists on whether future procurement of renewables will continue to require FCDS it may be premature to make dramatic changes to the TPD allocation process. Moreover, any suggestion that allows projects the opportunity to remain in the queue and apply for TPD indefinitely raises concerns of issues experienced with the past serial process where projects lingering in the queue adversely affect other active projects and projects new to the queue. The increased uncertainty for projects sharing network upgrades and later clusters that potentially need those assumed upgrades could make future study results flawed and meaningless. Nevertheless, the CAISO is committed to examining this issue, and there could be a number of revisions that provide positive results without jeopardizing the stability of the *status quo*. Due to significant stakeholder interest, the CAISO intends to examine this issue, and will solicit stakeholder suggested enhancements for proposed changes to the TPD allocation process in the 2018 IPE initiative.

4.2 Balance Sheet Financing

The CAISO is willing to consider specific proposed changes to the TPD allocation criteria identified in Section 8.9.2 of Appendix DD of the CAISO tariff that mitigates potential increased risk to other parties.

One specific change proposed by a number of stakeholders is to eliminate Section 8.9.2(2)(a) of Appendix DD, which allows interconnection customers to claim their generating facility will be

[4] Proposed Decision, p. 82.
[5] California Public Utilities Commission, Administrative Law Judge's Ruling Seeking Comment on Proposed Reference System Plan and Related Commission Policy Actions, Rulemaking 16-02-007, September 19, 2017, Attachment A, p.58.
[6] Proposed Decision, p. 2.

balance-sheet financed or has otherwise received a commitment of project financing, and the interconnection customer is proceeding to commercial operation without a power purchase agreement. These criteria are also a mechanism for demonstrating that a project is commercially viable.

The Large-scale Solar Association ("LSA"), EDF-Renewable Energy ("EDF-RE"), and First Solar have all requested the CAISO review the effectiveness of the balance sheet financing option. Other stakeholders expressed concerns that projects using the balance sheet financing election are unfairly receiving deliverability allocations (via the TPD process), and lingering in the queue (via the commercial viability process).

- Stakeholders have recommended the following solutions:
- Change the TPD allocation scoring criteria.
- Eliminate the commercial viability balance sheet financing option altogether.
- Strengthen the balance sheet financing requirements such that projects must provide evidence they are prepared and able to balance sheet finance (examples).

For instance, LSA suggested a number of options to strengthen the ability to balance sheet financing including that the CAISO obtain independent support for the balance-sheet financing claims or at a minimum forfeit an amount of security. For example, Section 8.9.2 of Appendix DD of the CAISO tariff contains requirements that any interconnection customer that states that they will balance-sheet finance a project will not be eligible for refund of their security if they do not receive a power purchase agreement in accordance with Section 11.4.1(a) of Appendix DD.

LSA and EDF-RE specifically requested the CAISO issue summary statistics identifying how many projects were constructed on a merchant basis. These stakeholders suggest that the CAISO could review public LSE filings against the CAISO interconnection queue. CAISO is concerned that it may not have the data or resources to provide reporting on these statistics, but it is the CAISO's experience that the stakeholder's theory has merit because CAISO has observed that nearly all developed projects have obtained PPAs. Nevertheless, the CAISO is reluctant to eliminate the balance-sheet financing option altogether without broad stakeholder support as there are legitimate interconnection customers that do use this mechanism (e.g. municipal utilities, state agencies, water districts, etc.).

Alternatively, stakeholders have suggested interconnection customers attesting to balance-sheet financing be required to provide one of the following types of documentation:

- An executed loan agreement with a non-affiliated bank,
- Record of significant expenditures on development activities, or
- Record of non-revocable escrow account that can only be used for project development.

EDF-RE also suggested that, besides providing balance-sheet financing evidence, interconnection customers should be required to provide credible evidence that the developer will proceed with project development without a PPA. EDF-RE suggests a developer could

demonstrate intent to proceed without a PPA through a history of constructing similar-size projects in California with balance-sheet financing and no PPA. The CAISO is concerned this could unfairly prohibit less-experienced interconnection customers from participating in the interconnection queue, and seeks additional stakeholder feedback on this suggestion.

EDF-RE and LSA also suggested that for balance-sheet financed projects the CAISO implement "a minimum forfeit amount" (e.g., $20,000/MW) for serial-study projects, or an additional posting for cluster-study projects with low or no Network Upgrades because in both situations, loss of ability to claim partial security release for failure to secure an acceptable PPA has little financial impact.

Due to significant stakeholder interest, the CAISO proposes to include this issue for consideration under the 2018 IPE initiative.

4.3 Participating in the Annual Full Capacity Deliverability Option

The annual full capacity deliverability option described in Section 9.2.1 (ii) of Appendix DD of the CAISO tariff allows Option (A) projects that were not allocated TPD in any prior TPD allocation cycle or that converted to energy only and have GIAs in good standing to seek TPD for Partial Capacity Deliverability Status (PCDS) or FCDS for the energy only portion of their projects. Various stakeholders have asked the CAISO to consider changes to the annual option, including additional qualifying criteria, requiring the same TPD retention criteria as for projects that received a TPD allocation by qualifying for the allocation in the TPD allocation process, and the potential for gaming. The CAISO agrees that the annual capacity deliverability option should be explored and clarified, and as such, proposes this issue be included in the 2018 IPE initiative.

4.4 Change in Deliverability Status to Energy Only

Under the 2018 IPE initiative, the CAISO seeks to clarify when projects may convert to energy only deliverability status, as well as the circumstances that will require projects to do so. The CAISO also seeks to clarify the consequences for such conversion.

Current opportunities for projects to convert to energy only deliverability status

Existing CAISO tariff provisions allow projects to convert from FCDS or PCDS to energy only deliverability status only at certain times during the interconnection process in order to minimize impacts on other projects and the PTOs. A project may convert to energy only deliverability status between Phase I and Phase II studies or immediately following the TPD allocation process (either after the Phase II study or after parking for parked projects). Projects that convert to energy only deliverability status at these times are no longer responsible for deliverability network upgrades costs going forward.

Additional opportunities to request energy only deliverability status

While the CAISO tariff is specific on when a project can convert to energy only deliverability

status, it is silent as to whether a project can request energy only deliverability status at other times during the interconnection process and any potential consequences of such conversion. The CAISO is not opposed to considering additional opportunities for projects to convert to energy only deliverability status. However, at a minimum, the CAISO believes that projects should remain responsible for their allocated costs for deliverability network upgrades needed by other projects so that late conversion to energy only status does not have a negative cost impact on the other projects or the PTO. This requirement also would prevent interconnection customers from converting to energy only merely to reduce their interconnection financial security postings before withdrawal.

Projects converted to energy only deliverability status for failure to meet commercial viability

Currently, if the CAISO converts a project to energy only deliverability status (as opposed to the project withdrawing) due to failure to meet commercial viability criteria or TPD retention criteria, all delivery network upgrade costs are removed from the project's cost responsibility. The intent of this action is that the project would move forward as energy only deliverability status in the future. However, the CAISO believes that some project developers may seek to utilize the conversion requirements associated with failure to meet commercial viability criteria and TPD retention criteria to reduce their cost responsibility and then withdraw, the project may lose their TPD assuming that they can come back into the annual full capacity allocation process and get the TPD allocation without paying for the deliverability network upgrades. The CAISO believes this outcome may be problematic because it allows projects to shift costs to other project developers inappropriately. To prevent this problem, the CAISO proposes that a project's cost responsibility not be adjusted if the CAISO converts the project to energy only deliverability status due to failure to meet commercial viability criteria or TPD retention criteria. Under this proposed enhancement, if a project withdraws after being converted to energy only deliverability status for failure to meet commercial viability or TPD retention criteria, then any non-refundable financial security will be based on the project cost responsibility prior to converting to energy only deliverability status.

The CAISO proposes to include this issue for consideration in the 2018 IPE initiative.

4.5 Energy Only Projects' Ability to Re-enter the CAISO Queue for Full Capacity

Stakeholders have indicated a desire for the CAISO to provide an additional opportunity for projects to re-enter the queue to obtain deliverability status. LSA has provided feedback that proposes existing interconnection customer projects should have the opportunity to re-enter the interconnection queue to obtain deliverability, or additional deliverability, after they have achieved their commercial operation date. LSA believes that if a project has achieved Commercial Operation Date (COD) then they have demonstrated their viability and should be able to re-enter the queue if they initially received energy only or PCDS.

The CAISO appreciates LSA's suggestion; however, the CAISO believes that the existing annual full capacity deliverability option is in place to meet the potential need for an additional

opportunity to revisit a projects deliverability status. Additionally, CAISO believes that a more important consideration is that it may not be in the best interest of ratepayers to allow an existing project to pursue deliverability or additional deliverability at ratepayer's expense. If a project is allowed to re-enter the queue to obtain additional deliverability it would likely result in the identification of delivery network upgrades that would be reimbursable to the interconnection customer at the expense of ratepayers, however, these upgrades would likely only benefit that project. If delivery network upgrades provide a wider benefit beyond what is required just for that project to obtain additional deliverability, those upgrades with wide spread benefits will be identified in the CAISO's annual Transmission Planning Process (TPP). If such upgrades are approved, then a project already has the opportunity to obtain additional deliverability under the existing annual full capacity deliverability options. The CAISO is not opposed to providing additional opportunities to obtain deliverability status; however, at a minimum, the project should remain responsible for their allocated costs for delivery network upgrades needed and should not have a negative cost impact on other projects, PTO's, or ratepayers. The CAISO proposes to include this issue for consideration in the 2018 IPE initiative.

4.6 Options to Transfer Deliverability

Stakeholders have requested that the CAISO consider clarifying mechanisms to transfer deliverability among generation projects. As part of 2018 IPE, the CAISO will clarify the methodology of deliverability transfer under various scenarios. In addition, the CAISO will consider including the deliverability transfer option in the behind the meter capacity expansion under the independent study process.

