January 2, 2020

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket No. ER20-___-000

Tariff Amendment to Implement Deliverability Assessment Methodology Enhancements

Dear Secretary Bose:

The California Independent System Operator Corporation ("CAISO") submits this tariff amendment[1] to implement three deliverability enhancements for interconnection customers. "Deliverability" refers to a generator's[2] ability to deliver its energy to load during different system conditions, including expected congestion caused by other generators' output. First, the CAISO proposes a new option for interconnection customers to request Off-Peak Deliverability Status ("OPDS"), which indicates that the generator can provide its energy to load during off-peak conditions without excessive curtailment due to transmission constraints. Second, the CAISO proposes a new curtailment priority based on the type of deliverability option a generator selects.[3] The CAISO proposes that only generators electing Off-Peak Deliverability Status and financing those upgrades will be permitted to self-schedule, thus giving them curtailment priority. This will ensure that if the CAISO must curtail generation, generators facing the same transmission constraints that elected to finance network upgrades have

[1] The CAISO submits this filing pursuant to section 205 of the Federal Power Act ("FPA"), 16 U.S.C. § 824d. Capitalized terms not otherwise defined herein have the meanings set forth in the CAISO tariff, and references to specific sections, articles, and appendices are references to sections, articles, and appendices in the current CAISO tariff and as revised or proposed in this filing, unless otherwise indicated.

[2] The CAISO uses the term "generator" throughout this filing for simplicity and concision; however, these references generally would include energy storage resources unless otherwise noted.

[3] As explained in detail below, existing generators will be grandfathered into Off-Peak Deliverability Status.

priority over generators that elected not to finance network upgrades. Third, because the CAISO faces potential capacity shortfalls,[4] and because revisions to the CAISO's on-peak deliverability assessment will make a substantial amount of deliverability capacity available to interconnection customers,[5] the CAISO proposes to implement a one-time process to allocate available on-peak deliverability capacity to interconnection customers based on their commercial viability and how soon they will come online.

Collectively, these tariff revisions represent a critical component of the CAISO's efforts to address the curtailment, resource adequacy, and capacity issues now facing the CAISO. The CAISO respectfully requests that the Commission accept the tariff revisions proposed in this filing as just and reasonable effective March 3, 2020, *i.e.*, 61 days after the date of this filing.

I. Executive Summary

In addition to interconnection service, CAISO interconnection customers can also request "deliverability." Deliverability refers to a generator's ability to deliver its energy to load centers during different system conditions, including expected congestion caused by other generators' production.[6] The CAISO's deliverability assessments identify the network upgrades required to enable generators requesting deliverability to deliver their energy to load. As explained below, currently interconnection customers can elect one of three deliverability statuses, all of which address the generator's ability to deliver load during peak demand conditions:

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[4] *See, e.g.*, "Reply Comments of the CAISO," filed in *Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements*, CPUC Docket No. R16-02-007 (Aug. 12, 2019), *available at* http://www.caiso.com/Documents/Aug12-2019-ReplyComments-PotentialReliabilityIssues-IRP-R16-02-007.pdf; "Comments of the CAISO," filed in *Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements*, CPUC Docket No. R16-02-007 (Oct. 2, 2019), *available at* http://www.caiso.com/Documents/Oct2-2019-Comments-ReliabilityProcurementProposedDecision-IRP-R16-02-007.pdf; S&P Global, "Calif.ISO warns capacity shortfall could hit 4,700 MW in 2022" (Aug. 14, 2019), https://www.spglobal.com/marketintelligence/en/news-insights/trending/vyVenbSJmRbV5lPQK96S1A2; Green Tech Media, "Looming Grid Shortfall Prompts 2.5 GW California Procurement Proposal" (Sept. 13, 2019), *available at* https://www.greentechmedia.com/articles/read/looming-grid-reliability-shortfall-prompts-2-5gw-california-procurement-pro.

[5] For example, if a 100 MW solar generator had transmission designed to deliver 80 MW to load, but now the generator only counts for 20 MW, the same transmission can now support other resources' providing the additional 60 MW. By changing the qualifying capacity values, the CAISO now has 60 MW of TP Deliverability to allocate.

[6] *See* "Deliverability," Appendix A to the CAISO tariff.

(1) Full Capacity Deliverability Status ("FCDS") represents that the grid can deliver the generator's full, expected output to the grid under peak load conditions.[7] FCDS generators are eligible to provide resource adequacy capacity.

(2) Partial Deliverability Capacity Status ("PCDS") represents that a portion of the generator's output can be delivered to the grid under peak load conditions, and the generator is eligible to provide resource adequacy capacity up to that portion.

(3) Energy Only Deliverability Status ("Energy Only") represents that the generator's output can be delivered only subject to grid conditions. Energy Only generators are ineligible to provide resource adequacy capacity.

Deliverability status is critical for interconnection customers to market their planned generators because it affects their eligibility to qualify as resource adequacy resources under the California Public Utilities Commission ("CPUC") requirements. Since the CAISO last updated its deliverability assessment methodologies in 2008,[8] renewable generation, rooftop solar resources, and changing load patterns led the CPUC to reevaluate the qualifying capacity counting methodologies of different generator technologies for resource adequacy purposes.[9] In 2018 the CPUC replaced its exceedance-based capacity calculation for wind and solar generators with an Effective Load Carrying Capability ("ELCC") calculation. The exceedance calculation measured the minimum generation produced by the generator in a certain percentage of selected hours. The selected hours for the wind and solar calculations were 1 p.m. to 6 p.m. from April to October, and 4 p.m. to 9 p.m. for the remaining months. These times represented the general peak load conditions that existed when the CAISO established the existing deliverability assessment calculation in 2008. The ELCC calculation, in contrast, evaluates a generator's ability to deliver energy to load compared to a "perfect capacity" resource that could deliver its maximum output 24/7. Because system-connected and retail-customer-connected solar generators are now pervasive, and because solar generators produce little or no energy during certain periods,[10] the ELCC calculation significantly reduces their resource adequacy capacity values.

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[7] Full, expected output does not mean maximum or nameplate capacity. It means what that generator generally could provide at peak, *i.e.*, its "qualifying capacity," as explained below.

[8] *California Independent System Operator Corp.*, 124 FERC ¶ 61,292 (2008).

[9] CPUC, "Decision Adopting Local and Flexible Capacity Obligations for 2018 and Refining the Resource Adequacy Program," D.17-06-027 (June 29, 2017).

[10] *E.g.*, early evening hours when the sun is down but customer load is relatively high.

For the CAISO's interconnection process, accounting for the reduced solar output during peak demand that drove the CPUC's adoption of the ELCC methodology means that solar and wind resources should require fewer upgrades for on-peak deliverability status because of their significantly reduced resource adequacy capacity values. For example, a solar photovoltaic generator with a nameplate capacity of 100 MW previously would have counted toward a load-serving entity's August resource adequacy requirement for 80 MW. Under the new ELCC methodology, the same generator now will only count for 27 MW because peak demand conditions occur later in the evening when the solar generator fleet produces little, and therefore reasonably counts less towards load-serving entities' resource adequacy requirements (although it can contribute to reliability in other hours). Previously, to be considered deliverable on-peak, the generator would have had to finance delivery network upgrades allowing it to deliver 80 MW; now it must only finance upgrades for 27 MW.

Although the qualifying capacity values and peak periods are inputs and modeling assumptions the CAISO uses for the on-peak deliverability assessment, and not rates, terms, and conditions of service of the CAISO tariff, the CAISO conducted a stakeholder initiative to revise those inputs. During this initiative stakeholders conveyed that they also used the on-peak deliverability assessment as a proxy to determine whether their generators would be subject to curtailment. However, because the CAISO is moving its on-peak deliverability assessment to later in the day when solar generation is producing much less electricity, the on-peak deliverability assessment will no longer be a good proxy for a generator's risk of curtailment during its peak production, especially because on-peak network upgrades will likely be smaller and fewer going forward, with less deliverability required for the same capacity. Absent further consideration of off-peak deliverability in the CAISO process, this could result in increased curtailment under constrained conditions in the CAISO energy markets. Although the CAISO already performs an off-peak deliverability assessment for location-constrained resources that principally produce energy off-peak, the off-peak assessment is for informational purposes only.[11] Generation developers were reasonably concerned that they could be subject to increased curtailment due to local constraints during off-peak conditions (when demand is low but solar and wind generation is high) even if they invested in network upgrades based on the on-peak deliverability assessment.

To address this issue, the CAISO proposes to allow interconnection customers to elect to finance any off-peak network upgrades necessary for their generators to be able to deliver their energy to load during expected off-peak conditions without excessive curtailment due to transmission constraints.

[11] Section 6.3.2.2 of Appendix DD to the CAISO tariff. Appendix DD contains the CAISO's Generator Interconnection and Deliverability Allocation Procedures (GIDAP).

Through this new process, the CAISO will perform an off-peak deliverability assessment to identify transmission bottlenecks that would cause excessive curtailment for generators requesting this status, but the study assumptions will focus on system conditions when system-wide oversupply is unlikely. Interconnection customers that elect to finance the network upgrades identified in the off-peak deliverability assessment (or that do not face such constraints) will receive Off-Peak Deliverability Status.

In addition, the CAISO proposes, on a going-forward basis only, to implement an additional curtailment priority in the CAISO markets for generators that receive Off-Peak Deliverability Status.[12] The curtailment priority will be effectuated by the CAISO only allowing generators with Off-Peak Deliverability Status to self-schedule in the CAISO markets. Generators that require delivery network upgrades to relieve transmission constraints, but that elect not to finance them, will be deemed "Economic Only," and may not self-schedule in the CAISO markets.[13]

These new self-scheduling rules will give generators that finance delivery network upgrades to relieve local constraints higher scheduling priority during curtailment events than generators that elect to forego financing such upgrades. Under existing rules, developers that finance delivery network upgrades can be prevented from delivering their energy to load when other generators "free-ride" on those delivery network upgrades and site their projects nearby, but forego financing additional delivery network upgrades to make their capacity deliverable. If the generators behind the local transmission constraint self-schedule, the CAISO curtails them equally. The generator that financed delivery network upgrades expecting to deliver its energy to load cannot deliver it, and is on equal

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[12] This would be in addition to the dozen curtailment priorities that already exist in the CAISO tariff for different classes of non-priced curtailment parameters (*e.g.*, regulatory must-take, regulatory must-run, *etc.*). *See* Section 31.4 of the CAISO tariff. For the full table of market parameter values, see Section 6.6.5 of the Business Practice Manual for Market Operations, *available at* https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Market%20Operations. Ineffective Economic Bids are also adjusted after Self-Schedules. *See California Independent System Operator Corp.*, 126 FERC ¶ 61,147 (2009). Ineffective economic bids are those bids that "while available, are deemed to be an unacceptable means of relieving a constraint because the per-MW cost of using such bids exceeds the parameter for adjusting a non-priced quantity." *Id*. at P 12. The CAISO is not proposing any changes to its market price parameters, so Existing Transmission Contracts, Regulatory Must-Take Generation, and other scheduled energy with higher market parameter values will still be curtailed after self-scheduled generation (assuming equal bids).

[13] Unless they self-schedule in the real-time market up to their existing day-ahead award. As explained in detail below, the CAISO expects that the vast majority of generators will have off-peak deliverability status.

footing with the other generators that sited nearby.[14] Under today's rules, the CAISO's transmission planning process eventually identifies economic transmission facilities that will relieve congestion where the curtailment costs exceed the upgrade costs. However, this process occurs *after* the generators are online and takes significant time. Identifying these constraints in the interconnection process, allowing generators to finance them, and limiting other generators from free-riding off them will align any curtailment with customers' elections in the interconnection process.

Finally, the CAISO proposes to institute a one-time deliverability allocation process for its upcoming cycle to allocate the on-peak deliverability capacity made available to the interconnection customers that are both commercially viable and most likely to come online soon. The CAISO's updates to its on-peak deliverability assessment methodology assumptions to reflect a later peak will free up a substantial amount of deliverability for interconnection customers. This timing is essential because the CAISO faces a potential capacity shortfall, and therefore needs more generation able to deliver energy at a later peak. Although the CAISO's current deliverability allocation process allocates available deliverability capacity to interconnection customers based on their commercial viability, it does not account for *when* any generator will achieve commercial operation: if two interconnection customers have secured power purchase agreements, the CAISO treats them as equally competitive to receive available deliverability capacity, even if one will come online in 2021 and the other in 2024. The current deliverability allocation process also ranks new interconnection customers ahead of interconnection customers that already failed to secure deliverability in previous cycles, regardless of when they will come online.

To allocate the on-peak deliverability capacity made available to the interconnection customers that are both commercially viable and most likely to come online soon, the CAISO proposes to institute a one-time deliverability allocation process for its upcoming cycle. Following this one-time, transitional cycle, the CAISO will revert to its current allocation process. The CAISO's one-time deliverability allocation process will allocate deliverability capacity to the most commercially viable interconnection customers—as it does today—but will consider when the generators will come online as an additional tiebreaker if there is insufficient deliverability capacity for otherwise equal generators. Further, the CAISO will allow interconnection customers that already had an opportunity to seek deliverability and are still in queue to re-apply. This will ensure the greatest

[14] Currently, developers that finance delivery network upgrades may still face curtailment due to local transmission constraints when new generators site nearby but forego constructing additional delivery network upgrades. If both generators behind the local transmission constraint self-schedule, and the CAISO must curtail them, the CAISO curtails them equally. This assumes effective economic bids have been curtailed first. Even if the first developer financed delivery network upgrades with some expectation of avoiding local transmission constraints, it is on equal footing with the other generators in the same local area to delivery energy in the CAISO markets.

number of interconnection customers possible can obtain deliverability, market their projects to prospective off-takers, and come online to provide the CAISO with urgently-needed generating capacity.

II. Background

A. Resource Adequacy Qualifying Capacity

Each generator technology is unique in how much energy it can reliably provide for resource adequacy purposes. The CPUC assigns each generator technology a monthly "qualifying capacity" representing how much resource adequacy capacity it can provide based only on the generation technology and expected load conditions, but without considering potential transmission constraints.[15] For example, a gas- or nuclear-fueled generator has a qualifying capacity equal to its total capacity all months of the year. But with a late afternoon or early evening load peak, a solar resource's potential monthly output depends heavily on the time of the year. The following table lists a 100 MW solar photovoltaic ("PV") generator's qualifying capacity for each month in 2017, based on the exceedance factor methodology:

100 MW Solar PV	
2017 Month	**Qualifying Capacity (MW)**
January	0.26
February	1.47
March	6.82
April	79.82
May	75.56
June	79.35
July	75.34
August	80.34
September	75.01
October	57.51
November	0.16
December	0.11

For example, if a load-serving entity had a resource adequacy requirement of 80 MW in August, when demand is highest, and 20 MW in December, the solar PV resource alone would meet its August requirement, but would contribute almost nothing toward its December requirement (for which the load-serving entity would need other resources).

[15] Although the CAISO has other local regulatory authorities in its balancing authority area, the overwhelming majority of interconnection customers requesting on-peak deliverability do so to provide resource adequacy pursuant to a CPUC-determined qualifying capacity.

Likewise, wind patterns and weather affect the output of wind turbines. The following table lists the qualifying capacity for each month in 2017 for a wind generator with a 100 MW nameplate capacity:

100 MW Wind	
2017 Month	**Qualifying Capacity (MW)**
January	2.42
February	10.9
March	16.42
April	19.88
May	32.88
June	26.58
July	18.90
August	17.65
September	11.33
October	6.52
November	4.01
December	4.63

The CPUC's qualifying capacity values account for generator technologies and expected conditions, but they are not specific to any particular generator at a particular point of interconnection to the grid. Because generators may face transmission constraints, the CAISO calculates each generator's "net qualifying capacity." Net qualifying capacity takes the generator's qualifying capacity and then adjusts it to account for the expected load and energy flows on the transmission lines the generator needs to deliver its energy to load.[16]

B. Exceedance and ELCC Methodologies

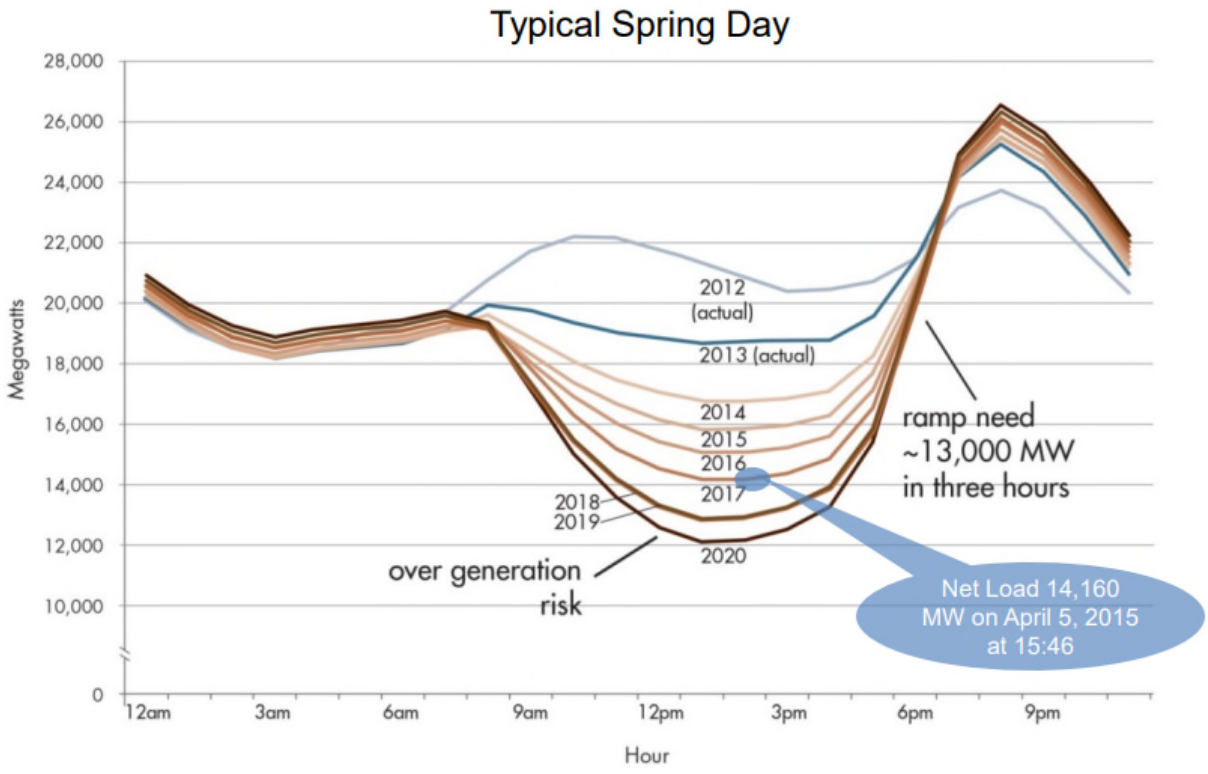
Until 2018 the CPUC assigned qualifying capacity to wind and solar resources based on an exceedance calculation adopted in 2009. The exceedance calculation measured the minimum generation produced by the generator in a certain percentage of selected hours.[17] The selected hours were 1 p.m. to 6 p.m. from April to October, and 4 p.m. to 9 p.m. for the remaining months. These times represented general peak load conditions. The CPUC used a 70 percent exceedance level to calculate the qualifying capacity of wind and solar resources. Exceedance level is a value used to profile a group. For example, the concept of "median" is merely an exceedance level set to 50

[16] The CAISO explains its process for determining these values below in Section II.C of this transmittal letter.