4.7 Transparency on Availability of Deliverability

Stakeholders have requested that the CAISO provide insight into how much deliverability is available at different points on the grid, and how much is available before the next significant upgrade would be triggered. Specifically, LSA has requested that the CAISO report regularly on the available TPD for each of the major cluster-study areas as follows:

1. ***Available deliverability,*** after the annual downsizing study (and before the opening of the annual cluster-study application window); and
2. ***Awarded deliverability,*** after annual post-Phase II Study TPD allocation.

LSA suggested that both of these reports should include the amount of deliverability reserved for pre-GIDAP projects by vintage/cluster. These reports would provide information to generation developers about the best areas to locate future generation or storage projects, where deliverability is a required or highly desired attribute, and indicate areas they may want to avoid because deliverability is already limited or unavailable.

First Solar also believes that interconnection customers have limited information on how much deliverability is available for different areas on the grid. First Solar believes that generators should have more insight into how much deliverability is available at different points of the grid, and how much deliverability is available before the next significant upgrade would be triggered.

First Solar believes that the Business Practice Manual for Generator Interconnection and Deliverability Allocation Procedure ("GIDAP BPM") may not always reflect current processes and suggests it should be updated to avoid confusion related to how the clusters are allocated deliverability and how the annual deliverability allocation process is conducted. Stakeholders request that interconnection customers are provided with the ability to readily access the procedures that the CAISO uses internally for allocation to ensure transparency so that all interconnection customers are on a level playing field when developing their projects.

In response to these stakeholder concerns and suggestions, CAISO notes that in areas where there isn't sufficient transmission to support deliverability of all generation projects in the queue, the available deliverability is provided in both the generation interconnection study reports and the annual transmission plans.

In addition, details regarding area deliverability constraints are already provided in all cluster Phase I and Phase II study reports. This information includes:

- The list of generators behind the constraint,
- Total MW of the generators in the queue,
- Total MW in the California 33% renewable portfolio behind the constraint, and
- Total available generation deliverability.

The Phase I report also includes conceptual area delivery network upgrades to increase the deliverability and the amount of incremental deliverability the upgrades provide. The Phase I and Phase II area reports are posted on the CASIO market participant portal transmission planning page[7] under each cluster study.

The annual transmission plan on the CAISO's public website contains a summary of all the area deliverability constraints identified in the generation interconnection studies. It lists the renewable zones behind each area constraint and total available deliverability for each area constraint.

Upon completion of the 2017 TPD allocation, the CAISO issued a market notice and published the 2017 TPD allocation report on the market participant portal.[8] The report describes each area deliverability constraint binding and limiting TPD allocation. The total generation behind the constraint is listed in four categories: (1) prior commitment, (2) total 2017 TPD candidate, (3) eligible TPD candidate, and (4) TPD allocated. Although it is not explicitly stated in the report, TPD allocated less than eligible TPD candidate(s) indicates that the available deliverability is depleted in the allocation.

The CAISO understands that even with all this information available, it could still be difficult for the interconnection customer to have a clear indication where deliverability is still available. This is partly due to the complexity of the methodology, which is described in further detail below.

[7] https://mpp.caiso.com/tp/Pages/default.aspx

[8] https://mpp.caiso.com/tp/Documents/2017%20TPD%20Allocation%20Report.pdf

First, the boundary of an area constraint is defined by the generator shift factor on the particular overloads forming the area constraint. This boundary does not always neatly align with identified geographic areas or renewable zones. The boundary could also change between studies when the system condition changes. Additionally, a single generator may be behind multiple deliverability constraints. Identifying which constraint will be the most limiting and first to bind is not always obvious. Some area constraints impact a very large number of generators in a wide spread area, one example of this is the Desert Area Constraint. Given the uncertainty associated with each of these generation projects, it is impossible to predict the chance of obtaining deliverability allocation for a particular generator or predict the deliverability at one location.

As part of 2018 IPE, the CAISO will consider improving the reports or creating new mechanisms so deliverability information could be more accessible and useful to the interested stakeholders.

4.8 Commercial Viability Criteria – Continuous Compliance Obligation

EDF-RE has suggested the CAISO consider implementing a continuous commercial viability criteria compliance obligation, including during instances where a project makes modifications after it has made an initial commercial viability criteria demonstration but before the annual review process. This issue is currently under consideration in an open proceeding before FERC in docket ER18-156-000. The CAISO may choose to discuss this topic in the 2018 IPE initiative once that proceeding has concluded.

4.9 Interim Deliverability Status

Stakeholders have requested clarification of the CAISO's interim deliverability status methodology and decisions related to what projects are awarded available deliverability. LSA has requested that CAISO provide documentation of the methodology for determining the availability of interim deliverability. This effort should include discussion of decisions about which projects receive awards of available deliverability, including tradeoffs of using different allocation methodologies, and the possibility of multiple-year interim deliverability status (IDS) awards and/or PCDS awards where sufficient capacity is available. Stakeholders have indicated that this topic is critical to generation developers who can face significant financial penalties for delays in providing deliverability when transmission projects (triggered by their study clusters, or "precursor" projects triggered by earlier clusters or the transmission planning process) are delayed. As described below, the CAISO provides information regarding interim deliverability in various documents that address the above concerns and therefore does not believe this issue needs to be a 2018 IPE topic.

An interconnection customer that completed the interconnection studies for FCDS or PCDS achieves its deliverability status after the following are in service:

- Network upgrades identified in the transmission planning process that are assumed online in the base case,

- Network upgrades required for the generator itself; and
- Transmission upgrades assumed in service and needed to support the deliverability of the generator.

All of these requirements are identified in the interconnection customer's Phase II study report or most recent reassessment. The CAISO provides the initial list of the upgrades to achieve requested deliverability status in the Phase II interconnection study report, but this initial list is amended as the system conditions and generation interconnection queue change. Typically, upgrades are removed from the original list as generation projects withdraw, however some upgrades may return for a variety of reasons.

As part of the cluster Phase II interconnection study, the CAISO performs an operational deliverability assessment. The methodology for this assessment is described in the GIDAP BPM and provided in each cluster Phase II interconnection study report. The operational deliverability assessment is performed for each applicable study year through the prior year before all of the required delivery network upgrades are in-service. For each study year, the generators and transmission system are modeled according to their commercial operation date for generation and in service date for transmission. All generators operational by September 1 of the study year and transmission upgrades in service before June 1 of the study year are studied for the year. The CAISO considers operational deliverability assessment results stated for the first year in the annual net qualifying capacity process that the CAISO performs for the next resource adequacy compliance year. The study results for any other years are advisory and provided to the interconnection customer for informational purposes only.

Assuming the system conditions cannot accommodate the full deliverability of all generators in a study group that will be in commercial operation for the study year, available deliverability is allocated to each generator in the study group with requested FCDS or PCDS as a function of the queue position, generator size, and generator flow impact on the transmission constraint binding in the deliverability power flow. A generator may be allocated deliverability less than it has requested.

For each deliverability constraint, the available deliverability is first allocated to "Full Capacity (FC) generators," i.e., generators that would have achieved their requested deliverability status in the study year. If there isn't sufficient deliverability for all the FC generators, the capacity is allocated among the FC generators using a weighted least square optimization described below. If there is sufficient deliverability for the FC generators, then the remaining deliverability, after supporting the FC generators first, is allocated to other generators in the order from earlier queued to later queued until it is depleted. The projects in the same cluster are considered to have the same allocation position. If there is partial capacity deliverability for projects in the same cluster, the capacity is allocated using the weighted least square optimization.

The weighted least square optimization allocation formula is defined as follows:

$$Min \sum_{i=1}^{N} \frac{1}{\overline{D_i}} (\overline{D_i} - D_i)^2$$

$$s.t. \quad \sum_{i=1}^{N} D_i \cdot SF_{il} \le C_l, \quad l = 1, \cdots, L$$

$$0 \le D_i \le \overline{D_i}, \quad i = 1, \cdots, N$$

Where

D_i = Deliverable MW of generator i

$\overline{D_i}$ = Upper limit of NQC[9] of generator i

L = number of deliverability constraints

C_l = available capacity on the deliverability constraint l

SF_{il} = shift factor of generator i output on deliverability constraint l

The CAISO has been providing the interim deliverability information in the cluster Phase II study reports posted on the market participant portal transmission plan page[10] under each cluster Phase II study. The operational deliverability assessment results in these reports provides estimated deliverability status by year, by cluster, and by study groups. The intent of providing this information publicly is that any interconnection customer, not just the ones with projects in the current cluster, could use the posted report to determine the deliverability status each year and what upgrades the generator is waiting for. However, the results are advisory only, except for the first year study. The annual net qualifying capacity process for the next resource adequacy compliance year is where the results become firm and binding.

The CAISO believes that the above discussion may satisfy the question presented by LSA, and in any case, does not believe that there is an issue here that needs to be addressed in 2018 IPE.

4.10 Effective Load Carrying Capacity

Stakeholders have requested that CAISO explore the implications of the CPUC's adoption of the Effective Load Carrying Capacity (ELCC) for wind and solar projects on deliverability availability and interconnection studies. This section provides an initial description of the CAISO's understanding of the potential implications of ELCC for these items.

Starting in 2018, the CPUC will transition from the exceedance based qualifying capacity calculation method to an Effective Load Carrying Capacity (ELCC) based QC calculation method for wind and solar resources QC values. ELCC is a statistical modeling calculation that determines the capacity values of different resources relative to "perfect capacity." The ELCC

[9] For intermittent generation, a range of output levels between the 20% and 50% production exceedance during summer peak load hours are studied.

[10] https://mpp.caiso.com/tp/Pages/default.aspx

of a generator is defined as the capacity amount by which the system's loads can increase when the generator is added to the system while maintaining the same system reliability. The CPUC's ELCC QUALIFYING CAPACITY values for wind and solar resources are calculated through the following steps:

1. Model a capacity portfolio that brings the CAISO area, as a whole, to a target Loss of Load Expectation (LOLE) of 0.1 (approximately equivalent to 1-day-in-10 years), given the loads and resources expected to exist in the study year.
2. Remove all resources of interest (wind or solar) in the CAISO area.
3. Add "perfect capacity" back to the portfolio to bring system back to the target LOLE of 0.1.
4. The ELCC value of the resources of interest equals the ratio of the removed capacity to the amount perfect capacity that was required to bring the portfolio back to 0.1 LOLE*, i.e.*, (removed capacity/perfect capacity*100%).