[17] For a detailed description of how qualifying capacities were computed under the exceedance calculation, *see* CPUC, "Qualifying Capacity Methodology Manual Adopted 2015," *available at* https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=9187.

percent. By using an exceedance level of 70 percent, the CPUC assigned solar and wind generators qualifying capacity as the MWh the resource produces at least 70 percent of the time during the expected period. For example, if a 20 MW generator has an October qualifying capacity of 10 MW, it means it should produce 10 MW or more 70 percent of the time during the selected hours.

The hours selected to calculate qualifying capacity for wind and solar played a significant role. By examining the hours of 1 p.m. to 6 p.m. from April to October, the exceedance calculation included times where solar produced at or near its full output. Although the hours of 1 p.m. to 6 p.m. roughly captured the historical gross demand peak, the proliferation of behind-the-meter rooftop solar and system-connected solar in California has shifted the net demand peak to hours where solar produces less energy. In the Spring and Fall months, when demand is low but rooftop solar production is high, grid-connected solar primarily produces during the lowest point on the daily demand curve, also known as "the belly of the duck."[18]



In 2018 the CPUC transitioned to the ELCC methodology to calculate qualifying capacity values. The ELCC is a statistical modeling approach to determine the effective capacity value of different resources by comparing the resource's effectiveness relative to "perfect capacity" that would be available all

[18] *See* Wikipedia, "Duck Curve," *available at* https://en.wikipedia.org/wiki/Duck_curve.

the time. Essentially, the ELCC tries to establish how much energy a generator contributes to avoid "loss of load." Loss of load occurs whenever demand exceeds generation and reserves, either due to insufficient installed capacity or the inability to dispatch generation (*e.g.*, if the sun is down for solar generators). Calculating qualifying capacity using the ELCC methodology follows a five-step process:

1. Create the capacity portfolio that brings the CAISO area to a target loss of load expectation of 0.1, accounting for the expected load and generation. In other words, determine how much generating capacity is required for a month.

2. Remove all wind and solar generators in the CAISO.

3. Add the amount of perfect capacity needed to bring the CAISO back to the target loss of load expectation of 0.1.

4. Add solar or wind generation back into CAISO until it replaces the perfect capacity.

5. The ELCC value is calculated as (perfect capacity divided by solar or wind capacity placed back in) for each technology.[19]

For example, suppose the CAISO needs 1,000 MW of total generating capacity in a month to avoid loss of load, and has 500 MW of wind generation, 500 MW of solar generation, and 500 MW of other generation. The ELCC calculation for solar or wind would be:

1. Start with 1,000 MW of needed capacity to avoid loss of load;

2. Remove the 500 MW of wind and the 500 MW of solar, leaving the CAISO with 500 MW of other generation;

3. The CAISO now needs 500 MW of perfect capacity to get back to the 1,000 MW required to avoid loss of load;

4. If it is assumed that the CAISO needs 1,000 MW of solar generation to replace the 500 MW of perfect capacity, then;

5. Solar generators' qualifying capacity value for this month would be 50 percent.

[19] For a detailed explanation, *see* CPUC, "Qualifying Capacity Methodology Manual Adopted 2017," *available at* https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442455533.

Determining the capacity needed in step one of the ELCC calculation is as important to determining qualifying capacity values as the calculation itself (just as picking the selected hours played a significant role in the exceedance-based calculation). The California Energy Commission provides the CPUC with each month's load forecast, then the CPUC conducts an hourly reliability simulation for each month of the year based on that forecast to determine the generation required, accounting for expected outages, weather, reserve margins, and other factors affecting the generation capacity required to meet demand.[20] These complexities aside, beginning the qualifying capacity calculation by asking how much generation is required emphasizes the need to meet net peak demand, which generally occurs close to sundown when rooftop solar resources produce little energy, people return home and turn on devices, and temperatures (and therefore air conditioner load) peak.

As shown in the following tables, the transition to the ELCC calculation results in different qualifying capacity values for renewable resources, especially solar resources:

100 MW Solar PV		
Month	**2017 Exceedance Based Qualifying Capacity (MW)**	**2020 ELCC Qualifying Capacity (MW)**
January	0.26	4
February	1.47	3
March	6.82	18
April	79.82	15
May	75.56	16
June	79.35	31
July	75.34	39
August	80.34	27
September	75.01	14
October	57.51	2
November	0.16	2
December	0.11	0

[20] *Id*.

100 MW Wind		
Month	2017 Exceedance Based Qualifying Capacity (MW)	2020 ELCC Qualifying Capacity (MW)
January	2.42	14
February	10.9	12
March	16.42	28
April	19.88	25
May	32.88	25
June	26.58	33
July	18.90	23
August	17.65	21
September	11.33	15
October	6.52	8
November	4.01	12
December	4.63	13

C. Deliverability Status Options

The CAISO calculates each generator's "net qualifying capacity" by taking the generator's qualifying capacity and accounting for the expected load and energy flows on the transmission lines the generator needs to deliver its energy to load. This is necessary because the generator could face transmission constraints in the actual operational space that would limit the amount it can actually deliver to the CAISO grid. When a developer submits an interconnection request it requests one of three on-peak deliverability statuses: Full Capacity Deliverability Status ("FCDS"), Partial Capacity Deliverability Status[21] ("PCDS"), or Energy Only Deliverability Status ("Energy Only"). Being designated as FCDS represents that the grid can deliver the generator's qualifying capacity to the grid under peak load conditions—its net qualifying capacity equals its qualifying capacity.[22] An Energy Only designation represents that the generator's output

[21] Partial Capacity Deliverability Status entitles a generating facility to a Net Qualifying Capacity amount that cannot be larger than a specified fraction of its Qualifying Capacity, and may be less pursuant to the CAISO's assessment of its Net Qualifying Capacity. An Interconnection Customer requesting Partial Capacity Deliverability Status must specify the fraction of Full Capacity Deliverability Status it seeks in its Interconnection Request. "Partial Capacity Deliverability Status," Appendix A to the CAISO tariff.

[22] *California Independent System Operator Corp.*, 124 FERC ¶ 61,292, at P 94 ("For generators selecting full capacity deliverability, the maximum output of each facility can be delivered under peak conditions. Deliverability assessment(s) will be performed to determine the need for delivery network upgrades. The costs for delivery network upgrades will be assigned based on the flow impact of each generating facility on the [CA]ISO controlled grid. In addition, an analysis for reliability impacts will be done to determine the need for reliability network upgrades"). Deliverability designations are slightly different for wind resources because their "maximum capacity" is not necessarily commensurate with their nameplate capacity (minus auxiliary load), as it is for most generators. In any case, being designated as

can be delivered only subject to grid conditions.[23] Energy Only generators have a net qualifying capacity of zero, and are thus ineligible to provide resource adequacy capacity.[24]

Only FCDS or PCDS generators are assigned the financing costs for "Delivery Network Upgrades," which are upgrades designed to relieve transmission constraints so the resource can physically deliver its designated output.[25] An Energy Only designation means the interconnection customer is not responsible for the costs of such upgrades, but it will not be eligible to provide resource adequacy capacity.[26] Under today's rules, FCDS generators and Energy Only generators participate on equal footing in the CAISO markets: if an FCDS generator and an Energy Only generator at the same pricing node bid to supply energy at the same price (or both self-schedule) behind the same constraint, and the CAISO must curtail generation, they will be curtailed equally.[27]

The majority of interconnection customers that achieve commercial operation on the CAISO grid have Full Capacity Deliverability Status. Since the CAISO implemented deliverability statuses in 2008, only 18 Energy Only generators constituting an aggregated 621 MW have come online, and only three

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FCDS or PCDS does not guarantee that such a generator's energy will be delivered to load. All generators—regardless of designation—are subject to security-constrained economic dispatch and curtailment by the CAISO based on the then-existing topology of the system and demand.

[23] *Id*. at P 95.

[24] *See* "Energy Only," Appendix A to the CAISO tariff. These terms apply to all generators regardless of which Local Regulatory Authority governs their resource adequacy requirements.

[25] *See* "Delivery Network Upgrades," Appendix A to the CAISO tariff. Delivery Network Upgrades are different from Reliability Network Upgrades, which are the transmission facilities a generator needs to interconnect safely and reliably to the grid, regardless of its deliverability designation. *See* "Reliability Network Upgrades," Appendix A to the CAISO tariff.

[26] *See* "Energy Only Deliverability Status," Appendix A to the CAISO tariff. A Resource Adequacy Resource is defined in Appendix A to the CAISO tariff as "[a] resource that is designated in a Supply Plan to provide Resource Adequacy Capacity. The criteria for determining the types of resources that are eligible to provide Qualifying Capacity may be established by the CPUC or other applicable Local Regulatory Authority and provided to the CAISO."

[27] Put another way, if the same generators both submit self-schedules and they are both subject to the same constraint in the CAISO market clearing process, in the event there is oversupply and the CAISO must relax the constraint in order to clear the market, both generators are treated equally in the curtailment priorities. *See* Section 34.12 of the CAISO tariff.

of those generators were larger than 20 MW.[28] Only two Energy Only generators have come online since 2017. In contrast, 78 FCDS generators have come online in the same period, constituting 4,982 MW in capacity.[29] Of these 78, 21 have come online since 2017. Although some interconnection customers will become Energy Only during the interconnection process, every initial interconnection request in the past two years has requested Full Capacity Deliverability Status. Interconnection customers generally become Energy Only because they could not receive a deliverability capacity allocation, or because they became ineligible to retain their deliverability capacity. As explained below, although Energy Only generators are a minority, they can significantly impact nearby generators' ability to deliver energy, especially if delivery network upgrades become smaller to account for a later peak.

D. The CAISO's On-Peak Deliverability Assessment Methodology

The goal of performing the on-peak deliverability study during the interconnection process is to identify what delivery network upgrades are necessary for generators requesting deliverability to deliver to load energy equal to their qualifying capacity.[30] The CAISO deliverability assessment ensures that facility enhancements and cost responsibilities can be identified in a fair and nondiscriminatory manner. The CAISO tariff requires the CAISO to publish the on-peak deliverability assessment methodology on the CAISO website.[31] The CAISO's on-peak deliverability assessment ensures that capacity is not "bottled" from a resource adequacy perspective. It asks whether each electrical region can reasonably accommodate the output of all of its capacity resources—which can include generators, demand response, and energy storage—and export whatever power is not consumed by local load during periods of peak system load.

From the perspective of individual generators, deliverability ensures that under normal transmission system conditions, if capacity resources are available and called on, their ability to provide energy to the system at peak load will not be limited by the dispatch of other capacity resources nearby. This test does not guarantee that a generator will be dispatched to produce energy under any system load condition. The CAISO does not offer firm network or point-to-point transmission service, as other independent system operators and regional

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[28] Of the 18 generators, one was 290 MW, meaning the other 17 generators constituted 331 MW. *See* CAISO, "Generator Interconnection Queue," *available at* https://rimspub.caiso.com/rims5/logon.do.

[29] Only one generator has come online as PCDS. It is 206 MW.

[30] *See* Section 6.3.2.1 of Appendix DD to the CAISO tariff.

[31] Section 6.3.2.1.1 of Appendix DD to the CAISO tariff; http://www.caiso.com/Documents/On-PeakDeliverabilityAssessmentMethodology.pdf.

transmission organizations do. However, Energy Only resources may displace resource adequacy resources in the market's economic dispatch because they are treated equally with generators that paid for Full Capacity Deliverability Status when the CAISO must curtail self-schedules.

The electrical regions from which generation must be deliverable range from individual buses to wider areas including all generation electrically near the generator under study. The premise of the deliverability test is that all capacity near the generator under study is required, hence the remainder of the system is experiencing a significant reduction in capacity.[32] If an interconnection customer fails the initial deliverability assessment, it will trigger new delivery network upgrades. Likewise, if adding the generator will cause a deliverability deficiency for existing FCDS generators, then it cannot be counted fully until delivery network upgrades can be constructed to relieve the new constraint.

If a generator or group of generators require a delivery network upgrade to relieve a local transmission constraint, the CAISO will assign that local delivery network upgrade to them in their interconnection studies, and they will share its financing responsibility in proportion to their flow impacts on the constraint.[33] Generators requiring delivery network upgrades can interconnect to the grid when their reliability network upgrades are complete, and may have Interim Deliverability Status until their delivery network upgrades are complete.[34]

[32] Because localized capacity deficiencies should be tested when evaluating deliverability from the load perspective, the dispatch pattern in the remainder of the system is appropriately distributed.

[33] Section 6.3.2.1.1 of Appendix DD to the CAISO tariff.

[34] Interim Deliverability Status is "[a]n interim designation that allows an Interconnection Customer that has requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status to obtain non-zero Net Qualifying Capacity . . . pending the in-service date of all the required Network Upgrades required for its requested Deliverability Status." "Interim Deliverability Status," Appendix A to the CAISO tariff.

The CAISO also can identify area delivery network upgrades in its transmission planning process. Area delivery network upgrades generally are large, relatively more expensive transmission upgrades necessary to enable many generators to be deliverable.[35] Area delivery network upgrades fulfill public policy requirements under the Commission's Order No. 1000,[36] and are generally subject to a competitive solicitation. The financing and construction of area delivery network upgrades occurs independent from the interconnection process; although, some generators may require the area delivery network upgrades to be complete before they can have Full Capacity Deliverability Status.

E. The CAISO's Off-Peak Deliverability Assessment Methodology

After the on-peak deliverability assessment, the CAISO performs an off-peak deliverability assessment.[37] The off-peak deliverability assessment examines whether any *additional* delivery network upgrades would be necessary for the generator's output to be deliverable during off-peak hours. When the CAISO implemented the original on-peak deliverability assessment, CAISO stakeholders requested that the CAISO also perform an informational off-peak assessment so developers could have some additional indication of their ability to deliver energy during off-peak hours. The off-peak deliverability assessment is currently for informational purposes only. Because deliverability concerns principally relate to resource adequacy (and therefore peak), generators' ability to deliver energy off-peak historically had not been a concern warranting developers' financing network upgrades to relieve any constraints.

The CAISO tariff currently only requires the CAISO to perform an off-peak deliverability assessment to identify transmission upgrades for Location Constrained Resource Interconnection Generators ("LCRIGs") whose fuel source occurs during off-peak conditions.[38] The tariff defines LCRIG as "a Generating Unit that (a) uses a primary fuel source or source of energy that is in a fixed location and cannot practicably be transported from that location; and (b) is located in an Energy Resource Area."[39] Although this term is intentionally

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35 *See* "Area Delivery Network Upgrade" and "Area Deliverability Constraint," Appendix A to the CAISO tariff.

36 *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, Order No. 1000, 136 FERC ¶ 61,051 (2011), *order on reh'g*, Order No. 1000-A, 139 FERC ¶ 61,132, *order on reh'g and clarification*, Order No. 1000-B, 141 FERC ¶ 61,044 (2012), *aff'd sub nom. South Carolina Public Service Authority v. FERC*, 762 F.3d 41 (D.C. Cir. 2014).

37 Section 6.3.2.2 of Appendix DD to the CAISO tariff.

38 *Id.*

39 "Location Constrained Resource Interconnection Generator," Appendix A to the CAISO tariff. Appendix A to the CAISO tariff defines "Energy Resource Area" as "[a] geographic region

technology neutral, the tariff states that wind, solar, geothermal, hydroelectric, digester gas, landfill gas, ocean wave, and ocean thermal tidal generators meet criterion (a) of the LCRIG definition today.[40]

Currently, the LCRIGs whose fuel sources occur during off-peak conditions are solar and wind resources interconnecting in the Energy Resource Areas certified by the CPUC and California Energy Commission. Other technologies could be studied in the future to the extent they meet the tariff requirements. During the off-peak period, the CAISO system load is between 40 percent and 60 percent of its summer peak load. Minimum required conventional generation is kept online at minimum output levels to be available for the evening ramp and peak. Because replacement generation is nearly always available off-peak, the CAISO reduces even low-cost generation with a controllable fuel source in its off-peak assessment, without regard to marginal economic cost to mitigate transmission constraints found during the analysis. However, generation without a controllable fuel source—principally wind and solar—is assumed to be running at its expected output during the study.

F. The CAISO's Transmission Plan Deliverability Allocation Process

The CAISO's on-peak deliverability assessment determines whether an FCDS or PCDS generator requires delivery network upgrades, but an interconnection customer must first qualify for its deliverability status. An interconnection customer's ability to receive an FCDS or PCDS designation depends on the CAISO's Transmission Plan Deliverability ("TP Deliverability") allocation process.[41] TP Deliverability means "the capability, measured in MW, of the CAISO Controlled Grid as modified by transmission upgrades and additions modeled or identified in the annual Transmission Plan to support the interconnection with FCDS or PCDS of additional Generating Facilities in a

certified by the California Public Utilities Commission and the California Energy Commission as an area in which multiple LCRIGs could be located, provided that, for the interim period before those agencies certify such areas and for Location Constrained Resource Interconnection Facilities that are proposed to connect LCRIGs located outside the State of California, an Energy Resource Area shall mean a geographic region that would be connected to the CAISO Controlled Grid by an Location Constrained Resource Interconnection Facility with respect to which the CAISO Governing Board determines that all of the requirements of Section 24.4.6.3 are satisfied, except for the requirement that the LCRIGs to which the Location Constrained Resource Interconnection Facility would connect are located in an area certified as an Energy Resource Area by those agencies."

40 *Id*.

41 Interconnection customers also can elect to bypass the TP Deliverability allocation process by building their delivery network upgrades on a merchant basis, without reimbursement. *See* Section 7.2 of Appendix DD to the CAISO tariff.

specified geographic or electrical area of the CAISO Controlled Grid."[42]

The CAISO's transmission planning process identifies network upgrades based on the location and the amount of new resources anticipated to be ultimately developed in discrete geographic areas. These network upgrades add a certain amount of transmission capacity to the grid, which will be available to meet the deliverability requirements of proposed new generating facilities in those geographic areas.[43] The CAISO then determines the volume of new generation in each area whose deliverability can be met by the additional grid capacity the network upgrades will provide. The CAISO allocates the resulting MW volumes of TP Deliverability to those proposed generating facilities in each area determined to be most viable based on a set of specified project development milestones.[44] Earlier this year the Commission approved the CAISO's revisions to the TP Deliverability allocation criteria.[45]

Currently, the CAISO allocates TP Deliverability to these groups in the following order:

(1) To interconnection customers that have executed power purchase agreements, and to interconnection customers that are load-serving entities serving their own load; then

(2) To interconnection customers actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; and then

(3) To interconnection customers that elect to proceed without a power purchase agreement.[46]

The CAISO first awards TP Deliverability to interconnection customers described in group (1). If additional TP Deliverability is available, the CAISO will allocate it to group (2), and so on. This allocation order aligns with commercial viability, and rewards the most financially competitive projects. If there is insufficient TP Deliverability to award an entire allocation group, the CAISO will allocate TP Deliverability based upon a points system, which will examine the interconnection

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42 "TP Deliverability," Appendix A to the CAISO tariff.

43 See page 4 of the transmittal letter for the CAISO's Tariff Amendment to Integrate Transmission Planning and Generator Interconnection Procedures, Docket No. ER12-1855-000 (May 25, 2012).

44 *Id*.

45 *California Independent System Operator Corp.*, 166 FERC ¶ 61,113 (2019).

46 Section 8.9.2 of Appendix DD to the CAISO tariff.

customer's permitting and site exclusivity statuses.[47] Interconnection customers in these three groups that receive a TP Deliverability allocation will be assigned the delivery network upgrades necessary to achieve Full Capacity Deliverability Status or Partial Capacity Deliverability Status.[48] Interconnection customers electing to proceed without a power purchase agreement are subject to strict requirements: among other requirements, they may not "park" their interconnection requests to re-seek deliverability later if they acquire it, suspend their Generator Interconnection Agreements ("GIAs"), or request undue extensions to their commercial operation date.[49]

If there is available TP Deliverability that will not require additional upgrades,[50] the CAISO will allocate it to these groups in the following order:

(4) To interconnection customers that have not achieved their commercial operation date, originally requested FCDS or PCDS, and have executed a power purchase agreement; and to interconnection customers that have achieved their commercial operation date and have executed a power purchase agreement; then

(5) To interconnection customers that have not achieved their commercial operation date, originally requested FCDS or PCDS, and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; and to interconnection customers that have achieved their commercial operation date and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; then

(6) To interconnection customers that originally requested FCDS or PCDS but achieved their commercial operation date as Energy Only; and then

(7) To interconnection customers that achieved their commercial operation date.[51]

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47 *Id*.

48 Section 8.9.2.1 of Appendix DD to the CAISO tariff; Section 8.1 of Appendix Y to the CAISO tariff.

49 Section 8.9.2.2 of Appendix DD to the CAISO tariff.

50 In other words, their deliverability must result from existing transmission facilities, approved upgrades in the CAISO transmission planning process, or upgrades assigned to an interconnection project that is under construction.

51 Sections 8.9.2 and 9 of Appendix DD to the CAISO tariff.

Allocating TP Deliverability to these groups in this order awards TP Deliverability to the most viable projects, even if those projects failed to secure a TP Deliverability allocation initially. It essentially grants them a reprieve, but without requiring the CAISO to re-study the projects or construct new network upgrades. In addition, it allows load-serving entities to access generators already online that may be more cost-efficient than new facilities.

G. Constraints, Congestion, and Curtailment

The purpose of deliverability and delivery network upgrades has been to ensure that generation can deliver energy to load during stressed system conditions common to the peak net demand. The purpose, to date, has not been to ensure delivery outside of those conditions, such as during a Spring day when available generation far outweighs demand. Instead, the CAISO and generation developers have relied on the CAISO's transmission planning process to identify economic transmission facilities that will relieve congestion where the cost of curtailing inexpensive, free, or negative-priced energy exceeds the additional upgrade costs. However, the transmission planning process can identify local congestion constraints only after the generators have come online and faced persistent curtailment. These generators must wait years for the transmission planning process to approve a transmission solution and project sponsor, and then for the project sponsor to site, permit, and construct the facilities.

This iterative process can cause generators in constrained locations to face congestion in the CAISO markets until new upgrades are identified and constructed. The CAISO manages congestion through security-constrained economic dispatch and commitment processes based on generators' supply bids. Supply bids are considered "economic" where the generator includes a $/MWh value in its bid, and "self-schedules" where they do not. The CAISO also accounts for demand forecasts, grid topology, thermal limits, and potential contingencies, among other factors. If the CAISO cannot ensure compliance with thermal limits through congestion costs, it must curtail generation to maintain reliability. For a generator facing local transmission constraints, curtailment can take several forms. First, because the CAISO curtails effective economic bids before self-schedules, a generator economically bidding against a generator located behind the same constraint that submits a self-schedule would have some or all of its output curtailed if the constraint is binding (*i.e.*, reaching a thermal limit and thereby preventing the CAISO from dispatching both). Second, the CAISO may curtail self-schedules if it cannot relieve constraints through curtailing effective economic bids alone. In this case, the curtailment procedure for the CAISO's market dispatch currently does not account for which developers elected to finance additional delivery network upgrades.

Generation developers, understandably, are especially frustrated by

curtailment due to transmission constraints where they financed delivery network upgrades to have Full Capacity Deliverability Status. Curtailment of self-schedules can occur for such generators where Energy Only generators are sited near FCDS generators. Because the delivery network upgrades the FCDS generators financed were only designed to ensure the delivery of energy of the FCDS generator under peak load conditions, they are frequently inadequate to deliver the energy of both FCDS generator *and* the Energy Only generators. This situation can present itself both on-peak and off-peak.

For example, assume an interconnection customer requests to construct a new 20 MW generator with Full Capacity Deliverability Status. The interconnection customer receives a power purchase agreement to provide resource adequacy, and receives a deliverability capacity allocation in the CAISO's TP Deliverability process. Assume the generator requires local transmission facilities to deliver its energy to load. To receive Full Capacity Deliverability Status and be eligible to provide resource adequacy, the developer must finance these additional delivery network upgrades. It agrees to do so, and now its transmission facilities are capable of delivering 20 MW of energy during peak conditions. Now assume a second 20 MW generator sites next to the existing FCDS generator. The second generator does not want to finance any delivery network upgrades, so it elects to be Energy Only and forgoes being a resource adequacy resource. Although the Energy Only generator may trigger additional reliability network upgrades to avoid short-circuit and thermal overload issues, it would not trigger any delivery network upgrades.[52] The transmission facilities that now deliver both generators' energy to load would *not* be reconstructed to transmit 40 MW: demand still requires only 20 MW from this generation pocket during peak conditions, and the CAISO's interconnection process currently only evaluates deliverability on-peak, so the existing transmission facilities suffice. That 40 MW of instantaneous energy could flow on the facilities would not trigger additional upgrades, and the CAISO can avoid potential overloads through congestion management (including curtailment).

If we assume both generators will produce their full capacity, and that they self-schedule their energy by submitting supply bids without a $/MWh value, the current CAISO market will not distinguish between the two generators in curtailing their energy to avoid overloading their transmission facilities. Both the FCDS generator and the Energy Only generator will receive equal curtailment instructions so they only produce 10 MW each. Even though the Energy Only generator did not finance the additional upgrades the FCDS generator financed, the FCDS generator is no better off if the CAISO must curtail deliveries due to constraints. The FCDS generator will be curtailed *pro rata* along with the Energy

[52] Again, Full Capacity Deliverability Status is not firm capacity. An Energy Only generator does not have to mitigate its impact on an FCDS generator because doing so essentially would compel the Energy Only generator to be an FCDS generator.

Only generator even though the FCDS generator alone paid for the delivery upgrades on the transmission facilities. Although the FCDS generator is eligible to provide resource adequacy capacity, the delivery network upgrades it elected to finance are now insufficient for it to deliver its energy to load.

This situation is not hypothetical; it occurs today. In the 2018-19 transmission planning process, for example, the CAISO approved transmission upgrades to alleviate this precise scenario at the Fresno Giffen area.[53] The CAISO found that reconductoring the 70 kW radial transmission line that connects 39 MW of generation to load would cost $5 million, but would produce $49 million in benefits to ratepayers through avoided curtailment and congestion costs. The CAISO Board of Governors ("Board") approved the transmission upgrade based on the 7.5 benefit-to-cost ratio for ratepayers. Unfortunately, ratepayers and the generators behind the constraint will have waited several years for this solution even though it could have been identified in the interconnection process, as proposed below. The CAISO and stakeholders are concerned that the changes in on-peak deliverability assessment and corresponding TP Deliverability will result in more constraints like the Fresno Giffen area unless interconnection customers can also address off-peak deliverability constraints in the interconnection process.

H. Transition to Later Peaks in the CAISO's On-Peak Deliverability Assessment

Although the periods used to define peak demand are inputs and modeling assumptions the CAISO uses for the on-peak deliverability assessment, and not rates, terms, and conditions of service of the CAISO tariff,[54]

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[53] CAISO, 2018-19 Board-Approved Transmission Plan, Section 4.9.2, pp. 279-80, *available at* http://www.caiso.com/Documents/ISO_BoardApproved-2018-2019_Transmission_Plan.pdf.

[54] Doing so does not require any revisions to the CAISO tariff. Section 6.3.2.1 of Appendix DD to the CAISO tariff states: "The On-Peak Deliverability Assessment shall determine the Interconnection Customer's Generating Facility's ability to deliver its Energy to the CAISO Controlled Grid under peak load conditions, and identify preliminary Delivery Network Upgrades required to provide the Generating Facility with Full Capacity or Partial Capacity Deliverability Status." The CAISO is not proposing any changes to that tariff provision in this filing. The generator output levels are aligned with the load conditions in the assessment that the CAISO uses to determine how a generator can qualify for Full Capacity Deliverability Status, meaning that its net qualifying capacity is equal to its qualifying capacity (which has been revised by the CPUC). Although the CAISO has other local regulatory authorities in its balancing authority area, the vast majority of interconnection customers requesting on-peak deliverability do so to provide resource adequacy pursuant to a CPUC-determined qualifying capacity.

The generator output levels aligned with the load conditions will be captured in the CAISO's On-Peak Deliverability Assessment methodology. The CAISO has included its revised methodology as Attachment E to this filing. Section 6.3.2.1.1 of Appendix DD to the CAISO tariff

the CAISO conducted a stakeholder initiative to revise those inputs. Because the contribution of solar resources in meeting later daily peaks is much lower than the previous mid-afternoon peak—resulting in the CPUC's lower qualifying capacity values for solar resources—the CAISO and stakeholders expect that solar resources will require fewer, smaller delivery network upgrades to provide resource adequacy. Interconnection requests including solar generation still constitute 60 percent of the CAISO generator interconnection queue, so the change in delivery network upgrades for solar resources will have a significant impact on future grid topology. For example, a solar photovoltaic generator with a nameplate capacity of 100 MW previously would have counted toward a load-serving entity's August resource adequacy requirement for 80 MW. Under the new ELCC methodology, the same generator now will only count for 27 MW because peak demand conditions occur later in the evening when the solar generator fleet produces little electricity, and therefore reasonably counts less towards load-serving entities' resource adequacy requirements. Previously, to be considered deliverable on-peak, the generator would have had to finance delivery network upgrades based on an 80 MW qualifying capacity; now it must only finance upgrades for 27 MW.[55]

If existing generators already face curtailment due to transmission constraints during off-peak hours, new generators will face even more curtailment with fewer, smaller delivery network upgrades. In other words, because less deliverability will be required for the same capacity due to the reason described above, on-peak network upgrades will be smaller and fewer. Absent further consideration of off-peak deliverability in the CAISO process, this could result in increased curtailment under constrained conditions in the CAISO energy markets. Generation developers were reasonably concerned that they could be subject to increased curtailment due to local constraints during off-peak conditions (when demand is low but solar and wind generation are high) even if they invested in network upgrades based on the on-peak deliverability assessment.

requires the CAISO to publish the On-Peak Deliverability Assessment methodology on the CAISO website.

[55] To be sure, the CAISO still studies the generator as capable of delivering much higher outputs during other periods. The difference is that, for the on-peak deliverability assessment, the CAISO will now study these resources based on later (and thus lower) dispatch levels compared with the former mid-afternoon dispatch levels.

III. Proposed Tariff Revisions

A. Off-Peak Deliverability Status

To reduce the risk of curtailment due to failing to build the sufficient delivery upgrades,[56] the CAISO proposes to allow interconnection customers to request "Off-Peak Deliverability Status" in addition to the existing peak deliverability statuses. Off-Peak Deliverability Status will indicate that the generator can deliver its expected output to load during modeled off-peak conditions without excessive curtailment due to local transmission constraints.[57] This is a critical step in aligning the CPUC's new methodology for evaluating resource adequacy capacity with how the CAISO plans the grid to deliver new generators' energy to meet demand. Because the CPUC's revised qualifying capacity values are much lower for solar resources, the CAISO and stakeholders expect that solar resources will require fewer, smaller delivery network upgrades. If existing generators already face curtailment due to transmission constraints during off-peak hours now, new generators will face even more curtailment with fewer, smaller peak delivery network upgrades. Interconnection customers can receive Off-Peak Deliverability Status if (a) they site in locations that do not face off-peak constraints, (b) if they finance the "Off-Peak Network Upgrades" that will relieve those constraints, or (c) if the delivery network upgrades identified in the on-peak deliverability assessment also will relieve any off-peak constraints.[58]

Generators with Off-Peak Deliverability Status will still be subject to curtailment if actual transmission contingencies occur and during system oversupply conditions.[59] Similar to the on-peak deliverability assessment, the CAISO proposes to include a tariff provision requiring the CAISO to publish the off-peak deliverability assessment methodology on the CAISO website, which will explain the inputs and assumptions used based on the most recent data and grid

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[56] *I.e.*, until the transmission planning process can identify the need, approve a solution, select a project sponsor, and then have the solution permitted and constructed.

[57] Proposed "Off-Peak Deliverability Status," Appendix A to the CAISO tariff; proposed Appendix 1 and Appendix B to Appendix DD to the CAISO tariff.

[58] This latter condition will primarily apply to non-wind and non-solar resources, as explained below.

[59] Moreover, neither Off-Peak Deliverability Status nor Full Capacity Deliverability Status should be confused with firm transmission service. The CAISO has included tariff revisions reiterating that deliverability status does not convey any right to deliver electricity to any specific customer or delivery point, nor guarantee any level of deliverability, or transmission capacity, or avoided curtailment. Proposed "Local Off-Peak Network Upgrades", Appendix A to the CAISO tariff; proposed Sections 6.3.2.1 and 6.3.2.2 of Appendix DD; proposed Article 4.1 of Appendix EE to the CAISO tariff. Likewise, "curtailment" should not be confused with the failure to receive a dispatch schedule because the generator's bids were uneconomic. Security-constrained economic dispatch will still apply to generators regardless of their deliverability statuses.

topology.[60] The CAISO has attached the methodology it will use as Attachment F to this filing.