The following tables below show the technology factors utilized to calculate the QC values for wind and solar resources for the ELCC methodology in 2018 and the exceedance methodology that was used in 2017. Theses tables indicate that for 2018 the technology factors for wind are higher and solar are lower.

Table 1: 2018 Technology Factors for Solar and Wind Resources

Month	CY 2018 Solar ELCC	CY 2018 Wind ELCC
1	0.0%	11.3%
2	2.4%	17.3%
3	10.4%	18.3%
4	33.2%	31.4%
5	30.5%	30.6%
6	44.8%	47.5%
7	41.7%	29.7%
8	41.0%	26.5%
9	33.4%	26.5%
10	29.4%	8.8%
11	4.1%	8.4%
12	0.0%	15.2%

Table 2: 2017 Technology Factors for Solar and Wind Resources

Month	CY 2017 Solar PV Factor	CY 2017 Solar Thermal Factor	CY 2017 Wind Factor
1	0.26%	0.37%	2.42%
2	1.47%	1.74%	10.90%
3	6.82%	7.83%	16.42%
4	79.82%	79.12%	19.88%
5	75.56%	64.70%	32.88%
6	79.35%	88.88%	26.58%
7	75.34%	87.44%	18.90%
8	80.34%	93.63%	17.65%
9	75.01%	87.30%	11.33%
10	57.51%	45.93%	6.52%
11	0.16%	0.43%	4.01%
12	0.11%	0.21%	4.63%

Stakeholders have requested the ability to contribute their input to the CAISO's implementation of a new deliverability methodology that would be required in response to the implementation of the CPUC ELCC methodology in 2018 IPE or through a separate initiative. The stakeholder's concerns focus on how the deliverability methodology will align with the reduction of QC of solar resources under ELCC, and how implementation of a modified deliverability method would potentially impact interconnection requests previously studied under the current methodology and the future ones. Specifically, LSA has asked:

- Is there now more deliverability in the system that could be used for later-queued projects, and or allow Delivery Network Upgrades to be cancelled?
- How will projects currently under study, and those in future clusters be analyzed in the interconnection-study process?
- Can solar projects that have been previously studied at higher deliverability levels add capacity to "get back" some of the QC difference?

The CAISO provides the following initial response to these stakeholder questions and concerns. In 2004 the CAISO developed a deliverability study methodology for resource adequacy purposes. The methodology was generally adopted in the CPUC's resource adequacy proceeding in 2004. A generating resource must pass the CAISO deliverability test under system summer peak load conditions for its qualifying capacity to become Net Qualifying Capacity (NQC) that can qualify towards meeting resource adequacy requirements. The generating resources in service in 2004 when this methodology was adopted were predominantly non-intermittent, such as thermal plants and hydro plants. The QC values used in the deliverability assessment were generally equal to the respective maximum output for the resource. When the 20% and 33% Renewable Portfolio Standards (RPS) targets were adopted, that drove a high volume of renewable generation interconnection requests to the grid. With this

RPS development, the deliverability methodology was also expanded to account for intermittent resources. The QC values for wind and solar resources were calculated based on the resource's production exceedance values. To align with the exceedance methodology QC calculation, the CAISO developed the capacity assumptions for intermittent resources in the deliverability assessment based on the exceedance values during the same QC counting window in the summer months. The methodology has been applied in the CAISO generation interconnection studies and transmission planning studies. Several policy driven transmission upgrades were identified and approved to support deliverability of 33% RPS portfolio.

As the resource portfolio keeps evolving toward a higher RPS target, and additional energy efficiency, demand response, and behind-the-meter distributed generation, both the characteristics of the load profile and the resource portfolio are going through a drastic transformation that raise concerns about the overall effectiveness of the current deliverability methodology. In response to these ongoing changes, the CAISO performed an informational study in the 2016-2017 Transmission Planning Process (TPP) 50% RPS deliverability assessment that evaluated the current deliverability methodology and experimented with potential modifications to the study assumptions in the deliverability assessment to reflect the changes to the resource and load conditions. Further, the ELCC methodology adopted by the CPUC for 2018 triggered the review of the deliverability assessment from a broader framework that involves the study methodology, upgrade identification, NQC determination and coordination between transmission planning process and generation interconnection procedure.

The CAISO is actively reviewing the deliverability methodology. Because it is a highly complex technical study, the CAISO must evaluate potential modifications and consequences before proposing a new methodology for stakeholder review and input. The CAISO intends for this effort to take its own track, outside of this 2018 IPE initiative. CASIO expects to share the initial results of this effort and seek input from the stakeholders in the 2018-2019 transmission planning cycle.

4.11 Cancellation or Delay of CAISO Approved Transmission Projects

Stakeholders have requested that CAISO consider explicitly including generator deliverability in decisions to delay or cancel transmission projects that have been approved under the CAISO TPP and in mitigation plans to address these actions, and to provide notice to generation developers of resulting impacts.

Due to the rapid growth of energy efficiency, demand response and behind-the-meter distributed generation, the electrical grid is going through significant changes. The provisions of the current TPP require CAISO to prudently re-evaluate previously approved transmission upgrades that are not yet under construction. If the evaluation determines that the upgrade is no longer needed to reliably serve the load under various system conditions, to support local reliability capacity needs, or support generation deliverability, the upgrade is cancelled.

In response to these stakeholder suggestions, CAISO notes that it does not cancel a transmission upgrade if the upgrade is required by generation projects active in the

interconnection queue. Delays to transmission upgrades could be due to many factors, such as environmental issues in the permitting process, equipment availability or staffing. The CAISO updates transmission project status regularly in both the annual transmission plan report and the cluster interconnection study reports. The CAISO also provides updates directly to the interconnection customers when the upgrade affects the deliverability status of the generation projects. For these reasons, the CAISO does not plan to consider these issues in the 2018 IPE initiative.

5. Energy Storage

There are three (3) topic areas included that are associated with energy storage included in this 2018 IPE initiative.

- Distributed Energy Resources – 5.1
- Wholly Replacing Existing Facility – 5.2
- Deliverability Assessment – 5.3

5.1 Distributed Energy Resources

Diversified Energy Regulatory Consulting suggested the CAISO provide clarification regarding interconnection, jurisdictional boundaries, market participation and dispatch, and safety requirements for Distributed Energy Resources (DERs) in this stakeholder initiative. The CAISO has included most of these issues in the scope of the Energy Storage and Distributed Energy Resources (ESDER) Phase 3 initiative. As such, the CAISO does not believe that these issues should be included in the 2018 IPE initiative.

DERs already can, and do, participate in the CAISO markets as single or aggregate resources. Jurisdictional boundaries between the CAISO and distribution companies are currently being vetted by the CPUC in its energy storage proceeding, docket R.15-03-011, and in the ESDER Phase 3 initiative. Regarding safety requirements, distribution system operators are responsible for establishing safety priorities and requirements related to personnel working on their systems.

Dominion Energy also recommends that CAISO consider modifications to the interconnection process to include a notification to distributed energy resources when they potentially meet the North American Electric Reliability Corporation (NERC) Bulk Electric System (BES) definition inclusion 4 (I4) criteria. This criterion establishes that project aggregations of 75 MVA or greater are included in the definition of BES and fall under NERC jurisdiction. CAISO understands this suggestion, however, it is not the CAISO's role to determine and notify entities if they fall under NERC jurisdiction or may have to meet NERC standards. As such, the CAISO does not plan to include this topic in the 2018 IPE initiative.

5.2 Replacing Entire Existing Generator Facilities with Storage

Some interconnection customers have sought to replace the entirety of their project or existing generating facility with storage through the modification process. The BPM for Generator Management ("GM BPM") provides that projects in the queue may replace a portion of the requested MW with storage, or add storage to the project above the approve project capability provided it does not increase the total output of the generating facility to the grid at any time. For existing generating facilities, the GM BPM allows for a portion of the project capacity to be converted to energy storage. In both instances, the CAISO assumes the non-storage portion of the generating unit is available to charge the storage facility if the grid cannot directly provide power to the energy storage unit when necessary. While there is currently no bright-line test to determine how much capacity can be replaced with storage without substantially changing the electrical characteristics of the generating facility, a whole replacement of the generating facility would constitute such a change. To date, the CAISO has only approved up to 10% conversion to battery from an existing project via the modification process. In addition, as discussed further below, the CAISO has allowed projects to add up to 100% of their original studied capacity to the project but requires an automatic tripping scheme to ensure that the actual capacity delivered to the grid is not greater that the studied interconnection capacity.

Issues related to this concept of replacing some project capacity with storage under the modification process may have material impacts on grid reliability. The following examples help describe how the current requirements would be applied to projects utilizing the modification process to replace portions of the existing project with storage capacity.

As noted above, using the modification process does not allow the CAISO or PTO to study whether the change to the generating facility would affect its ability to deliver energy to the grid. As an example, assume a 100 MW solar generating facility wants to modify its project to 80 MW solar and 20 MW energy storage. The original project was studied for FCDS at 93 MW on-peak and 0 MW off-peak. Since the modification process does not allow for the restudy of a project's deliverability, the CAISO will not know the impact to the grid of discharging the energy storage unit outside of the on-peak period. This is the reason behind the CAISO's requirement that energy storage added through the generator interconnection process, including modifications, must follow CAISO dispatch instructions to ensure reliability of the grid.

An additional example helps explain other related requirements. For instance, assume that a 100 MW solar generating facility wants to modify its project to add 20 MW energy storage under the modification process. In order to ensure that the generating facility meets the established requirement that it does not increase its total MW capability delivered to the grid, the project must install an automatic generator tripping scheme. This automatic generator tripping scheme must be sufficient to ensure that the total output of the generating facility, including the energy storage addition, does not at any time exceed the interconnection request maximum interconnection capacity at the point of interconnection. The CAISO will have the authority to trip the generating facility subject to the automatic generator tripping scheme, or take any other necessary actions to limit the output of the generating facility so the total output of the

generating facility does not exceed the approved interconnection request capacity at the point of interconnection. In addition, the 20 MW energy storage addition is considered energy-only, therefore, adding storage does not impact FCDS. If the project wants to move deliverability to the storage unit from the solar unit then the project would be PCDS.