The objective of the off-peak deliverability assessment is to identify local transmission upgrades needed to relieve excessive off-peak curtailment caused by transmission constraints, similar to the Fresno Giffen issues described above. The off-peak deliverability assessment will identify local transmission bottlenecks that would cause excessive curtailment, but the study assumptions will focus on system conditions when system-wide oversupply is unlikely. Similar to the on-peak deliverability assessment, the off-peak deliverability assessment will identify transmission upgrades for local constraints that are generally less expensive. The need for such upgrades depends primarily on the specific generation projects interconnecting in a small localized area. These local constraints face a relatively high simultaneous output of local generation before system-wide oversupply situations occur.

Consistent with the CAISO's on-peak deliverability practices, the CAISO will conduct the off-peak deliverability assessment in all of the interconnection studies, and will assign "Local Off-Peak Network Upgrades" in the Phase I and Phase II interconnection studies for those interconnection customers that elect Off-Peak Deliverability Status in their interconnection request and that face local constraints.[61] The CAISO will continue to determine if a constraint is local based on whether it results from the generation inside the local generation pocket alone, and not from other generation pockets in the identified area.[62] Interconnection customers that do not face off-peak constraints will require no off-peak network upgrades to achieve Off-Peak Deliverability Status. Each interconnection customer's interconnection studies also will explain all assumptions and results, and the interconnection customer can discuss those assumptions and results in their Phase I and Phase II study results meetings.[63] The allocated costs of local off-peak network upgrades will be part of the interconnection customer's financing responsibility, and will be reimbursed by the transmission owner within five years of achieving its commercial operation date.[64]

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[60] Proposed "Off-Peak Deliverability Assessment" and "On-Peak Deliverability Assessment", Appendix A to the CAISO tariff.

[61] Proposed Sections 6.2, 6.3.2.2, and 8.1.1 of Appendix DD to the CAISO tariff.

[62] If a constraint is not local, it will be an Area Off-Peak Constraint, which will require an Area Off-Peak Network Upgrade.

[63] Sections 6.7 and 8.7 of Appendix DD to the CAISO tariff.

[64] Section 6.3.2.2 of Appendix DD to the CAISO tariff. Just as for delivery network upgrades, off-peak network upgrade costs will be allocated to interconnection customers sharing the same upgrade based on each generator's flow impact on the upgrade based on the distribution factor methodology set forth in the off-peak deliverability assessment methodology. Proposed Sections 6.3.2.2 and 8.4.1 of Appendix DD to the CAISO tariff.

Consistent with the CAISO's on-peak deliverability practices, larger, more expensive "Area Off-Peak Network Upgrades" will be identified in the transmission planning process based on generation procurement portfolios.[65] Their costs will not be assigned to interconnection customers, but will be included in interconnection studies for informational purposes. In simplest terms, the CAISO is adding a new variety of delivery network upgrades to address off-peak transmission constraints, and they will be treated the same as the existing delivery network upgrades that address peak transmission constraints.[66]

Based on these assessments, the CAISO proposes tariff amendments to offer the new Off-Peak Deliverability Status that will be a voluntary customer election. Interconnection customers that prefer to avoid the potential financing costs of any off-peak network upgrades can elect to be "Economic Only." Interconnection customers will elect to have Off-Peak Deliverability or Economic Only status in their interconnection requests.[67] If an interconnection customer requests to be Economic Only, the CAISO will still describe the generator's off-peak constraints in its interconnection studies. Interconnection customers electing to use the fast track and independent study processes also can request Off-Peak Deliverability Status.[68]

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[65] Proposed "Area Off-Peak Network Upgrades", Appendix A to the CAISO tariff. Just as for current Area Delivery Network Upgrades, Area Off-Peak Network Upgrades will be identified for informational purposes in interconnection studies, but the CAISO will not assign their costs to interconnection customers. The transmission planning process will identify a project sponsor that will construct Area Off-Peak Network Upgrades.

[66] Off-peak network upgrades can be assigned, conditionally assigned, or identified as precursor network upgrades. The majority of the CAISO's proposed tariff revisions simply add off-peak network upgrades to its existing Generator Interconnection and Deliverability Allocation Procedures set forth in Appendix DD to the CAISO tariff: proposed Sections 2.4.3.1 and 2.4.3.3 (interconnection studies generally); 3.5.1 (initiating an interconnection request); 3.6 (public information on interconnection requests); 6.2 (Phase I study); 6.7.2.2 (modifications to opt out of off-peak delivery status after Phase I); 7.2 (costs for different FCDS options); 7.3 (cost caps); 8.1.1 (Phase II study); 10.1 and 10.2 (cost allocation); 11.2.3.1, 11.2.3.2, 11.3.1.3, 11.3.1.4.1, and 11.3.1.4.2 (financial security); and 14.3.1 and 14.3.2.1 (reimbursement). The CAISO has included similar changes in its *pro forma* GIAs: proposed Articles 1, 5.20, and 11.4.1.1 of Appendix EE to the CAISO tariff; Articles 1.3, 5.2, 5.3.1, and 12.13 and Attachment 1 of Appendix FF to the CAISO tariff. The CAISO has also proposed similar changes to the existing definitions in Appendix A to the CAISO tariff of "Assigned Network Upgrade", "Conditionally Assigned Network Upgrade", "Deliverability Assessment", and "Deliverability Status". In addition, the CAISO proposes to add new definitions to Appendix A to the CAISO tariff to define "Area Off-Peak Constraints", "Local Off-Peak Constraints", "Off-Peak Deliverability Constraints", "Off-Peak Network Upgrades", consistent with the CAISO's existing terminology for on-peak delivery constraints and network upgrades. These new and revised definitions also will be added to the glossaries of defined terms contained in the CAISO's *pro forma* GIAs. *See* Proposed Article 1 of Appendix EE to the CAISO tariff; proposed Attachment 1 to Appendix FF to the CAISO tariff.

[67] Proposed Appendices 1 and B to Appendix DD to the CAISO tariff.

[68] Proposed Sections 4.2.1.2, 4.6, 4.8, and 5.2.1.3 of Appendix DD to the CAISO tariff.

To ensure that the CAISO tariff remains generator technology neutral, the CAISO will maintain the current tariff language for off-peak deliverability that describes how LCRIGs whose source of energy substantially occurs off-peak may require additional network upgrades to be deliverable off-peak, regardless of their on-peak deliverability.[69] Although currently wind and solar resources qualify as "LCRIGs whose source of energy substantially occurs off-peak," existing technologies and new technologies may meet those conditions in the future as generation and load curves evolve. In any case, LCRIGs with off-peak energy sources may require network upgrades not identified in the on-peak deliverability assessment to receive Off-Peak Deliverability Status, hence the need for the assessment. Generators that are not LCRIGs or whose fuel source primarily does not occur off-peak—all non-wind and non-solar today—would not trigger network upgrades under the off-peak deliverability assessment. Because the on-peak deliverability assessment occurs first and because virtually all interconnection customers request Full Capacity Deliverability Status, such generators' Off-Peak Deliverability Status will depend on whether they request Full Capacity Deliverability Status. Full or Partial Capacity Deliverability Status generators that are not LCRIGs with an off-peak energy source will automatically receive Off-Peak Deliverability Status. If the same generators are Energy Only, they will be ineligible for Off-Peak Deliverability Status. As explained below, the CAISO will implement these distinctions going forward. All existing, online generators will be grandfathered into Off-Peak Deliverability Status, regardless of technology or on-peak deliverability status.

The Commission should accept these tariff revisions as just and reasonable. They build off existing procedures to address a critical issue that has resulted from the evolving generation and load patterns resulting from the modern grid. Without these revisions, generators in the CAISO will face even more curtailment due to the shifting resource adequacy needs in California. Allowing interconnection customers to address off-peak deliverability constraints in the interconnection process will benefit developers and ratepayers by immediately addressing issues that are expected to occur more frequently in the future and currently take years to solve. Stakeholders broadly supported these revisions.

B. Curtailment Priorities

Allowing interconnection customers to request off-peak deliverability will help address curtailment caused by transmission constraints during off-peak

[69] Proposed Section 6.3.2.2 of Appendix DD to the CAISO tariff. In other words, an LCRIG with an off-peak energy source could request Off-Peak Deliverability Status regardless of whether it requests Full Capacity Deliverability Status, Partial Capacity Deliverability Status, or Energy Only status.

hours. But without further changes to how resources that elect this option participate in the CAISO markets, interconnection customers still could lose the benefit of their bargain if other generators site nearby and create constraints. This problem could result even if the new generator did not choose its location intending to free-ride off the first generator's off-peak network upgrades. For example, a developer could construct a new 10 MW generator with Off-Peak Deliverability Status. The off-peak network upgrades it finances would deliver its 10 MW to load without excessive curtailment due to transmission constraints. However, if a 200 MW generator sites adjacent to the 10 MW generator, and the 200 MW generator does not want to finance additional off-peak network upgrades, the 10 MW generator could lose its ability to deliver energy off-peak.[70] Under current rules, if both generators submit self-schedules—supply bids without a $/MWh price—they will be curtailed on a *pro rata* basis based upon their output.[71] If the generators each submit self-schedules at their PMax, and the transmission line that connects them to load could only support 50 MW off-peak, the 200 MW generator would be curtailed to produce 47.6 MW. The 10 MW generator would be curtailed to produce 2.4 MW even though it financed off-peak network upgrades specifically to avoid this constraint. This is unfair.

To solve this problem, the CAISO proposes that generators that elect to forego financing off-peak network upgrades to address local transmission constraints will be "Economic Only," and prohibited from self-scheduling energy.[72] Only generators with Off-Peak Deliverability Status will be able to self-schedule energy. Because the CAISO curtails effective economic bids before self-schedules,[73] this will give generators with Off-Peak Deliverability Status a curtailment priority over Economic Only generators if the CAISO cannot feasibly dispatch both generators.[74] Under existing tariff-based rules, self-scheduled generation is curtailed after the CAISO has exhausted all effective supply bids economically bid into the CAISO markets. The CAISO does not propose to

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70 Requiring the 200 MW generator to mitigate any impact on the 10 MW generator essentially would require the 200 MW generator to finance its own off-peak network upgrades, thereby making Off-Peak Deliverability Status into a requirement instead of an election.

71 Assuming they are otherwise similarly situated, meaning that no other curtailment priority already applies to one generator and not the other (*e.g.*, reliability must-run, regulatory must-take, existing transmission contract, or transmission ownership right). *See* Section 31.4 of the CAISO tariff. For the full table of market parameter values, see Section 6.6.5 of the Business Practice Manual for Market Operations.

72 Proposed "Economic Only," Appendix A to the CAISO tariff; proposed Sections 30.5.2.2.1 and 30.5.6.1 of the CAISO tariff.

73 *See* Sections 27.4.3 and 31.3.1.1 of the CAISO tariff; *California Independent System Operator Corp*., 126 FERC ¶ 61,147 (2009).

74 If both economically bid, the higher bid will not receive an award.

change the scheduling priorities of how it curtails any self-schedules.[75]

Under the CAISO's proposal, the generator with Off-Peak Deliverability Status now can preserve the benefit of financing its off-peak network upgrades. Future generators cannot unduly free-ride on the off-peak network upgrades financed by others or otherwise erode the upgrades' intended benefits. Returning to the example above, if the 10 MW generator finances off-peak network upgrades, and the 200 MW generator elects not to, only the 10 MW generator can self-schedule energy. By self-scheduling against the 200 MW generator's economic bids, the 10 MW generator will have priority over the 200 MW generator's economic bids if the market cannot support both resources due to transmission constraints.[76]

The CAISO notes that Economic Only generators can still self-schedule energy in the CAISO's real-time market up to any market schedule they receive in the day-ahead market for the same trading interval, similar to proxy demand resources' limited ability to self-schedule.[77] Additionally, deliverability status will continue to be immaterial to out-of-market actions taken by operators to ensure reliability if an emergency occurs.[78]

Although generators ultimately are reimbursed for the network upgrades they finance, every additional dollar a developer must finance makes the generator that much less competitive for power purchase agreements. For this reason, the vast majority of interconnection request withdrawals come immediately after interconnection customers receive their Phase I study results and see their potential financing obligations—developers know that their upgrade

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75 *See* Section 31.4 of the CAISO tariff; Section 6.6.5 of the Business Practice Manual for Market Operations. Ineffective economic bids are also adjusted after self-schedules. *See California Independent System Operator Corp*., 126 FERC ¶ 61,147 (2009). Ineffective economic bids are those bids that "while available, are deemed to be an unacceptable means of relieving a constraint because the per-MW cost of using such bids exceeds the parameter for adjusting a non-priced quantity." *Id*. at P 12. The CAISO is not proposing any changes to its market price parameters, so existing transmission contracts, regulatory must-take generation, and other scheduled energy with higher market parameter values will still be curtailed after self-scheduled generation (assuming equal bids).

76 If both generators economically bid, the market will dispatch the generators based on their bids. As the CAISO has explained, deliverability status should not be confused with firm transmission service. In the example above, if the Economic Only 200 MW generator submits a bid of $10/MWh for 50 MWh in a settlement interval, and the OPDS 10 MW generator submits a bid of $20/MWh for 10 MWh, and the CAISO can only take 50 MWh, the Economic Only 200 MW generator would receive a schedule for 50 MWh and the OPDS 10 MW generator would not be dispatched.

77 Proposed Sections 30.5.2.2.1 and 30.5.6.1 of the CAISO tariff; *see* Section 30.6.1 of the CAISO tariff (PDR bidding). Economic Only status does not affect a generator's ability to bid energy economically or to supply ancillary services with economic bidding or self-provision.

78 *See, e.g.*, Sections 7.7, 7.8, 31.6, 34.11, and 34.21 of the CAISO tariff.

financing costs must be competitive for the generation project ever to be purchased and developed. If a developer elects to finance additional network upgrades to address off-peak constraints, allowing future developers to unduly free-ride off those upgrades during curtailment conditions and undermine the original generator's benefits would be entirely unfair.

The Commission should approve the CAISO's proposal as just and reasonable. Although the CAISO expects very few generators to have Economic Only status, the few that do can erase the benefits of Off-Peak Deliverability Status generators should receive by financing off-peak network upgrades. Allowing OPDS generators to self-schedule against bids from Economic Only generators will ensure they do not lose the benefit of their financial commitments, and reasonably mitigate their curtailment risk.

With the exceptions discussed in Section IV, below, stakeholders generally supported the CAISO's proposal to prohibit Economic Only generators from self-scheduling.

C. Transition to Off-Peak Deliverability Status

To preserve online generators' existing rights, the CAISO proposes to grandfather all current participating resources into Off-Peak Deliverability Status so they can continue to self-schedule energy.[79] Interconnection customers already in the CAISO queue but not yet online also will be grandfathered into Off-Peak Deliverability Status if (a) they have Full or Partial Capacity Deliverability Status, or (b) are not LCRIGs with off-peak sources of energy.[80] The former groups already elected to construct delivery network upgrades under available options, and the latter group would not require off-peak network upgrades. The CAISO proposes to allow the remaining interconnection customers—Energy Only LCRIGs with off-peak energy—to request Off-Peak Deliverability Status.[81] These interconnection customers elected to forego delivery network upgrades, but could face off-peak constraints. The CAISO thus proposes to allow them to opt into Off-Peak Deliverability Status. If they do so, the CAISO will study those requests in the next interconnection study, and assign any required local off-peak network upgrades to them.[82] Their interconnection studies, cost caps, and GIAs would then be amended to include those costs.

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79 Proposed Sections 30.5.2.2.1 and 30.5.6.1 of the CAISO tariff.

80 Proposed Section 6.3.2.3 of Appendix DD to the CAISO tariff.

81 *Id*.

82 *Id*. These interconnection customers could elect to revert to Economic Only after seeing their assigned Local Off-Peak Network Upgrade costs.

The following table describes the transition to Off-Peak Deliverability and Economic Only status:

	OPDS	Economic Only
Current Participating Generators	All	None
Current Interconnection Customers		
LCRIGs with off-peak energy sources	(1) FCDS/PDCDS; and (2) Energy Only that request OPDS	Energy Only that decline OPDS
Other	All	None
Future Interconnection Customers		
LCRIGs with off-peak energy sources	Elect OPDS	Elect Economic Only
Other	Elect FCDS/PCDS	Elect Energy Only

All future interconnection customers will have off-peak deliverability or Economic Only status based upon their elections.

The CAISO expects very few generators will be Economic Only. Less than 10 percent of the CAISO's 300+ active interconnection requests would even need to take action to request Off-Peak Deliverability Status because they will not *automatically* receive it.[83] Nearly all of those interconnection customers have submitted requests to receive a deliverability capacity allocation in the upcoming cycle if the Commission approves this filing. As such, every online generator and virtually every current interconnection customer in queue today will have Off-Peak Deliverability Status. The first Economic Only generators the CAISO could see may not have entered the queue yet, which means they are years from coming online (assuming any LCRIGs with off-peak energy sources *elect* to forego off-peak deliverability). They will know the rules when they enter the queue and can make an informed decision whether to request Off-Peak Deliverability Status.

The CAISO believes this transition appropriately preserves generators and interconnection customers' expectations to self-schedule energy based upon the options available when they submitted interconnection requests. The

[83] Because they are Energy Only and constructing LCRIGs with off-peak energy sources.

Commission should approve these revisions as just and reasonable, and consistent with the filed rate doctrine.

D. One-time TP Deliverability Allocation

As explained above, updating the CAISO's on-peak deliverability assessment methodology assumptions to reflect the new qualifying capacity methodology and a later peak will free up substantial existing deliverability capacity to interconnection customers.[84] Doing this now is necessary because the CAISO faces a potential capacity shortfall.[85] The capacity shortages pose a need to ensure that any generation that comes online in the future is deliverable and not subject to curtailments due to constrained grid conditions.

Although the CAISO's current deliverability allocation process allocates available deliverability capacity to interconnection customers based on their commercial viability, it does not account for *when* any generator will achieve commercial operation. If two interconnection customers have secured power purchase agreements, they are considered equally competitive to receive available deliverability capacity, even if one will come online in 2021 and the other in 2024. The current deliverability allocation process also ranks new interconnection customers ahead of interconnection customers that already failed to secure deliverability in previous cycles, regardless of when they will come online.

To allocate the large amount of on-peak deliverability capacity that will be available to the interconnection customers that are both commercially viable and

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[84] For example, if a 100 MW solar generator had transmission designed to deliver 80 MW to load, but now the generator only counts for 20 MW, the same transmission can now support other resources' providing the additional 60 MW. By changing the qualifying capacity values, the CAISO now has 60 MW of TP Deliverability to allocate.

[85] *See, e.g.*, "Reply Comments of the CAISO," filed in *Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements*, CPUC Docket No. R16-02-007 (Aug. 12, 2019), *available at* http://www.caiso.com/Documents/Aug12-2019-ReplyComments-PotentialReliabilityIssues-IRP-R16-02-007.pdf; "Comments of the CAISO," filed in *Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements*, CPUC Docket No. R16-02-007 (Oct. 2, 2019), *available at* http://www.caiso.com/Documents/Oct2-2019-Comments-ReliabilityProcurementProposedDecision-IRP-R16-02-007.pdf; S&P Global, "Calif. ISO warns capacity shortfall could hit 4,700 MW in 2022" (Aug. 14, 2019), https://www.spglobal.com/marketintelligence/en/news-insights/trending/vyVenbSJmRbV5lPQK96S1A2; Green Tech Media, "Looming Grid Shortfall Prompts 2.5 GW California Procurement Proposal" (Sept. 13, 2019), *available at* https://www.greentechmedia.com/articles/read/looming-grid-reliability-shortfall-prompts-2-5gw-california-procurement-pro.

most likely to come online soon, the CAISO proposes to institute a modified deliverability allocation process on a one-time basis only for its upcoming cycle.[86] Following this one-time, transitional cycle, the CAISO will revert to its current allocation process.[87]

The principal difference between the proposed one-time process and the current process is that the one-time process will allow any interconnection customer with a completed Phase II study that is still an active project in the interconnection queue to seek deliverability by representing it elects to proceed without a power purchase agreement, and will be subject to the restrictions described in Section 8.9.2.2 of Appendix DD to the CAISO tariff going forward.[88] The current CAISO tariff restricts this option only to interconnection customers seeking a deliverability allocation the first time. Additionally, the CAISO proposes to allocate available deliverability to interconnection customers in this group last.[89] This means that the previous allocation group three will now be allocation group seven, and allocation groups previously designated as four, five, six, and seven will move up. Allocation groups one and two are unchanged.

The CAISO thus proposes to allocate deliverability in 2020 in the following order:

(1) To interconnection customers in the current queue or coming out of parking that have executed power purchase agreements, and to interconnection customers in the current queue cluster that are load-serving entities serving their own load; then

(2) To interconnection customers in the current queue cluster or coming out of parking actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; then

(3) To Energy Only interconnection customers that have not achieved

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86 Proposed Section 9.1 of Appendix DD to the CAISO tariff.

87 *Id*. The CAISO is not proposing a permanent change. First, outside of capacity shortfalls, it is not expedient to allow every interconnection customer with completed studies to re-seek deliverability after having already done so, nor expedient to account for proposed commercial operation dates. Interconnection customers receive three opportunities while in queue, and can then re-seek deliverability once they come online every year until successful. Second, in future years the CAISO will not have the surplus of deliverability capacity to allocate that will result from changing qualifying capacity values. Absent this special situation, the CAISO's current deliverability allocation process—which was very recently developed by the CAISO with stakeholders and approved by the Commission—should be effective.

88 *Id*.

89 *Id*.

their commercial operation date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and have executed power purchase agreements; and to Energy Only interconnection customers that have achieved their commercial operation date and have executed power purchase agreements; then

(4) To Energy Only interconnection customers that have not achieved their commercial operation date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; and to Energy Only interconnection customers that have achieved their commercial operation date and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; then

(5) To Energy Only interconnection customers that originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status but achieved their commercial operation date as Energy Only; then

(6) To Energy Only interconnection customers that achieved their commercial operation date; then

(7) To interconnection customers, including interconnection customers that have parked, that elect to proceed without a power purchase agreement, and elect to be subject to section 8.9.2.2.[90]

This revised allocation order is appropriate for 2020 because it makes deliverability available to *all* interconnection customers with completed studies, but prevents interconnection customers that have had an opportunity to qualify for deliverability—Energy Only customers in the final group—from receiving allocations before more viable interconnection customers, many of which have not yet had this opportunity.[91]

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90 *Id*.

91 The CAISO will maintain its existing practice where interconnection customers in groups one and two and interconnection customers in group seven that have not converted to Energy Only may trigger the construction of new Delivery Network Upgrades pursuant to Section 6.3.2 of Appendix DD to the CAISO tariff. Proposed Section 9.1 of Appendix DD to the CAISO tariff reiterates this fact because of the change in order and because the group proceeding without a power purchase agreement will include interconnection customers seeking deliverability for the first time (that would be group three under the existing tariff), and interconnection customers that already sought deliverability (that would have been limited to groups four through seven). The

If there is sufficient capacity in the 2020 cycle for all interconnection customers seeking deliverability to receive it, the groups become immaterial. However, if there is insufficient deliverability, the CAISO will allocate it in the order proposed above. If there is insufficient deliverability for every interconnection customer in the last group that qualifies for available deliverability,[92] the CAISO uses numerical scores based on interconnection customers' affidavits that describe their viability. The current affidavits awards points based upon financing, permitting, and property development.[93] To address the potential capacity shortfall, the CAISO proposes to include a fourth points category based on the interconnection customer's commercial operation date.[94] The earlier the interconnection customer will come online, the more points it will receive.[95]

The Commission should accept this proposed one-time deliverability process as just and reasonable.[96] It will ensure the greatest number of interconnection customers possible can obtain deliverability, market their projects to prospective off-takers, and come online to provide the CAISO with much-needed generating capacity sooner rather than later. The CAISO's proposal follows its recently approved tariff provisions while recognizing that significant deliverability capacity will be available in 2020, before the CAISO faces a capacity shortfall. Stakeholders broadly supported the CAISO's proposal.

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current tariff allows the former group to trigger upgrades, but not the latter group, and the CAISO does not propose to change this practice. The CAISO will thus allocate deliverability to groups three, four, five, six, and Energy Only interconnection customers in group seven based on deliverability available from existing transmission facilities, upgrades already approved in the CAISO transmission planning process, or upgrades under construction.

92 For example, if there is only sufficient deliverability for the first two allocation groups, group two would be the last qualifying group. The CAISO is not referring to group seven *per se* unless the CAISO has sufficient deliverability for all interconnection customers in groups one through six but only some available for group seven.

93 Section 8.9.2.1 of Appendix DD to the CAISO tariff.

94 Proposed Section 9.1 of Appendix DD to the CAISO tariff.

95 *Id*. Consistent with current practice, in the unanticipated event of point ties, the CAISO will use lowest-cost local delivery network upgrade cost estimates as the final tiebreaker, followed by partial allocations using the weighted least-square algorithm.

96 The CAISO notes that this one-time deliverability allocation proposal is dependent on the Commission's acceptance of the off-peak deliverability proposals described above in Section III.A of this transmittal letter. If the Commission does not accept the CAISO's proposal to address off-peak deliverability in the interconnection process, the CAISO will not revise its current on-peak deliverability assessment methodology, so additional deliverability would not be available, so a tailored allocation process would be unnecessary for 2020.

IV. Stakeholder Process

The stakeholder process that resulted in this filing included:

- Four issue papers issued by the CAISO;
- Developing draft tariff provisions;
- Five stakeholder meetings and conference calls to discuss the CAISO papers and the draft tariff provisions; and
- Four opportunities to submit written comments on the CAISO papers and the draft tariff provisions.[97]

The proposals were presented to the CAISO Board during its public meeting on November 13, 2019. The Board voted unanimously to authorize this filing.[98] Stakeholders broadly supported the CAISO's proposals regarding the on-peak deliverability assessment methodology changes, the ability to address off-peak deliverability in the interconnection process, and the one-time deliverability allocation process.

Stakeholders generally supported the CAISO's proposal to prohibit generators with Economic Only status from self-scheduling; however, the Western Power Trading Forum ("WPTF") offered a number of scattershot arguments opposing "directly connect[ing] a resource's deliverability status to their bidding rules."[99] WPTF argued that "self-scheduling or the ability to be a price-taker is fundamental bidding feature and importantly that all resources should have access to the same bidding rules."[100] These arguments are broad generalizations and conclusory.

Self-scheduling is not a "fundamental bidding feature." The only unique benefit self-scheduling provides is scheduling priority over economic bids if

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97 Materials regarding the generation deliverability assessment are available on the CAISO website at http://www.caiso.com/StakeholderProcesses/Generation-deliverability-assessment.

98 Materials related to the Board's authorization to prepare and submit this filing are available on the CAISO website at http://www.caiso.com/informed/Pages/BoardCommittees/BoardGovernorsMeetings.aspx. The memorandum provided to the Board regarding the proposals in this filing is contained in Attachment D to this filing.

99 WPTF Letter to CAISO Board of Governors, November 13, 2019, *available at*: http://www.caiso.com/Documents/PublicCommentLetterfromWPTFreDeliverabilityAssessmentMethodologyRevisions-Nov13_2019.pdf ("WPTF Letter").

100 *Id*.

curtailment occurs. There is no other inherent utility to self-scheduling that economic bidding does not provide, and nothing in Commission precedent suggests that self-scheduling is an inalienable right or essential to just and reasonable rates under the Federal Power Act. Moreover, the CAISO's current tariff already provides different levels of self-scheduling priority based on resource-type—regulatory must-take and reliability must-run generators—and transmission rights—transmission ownership rights and existing transmission contracts, among other factors.[101]

WPTF's argument *that a customer's own elections* in the interconnection process cannot affect its participation in the energy markets is not persuasive. The CAISO's proposal does not unduly impact a non-OPDS resource's participation in the energy markets, it merely accords an OPDS resource a priority in the event of curtailment. Curtailment priorities are commonplace in both the natural gas and electric industries as customers making the necessary financial commitments and electing higher-quality service are able to receive a curtailment priority. The CAISO's proposal is no different in general result.

Examples abound in the organized markets, especially those that offer firm and point-to-point transmission service. In 2018, for example, the Commission rejected Southern California Edison Company's ("SCE") proposal to study storage devices because it only offered distributed energy storage resources with the ability to be studied on an as-available basis.[102] The Commission specifically held SCE had failed to demonstrate why it is not unduly discriminatory "to curtail one class of interconnection customer's load … without providing an opportunity to have the energy storage device's load studied and to pay for the system upgrades needed to allow its load to have the same curtailment priority as other wholesale loads."[103] The Commission suggested "If SoCal Edison were to offer an interconnection customer the opportunity to be studied for potential system upgrades and the customer declines to do so, then it could perhaps be just and reasonable for SoCal Edison to curtail that interconnection customer's load before other wholesale loads."[104] The CAISO proposes to do *exactly that* for energy.

In Order No. 845, the Commission required transmission providers to give customers the ability to make interconnection choices with energy market results. The first reform the Commission mandated in the category of "Enhancing

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101 *See* Section 31.4 of the CAISO tariff; Section 6.6.5 of the Business Practice Manual for Market Operations; *California Independent System Operator Corp*., 126 FERC ¶ 61,147.

102 *Southern California Edison Co.*, 164 FERC ¶ 61,130 (2018).

103 *Id*. at P 39.

104 *Id*.

Interconnection Processes" was "to allow interconnection customers to request interconnection service that is lower than full generating facility capacity"[105] with the express purposes of lower interconnection costs and reflecting a resource's intended operation.[106] The Commission's proposal was met with broad support, including from the CAISO, which already allowed such elections.[107] Commenters agreed that developers should be able to lower their interconnection costs by requesting undersized interconnection capacity even if it means they could not provide their full capacity to the energy and capacity markets.[108] These examples demonstrate that the Commission has extended developers the flexibility to make trade-offs between interconnection costs and the markets.

WPTF also failed to explain why interconnection choices can affect participation in capacity procurement markets, but should not affect curtailment priorities in the energy markets. In California, a generator's ability to sell resource adequacy capacity depends entirely on its willingness to finance delivery network upgrades. Neither WPTF nor any party has objected to this condition. The upgrades enable the capacity to be free from transmission constraints during peak hours. But the same logic applies to off-peak network upgrades: without the upgrades, a location-constrained generator with an off-peak energy source may face transmission constraints during off-peak hours. WPTF argues that the energy market should ignore this reality, but the CAISO disagrees. Upgrades affect energy deliverability just as they affect capacity.

WPTF also argued it is "discriminatory" to tie a generator's ability to self-schedule to its decision to finance upgrades that relieve the constraint its generation causes.[109] WPTF argues that "all resources should have access to the same bidding rules."[110] But WPTF fails to explain how the CAISO has prevented any resource from accessing the same bidding rules. WPTF's argument mistakes a level playing field for equal results. The CAISO's proposal is based entirely on developers' own elections: what generating technology they elect to develop, where they elect to locate their generators, and what network upgrades they elect to finance. WPTF suggests that different bidding rules are somehow discriminatory, even where based on customers' elections, but ignoring the differences in customer elections would only result in preferential treatment. Different resources impact the grid differently. The Commission has recognized

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105 *Reform of Generator Interconnection Procedures and Agreements*, Order No. 845, 163 FERC ¶ 61,043, at P 343 (2018).

106 *Id*. at P 354.

107 *Id*. at P 358.

108 In fact, they are expressly prohibited from doing so.

109 WPTF Letter at p. 1.

110 *Id.*

that different generating technologies have different interconnection study needs based upon their varying capabilities, and that accommodating these differences is not discriminatory.[111] The CAISO's proposal is agnostic to whether the generator is renewable or not; the only determining factors are the impact of the generator's output on the grid, and to what extent the generator elects to address that impact.

Seeking to have it both ways, WPTF next argues that self-scheduling should be avoided and the CAISO's proposal likely will increase self-scheduling among OPDS generators. WPTF predicts that "in order to get funding" for off-peak network upgrades, developers "will have to guarantee they are accessing this priority, and thus a self-scheduling requirement will be included in their contracts."[112] The CAISO disagrees. First, WPTF's claim is speculative, and any load-serving entity or regulatory authority could prevent clauses *requiring* a generator to self-schedule 24/7. Second, the CAISO's proposal should have the opposite effect of WPTF's prediction. In today's market, self-scheduling resources already have a curtailment priority over economic bids. Because all generators currently can self-schedule, generators facing frequent transmission constraints are incentivized to always self-schedule to avoid the curtailment that would result if they economically bid against a generator self-scheduling behind the same constraint. In other words, in a situation where two generators can self-schedule behind a constraint, they both *have to* self-schedule to avoid disparate curtailment. The CAISO's proposal removes this problem by only allowing the resources that financed the necessary upgrades to self-schedule. OPDS generators would *not* have to self-schedule against Economic Only generators because they know that the Economic Only generator *cannot* self-schedule in the first place.

Finally, WPTF notes that an OPDS generator that self-schedules would have scheduling priority over an Economic Only generator if the CAISO experiences *system* oversupply that warrants curtailing both. WPTF objects to this result because off-peak deliverability is designed to address local transmission constraints, not system oversupply. The CAISO recognizes that an OPDS generator self-scheduling would be curtailed after economic bids in an oversupply situation where dispatching both generators is infeasible. But as explained above, the CAISO's proposal actually removes the OPDS generator's

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111 *See, e.g.*, *PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,159, at P 78 (2018) ("We agree with PJM that [wind resources and Environmentally-Limited Resources] are uniquely situated with respect to the disparity between their winter-period and summer-period capabilities, and that this distinction is significant enough to support an accommodation that facilitates their participation in the RPM market. We also conclude that PJM's proposed accommodation is reasonable because PJM will prevent infringement on available system capabilities of other resources and will only grant additional Capacity Interconnection Rights to resources to the extent the existing system topology will support doing so.").

112 WPTF Letter at pp. 1-2.

need to self-schedule because now it knows its Economic Only neighbor cannot self-schedule. In any situation, both generators are free to bid their marginal costs, and curtailment would be based on economic bids instead of tiebreaking market parameters. Moreover, off-peak transmission constraints can impact the resources behind them almost 24/7, as was the case with the Fresno-Giffen area. This means that in system oversupply cases, the local transmission constraints already would have been binding on the generators behind them. And these constraints would only become more severe and more pervasive with smaller on-peak delivery network upgrades, as described above.