Because a whole change from the studied project to storage results in changes to the electrical characteristics that were studied, the CAISO cannot permit a replacement of the generating facilities to battery storage through the modification process and the request must go through the cluster study process as a new project. As such, the CAISO does not plan to include this topic in the 2018 IPE initiative.

5.3 Deliverability Assessment for Energy Storage Facilities

In 2014 the CAISO conducted a stakeholder initiative on interconnection processes for energy storage resources.[11] The initiative concluded that no CAISO tariff changes were necessary, and interconnection customers would provide electrical characteristics of the energy storage facilities in charging and discharging mode as part of their interconnection request.

The California Energy Storage Alliance (CESA) claims that the current deliverability assessments for energy storage is illogical. CESA mistakenly thinks that the deliverability assessments for energy storage include both discharge study under a worst-case dispatch condition and a charging study during peak and off-peak periods. CESA therefore requested that the CAISO re-consider the assessment methodology for energy storage.

CESA's comments are based on a misunderstanding of the CAISO's study methodology. Specifically, there is no charging deliverability study and no "fuel availability" requirement imposed in the deliverability assessment. The reliability study evaluates either peak or shoulder peak charging scenarios because energy storage facilities could participate in the CAISO market as regulation capacity. CAISO can dispatch energy storage facilities through the full range of charging to discharging for regulation purposes. The reliability study intends to capture potential congestion under such conditions.

The reliability studies performed under GIDAP consider both charging and discharging modes. These studies identify network upgrades needed to mitigate reliability problems caused by a project that cannot be mitigated through congestion management. In other words, if congestion management is the appropriate mitigation measure then network upgrades to relieve operational limitations will not be identified.

For energy storage projects requesting FCDS or PCDS, deliverability studies performed under GIDAP will consider only discharge mode in a manner consistent with current CPUC resource adequacy counting rules. It was determined in the 2014 stakeholder process for energy storage interconnection that if an energy storage project wanted specific charging capabilities, such as

[11] https://www.caiso.com/informed/Pages/StakeholderProcesses/CompletedClosedStakeholderInitiatives/EnergyStorageInterconnection.aspx.

uninterrupted charging similar to firm load service, then they must apply to the interconnecting transmission owner for firm load service.

The current study methodology was implemented in 2014 for all of the generation interconnection studies. In the reliability study, the CAISO and PTOs may select one or more scenarios among summer peak, shoulder peak, and off-peak, to evaluate the impacts of charging the energy storage facilities. The table below provides a general guidance for developing the scenarios. As noted above, network upgrades are not required if the adverse impact of charging energy storage can be mitigated through congestion management.

Table 1: Key Assumptions in Energy Storage Charging Study

Assumptions	Scenarios		
	Peak C[12]	Shoulder Peak C	Off-Peak Nighttime C
Load Level	1-in-10	~75% of peak	~40% of peak
Solar Generation	Pmax	0	0
Wind Generation	50% ~ 65% of Pmax	~ 50% of Pmax	Pmax
Energy Storage Dispatch	Max charging	Max charging	Max charging
Other renewable	Pmax	Pmax	Pmax
Thermal Generation	As needed to balance load	As needed to balance load	As needed to balance load
Hydro Generation	Based on historical data	Based on historical data	Based on historical data
Import Levels	Historical max flows adjusted to accommodate output from renewable generation as needed	Historical max flows adjusted to accommodate output from renewable generation as needed	Historical max flows adjusted to accommodate output from renewable generation as needed

The deliverability assessment models and tests the 4-hour continuous discharging capacity. The deliverability assessment is performed under the on-peak deliverability assessment methodology[13]. If delivery network upgrades are required, they are assigned to all generation projects behind the deliverability constraints.

At this time, the CAISO believes that the issues raised by stakeholders have been addressed through these clarifications and do not require further consideration in the 2018 IPE initiative.

[12] ISO and the PTO may select either peak or shoulder peak scenario to evaluate charging the energy storage facilities.

[13] http://www.caiso.com/Documents/On-PeakDeliverabilityAssessmentMethodology.pdf

6. Generator Interconnection Agreements

There are six (6) topics being included in the 2018 IPE initiative that relate to GIAs.

- Suspension Notice - 6.1
- Affected Participating Transmission Owner - 6.2
- Clarify New Resource Interconnection Requirements - 6.3
- Ride-through Requirements for Inverter-based Generation - 6.4
- Affected Systems Options - 6.5
- Modeling Data Requirements – 6.6

6.1 Suspension of Notice

The CAISO believes that modifications to the Large Generator Interconnection Agreement (LGIA) are needed to allow for request and approval of a project to suspend. Article 5.16 of the LGIA requires interconnection customer to notify the CAISO and PTO if a project will be suspended. This article is not specific that the request include a start and end date for the suspension. The provisions also do not provide opportunity for the CAISO to approve the terms of the suspension to ensure that the project is not in breach of the GIA when suspension is requested and ensure that the suspension will not impact other interconnection customers.

The CAISO believes that Article 5.16 should be modified to require any request for suspension include a start and end date, and provide the CAISO the ability to approve the suspension period. The CAISO proposes to include this enhancement in the 2018 IPE initiative.

6.2 Affected Participating Transmission Owner

Generating facilities interconnecting to the CAISO controlled grid may affect the transmission system of a PTO in which the point of interconnection is not located. In these instances, the PTO is referred to as an affected PTO. The current GIDAP does not address how the interconnection customer's financial security postings, cost responsibility, and PTO repayment will be disbursed among the interconnecting and affected PTOs. CAISO believes that interconnection customers and PTOs would benefit from clarifications to policies regarding financial considerations when interconnection customers must contract with two separate PTOs for the construction of interconnection facilities and network upgrades. CAISO believes that including this documentation in the GIDAP would ensure consistency and transparency for interconnection customers. As such, the CAISO proposes to consider this issue in the 2018 IPE initiative.

6.3 Clarify New Resource Interconnection Requirements

New generators seeking interconnection to the CAISO are required to go through the CAISO generator interconnection process, which includes interconnection requests, planning studies, and negotiation of a 3-party GIA with the CAISO, interconnecting PTO and interconnection customer. Existing generators grandfathered under existing PPAs must convert to participating generator status under Section 25 of the CAISO tariff once their PPA terminates, and receive interconnection service under a 3-party GIA with the CAISO and interconnecting PTO. Besides going through the interconnection or conversion process, these generators are also required to go through the New Resource Implementation (NRI) process. The NRI process allows the generator to be modeled in the CAISO market systems, ensure certified metering and telemetry is installed, and be setup to bid, schedule, and deliver energy to the CAISO markets. The NRI process also applies to generators that connect to the distribution grid and seek to participate in the CAISO market.

While completion of the NRI process for participation in the CAISO market is necessary, the requirement is not clearly outlined in the CAISO tariff. Based on interaction with prospective interconnection customers, the CAISO has identified there might be confusion on the applicability of the NRI process.

To accomplish the clarification CAISO believes necessary, an update is required in Section 25 of the CAISO tariff, outlining the need for all generators seeking CAISO market participation to complete the NRI process. This clarification does not burden generators with additional obligations but seeks to clarify existing ones. The CAISO proposes to include these enhancements in the 2018 IPE initiative.

6.4 Ride-through Requirements for Inverter-based Generation

Over the past five years, the CAISO controlled grid has expanded substantially in correspondence with the state's 33% renewables by 2020 and 50% by 2030 policies. With this expansion, more generating facilities are interconnected with inverters, and the technical characteristics of the inverters are affecting the system during transmission faults more frequently. During recent operations, the CAISO system experienced one transmission fault that ultimately led to 1,100 MW of generation that unnecessarily tripped off and did not return for an extended period. CAISO staff has already worked with generators, PTOs, NERC, Western Electricity Coordinating Council (WECC), and inverter manufactures to address this issue, but intends to address tripping rules and related inverter settings for inverter-based generation in the 2018 IPE initiative as well.[14]

Appendix H of the LGIA allows the asynchronous generating facility to cease to inject current

[14] Because this issue only presents in the form of inverter-based generation, the CAISO does not plan to address tripping or ramping of non-inverter-based generation.

into the transmission grid during a fault. In discussions with manufactures, inverters can be designed and programed to continue injecting current into the grid thereby decreasing the impact of the fault. Moreover, NERC reliability standard PRC-024-2 establishes the generator frequency and voltage protective relay settings such that generating units remain connected during defined frequency and voltage excursions. Nevertheless, the CAISO has experienced large blocks of asynchronous generation tripping offline for faults occurring on the high voltage transmission system. The amount of generation lost during these instances has ranged from 30 MW to 1,100 MW. These generators tripped for faults on the high voltage transmission system (500 kV and 220 kV) for frequency deviations at the "Instantaneous Trip" level in Attachment 1 of PRC-024-2. However, transmission operators consistently cleared all faults in four cycles or fewer, obviating the need for these generators to trip at all. Preliminary analysis indicates that many of the inverters tripped instantaneously with frequency or voltage targets as recorded in the inverter codes. In 2018 IPE, the CAISO seeks to address ride-through requirements and requirements to continue injecting current and return online for inverter-based generation.

In addition, Appendix H of the LGIA exempts existing and operational asynchronous generating facilities from the obligations of asynchronous generating facilities regarding low-voltage ride-through, frequency disturbance ride-through, power factor design, SCADA and power system stabilizers. Given the impact to the CAISO grid of increasing asynchronous generating facilities, should the existing and operational generating facilities continue to be exempt from the requirements? Today the existing and operational generating facilities would only need to meet the Appendix H requirements if they repower their generating facilities or go through the interconnection queue with a new project. Another issue to consider is should small generating facilities, less than 20 MW, be treated differently? The CAISO seeks to explore this issue with the stakeholders in the 2018 IPE process.

6.5 Affected System Options

LSA has proposed the inclusion of CAISO-system options to mitigate adverse affected system impacts identified in CAISO interconnection studies. This suggestion intends to eliminate or reduce the need to deal with separate affected system study timelines and financial-impact uncertainty.

The CAISO interconnection studies do not identify impacts on other electric systems and are not an alternative to affected system studies required by other electric systems. The CAISO does not have access to data required to study other electric systems. CAISO disagrees with the assertion that the CAISO interconnection studies could identify adverse affected system impacts and eliminate or reduce the need for affected system studies.

LSA believes that the CAISO provides little or no assistance to developers in the affected system process. However, section 6.1.4.3 of the GIDAP BPM allows the interconnection customer or the identified affected system operator to request that CAISO review the reasonableness of the studies conducted and study results issued by the identified affected system operator. Whenever these parties have requested such review in the past, the CAISO has been involved with the review of the studies inputs and results, as well as the legitimacy of identified reliability issues, and evaluation of potential mitigation on the CAISO controlled grid

required to resolve legitimate reliability issues on the affected system. Prior requests have come from both interconnection customers and affected system operators.

Upon request, the CAISO has coordinated with multiple affected system operators to ensure study timelines will not jeopardize the planned interconnection of a project. Since implementation of the current affected system process in 2015, there have been no instances where a project has been delayed due to coordination with affected systems. The current process, detailed in Section 6.1.4 of the GIDAP BPM, also provides that the CAISO will seek mitigation on the CAISO controlled grid for any legitimate reliability issues found in an affected system study. The CAISO believes the current coordination and review provisions allow sufficient opportunity for CAISO to provide support to interconnection customers and affected system operators and does not intend to include this topic in the 2018 IPE initiative.

6.6 Modeling Data Requirements

NERC and WECC have implement MOD-032 that requires generating units connected to the bulk electric system (100 kV and above) and greater than 10 MVA (single unit) or 75 MVA (generating facility) to comply with NERC data standards, and provide updated data at least every 10 years. However, the NERC dynamic data validation standards only apply to generating units 75 MW and above. The CAISO estimates that approximately 30% of the generation in the market are not required to meet the NERC/WECC standard yet the CAISO needs the data to ensure both modeling for planning purposes and reliability of the grid. The lack of validated data compromises the accuracy of power system models utilized to predict the ability of the CAISO system to withstand credible contingencies on the CAISO system. It also compromises our ability to maintain accurate models as required for NERC/WECC compliance.

While the section 4.6.4 of the tariff requires participating generators to provide the capacity and operating characteristics to the CAISO upon request, the tariff is not explicit regarding the data requirements. The CAISO proposes to provide greater clarity regarding this issue in the CAISO tariff and will invite stakeholder comments on this topic.

7. Interconnection Financial Security and Cost Responsibility

The following eight (8) topic areas are associated with interconnection financial security and cost responsibility.

- Maximum Cost responsibility for NUs and potential NUs - 7.1
- ITCC for non-cash reimbursable network upgrade costs - 7.2
- Financial Security Postings and Non-Refundable Amounts - 7.3
- Queue Clearing Measures - 7.4
- Shared SANU and SANU Posting Criteria Issue - 7.5
- Clarification on Posting Requirements for PTOs - 7.6

- Reliability Network Upgrade Reimbursement Cap - 7.7
- Reimbursement for Network Upgrades - 7.8

7.1 Maximum Cost Responsibility for Network Upgrades and Potential Network Upgrades

In the two phase cluster study process, the maximum cost responsibility for network upgrades assigned to a project is established from the two study reports. The combined costs for all network upgrades in the Phase I and Phase II study reports are compared and the lower of the cost for all network upgrades between the two reports sets the maximum cost responsibility for network upgrades for the project. The maximum cost responsibility is also referred to as the cost cap. Interconnection customers can identify the maximum amount of network upgrade costs they could be responsible for their project with the maximum cost responsibility. This allows customers to calculate the worst-case maximum amounts that could be required for their second and third interconnection financial security postings.

Following the Phase II studies, the CAISO performs a reassessment, as explained further below. The reassessment may have an impact on a project's "current cost responsibility" as well as the "maximum cost responsibility". The use of these similar terms, "maximum cost responsibility" and "current cost responsibility" has created confusion and the CAISO proposes to clarify and define terms as part of the 2018 IPE initiative.

Through the annual reassessment process a project can have one or more Reliability Network Upgrades (RNU) or Local Deliverability Network Upgrades (LDNU) removed as a required network upgrade and have a reduction in current cost responsibility. However, interconnection customers are only eligible for an adjustment to the maximum cost responsibility for network upgrades if the revised cost in the reassessment reduces the customer's estimated cost responsibility for network upgrades by at least 20 percent and one million dollars, as compared to its current maximum cost responsibility for network upgrades based on the interconnection studies or a previous reassessment.[15]

Occasionally study reports identify required network upgrades for which the project does not have any cost responsibility, but is required for the project's requested level of service. These potential network upgrades are upgrades that are the obligation of a project in an earlier cluster and are considered precursor network upgrades for the project. Potential network upgrades are identified in a project's Phase I and Phase II group and individual study reports. A potential network upgrade will become a bona fide cost responsibility of a project if no projects in an earlier cluster group that is assigned all or a portion of the cost responsibility for the network upgrade withdraw without executing a GIA. If all projects assigned cost responsibility for a potential network upgrade withdraw prior to executing a GIA, and it is determined in the following reassessment that the potential network upgrade is still required for later cluster project(s), the cost responsibility for the network upgrade will become the cost responsibility of the project(s) in the next cluster that it is assigned to as a potential network upgrade. When that

[15] Appendix DD Section 7.4.3 (i)

occurs the costs associated with the potential network upgrade will no longer be considered potential costs.

While a project is not required to post interconnection financial security for a potential network upgrade, the cost of the potential network upgrade is included in the project's maximum cost responsibility. Whenever a potential network upgrade is identified in a project's study report, the interconnection financial security posting will be based on the maximum cost responsibility reduced to exclude the cost of the potential network upgrade(s).

The portion of the maximum cost responsibility that is attributed to a potential network upgrade cannot be used to create unassigned costs under the maximum cost responsibility or "headroom" that could be utilized to increase the cost responsibility for other network upgrades assigned to a project within the reassessment process. CAISO only includes these potential costs for precursor upgrades in a project's maximum cost responsibility to allow interconnection customers to evaluate the maximum financial responsibility their projects may face if all prior projects assigned the cost responsibility were to withdraw. This also protects the PTO from backstopping the cost of a network upgrade when no project signs a GIA, particularly costly network upgrades that result in project withdrawals.

The CAISO believes that these cost responsibility principles should be defined more clearly in the CAISO tariff. The CAISO is aware that the principles and reassessment related cost responsibility changes and the increased appearance of potential network upgrade costs in project's study reports has created confusion around how the maximum cost responsibility plays out in practice. The CAISO proposes to provide greater clarity and will invite stakeholder comments on these proposed definitions.

The CAISO believes that it could potentially adopt the following definitions to provide additional clarity:

> Maximum Cost Responsibility for Network Upgrades:
> The total costs allocated for all Network Upgrades assigned to an Interconnection Customer, based on the lesser of the costs for such Network Upgrades assigned to the Interconnection Customer in the final Phase I Interconnection Study, or the final Phase II Interconnection Study and will include the cost of Potential Network Upgrades. The Maximum Cost Responsibility for Network Upgrades shall be subject to further adjustment based on the results of the annual reassessment and the criteria for changes to the Maximum Cost Responsibility in the reassessment process provisions in Appendix DD.[16]
>
> Current Cost Responsibility for Network Upgrades:
> The cost for Network Upgrades used to calculate the Interconnection Financial Security requirement when the Interconnection Financial Security requirement is due, which does not include the cost of Potential Network Upgrades.
>
> Potential Network Upgrades:
> Network Upgrades that are required by a project for its selected level of service whose cost responsibility is assigned to one or more prior cluster projects where at the time that

[16] Appendix DD Section 7.4.3 (i)

a study report is completed none of those prior cluster projects have executed a Generator Interconnection Agreement, including Stand Alone Network Upgrades (SANU). A Network Upgrade stops being a Potential Network Upgrade and the cost responsibility becomes the responsibility of a project when all prior cluster projects assigned a cost responsibility allocation for the Network Upgrade withdraw without having executed a Generator Interconnection Agreement. This will also cause the costs for this Network Upgrade to be included in the project's Current Cost Responsibility for Network Upgrades, up to the projects Maximum Cost Responsibility at that time.

7.2 ITCC for Non-cash Reimbursable Network Upgrade Costs

ITCC is the income tax component of contribution that is equal to the estimated tax liability for the interconnection facilities paid to the PTO. California Wind Energy Association (CalWEA) has requested the treatment of ITCC for non-cash reimbursable network upgrade costs (e.g., RNU cost above $60K/MW) be reviewed in the 2018 IPE initiative. CalWEA suggests that the CAISO consider the following issues:

1. Should the non-cash reimbursable network upgrade costs be reimbursed though another instrument such as CRRs; and
2. Should non-cash reimbursable network upgrades be subject to ITCC.

The CAISO has no position on these ITCC related issues and opens the issue to discussion by the participants as to whether it should be further considered in the 2018 IPE initiative.

7.3 Financial Security Postings and Non-Refundable Amounts

An interconnection customer can withdraw its interconnection request and may recoup a partial amount of the interconnection financial security posted in certain circumstances. Typically, portions of the deposited funds are non-refundable due to a project's withdrawal. First Solar believes CAISO's current non-refundable amounts are excessive. First Solar has indicated that withdrawals are often due to market conditions outside of the project's control, not because their project was not viable, and therefore CAISO provisions should not financially punish the projects for needing to withdraw from the queue.

Westland's Solar Parks also provided feedback that the CAISO should consider the issue of non-refundable amounts required of interconnection customers when they withdraw the queue. Westland Solar Parks believes that the current structure incentivizes projects to stay in queue too long, giving the queue and reassessment studies false or misleading information that can create an inaccurate image of available transmission plan deliverability and required upgrades.