The CAISO's curtailment data likewise demonstrates that generators rarely, if ever, need to self-schedule to avoid being curtailed during system oversupply.[113] Because the CAISO has more than ample economic bids during system oversupply, an OPDS generator (or any generator) does not have to self-schedule to avoid curtailment. In 2019, for example, the CAISO never had to curtail self-schedules during system oversupply because there were sufficient effective economic bids:

TYPE	2019 CURTAILED ENERGY DURING SYSTEM OVERSUPPLY
Economic Bids	327,673 MWh
Self-Schedules	0 MWh

In fact, when the CAISO must curtail energy for other reasons, like local or area congestion,[114] the CAISO must resort to curtailing self-schedules only about one percent of the time:

TYPE	2019 CURTAILED ENERGY FOR NON-SYSTEM CONGESTION
Economic Bids	628,710 MWh
Self-Schedules	6,382 MWh

As such, OPDS generators likely will be incentivized to take advantage of their self-scheduling priority only if they face chronic local congestion, for example, if a large resource sites nearby and elects to forego financing additional upgrades

[113] The CAISO maintains monthly curtailment data reports on its website. *See* CAISO, "Managing Oversupply," http://www.caiso.com/informed/Pages/ManagingOversupply.aspx. The most recent curtailment data report, ending December 29, 2019, is available at http://www.caiso.com/Documents/Wind_SolarReal-TimeDispatchCurtailmentReportDec29_2019.pdf. Note that "Local Economic" and "Local Self-Schedule" curtailment in the reports can refer to broader scenarios than curtailment caused by the local deliverability constraints referred to in the instant filing.

[114] *I.e.*, "Local Economic" and "Local Self-Schedule" curtailment in the reports can refer to broader scenarios than curtailment caused by the local deliverability constraints referred to in the instant filing.

(and is thus Economic Only). In other words, the curtailment priority Off-Peak Deliverability Status provides should only incentivize generators to self-schedule as designed, with little to no other benefit or externality.

V. Effective Date and Request for Order

The CAISO requests that the Commission accept all of the tariff revisions proposed in this filing effective March 3, 2020, *i.e.*, 61 days after the date of this filing. This effective date will allow the CAISO to implement the instant revisions in the next TP Deliverability allocation cycle, which will take place in March 2020. The CAISO's interconnection and transmission planning study deadlines cannot be delayed without seeking waiver from the Commission. The CAISO also requests an order by March 3, 2020 so that it may perform its studies and maintain its interconnection study deadlines for the 2020 calendar year. At a minimum, the CAISO requests an order by March 3, 2020 accepting the proposed tariff revisions described above in Sections III.A and III.D of this transmittal letter, effective March 3, 2020.

VI. Communications

In accordance to Rule 203(b)(3) to the Commission's Rules of Practice and Procedure,[115] the CAISO respectfully requests that correspondence and other communications regarding this filing should be directed to:

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VII. Service

The CAISO has served copies of this filing on the California Public Utilities Commission, the California Energy Commission, and all parties with scheduling coordinator agreements under the CAISO tariff. In addition, the CAISO has

[115] 18 C.F.R. § 385.203(b)(3).

posted a copy of this filing on the CAISO website.

VIII. Contents of Filing

Besides this transmittal letter, this filing includes these attachments:

Attachment A	Clean CAISO tariff sheets incorporating this tariff amendment;
Attachment B	Red-lined document showing the revisions in this tariff amendment;
Attachment C	Final policy papers on this tariff amendment;
Attachment D	Board memorandum;
Attachment E	On-peak deliverability assessment methodology; and
Attachment F	Off-peak deliverability assessment methodology.

IX. Conclusion

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission accept the tariff revisions proposed in the filing effective March 3, 2020.

Respectfully submitted,

/s/ William H. Weaver
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William H. Weaver
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Counsel for the California Independent System Operator Corporation

Attachment A – Clean Tariff

Deliverability Assessment Methodology Enhancements

California Independent System Operator Corporation

Appendix A

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- Area Off-Peak Constraints

A transmission system operating limit that would cause excessive curtailment to a substantial number of Generating Facilities during Off-Peak Load conditions, as described in Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website.

- Area Off-Peak Network Upgrades (AOPNUs)

A transmission upgrade or addition the CAISO identifies in the Transmission Planning Process to relieve an Area Off-Peak Constraint.

- Assigned Network Upgrade (ANU)

Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to the Interconnection Customer. Assigned Network Upgrades exclude (1) Conditionally Assigned Network Upgrades unless they become Assigned Network Upgrades, and (2) Precursor Network Upgrades.

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- Conditionally Assigned Network Upgrade (CANU)

Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to an earlier Interconnection Customer, but which may be assigned to the Interconnection Customer.

...

- Deliverability Assessment

The On-Peak Deliverability Assessment and the Off-Peak Deliverability Assessment.

- Deliverability Status

Attributes of a Generating Facility requested by an Interconnection Customer, assigned by the CAISO to the Generating Facility through the GIP, GIDAP, or other process specified in the CAISO tariff, indicating

its studied ability to deliver its Energy to Load during different modeled conditions, which affects its maximum Net Qualifying Capacity.

...

- Economic Only

Status for a Generating Facility that prohibits its Scheduling Coordinator from submitting certain Self-Schedules for Energy, as described in Section 30.5.2.

...

- Local Off-Peak Constraints

A transmission system operating limit modeled in the generator interconnection study process that would be exceeded or lead to excessive curtailment, as described in the Off-Peak Deliverability Assessment methodology, if the CAISO were to assign Off-Peak Deliverability Status to one or more Generating Facilities interconnecting to the CAISO Controlled Grid in a specific local area, and that is not an Area Off-Peak Constraint.

- Local Off-Peak Network Upgrades (LOPNUs)

A transmission upgrade or addition the CAISO identifies in the generator interconnection study process to relieve a Local Off-Peak Constraint.

...

- Off-Peak Deliverability Assessment

The technical study performed under Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website, to study if Generating Facilities can provide expected Energy to the CAISO Controlled Grid during modeled off-peak Load conditions without excessive curtailment due to transmission constraints.

- Off-Peak Deliverability Constraints

A transmission system operating limit that constrains Generating Facilities in an area, leading to the excessive curtailment of expected Energy.

- Off-Peak Deliverability Status

Status for a Generating Facility indicating it can provide expected Energy to the CAISO Controlled Grid during modeled off-peak Load conditions without excessive curtailment due to transmission constraints, and that allows its Scheduling Coordinator to submit Self-Schedules consistent with the CAISO Tariff.

- Off-Peak Network Upgrades

Network Upgrades needed to relieve Off-Peak Deliverability Constraints. Area Off-Peak Network Upgrades address Area Off-Peak Constraints. Local Off-Peak Network Upgrades address Local Off-Peak Constraints.

- On-Peak Deliverability Assessment

The technical study performed under Section 6.3.2.1 of Appendix DD and the CAISO On-Peak Deliverability Assessment posted on the CAISO Website, to determine if a Generating Facility or a group of Generating Facilities requesting Full Capacity Deliverability Status or Partial Capacity Deliverability Status can provide Energy to the CAISO Controlled Grid and be delivered to the aggregate of Load on the CAISO Controlled Grid at peak Load, under a variety of modeled stressed conditions.

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Appendix DD

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2.4.3 The Interconnection Studies.

For Interconnection Requests in Queue Cluster 5 and subsequent Queue Clusters, the Interconnection Studies consist of a Phase I Interconnection Study, a reassessment conducted prior to the commencement of a Phase II Interconnection Study, a Phase II Interconnection Study, and an update to the Phase II Interconnection Study report to reflect the results of a reassessment conducted after the TP Deliverability allocation process for the Queue Cluster.

For Interconnection Requests processed under the Independent Study Process, the Interconnection Studies consist of a system impact and facilities study, and, as applicable to Full Capacity or Partial Capacity Deliverability Status, Phase I and Phase II Interconnection Studies and a reassessment.

2.4.3.1 The Phase I Interconnection Studies

The Phase I Interconnection Studies for Queue Cluster Generating Facilities will

include, but not be limited to, short circuit/fault duty, steady state (thermal and voltage) and stability analyses. The Phase I Interconnection Studies will identify direct Interconnection Facilities and required Reliability Network Upgrades necessary to interconnect the Generating Facility, mitigate thermal overloads and voltage violations, and address short circuit, stability, and reliability issues associated with the requested Interconnection Service. The Phase I Interconnection Studies will also identify LDNUs and LOPNUs for Generating Facilities, including those being processed under the Independent Study Process, that have selected Full Capacity, Partial Capacity Deliverability Status, and Off-Peak Deliverability Status, as applicable. Such Network Upgrades shall be identified in accordance with the Deliverability Assessments set forth in Section 6.3.2. The Phase I Interconnection Studies will also provide cost estimates for ADNUs and AOPNUs, as described in Section 6.3.2. The Phase I Interconnection Study report shall include cost estimates for RNUs, LDNUs, ADNUs, LOPNUs, AOPNUs, and Participating TO Interconnection Facilities that shall, as applicable, establish the basis for the initial Interconnection Financial Security postings under Section 11.2.

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2.4.3.3 The Phase II Interconnection Studies

The Phase II Interconnection Studies will include, but not be limited to, short circuit/fault duty, steady state (thermal and voltage) and stability analyses, and will identify direct Interconnection Facilities and required RNUs necessary to interconnect the Generating Facility, mitigate thermal overloads and voltage violations, and address short circuit, stability, and reliability issues associated with the requested Interconnection Service. The Phase II Interconnection Studies shall identify LDNUs and LOPNUs for Generating Facilities participating in Phase II (including those being processed under the Independent Study Process) that have elected Full Capacity, Partial Capacity Deliverability Status, and Off-Peak Deliverability Status, as applicable, and ADNUs for Interconnection Customers selecting Option (B) in accordance with Section 7.2.

The Phase II Interconnection Study report shall also set forth the applicable cost estimates for RNUs, LDNUs, ADNUs, LOPNUs, and AOPNUs, and Participating TO Interconnection Facilities that shall, as applicable, establish the basis for the second and third Interconnection Financial Security postings under Section 11.3.

Where an Interconnection Study report identifies specific transmission facilities for Network Upgrade or Interconnection Facilities, the cost estimates determined in accordance with Section 6.4 will be set forth in present dollar costs as well as time-adjusted dollar costs, adjusted to the estimated year of expenditure for construction of the components being constructed.

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Section 3 Interconnection Requests

3.5 Processing of Interconnection Requests

3.5.1 Initiating an Interconnection Request.

To initiate an Interconnection Request, except as set forth for the Fast Track Process in Section 5, and have the Interconnection Request considered for validation under Section

3.5.2, the Interconnection Customer must submit all of the following during the Cluster Application Window, or at any time during the year for proposed Generating Facilities applying for processing under the Independent Study Process:

(i) An Interconnection Study Deposit of $150,000.

(ii) A completed application in the form of Appendix 1, including requested Deliverability statuses, requested study process (either Queue Cluster or Independent Study Process), preferred Point of Interconnection and voltage level, and all other required technical data, including all data requested in Attachment A to Appendix 1 in Excel format.

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3.6 Internet Posting

The CAISO will maintain on the CAISO Website a list of all Interconnection Requests. The list will identify, for each Interconnection Request: (i) the maximum summer and winter megawatt electrical output; (ii) the location by county and state; (iii) the station or transmission line or lines where the interconnection will be made; (iv) the most recent projected Commercial Operation Date; (v) the status of the Interconnection Request, including whether it is active or withdrawn; (vi) the availability of any studies related to the Interconnection Request; (vii) the date of the Interconnection Request; (viii) the type of Generating Facility to be constructed (e.g., combined cycle, combustion turbine, wind turbine, and fuel type); (ix) requested Deliverability statuses, and (x) project name.

Section 4 Independent Study Process

4.2.1.2 Requirement Set Number Two: for Requests for Independent Study of Behind-the-Meter Capacity Expansion of Generating Facilities

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(ii) Business criteria.

1) The Deliverability Status (Full Capacity, Partial Capacity or Energy-Only, and Off-Peak Deliverability Status or Economic Only) of the original Generating Facility will remain the same after the behind-the-meter capacity expansion. The capacity expansion will have Energy-Only, Economic Only Deliverability Statuses unless otherwise specified in this GIDAP, and the original Generating Facility and the behind-the-meter capacity expansion will be metered separately from one another and be assigned separate Resource IDs, except as set forth in (2) below.

2) If the original Generating Facility has Full Capacity Deliverability Status and/or Off-Peak Deliverability Status and the behind-the-meter capacity expansion will use the same technology as the original Generating Facility, the Interconnection Customer may elect to have the original Generating Facility and the behind-the-meter capacity expansion metered together, in which case both the original Generating Facility and the behind-the-meter capacity expansion may have Partial Capacity Deliverability Status and Off-Peak Deliverability Status, as applicable, pursuant to CAISO study results to determine Deliverability, and

a separate Resource ID will not be established for the behind-the-meter capacity expansion.

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4.6 Deliverability Assessments

Interconnection Customers under the Independent Study Process that request Partial Capacity, Full Capacity Deliverability Status, or Off-Peak Deliverability Status will be deemed to have selected Option (A) under Section 7.2 and will have Deliverability Assessments performed as part of the next scheduled Phase I and Phase II Interconnection Studies for the Queue Cluster study performed for the next Queue Cluster Window that opens after the CAISO received the request. If the Deliverability Assessment identifies any Network Upgrades that are triggered by the Interconnection Request, the Interconnection Customer will be responsible to pay its proportionate share of the costs of those Upgrades, pursuant to Sections 6, 7, and 8, and for posting Interconnection Financial Security pursuant to the rules for Interconnection Customers in Queue Clusters pursuant to Section 11. If the Generating Facility (or increase in capacity of an existing Generating Facility) achieves its Commercial Operation Date before the Deliverability Assessment is completed and before any necessary Delivery Network Upgrades are in service, the proposed Generating Facility (or increase in capacity) will be treated as an Energy-Only, Interim, or Partial Capacity Deliverability Status Generating Facility until such Delivery Network Upgrades are in service. This Section shall not apply to Interconnection Customers requesting behind-the-meter capacity expansion under Section 4.2.1.2. Separate rules regarding the Deliverability Status of such requests are set forth in that Section.

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4.8 Generator Interconnection Agreement

An Interconnection Customer in the Independent Study Process that requests Off-Peak Deliverability Status, Partial Capacity or Full Capacity Deliverability Status must still negotiate and execute a GIA reflecting Economic Only and Energy-Only Deliverability Status pursuant to the requirements and timelines set forth in Section 13. Upon the completion of the Deliverability Assessments per Section 4.6, the Interconnection Customer's GIA will be amended as appropriate to reflect the results thereof.

Section 5 Fast Track Process

5.1 Applicability and Initiation of Fast Track Process Request

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5.2.1 Screens

5.2.1.1 The proposed Generating Facility's Point of Interconnection must be on the CAISO Controlled Grid.

5.2.1.2 For interconnection of a proposed Generating Facility to a radial transmission circuit on the CAISO controlled grid, the aggregated generation on the circuit, including the proposed Generating Facility, shall not exceed 15 percent of the line section annual peak load as most recently measured at the substation. For purposes of this Section 5.2.1.2, a line section shall be considered as that portion of a Participating TO's electric system connected to a customer bounded by automatic sectionalizing devices or the end of the transmission line.

This screen will not be required for a proposed interconnection of a Generating Facility to a radial transmission circuit with no load.

In cases where the circuit lacks the telemetry needed to provide the annual peak load measurement data, the CAISO shall use power flow cases from the latest completed Queue Cluster studies (either Phase I or Phase II) to perform this screen.

5.2.1.3 For Generating Facilities requesting Off-Peak Deliverability Status, the CAISO can determine that the Generating Facility can receive Off-Peak Deliverability Status without participating in the Off-Peak Deliverability Assessment and without Off-Peak Network Upgrades.

5.2.1.4 The proposed Generating Facility, in aggregate with other Generating Facilities on the transmission circuit, shall not contribute more than 10 percent to the transmission circuit's maximum fault current at the point on the high voltage (primary) level nearest the proposed point of change of ownership.

The CAISO shall use the short circuit study data from the latest completed Queue Cluster studies (either Phase I or Phase II) to test this screen.

5.2.1.5 The proposed Generating Facility, in aggregate with other Generating Facilities on the transmission circuit, shall not cause any transmission protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Customer equipment on the system to exceed 87.5 percent of the short circuit interrupting capability; nor shall the interconnection be proposed for a circuit that already exceeds 87.5 percent of the short circuit interrupting capability.

The CAISO shall use the short circuit study data from the most recently completed Queue Cluster studies (either Phase I or Phase II) to test this screen.

5.2.1.6 A Generating Facility will fail this initial review, but will be eligible for a supplemental review, if it proposes to interconnect in an area where there are known transient stability, voltage, or thermal limitations identified in the most recently completed Queue Cluster studies or transmission planning process.

5.2.1.7 No construction of facilities by a Participating TO on its own system shall be required to accommodate the proposed Generating Facility.

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Section 6 Initial Activities and Phase I of the Interconnection Study Process for Queue Clusters

The provisions of this Section 6 shall apply to all Interconnection Requests except those processed under the Independent Study Process selecting Energy Only Deliverability Status, the Fast Track Process, or the 10 kW inverter process as set forth in Appendix 7.