First Solar and PG&E suggested that CAISO should re-evaluate the distribution of the non-refundable deposit funds. First Solar believes that non-refundable funds are currently disbursed to scheduling coordinators that are not associated with the study process. CAISO clarifies that the practice described by First Solar was ended in 2015 and non-refundable funds are now

disbursed to Transmission Access Charge ratepayers (loads and exports), and to PTOs to help pay for network upgrades that the withdrawing projects had a cost responsibility for, and are still needed by other projects. The current process was adopted through a prior stakeholder process and has been approved by FERC. This process is integral to the cluster study process and CAISO believes the current approach continues to be appropriate.

The CAISO also disagrees that the current non-refundable amounts are not appropriate. As noted by First Solar, requiring interconnection customers to have "skin in the game" is a legitimate reason to require significant deposits and ensures that serious generators are moving forward to cover associated interconnection facilities and network upgrades costs.

As such, the CAISO does not plan to include reconsideration of this issue in the 2018 IPE initiative.

PG&E would like a portion of non-refundable amounts to be assigned to upgrades that are no longer deemed needed due to reassessment but where the PTO has already incurred costs or irrevocably committed funds to the project. While CAISO understands PG&E's concern, the costs would need to be incurred consistent with the milestone table in Appendix B of the GIA. In other words, if PG&E commences construction activities in advance of obtaining the notice to proceed from the interconnection customer, then those costs should not be recovered from non-refundable funds. But if the PTO has obtained the notice to proceed and the project subsequently withdraws, then the CAISO can understand PG&E's reason for obtaining some of the non-refundable funds. The CAISO thus plans to include this issue in 2018 IPE.

7.4 Queue Clearing Measures

LSA proposes that the CAISO consider exploring measures to reduce the number of projects with questionable viability in the interconnection queue. LSA suggestions for potential queue clearing measures included the following recommendations:

1. **Commercial Viability Criteria compliance demonstration:** There is no particular reason the CAISO should wait until projects seek COD extensions to verify that they are commercially viable. The CAISO could require a periodic review – e.g., every three or five years – to ensure that projects lingering for long periods in the queue are still viable.
2. **One-time security-forfeit "holiday":** The CAISO could consider offering a one-time amnesty from interconnection financial security (IFS) non-refundable amounts for projects of at least a certain vintage to withdraw from the queue or convert to energy only without a security penalty, similar to occasional "tax holidays" offered by taxing authorities. While non-refundable amounts of the security deposit help ensure that serious projects continue in the interconnection-study process, they can also be incentives to linger in the queue and avoid or delay penalties for withdrawing. Furthermore, projects with costly upgrades have the largest postings and therefore, also the greatest incentive to remain in the queue to avoid or delay losing non-refundable portions of their IFS.

The CAISO believes its current cluster and tariff process should study and retain those projects that intend to move forward as viable projects. While the commercial viability criteria is only used when a project wants to extend beyond the 7/10 years allowed, the CAISO requires projects to provide quarterly detailed reports of the project status so that if a project is not progressing, the CAISO can work with them early as possible to get the project back on track or withdrawn. Therefore since the CAISO is already doing this review we do not believe additional compliance demonstration is warranted.

The CAISO does not agree that it would be reasonable to offer a "one-time security-non-refundable amounts holiday". The CAISO believes that the measures that are currently in place for queue management, including the review for commercial viability, are sufficient to ensure that projects are moving forward. Since the implementation of queue management in 2012, analyzing the projects that existed at that time, through cluster 5, the active projects reduced from 394 to 57; withdrawn projects increased from 561 to 843; and the completed projects increased from 37 to 141. Moreover, the CAISO believes a one-time security forfeiture holiday would impact the PTOs and other interconnection customers without commensurate benefits. As such, the CAISO does not plan to include this issue in the 2018 IPE initiative.

7.5 Shared Stand Alone Network Upgrades and Stand Alone Network Upgrade Posting Criteria Issues

Shared Stand Alone Network Upgrades

On March 7, 2017 LSA submitted a GIDAP BPM revision request which proposed to clarify provisions applicable to SANUs triggered by multiple generation projects in a study cluster, including the ability of two or more of those projects to share construction and cost responsibility for those upgrades. The CAISO rejected this prior GIDAP BPM revision request as it conflicted with existing policy and LSA has resubmitted the issue for potential inclusion issue in the 2018 IPE initiative.

The CAISO does not believe it is appropriate to build specific criteria related to the PTO and the CAISO agreement on what SANU's could be built by the Interconnection Customer into the CAISO tariff or GIDAP BPM. Each PTO has unique issues and circumstances that can lead to different determinations on what SANUs an Interconnection Customer should be allowed to build. The CAISO believes the determination should be made on a case-by-case basis, and therefore, proposes that no changes be made to Appendix DD related to SANUs.

The GIDAP BPM currently requires that 100% of the cost responsibility for the Network Upgrade must be assigned to the Interconnection Customer as indicated in the study reports to qualify as a Stand Alone Network Upgrade.[17] While the CAISO is concerned with the complexity of allowing separate entities to build a SANU, the CAISO solicits stakeholder comments on whether the requirement that 100% of the cost responsibility must be assigned to one customer

[17] GIDAP BPM Section 8.4.6. Posting Related to Interconnection Customer's Opting to Build Stand Alone Network Upgrade(s)

should be removed from the GIDAP BPM.

Interconnection Financial Security Postings for Shared SANU

LSA has also submitted an issue related to the posting amount required for projects sharing a SANU. LSA recommends that the CAISO consider clarifying the tariff and GIDAP BPM to state that the total financial security for a shared SANU should not exceed 100%. In other words, the security requirements for each project sharing a SANU should be proportional to its cost responsibility. LSA does not believe that the tariff should requiring multiple projects to each post security as though they had 100% cost responsibility for a shared SANU.

The CAISO disagrees with LSA's request because while SANU's may be a networked facility, the upgrade would not be needed, but for the proposed generating facilities. In general, a SANU is designated as a reliability network upgrade, but also serves more of the function of an interconnection facility and is needed because no appropriately available point of interconnection exists for the project(s).

CAISO policy requires each project needing the SANU be assigned a cost responsibility of 100% through the second posting to avoid potential negative impacts to PTOs. The cost allocation for the SANU is adjusted at the third IFS posting based on the projects active at that point of the process and making a third posting. Without posting for 100% of the SANU cost by each project, a developer could potentially propose multiple projects in an area such that each project requires the SANU. If each project is assigned a smaller percentage of the overall cost allocation for the SANU, some of the projects could withdraw, leaving the PTO on the hook to backstop the SANU costs assigned to the withdrawn projects and the remaining project(s) only responsible for a smaller percentage of the overall cost. Due to this potential cost shifting issue, the CAISO proposes to make no changes to the current policy. As such, the CAISO does not plan to include this issue in the 2018 IPE initiative.

7.6 Clarification on Posting Requirements for PTOs

PG&E proposes that PTOs should not have to post financial security to themselves when they develop new generation projects interconnecting to their own areas. PG&E has noted that the PTOs have already successfully petitioned FERC for case-by-case waivers on this issue, and PG&E is currently seeking a permanent CAISO tariff revision to obviate the need for further waiver filings. The CAISO agrees with PG&E's recommendation and believes that such a revision is prudent and the PTOs should not be required to post security to themselves, so long as they supply appropriate non-refundable funds to the CAISO in accordance with the tariff if they withdraw their projects. The CAISO thus plans to include this issue in 2018 IPE.

7.7 Reliability Network Upgrade Reimbursement Cap

The repayment limit of $60,000 per MW for RNUs assigned to a project was determined to result in full cash repayment for RNUs for the majority of projects, and to provide an incentive for interconnection customers to avoid siting projects in locations where the costs of RNUs

needed to support the interconnections would be inappropriately high.[18] The CAISO has found that the $60k/MW maximum reimbursement amount for an RNU for funds advanced for network upgrades has the potential to be circumvented in instances that earlier-queued projects withdraw but the upgrades are still needed.[19] For example, assume a 100 MW project in cluster 8 with an executed GIA has a required RNU whose cost exceeds the $60k/MW limit. Also assume a cluster 10 project, also 100 MW in size, has the same RNU as a requirement for interconnection as a precursor project. If the cluster 8 project that triggered the RNU withdraws, terminating its GIA, the PTO must fund the construction costs for the cluster 10 project. In this example the PTO is responsible for funding the entire cost of the RNU, including the portion over $60k/MW, and will ultimately put the entire cost of the RNU into its TRR and ratepayers will ultimately have to pay for the entire cost of the RNU. The CAISO seeks stakeholder input on methods for resolving this issue in 2018 IPE.

7.8 Reimbursement for Network Upgrades

Six Cities proposes that the CAISO consider "whether the CAISO's current allocation methodology for the cost of network upgrades needed to interconnect new (or functionally modified) resources should be revised to allocate such costs to interconnection customers." This would essentially change the recovery mechanism for network upgrades from the transmission access charge to some combination of capacity contracts and bids to supply power. More practically, it would make a number of current interconnection procedures infeasible, including meaningful cost caps for interconnection customers and the $60,000/MW reimbursement cap on RNUs. It would also lead to the creation of numerous new Merchant Transmission Congestion Revenue Rights. While these are not insurmountable obstacles, they would represent a fundamental paradigm shift in the CAISO's generator interconnection process. At this time, CAISO management is not willing to consider such a shift, and as such does not propose to consider this issue in the 2018 IPE initiative.

8. Interconnection Request

There are six (7) topic areas associated with Interconnection Requests that are under consideration for the 2018 IPE initiative.

- Study Agreement - 8.1
- Revision to Queue Entry Requirements - 8.2
- Master Planned Projects (Open-ended and Serial Projects) - 8.3
- Project Name Publication - 8.4

[18] http://www.caiso.com/Documents/May252012GIDAPAmendmentER12-1855pdf.pdf (page 50)

[19] Section 14.3.2.1 of Appendix DD states "An Interconnection Customer subject to this Section 14.3.2.1 shall be entitled to repayment for its contribution to the cost of Network Upgrades as follows For RNUs, in accordance with the Interconnection Customer's cost responsibility assigned up to a maximum of $60,000 per MW of generating capacity as specified in the GIA."

- Interconnection Request Application Enhancements - 8.5
- FERC Order 827 - 8.6

8.1 Study Agreement

The CAISO is evaluating ways to improve efficiencies in the interconnection process. Currently, interconnection customers proposing the development of a generating facility must initiate an interconnection request, which includes a complete application and interconnection study deposit. Following the interconnection request validation and scoping meetings, study agreements are drafted and tendered for each interconnection request. This task of tendering such study agreements includes verifying the accuracy of project name, legal entity, authorized signatory, point of interconnection, and deliverability status, all of which is originally obtained from the interconnection request. This task is time consuming for the CAISO and the interconnection customer because two sets of documents (the interconnection request and the study agreement) are required by the CAISO to begin the study process.

CAISO staff is considering modifications to incorporate Appendix 3 of Appendix DD, the generation interconnection study process agreement (GIPSA), into the interconnection request so that it is submitted when the interconnection customer submits an interconnection request.[20] To achieve this efficiency, the interconnection request form would change slightly and incorporate the documentation required by the GIPSA. CAISO proposes to undertake these enhancements in the 2018 IPE initiative.

8.2 Revisions to Queue Entry Requirements

Westlands Solar Park suggests that the CAISO consider enhancements to queue entry requirement and believes a more stringent information requirements for projects to enter the queue will help ensure that only viable projects seek interconnection. Westlands Solar Park suggests that CAISO consider requiring additional information for projects entering the CAISO queue to demonstrate viability will also discourage the speculative “testing” that occurs by project developers who want to have the CAISO do the study work to determine available transmission capacity without doing their own upfront engineering work before applying. Westlands Solar Park also believes the current CAISO interconnection process requires the CAISO to spend time and money studying all projects versus having this viability screening done in advance.

Consistent with FERC Order 2003 and 2006, and the various CAISO filings on generator interconnection, the CAISO is required to do the study work and any study work be compensated by the interconnection customer requesting the study. CAISO does not pass through any costs for project studies to ratepayers or other CAISO customers. However, it is apparent that many projects may be using the CAISO interconnection study process to do preliminary studies to determine which of several projects are most viable. While this may be a

[20] http://www.caiso.com/Documents/AppendixDD_GeneratorInterconnectionAndDeliverabiltyAllocationProcess_asof_Mar8_2016.pdf

valid concern, in prior proceedings FERC has expressed concern with any barriers to entry to the generation interconnection process, particularly for small projects. The CAISO believes that it is unlikely that it would be feasible to revise the queue entry requirements in any meaningful way that would be an acceptable consensus solution. For this reason, at this time CAISO does not plan to consider this issue in the 2018 IPE initiative. However, CAISO is open to considering additional stakeholder feedback that provides concrete proposals for new interconnection requirements or project screens.

8.3 Master Planned Projects (Open-Ended and Serial Projects)

Westlands Solar Park encourages the CAISO to address the unique status of open-ended and serial projects, specifically master planned renewable energy projects such as the Westlands Solar Park. The interconnection process currently has no provisions for evaluating open-ended projects, such as a master planned development that can phase development according to market and customer demands. Westlands believes that the CAISO should recognize these types of master planned projects in the interconnection process because they could be more viable and may provide the CAISO with a better understanding of when and how much renewable generation will come online in specified areas at specific times. This enhanced knowledge could decrease the potential for stranded costs because it can allow utilities to plan long-term upgrades around these projects and the related transmission upgrades may provide multiple benefits.

CAISO clarifies that current GIDAP provisions allow for phased generating facilities, decreases in capacity, and project modifications. CAISO believes these provisions can accommodate most of issues raised by Westlands Solar Park. Although there is no current mechanism to accommodate open-ended projects as suggested, the CAISO does not believe modifications should be made to the study process to accommodate this request because of the significant complexity and planning obstacles that open-ended projects such as the master planned project described above would present. The CAISO is willing to include the issue for further consideration in the 2018 IPE initiative if there is significant stakeholder support.

8.4 Project Name Publication

The project name associated with CAISO queued projects is not published as part of the interconnection queue. Project names are confidential until the GIA is executed and filed with FERC. This can be problematic because the CAISO often interacts with other agencies as a project goes through the interconnection process lifecycle and the inability of the CAISO to coordinate with these agencies based on a project name has caused inefficiencies and confusion. Interaction with California and other regulatory agencies, siting authorities, energy commissions, and public utilities commissions are common as a project goes through the interconnection process. The inability of the CAISO to coordinate based on a project name and instead require these agencies to be familiar with the CAISO queue number for projects has caused delays in obtaining needed information for all parties. Moreover, some developers have

expressed a desire for project names to be made public so that developers can more easily appraise, purchase, sell, and combine projects. These issues could be addressed if project names were public both before and after GIA execution and filing.

CAISO is also working with developers to ensure project names meet the naming guideline criteria currently in place to ensure that dispatchers and operations personnel can identify and easily communicate with each other regarding generators, consistent with NERC reliability standard COM-002. A list of prohibited project names, referred to as the Prohibited Project Name List (PPNL), is available on the CAISO public website and the project naming guidelines are available in section 5.2 of the GIDAP BPM. Providing project names publicly in the interconnection queue would provide additional insight to those seeking to enter the interconnection queue with a project name that meets our guidelines and what names are already taken.

The CAISO proposes to modify the current confidentiality requirements for project names so that in the future they will be publicly available through the interconnection queue report accessible on the CAISO's public website. CAISO believes this enhancement will help to support coordination with state agencies and to provide additional transparency on project names for developers. The CAISO welcomes additional stakeholder feedback on this proposal in the 2018 IPE initiative.

8.5 Interconnection Request Application Enhancements

Project Naming

PG&E's feedback has noted there has been some confusion with project naming selection during the application process and suggests new requirements to help mitigate confusion and renaming. As identified in Section 5.2 of the GIDAP BPM, the CAISO has established parameters for Interconnection Customers to determine if their proposed name is acceptable. As noted above, the PPNL is published on the CAISO's public website on the interconnection request page. The PPNL provides users with the ability to search for previously used names considered prohibited from further use. In the spring of 2017, prior to the opening of the cluster 10 application window, Section 5.2 was added to the GIDAP BPM and the PPNL was posted. CAISO and stakeholders had an opportunity to utilize these resources during the cluster 10 application and validation process, but there were many valuable lessons learned and CAISO believes more time may be necessary to evaluate the impact and improvement to these project-naming provisions. The CAISO does not believe this issue requires any CAISO tariff changes at this time. If updates or changes are deemed necessary in the future, CAISO believes they can be resolved through the GIDAP BPM Change Management process.

Standardized technical data

PG&E has suggested that CAISO consider updates to the interconnection request application to improve efficiency. First Solar has also suggested that CAISO consider enhancements to require improved standardization of technical data and information required during the

application process. The CAISO is currently working on improvements to the interconnection request application, including the data collected on the Attachment 1 to Appendix A, Generator Data form, to improve accuracy and consistency between all involved stakeholders. The CAISO's objective is to develop and implement the new interconnection request document, including the Generator Data form, in early 2018 for use during the Cluster 11 application process. The CAISO believes this enhancement does not require tariff changes and can be resolved outside of the 2018 IPE initiative. As noted, updates to the interconnection request document are currently underway outside of the 2018 IPE process and the improvements will be implemented prior to the Cluster 11 interconnection request window in 2018.

Changes to technical data

PG&E has suggested that CAISO consider defining the cut-off date for allowable changes to a project's technical data or system design specifications prior to the start of the Phase I Study process. The current process provides that the interconnection customer must confirm or specify the point of interconnection within three business days following the scoping meeting. PG&E has concerns that there may be legitimate circumstances that require an interconnection customer to request further changes after that time. The CAISO expects that all project data and project details be 'locked-in' following the Scoping Meeting, however, changes beyond that may be allowable, on a limited case-by-case basis, based on the particular circumstance and the ability to accommodate the change before the Phase I study base case development begins. CAISO believes that the current case-by-case consideration provisions are appropriate and no further tariff clarification is necessary at this time. As such, the CAISO does not plan to include this issue in the 2018 IPE initiative.

FERC Order No. 827

FERC Order No. 827 requires that non-synchronous generators design their generating facilities to maintain a composite power delivery at continuous rated power output at the high-side of the generator substation. Non-synchronous generators must provide dynamic reactive power within the power factor range of 0.95 leading to 0.95 lagging, unless the transmission provider has established a different power factor range. Non-synchronous generators may meet the dynamic reactive power requirement by utilizing a combination of the inherent dynamic reactive power capability of the inverter, dynamic reactive power devices (e.g., Static VAR Compensators), and static reactive power devices (e.g., capacitors) to make up for losses.

FERC accepted the CAISO's Order 827 compliance filing that applies these reactive power requirements to newly interconnecting asynchronous generators and repowering generators. The CAISO, in coordination with the PTOs, implemented the requirements in the generation interconnection studies. All generation projects in queue cluster 9 and beyond, and repowering requests made after FERC acceptance of the CAISO compliance filing, were evaluated whether the project could meet the reactive power requirement with the submitted technical data.

PG&E has suggested that CASIO consider further clarification of the FERC Order 827 requirements established in the interconnection request process.

Power Applications and Research Systems (PARS) inquired as to whether compliance with Order 827 requirements is needed at the time of the submission of the interconnection

application, or after issuing the Phase I or Phase II reports in the cluster process. PARS has suggested that CAISO consider developing a standardized methodology and test on reactive power sufficiency determination to ensure the CAISO and all PTOs are following the same methodology.

The CAISO's position is that evaluation of the reactive power capability is necessary during the validation of interconnection request submission. Interconnection studies are performed with models that reflect the actual capabilities of the facilities. The CAISO will work in coordination with PTOs to improve how the reactive power capability of projects is evaluated. A consistent approach will be developed outside this initiative prior to the next queue cluster window, with the requirements anticipated to be documented through the BPM change management process. For this reason, the CAISO does not plan to include this issue in the 2018 IPE initiative.

9. Modification

There are seven (7) topic areas associated with modifications.