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6.2. Scope and Purpose of Phase I Interconnection Study

The Phase I Interconnection Study shall:

(i) evaluate the impact of all Interconnection Requests received during the Cluster Application Window for a particular year on the CAISO Controlled Grid;

(ii) preliminarily identify all LDNUs, LOPNUs, and RNUs needed to address the impacts on the CAISO Controlled Grid of the Interconnection Requests, as Assigned Network Upgrades or Conditionally Assigned Network Upgrades;

(iii) preliminarily identify for each Interconnection Request required Interconnection Facilities;

(iv) assess the Point of Interconnection selected by each Interconnection Customer and potential alternatives to evaluate potential efficiencies in overall transmission upgrades costs;

(v) establish the Current Cost Responsibility, Maximum Cost Responsibility, and Maximum Cost Exposure for each Interconnection Request, until the issuance of the Phase II Interconnection Study report;

(vi) provide a good faith estimate of the cost of Interconnection Facilities for each Interconnection Request;

(vii) provide a cost estimate of ADNUs and AOPNUs for each Generating Facility in a Queue Cluster Group Study;

(viii) identify any Precursor Network Upgrades; and

(ix) identify RNUs as GRNUs or IRNUs.

The Phase I Interconnection Study will consist of a short circuit analysis, a stability analysis to the extent the CAISO and applicable Participating TO(s) reasonably expect transient or voltage stability concerns, a power flow analysis, including off-peak analysis, an On-Peak Deliverability Assessment, and an Off-Peak Deliverability Assessment for the purpose of identifying LDNUs and LOPNUs and estimating the cost of ADNUs and AOPNUs, as applicable.

The Phase I Interconnection Study will state for each Group Study or Interconnection Request studied individually (i) the assumptions upon which it is based, (ii) the results of the analyses, and (iii) the requirements or potential impediments to providing the requested Interconnection Service to all Interconnection Requests in a Group Study or to the Interconnection Request studied individually.

The Phase I Interconnection Study will provide, without regard to the requested Commercial Operation Dates of the Interconnection Requests, a list of RNUs, LOPNUs, and LDNUs to the CAISO Controlled Grid that are preliminarily identified as Assigned Network Upgrades or Conditionally Assigned Network Upgrades required as a result of the Interconnection Requests in a Group Study or as a result of any Interconnection Request studied individually and Participating TO's Interconnection Facilities associated with each Interconnection Request, the estimated costs of ADNUs and AOPNUs, if applicable, and an estimate of any other financial impacts (i.e., on Local Furnishing Bonds).

6.3 Identification of and Cost Allocation for Network Upgrades

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6.3.2 Delivery Network Upgrades.

6.3.2.1 The On-Peak Deliverability Assessment.

The CAISO, in coordination with the applicable Participating TO(s), shall perform On-Peak Deliverability Assessments for Interconnection Customers selecting Full Capacity or Partial Capacity Deliverability Status in their Interconnection Requests. Interconnection Customers may request Full or Partial Capacity Deliverability Status regardless of their requested Off-Peak Deliverability Status. The On-Peak Deliverability Assessment shall determine the Interconnection Customer's Generating Facility's ability to deliver its Energy to the CAISO Controlled Grid under peak load conditions, and identify preliminary Delivery Network Upgrades required to provide the Generating Facility with Full Capacity or Partial Capacity Deliverability Status. The Deliverability Assessment will consist of two rounds, the first of which will identify any transmission constraints that limit the Deliverability of the Generating Facilities in the Group Study and will identify LDNUs to relieve the local constraints, and second of which will determine ADNUs to relieve the area constraints. The On-Peak Deliverability Assessment does not convey any right to deliver electricity to any specific customer or Delivery Point, nor guarantee any level of deliverability, or transmission capacity, or avoided curtailment.

6.3.2.1.1 Local Delivery Network Upgrades

The On-Peak Deliverability Assessment will be used to establish the Maximum Cost Responsibility and Maximum Cost Exposure for LDNUs for each Interconnection Customer selecting Full Capacity or Partial Capacity Deliverability Status. Deliverability of a new Generating Facility will be assessed on the same basis as all existing resources interconnected to the CAISO Controlled Grid.

The methodology for the On-Peak Deliverability Assessment will be published on the CAISO Website or, when effective, included in a CAISO Business Practice Manual. The On-Peak Deliverability Assessment does not convey any right to deliver electricity to any specific customer or Delivery Point.

The cost of LDNUs identified in the On-Peak Deliverability Assessment as part of a Phase I Interconnection Study shall be estimated in accordance with Section 6.4. The estimated costs of Delivery Network Upgrades identified in the On-Peak Deliverability Assessment shall be assigned to all Interconnection Requests selecting Full Capacity or Partial Capacity Deliverability Status based on the flow impact of each such Generating Facility on the Delivery Network Upgrades as determined by the Generation distribution factor methodology set forth in the On-Peak Deliverability Assessment methodology.

6.3.2.1.2 Area Delivery Network Upgrades

The On-Peak Deliverability Assessment will be used in the Phase I Interconnection Studies to identify those facilities necessary to provide the incremental Deliverability between the level of TP Deliverability and such additional amount of

Deliverability as is necessary for the MW capacity amount of generation targeted in the Phase I Interconnection Studies. Based on such facility cost estimates, the CAISO will calculate a rate for ADNU costs equal to the facility cost estimate divided by the additional amount of Deliverability targeted in the study. The Phase I Interconnection Studies shall provide a cost estimate for each Interconnection Customer which equals the rate multiplied by the requested deliverable MW capacity of the Generating Facility in the Interconnection Request.

6.3.2.1.3 [Intentionally Omitted]

6.3.2.2 Off-Peak Deliverability Assessment.

The CAISO, in coordination with the applicable Participating TO(s), shall perform an Off-Peak Deliverability Assessment for Interconnection Customers selecting Off-Peak Deliverability Status. The Off-Peak Deliverability Assessment will identify transmission upgrades in addition to those Delivery Network Upgrades identified in the On-Peak Deliverability Assessment, if any, for a Group Study or individual Phase I Interconnection Study that includes one or more Location Constrained Resource Interconnection Generators (LCRIG), where the fuel source or source of energy for the LCRIG substantially occurs during off-peak conditions. Interconnection Customers that (i) are not LCRIGs whose fuel source of source of energy substantially occurs off-peak, and (ii) have Full or Partial Capacity Deliverability Status, will receive Off-Peak Deliverability Status without triggering Off-Peak Network Upgrades. Energy Only Interconnection Customers that are not LCRIGs whose fuel source of source of energy substantially occurs off-peak will be Economic Only. LCRIGs whose fuel source of source of energy substantially occurs off-peak will received Off-Peak Deliverability Status based upon the Off-Peak Deliverability Assessment, regardless of their On-Peak Deliverability Status.

The transmission upgrades identified under this Section shall comprise those needed for the expected output of each proposed new LCRIG or the amount of megawatt increase in the generating capacity of each existing LCRIG as listed by the Interconnection Customer in its Interconnection Request, whether studied individually or as a Group Study, to be deliverable to the aggregate of Load on the CAISO Controlled Grid under the Generation dispatch conditions studied without excessive curtailment. The methodology for the Off-Peak Deliverability Assessment will be published on the CAISO Website or, if applicable, included in a CAISO Business Practice Manual.

The CAISO will perform the Off-Peak Deliverability Assessment to identify Off-Peak Network Upgrades required for Generating Facilities to achieve Off-Peak Deliverability Status, and any such upgrades identified in the Off-Peak Deliverability Assessment as part of the Phase I Interconnection Study shall be estimated in accordance with Section 6.4. The Off-Peak Deliverability Assessment does not convey any right to deliver electricity to any specific customer or Delivery Point, nor guarantee any level of deliverability, or transmission capacity, or avoided curtailment.

The estimated costs of Local Off-Peak Network Upgrades identified in the Off-Peak Deliverability Assessment will be assigned or conditionally assigned to Interconnection Requests selecting Off-Peak Deliverability Status based on the flow impact of each such Generating Facility on the Off-Peak Network Upgrades

as determined by the Generation distribution factor methodology set forth in the Off-Peak Deliverability Assessment methodology.

The estimated costs of Area Off-Peak Network Upgrades are for information only and not assigned to any Interconnection Requests.

6.3.2.3 Transition to Off-Peak Deliverability Status

Active CAISO Interconnection Requests received before March 3, 2020 for Energy Only Generating Facilities that would be eligible to receive Off-Peak Deliverability Status pursuant to this Section 6.3.2 will have a one-time opportunity to request Off-Peak Deliverability Status. Notwithstanding any provision of this GIDAP, if such Interconnection Customers request Off-Peak Deliverability Status, the CAISO will study those requests in the next Interconnection Study, and assign any required Local Off-Peak Network Upgrades to them pursuant to this Section 6.3.2, and their Interconnection Studies will be amended to include the assigned costs for those Network Upgrades. Such Interconnection Customers' GIAs, Current Cost Responsibilities, Maximum Cost Responsibilities, and Maximum Cost Exposures also will be amended to reflect the additional costs of assigned Local Off-Peak Network Upgrades.
All CAISO Interconnection Requests for Full Capacity Deliverability Status or Partial Capacity Deliverability Status received before March 3, 2020 will automatically receive Off-Peak Deliverability Status. All CAISO Interconnection Requests received before March 3, 2020 for Generating Facilities that are not Location Constrained Resource Interconnection Generators, regardless of Deliverability Status, will automatically receive Off-Peak Deliverability Status.

Interconnection Customers that achieved their Commercial Operation Date before March 3, 2020 will have Off-Peak Deliverability Status pursuant to Sections 30.5.2.2.1 and 30.5.6.1 of the CAISO Tariff.

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6.7.2 Modifications.

6.7.2.1 At any time during the course of the Interconnection Studies, the Interconnection Customer, the applicable Participating TO(s), or the CAISO may identify changes to the planned interconnection that may improve the costs and benefits (including reliability) of the interconnection, and the ability of the proposed change to accommodate the Interconnection Request. To the extent the identified changes are acceptable to the applicable Participating TO(s), the CAISO, and Interconnection Customer, such acceptance not to be unreasonably withheld, the CAISO shall modify the Point of Interconnection and/or configuration in accordance with such changes without altering the Interconnection Request's eligibility for participating in Interconnection Studies.

6.7.2.2 At the Phase I Interconnection Study Results Meeting, the Interconnection Customer should be prepared to discuss any desired modifications to the Interconnection Request. After the issuance of the final Phase I Interconnection Study, but no later than ten (10) Business Days following the Phase I Interconnection Study Results Meeting, the Interconnection Customer shall submit to the CAISO, in writing, modifications to any information provided in the Interconnection Request. The CAISO will forward the Interconnection Customer's modification to the applicable Participating TO(s) within one (1)

Business Day of receipt.

Modifications permitted under this Section shall include specifically: (a) a decrease in the electrical output (MW) of the proposed project; (b) modifying the technical parameters associated with the Generating Facility technology or the Generating Facility step-up transformer impedance characteristics; (c) modifying the interconnection configuration; (d) modifying the In-Service Date, Initial Synchronization Date, Trial Operation Date, and/or Commercial Operation Date that meets the criteria set forth in Section 3.5.1.4 and is acceptable to the applicable Participating TO(s) and the CAISO, such acceptance not to be unreasonably withheld; (e) change in Point of Interconnection as set forth in Section 6.7.2.1; (f) change in Deliverability Status to Energy Only Deliverability Status, Partial Capacity Deliverability Status, or a lower fraction of Partial Capacity Deliverability Status; and (g) change from Off-Peak Deliverability Status to Economic Only.

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7.2 Full/Partial Capacity Deliverability Options for Interconnection Customers

This section applies to Interconnection Requests for which the Generating Facility Deliverability Status is either Full Capacity or Partial Capacity.

Within such Appendix B, the Interconnection Customer must select one of two options with respect to its Generating Facility:

Option (A), which means that the Generating Facility requires TP Deliverability to be able to continue to Commercial Operation. If the Interconnection Customer selects Option (A), then the Interconnection Customer shall be required to make an initial posting of Interconnection Financial Security under Section 11.2 for the cost responsibility assigned to it in the Phase I Interconnection Study for RNUs, LOPNUs, and LDNUs; or,

Option (B), which means that the Interconnection Customer will assume cost responsibility for Delivery Network Upgrades (both ADNUs and LDNUs, to the extent applicable) without cash repayment under Section 14.2.1 to the extent that sufficient TP Deliverability is not allocated to the Generating Facility to provide its requested Deliverability Status. If the Interconnection Customer selects Option (B) then the Interconnection Customer shall be required to make an initial posting of Interconnection Financial Security under Section 11.2 for the cost responsibility assigned to it in the Phase I Interconnection Study for RNUs, LDNUs, LOPNUs, and ADNUs. To qualify to receive any allocation of TP Deliverability, Interconnection Customers selecting Option (B) must still meet the minimum criteria identified in Section 8.9.2.

7.3 Postings and Cost Estimates for Network Upgrades

Notwithstanding the Interconnection Customer’s Maximum Cost Responsibility and Maximum Cost Exposure, until such time as the Phase II Interconnection Study report is issued to the Interconnection Customer, the allocated costs for Assigned Network Upgrades for each Interconnection Customer for RNUs, LOPNUs, and LDNUs in the Phase I Interconnection Study report shall establish the value for

(i) each Interconnection Customer's Current Cost Responsibility; and

(ii) the initial posting of Interconnection Financial Security required from each Interconnection Customer under Section 11.2 for such Network Upgrades.

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Section 8 Phase II Interconnection Study and TP Deliverability Allocation Processes

The provisions of this Section 8 shall apply to all Interconnection Requests under this GIDAP except those processed under the Independent Study Process selecting Energy Only Deliverability Status, the Fast Track Process, or the 10 kW inverter process.

8.1 Scope of Phase II Interconnection Study

8.1.1 Purpose of the Phase II Interconnection Study

The CAISO, in coordination with the applicable Participating TO(s), will conduct a Phase II Interconnection Study that will incorporate eligible Interconnection Requests from the previous Phase I Interconnection Study. The Phase II Interconnection Study shall:

(i) update, as necessary, analyses performed in the Phase I Interconnection Studies to account for the withdrawal of Interconnection Requests from the current Queue Cluster;

(ii) identify final GRNUs and IRNUs needed in order to achieve Commercial Operation status for the Generating Facilities and provide final cost estimates;

(iii) identify final LDNUs needed to interconnect those Generating Facilities selecting Full Capacity or Partial Capacity Deliverability Status and provide final cost estimates;

(iv) identify final ADNUs for Interconnection Customers selecting Option (B), as provided below and provide revised cost estimates;

(v) identify, for each Interconnection Request, the Participating TO's Interconnection Facilities for the final Point of Interconnection and provide a +/-20% cost estimate;

(vi) coordinate in-service timing requirements based on operational studies in order to facilitate achievement of the Commercial Operation Dates of the Generating Facilities;

(vii) update the Interconnection Customer's Current Cost Responsibility, Maximum Cost Responsibility, and Maximum Cost Exposure, as applicable;

(viii) provide updated Precursor Network Upgrades needed to achieve the Commercial Operation status and Deliverability Status for the Generating Facilities; and

(ix) and identify LOPNUs needed for Generating Facilities selecting Off-Peak Deliverability Status, and provide final cost estimates.

The Phase II Interconnection Study report shall set forth the applicable cost estimates for Network Upgrades and Participating TOs Interconnection Facilities that shall be the basis for Interconnection Financial Security Postings under Section 11.3. Where the Maximum Cost Responsibility is based upon the Phase I Interconnection Study (because it is lower under Section 10.1), the Phase II Interconnection Study report shall recite this fact.

To the extent the CAISO determines that previously identified Conditionally Assigned Network Upgrades become Precursor Network Upgrades pursuant to Section 14.2.2, or are otherwise removed, the CAISO will reduce the Interconnection Customer's Maximum Cost Exposure, as applicable. To the extent the CAISO determines that a Conditionally

Assigned Network Upgrade becomes an Assigned Network Upgrade, the CAISO will adjust the Interconnection Customer's Current Cost Responsibility and Maximum Cost Responsibility.

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8.2 Determining Phase II Network Upgrades

8.2.1 Reliability Network Upgrades, Local Delivery Network Upgrades, and Local Off-Peak Network Upgrades

RNUs, LOPNUs, and LDNUs will be identified on the basis of all Interconnection Customers in the current Queue Cluster regardless of whether they have selected Option (A) or (B).

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8.4.1 Cost Responsibility for Local Off-Peak Network Upgrades

The estimated costs of Local Off-Peak Network Upgrades identified in the Off-Peak Deliverability Assessment will be assigned or conditionally assigned to Interconnection Requests selecting Off-Peak Deliverability Status based on the flow impact of each such Generating Facility on the Off-Peak Network Upgrades as determined by the Generation distribution factor methodology set forth in the Off-Peak Deliverability Assessment methodology.

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Section 9 Additional Deliverability Assessment Options

9.1 2020 One-Time TP Deliverability Allocation Process

Notwithstanding the allocation order described in Section 8.9.2, following the process set forth in Section 8.9.1, the CAISO will allocate any remaining TP Deliverability in the following order for the 2020 TP Deliverability allocation cycle. Following the 2020 allocation cycle, this Section 9.1 will not be used, and the CAISO will allocate TP Deliverability pursuant to Section 8.9.2. All other provisions of Section 8.9 will apply to the 2020 allocation cycle unless expressly excepted in this Section 9.1.