- Timing of Technology Changes - 9.1
- Commercial viability – PPA path clarification - 9.2
- Increase repowering deposit - 9.3
- Clarify measure for modifications after COD - 9.4
- Short circuit duty contribution criteria for repower projects - 9.5
- Material Modification for Parked Projects - 9.6
- Data Requirements for New and Existing Resources 9.7

9.1 Timing of Technology Changes

Current provisions do not provide detailed limitations on the timing or types of technology and fuel type changes that an interconnection customer may request. Interconnection customers may request changes to the technology and fuel type of projects between the Phase I and Phase II process, and after the Phase II results.

The CAISO does not review project's time-in-queue or commercial viability status for technology/fuel type changes. The CAISO frequently receives requests for technology and fuel changes. Historically, the CAISO has denied many technology and fuel type change requests because they result in changes in electrical characteristics that would cause reliability issues that would have to be mitigated by a network upgrade. Of the requests received, the CAISO estimates at least 25% of active projects in the queue beyond the 7/10 year threshold have changed their fuel type or technology. [21] These changes most frequently occur after the Phase II results activities and after the project has been in the queue five or more years. Due to increased overall system reliability associated with transmission upgrades and topology

[21] CAISO Queue comparison (8/26/2011 vs. 12/5/2017)

changes, if the CAISO retains its current evaluation framework, as described above, the CAISO anticipates approving more technology and fuel change requests.

The CAISO received no formal stakeholder comments on this topic during the initial outreach for this initiative. However, in other venues, interconnection customers have reported that observing the highest-queued projects receive approval for changes in technology after being in the queue for over 10 years feels unfair. Stakeholders assert that receiving the change so late in the process grants the project unfair advantage in the interconnection process, and that the act of seeking the change is a tacit admission that the pre-modification project is not commercially viable. CAISO could consider evaluating a moratorium on technology changes for interconnection customers that have (or are requesting) a commercial operation date beyond the 7/ 10 year threshold anticipated by the CAISO tariff. The CAISO seeks feedback regarding establishment of a cut-off for project technology and fuel type changes.

9.2 Commercial Viability – Power Purchase Agreement Path Clarification

When interconnection customers request an extension to a project's COD the CAISO evaluates the request under the material modification assessment (MMA) process. The CAISO requires interconnection customers to prove their project meets commercial viability criteria to extend their milestones beyond the 7/10 year threshold, as it applies to projects studies under the cluster study process and serial study process, respectively.[22] The commercial viability criteria are:

- Having, at a minimum, applied for the necessary governmental permits or authorizations and that the permitting authority has deemed such documentation "as data adequate" for the authority to initiate its review process;
- Having an executed power purchase agreement, attesting that the Generating Facilities will be balance-sheet financed, or otherwise receiving a binding commitment of project financing;
- Demonstrating Site Exclusivity for 100% of the property (in lieu of a Site Exclusivity Deposit);
- Having executed a GIA; and
- Being in good standing with its GIA such that neither the PTO nor the CAISO has provided the Interconnection Customer with a Notice of Breach of the GIA (where the breach has not been cured or the Interconnection Customer has not commenced sufficient curative actions).

If a project satisfies all the commercial viability criteria except the financial component, the

[22] The In-Service Date ("ISD") for Generating Facilities studied in the serial study process shall not exceed ten (10) years from the date the Interconnection Request is received by the CAISO. For Generating Facilities studied in the cluster study process, the COD shall not exceed seven (7) years from the date the Interconnection Request is received by the CAISO.

CAISO will postpone converting the generating facility to energy-only deliverability status to the later of one year from the day the interconnection customer submits the modification request, or one year after the interconnection customer exceeds 7/10 year threshold. This grace period provides an opportunity to the interconnection customer for additional time to secure a PPA. The CAISO proposes to clarify that an interconnection customer's decision to either a) balance-sheet finance, or b) pursue additional PPA opportunities during the grace period, will be a binary election that must be made during the initial MMA assessment to extend the COD past the 7/10 years. In other words, interconnection customers may not submit balance-sheet attestation affidavits at the close of the grace period as evidence that their project is commercially viable. The reason for this restriction is to ensure that the financial attestation is truly meaningful. At the time of the request, the customer must attest that either 1) the project is commercially viability because it already has a PPA, or 2) the customer is so confident in the project's viability that the customer is willing to preclude the project from exercising its rights to receive partial recovery of its financial security for failure to secure a PPA. The CAISO notes that if stakeholders agree and CAISO ultimately concludes that interconnection customers should not be able to obtain or retain deliverability without a PPA (see section 4.2), this proposal would become unnecessary.

9.3 Power Purchase Agreement Transparency

Current provisions require interconnection customers demonstrating commercial viability criteria with a PPA to provide a copy of the PPA so the CAISO can verify that the project and the PPA match.[23] This requirement is intend to ensure accurate project-to-PPA data relationships and maintaining a robust and transparent commercial viability process. In order for customers with PPAs to modify the project's COD, the PPA must have the following in common with the proposed Generating Facility in the GIA:

- the point of interconnection;
- MW capacity (allowing differences in utility defined project size before transformation and line losses);
- fuel type and technology; and
- site location

The CAISO intends to clarify this requirement more explicitly in the tariff in the 2018 IPE initiative.[24]

[23] GM BPM section 6.5.2.2

[24] The PPA-to-GIA relationship may be many-to-one. However, a PPA cannot be used to support deliverability for more than the capacity specified in the PPA. Interconnection customers are free to redact sensitive financial data. Interconnection customers are not required to provide PPAs to the PTO, and the CAISO does not share the PPA with the PTO. The CAISO only positively affirms with the PTO that the customer has indeed met commercial viability criteria.

9.4 Increase Repowering Deposit

CAISO has consistently observed that the current $10,000 study deposit for repowering and restudy of serial projects has become significantly insufficient for covering the cost of the study process. While the amount varies depending upon the changes an existing generating unit proposes in the repowering or restudy, the CAISO has observed that these costs may vary between $7,000 and $54,000. If the initial deposit is insufficient to cover the full study costs then the study report could be delayed pending posting of additional funds. If a repowering or serial project is ultimately revenue insufficient it requires additional work for accounting to recover the necessary funds and results in the project being deemed not in good standing. If a project is not in good standing due to insufficient funds, the CAISO will stop all work on the project until the project has posted additional funds to cover the deficiency. The CAISO proposes to increase the study deposit for repowering and restudy of serial projects to $50,000. Because this issue is relatively straightforward, the CAISO proposes to include it in the 2018 IPE initiative and believes that it may be resolved on an expedited basis.

9.5 Clarify Measure for Modifications after Commercial Operation Date

Interconnection customers frequently struggle to understand the test to determine whether a modification will be approved. Specifically, this confusion may depend on whether the project is in the interconnection process or has already achieved commercial operation. During the interconnection process modifications are generally approved unless they are material, as explained in Section 9.1 above. Existing online generating units may request modifications to their generating facility if the total MW capability of the generating facility and its electrical characteristics do not change.[25] Both requirements are intended to prevent changes that will affect reliability and other projects studied or connected to the grid. The CAISO believes that these tests should be clarified in the tariff and GIAs therefore CAISO proposes to include this issue in the 2018 IPE initiative.

9.6 Short Circuit Duty Contribution Criteria for Repower Projects

As explained above in Section 9.5, changes to existing generators are allowed where they do not increase capacity or substantially change the electrical characteristics of the generator.[26]

[25] Article 5.19.1 of the Large Generator Interconnection Agreement which the generating units is bound to for an Interconnection Customer can make modifications to their project. The language in the LGIA uses an impact measurement of Material Modification under the GIDAP and not the language allowed for existing Generating Units in Section 25.1 of the CAISO tariff.

[26] Section 25.1.2 of the CAISO tariff provides that owners of existing Generating Units can be exempted from the CAISO's interconnection study process if the "total capability and electrical characteristics of the

Under section 12 of the GM BPM, the CAISO considers changes to be substantial if the change would have an adverse reliability impact on the transmission system. Three types of transmission system reliability impacts are evaluated for this purpose: (1) adverse flow impact, (2) short circuit duty impact, and (3) angular or voltage stability impact. The short circuit duty test requires the changes provide the same or reduced short duty circuit of the repowered generating unit as compared with the original generating unit. This framework is also used to evaluate post-COD modification requests. A small increase of short circuit duty would fail the test, even if the system still has a high breaker capacity margin.

For modification requests for projects active in the interconnection queue, the CAISO will consider changes to project equipment and transformers to be non-material if the new equipment is substantially similar and does not cause significant electrical changes, including changes to short circuit duty or reactive support. Evaluating changes to short circuit duty follows the general principle of no adverse impact to later queued generation project and the PTO. If the requested change causes only a small increase of short circuit duty, the modification could be considered non-material if the increase causes no breaker capacity concerns.

Due to the current differences in these determinations for existing and planned projects, the CAISO proposes to consider applying more consistent criteria in short circuit duty tests for repower and modification requests. Thresholds such as 100 amps at the nearest network breaker and 20 percent breaker capacity margin could be used in the determination. The CAISO proposes to address these potential enhancements in the 2018 IPE initiative.

9.7 Material Modifications for Parked Projects

The CAISO has recently received modification requests for parked projects. The CAISO believes the intent of parking is to remove a project from further obligations, as well as restricting project modification requests, while the project seeks TPD in the next allocation cycle. The CAISO proposes to consider restricting all work while a project is parked including modification requests. Similar to not working on the GIA while a project is parked, CAISO believes it appropriate to postpone processing any modification requests by parked projects, therefore CAISO will include this issue in the 2018 IPE initiative.

10. Next Steps

The CAISO has tried to capture and describe the issues raised by stakeholders and CAISO staff. The CAISO will hold a stakeholder meeting at the CAISO on January 24, 2018 to review the issue paper. Stakeholder comments will be due on February 7, 2018. The CAISO encourages all stakeholders to submit comments on the issue paper, including any additional topics that they believe should be included in the 2018 IPE initiative. Once the CAISO has had a chance to review all of the material a detailed schedule for this initiative will be published.

Generating Unit will remain substantially unchanged."