The CAISO will allocate available TP Deliverability to all or a portion of the full MW capacity of the Generating Facility as specified in the Interconnection Request. Where a criterion is met by a portion of the full MW generating capacity of the Generating Facility, the eligibility score associated with that criterion will apply to the portion that meets the criterion. The demonstration must relate to the same proposed Generating Facility as described in the Interconnection Request. The CAISO will allocate TP Deliverability in the following order:

(1) To Interconnection Customers in the current Queue Cluster or coming out of parking that have executed power purchase agreements, and to Interconnection Customers in the current Queue Cluster that are Load Serving Entities serving their own Load.

(2) To Interconnection Customers in the current Queue Cluster or coming out of parking that are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement.

(3) To Energy Only Interconnection Customers that have not achieved their Commercial Operation Date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and have executed power purchase agreements; and to Energy Only Interconnection Customers that have achieved their Commercial Operation Date

and have executed power purchase agreements.

(4) To Energy Only Interconnection Customers that have not achieved their Commercial Operation Date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; and to Energy Only Interconnection Customers that have achieved their Commercial Operation Date and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement.

(5) To Energy Only Interconnection Customers that originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status but achieved their Commercial Operation Date as Energy Only.

(6) To Energy Only Interconnection Customers that achieved their Commercial Operation Date.

(7) To Interconnection Customers, including Interconnection Customers that have parked, that elect to proceed without a power purchase agreement, and elect to be subject to Section 8.9.2.2.

Only groups one and two and Interconnection Customers in group seven that have not converted to Energy Only may trigger the construction of new Delivery Network Upgrades pursuant to Section 6.3.2. The CAISO will allocate TP Deliverability to groups three, four, five, six, and Energy Only Interconnection Customers in group seven based on TP Deliverability available from existing transmission facilities, from already approved upgrades in the CAISO Transmission Planning Process, or upgrades under construction.
Energy Only Interconnection Customers requesting Deliverability must submit to the CAISO a $60,000 study deposit for each Interconnection Request seeking TP Deliverability. The CAISO will deposit these funds in an interest bearing account at a bank or financial institution designated by the CAISO. The funds will be applied to pay for prudent costs incurred by the CAISO, the Participating TO(s), and/or third parties at the direction of the CAISO or applicable Participating TO(s), as applicable, to perform and administer the TP Deliverability studies for the Energy Only Interconnection Customers. Any and all costs of the Energy Only TP Deliverability study will be borne by the Interconnection Customer. The CAISO will coordinate the study with the Participating TO(s). The Participating TO(s) will invoice the CAISO for any work within seventy-five (75) calendar days of completion of the study, and, within thirty (30) days thereafter, the CAISO will issue an invoice or refund to the Interconnection Customer, as applicable, based upon such submitted Participating TO invoices and the CAISO's own costs for the study. If the actual costs of the study are greater than the deposit provided by the Interconnection Customer, the Interconnection Customer will pay the balance within thirty (30) days of being invoiced.

All power purchase agreements in this Section 9.1 must require Deliverability for the Interconnection Customer to represent that it has, is negotiating, or is shortlisted for a power purchase agreement. For all TP Deliverability allocations based upon having, negotiating, or being shortlisted for power purchase agreements, the CAISO will allocate TP Deliverability up to the amount of deliverable MW capacity procured by the power purchase agreement. All Load Serving Entities building Generating Facilities to serve their own Load must be doing so to fulfill a regulatory requirement that warrants Deliverability. Load Serving Entities acting as Interconnection Customers are otherwise eligible for all other attestations.

Interconnection Customers will be assigned a numerical score reflecting their demonstration of having met the criteria described in 8.9.2.1 under the methodology set forth in the Business Practice Manual, and a fourth criteria:

(4) Commercial Operation Date

a. The Interconnection Customer's Commercial Operation Date is in 2020 or earlier.

b. The Interconnection Customer's Commercial Operation Date is in 2021.

c. The Interconnection Customer's Commercial Operation Date is in 2022.

d. The Interconnection Customer's Commercial Operation Date is in 2023.

In allocating TP Deliverability, in a situation where the TP Deliverability cannot accommodate all of the Interconnection Customers in a qualifying group, the CAISO will allocate TP Deliverability based on the highest numerical score. In a situation where the available amount of TP Deliverability cannot accommodate all Interconnection Customers with equal scores, the CAISO will allocate the TP Deliverability to the Interconnection Customers with the lowest LDNU cost estimates, then based on the weighted least square algorithm. For all TP Deliverability allocations based upon having, negotiating, or being shortlisted for power purchase agreements, the CAISO will allocate TP Deliverability up to the amount of deliverable MW capacity procured by the power purchase agreement.

9.2 [Intentionally Omitted]

Section 10 Cost Responsibility for Interconnection Customers

10.1 Interconnection Customers in a Queue Cluster.

(a) RNUs, LOPNUs, and LDNUs. The Interconnection Studies will establish Interconnection Customers' Current Cost Responsibility, Maximum Cost Responsibility, and Maximum Cost Exposure consistent with the cost allocations described in Section 8. The CAISO will adjust Interconnection Customers' cost responsibilities as described in this GIDAP. Interconnection Customers will post Interconnection Financial Security based on their Current Cost Responsibility.

(b) AOPNUs and ADNUs. Interconnection Customers selecting Option (A) do not post Interconnection Financial Security for ADNUs. Interconnection Customers do not post Interconnection Financial Security for AOPNUs. The Current Cost Responsibility provided in the Phase I Interconnection Studies establishes the basis for the initial Interconnection Financial Security Posting under Section 11.2. For Interconnection Customers selecting Option (B), the Phase II Interconnection Studies shall refresh the Current Cost Responsibility for ADNUs and shall provide the basis for second and third Interconnection Financial Postings as specified in Section 11.

The ADNU and AOPNU cost estimates provided in any Interconnection Study report are estimates only and do not provide a maximum value for cost responsibility to an Interconnection Customer for ADNUs or AOPNUs. However, subsequent to the Interconnection Customer's receipt of its Phase II Interconnection Study report, an Interconnection Customer having selected Option (B) may have its ADNUs adjusted in the reassessment process undertaken under Section 7.4. Accordingly, for such Interconnection Customers, the most recent annual reassessment undertaken under Section 7.4 shall provide the most recent cost estimates for the Interconnection Customer's ADNUs.

10.2 Interconnection Customers in the Independent Study Process.

(a) Assigned Network Upgrades. The Current Cost Responsibility for the Interconnection

Customer's Financial Security for RNUs shall be established by the costs for such Network Upgrades assigned to the Interconnection Customer in the final system impact and facilities study report.

For such Interconnection Customers choosing Full Capacity or Partial Capacity Deliverability status, the maximum value of LDNUs shall be established by 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.

For such Interconnection Customers choosing Off-Peak Deliverability Status, the maximum value of LOPNUs will be established by 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.

The Interconnection Customer's Maximum Cost Responsibility shall be subject to further adjustment based on the results of the annual reassessment process, as set forth in Section 7.4.

(b) ADNUs and AOPNUs. Interconnection Customers selecting Option (A) do not post Interconnection Financial Security for ADNUs. The Current Cost Responsibility provided in the Phase I Interconnection Studies establishes the basis for the initial Interconnection Financial Security posting under Section 11.2. For Interconnection Customers selecting Option (B), the Phase II Interconnection Studies shall refresh the Current Cost Responsibility for ADNUs and shall provide the basis for second and third Interconnection Financial Postings as specified in Section 11.

The ADNU cost estimates provided in any study report are estimates only and do not provide a maximum value for cost responsibility to an Interconnection Customer for ADNUs However, subsequent to the Interconnection Customer's receipt of its Phase II Interconnection Study report, an Interconnection Customer having selected Option (B) may have its ADNU adjusted in the reassessment process undertaken under Section 7.4.

Interconnection Customers do not post Interconnection Financial Security for AOPNUs.

…

11.2.3 Posting Amount for Network Upgrades.

11.2.3.1 Small Generator Interconnection Customers

Each Interconnection Customer for a Small Generating Facility assigned to a Queue Cluster shall post an Interconnection Financial Security instrument as follows:

1) Interconnection Customers selecting Energy Only Deliverability Status must post for assigned RNUs and assigned LOPNUs, if any.

The posting amount for such RNUs and LOPNUs shall equal the lesser of fifteen percent (15%) of the Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades or (ii) $20,000 per megawatt of electrical output of the Small Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, but in no event less than $50,000.

2) Interconnection Customers selecting Option (A) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LOPNUs, and LDNUs, if any.

The posting amount for such RNUs, LOPNUs, and LDNUs shall equal the lesser of fifteen percent (15%) of the Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades or (ii) $20,000 per megawatt of electrical output of the Small Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, but in no event less than $50,000.

3) Interconnection Customers selecting Option (B) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LDNUs, LOPNUs, and ADNUs, if any.

The posting amount for such RNUs, LDNUs, LOPNUs, and ADNUs shall equal the lesser of fifteen percent (15%) of the ADNU costs and total Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades or (ii) $20,000 per megawatt of electrical output of the Small Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, but in no event less than $50,000.

11.2.3.2 Large Generator Interconnection Customers

Each Interconnection Customer for a Large Generating Facility assigned to a Queue Cluster shall post an Interconnection Financial Security instrument as follows:

1) Interconnection Customers selecting Energy Only Deliverability Status must post for assigned RNUs and assigned LOPNUs, if any.

The posting amount for such RNUs and LOPNUs shall equal the lesser of (i) fifteen percent (15%) of the total RNU Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades, (ii) $20,000 per megawatt of electrical output of the Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, or (iii) $7,500,000, but in no event less than $500,000.

In addition, if an Interconnection Customer switches its status from Full Capacity Deliverability Status or Partial Capacity Deliverability Status to Energy-Only Deliverability Status within ten (10) Business Days following the Phase I Interconnection Study Results Meeting, the required Interconnection Financial Security for Network Upgrades shall, for purposes of this section, be additionally capped at an amount no greater than the Current Cost Responsibility assigned to the Interconnection Customer in the Phase I Interconnection Study for Reliability Network Upgrades.

2) Interconnection Customers selecting Option (A) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LOPNUs, and LDNUs, if any.

The posting amount for such RNUs and LDNUs shall equal the lesser of (i) fifteen percent (15%) of the Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades, (ii) $20,000 per megawatt of electrical output of the Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, or (iii) $7,500,000, but in no event less than $500,000.

3) Interconnection Customers selecting Option (B) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LDNUs, LOPNUs, and ADNUs, if any.

The posting amount for such RNUs, LDNUs, LOPNUs, and ADNUs shall equal the lesser of (i) fifteen percent (15%) of the ADNU costs and the total Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades, (ii) $20,000 per megawatt of electrical output of the Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, or (iii) $7,500,000, but in no event less than $500,000.

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11.3.1.3 Posting Requirements and Timing for Parked Option (A) Generating Facilities

For an Interconnection Customer choosing Option (A) whose Generating Facility was not allocated TP Deliverability in either the first TP Deliverability allocation following its receipt of the final Phase II Interconnection Study or the TP Deliverability allocation after parking, and who chooses to park the Interconnection Request, the posting due date will be extended by 12 months consistent with each parking election after the initial allocation process.

For an Interconnection Customer choosing Option (A) whose Generating Facility was allocated TP Deliverability for less than the full amount of its Interconnection Request, and who chooses to seek additional TP Deliverability for the remainder of the requested Deliverability of the Interconnection Request in the next allocation cycle, the postings for RNU, Participating TO Interconnection Facilities, LOPNUs, and for LDNUs corresponding to the initial allocation of TP Deliverability will be due in accordance with the dates specified in this Section 11. The posting due date for the LDNUs corresponding to the remainder of the requested Deliverability will be extended by 12 months consistent with each parking election after the initial allocation process.

11.3.1.4 Network Upgrade Posting Amounts

11.3.1.4.1 Small Generator Interconnection Customers

Each Interconnection Customer for a Small Generating Facility assigned to a Queue Cluster or an Interconnection Customer for a Small Generating Facility in the Independent Study Process shall post an Interconnection Financial Security instrument that brings the security amount up to the following:

1) For Interconnection Customers selecting Energy Only Deliverability Status: the lesser of (i) $1 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs and LOPNUs in either the final Phase II Interconnection Study report, or for Independent Study Process Interconnection Customers, the system impact and facilities study. In no event shall the total amount posted be less than $100,000.

2) For Interconnection Customers who have Option (A) Generating Facilities, the lesser of (i) $1 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study.

However, in no event shall the total amount posted be less than $100,000.

3) For Interconnection Customers who have Option (B) Generating Facilities: the lesser of (i) $1 million or (ii) the sum of:

   (a) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study; plus

   (b) thirty (30) percent of the cost responsibility assigned to the Interconnection Customer for ADNUs in the final Phase II Interconnection Study. However, to the extent that the Option (B) Interconnection Customer's Generating Facility is allocated TP Deliverability, the cost responsibility assigned to the Interconnection Customer for ADNUs will be adjusted to reflect the allocation of TP Deliverability. If the allocation of TP Deliverability is for the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will equal zero (0). If the allocation of TP Deliverability is less than the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will be reduced pro rata.

However, in no event shall the total amount posted be less than $100,000.

11.3.1.4.2 Large Generator Interconnection Customers

Each Interconnection Customer for a Large Generating Facility assigned to a Queue Cluster and each Interconnection Customer for a Large Generating Facility in the Independent Study Process shall post an Interconnection Financial Security instrument that brings the security amount up to the following:

1) For Interconnection Customers selecting Energy Only Deliverability Status: the lesser of (i) $15 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs and LOPNUs in the, final Phase II Interconnection Study, system impact and facilities study. In no event shall the total amount posted be less than $500,000.

2) For Interconnection Customers, who have Option (A) Generating Facilities the lesser of (i) $15 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study.

However, in no event shall the total amount posted be less than $500,000.

3) For Interconnection Customers who have Option (B) Generating Facilities: the lesser of (i) $15 million or (ii) the sum of:

   (a) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study; plus

   (b) thirty (30) percent of the cost responsibility assigned to the Interconnection Customer for ADNUs in the final Phase II Interconnection Study. However, to the extent that the Option (B) Interconnection Customer's Generating Facility is allocated TP Deliverability, the cost responsibility assigned to the Interconnection Customer for ADNUs will be adjusted to reflect the allocation of TP Deliverability. If the allocation of TP Deliverability is for the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will equal zero (0). If the allocation of TP Deliverability is less than the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will be reduced pro rata.

However, in no event shall the total amount posted be less than $500,000.

...

14.3.1 Initial Funding

Assigned Network Upgrades shall be funded by the Interconnection Customer(s) either by means of drawing down the Interconnection Financial Security or by the provision of additional capital, at each Interconnection Customer's election, up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to each Interconnection Customer(s). Current Cost Responsibility may be adjusted consistent with this GIDAP and up to the Interconnection Customer's Maximum Cost Responsibility, but the applicable Participating TO(s) shall be responsible for funding any capital costs for the Assigned Network Upgrades that exceed the Current Cost Responsibility assigned to the Interconnection Customer(s).

(a) Where the funding responsibility for any RNUs, LOPNUs, and LDNUs has been assigned to a single Interconnection Customer, the applicable Participating TO(s) shall invoice the Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to each Interconnection Customer(s) for the RNUs, LOPNUs, or LDNUs, respectively.

(b) Where the funding responsibility for an RNU, LOPNU, or LDNU has been assigned to more than one Interconnection Customer in accordance with this GIDAP, the applicable Participating TO(s) shall invoice each Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, for such Network Upgrades in accordance with their respective Current Cost Responsibilities. Each Interconnection Customer may be invoiced up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to that Interconnection Customer.

(c) Where the funding responsibility for an ADNU being constructed by one or more Participating TO has been assigned to more than one Option (B) Interconnection Customer, the applicable Participating TO(s) shall invoice each Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, for such ADNUs based on their respective Current Cost Responsibilities.

Any permissible extension of the Commercial Operation Date of a Generating Facility will not alter the Interconnection Customer's obligation to finance its Assigned Network Upgrades where the Network Upgrades are required to meet the earlier Commercial Operation Date(s) of other Generating Facilities that have also been assigned cost responsibility for the Network Upgrades.

14.3.2 Repayment of Amounts Advanced for Network Upgrades and Refund of Interconnection Financial Security

14.3.2.1 Repayment of Amounts Advanced Regarding Non-Phased Generating Facilities

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 5 or earlier, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has been tendered a Generator Interconnection Agreement before December 19, 2014, shall be entitled to a repayment for the Interconnection Customer's contribution to the cost of Network Upgrades commencing upon the Commercial Operation Date of its Generating Facility.

An Interconnection Customer with a non-Phased Generating Facility in Queue

Cluster 6 or later, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has not been tendered an Interconnection Agreement before December 19, 2014, shall be entitled to repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed in service on or before the Commercial Operation Date of its Generating Facility, commencing upon the Commercial Operation Date of the Generating Facility. Repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed into service after the Commercial Operation Date of its Generating Facility shall, for each of these Network Upgrades, commence no later than the later of: (i) the first month of the calendar year following the year in which the Network Upgrade is placed into service or (ii) 90 days after the Network Upgrade is placed into service.

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:

(1) 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. The CAISO will publish an annual inflation factor and adjusted amount for this figure with the per unit cost publication on the CAISO Website pursuant to Section 6.4 of this GIDAP. Interconnection Customers will be entitled to repayment subject to the figure corresponding to their Commercial Operation Date.

(2) For LDNUs and LOPNUs, except for LDNUs for Option (B) Generating Facilities that were not allocated TP Deliverability, in accordance with the Interconnection Customer's Current Cost Responsibility.

(3) Option (B) Generating Facilities that were not allocated TP Deliverability will not receive repayment for LDNUs or ADNUs.

Unless an Interconnection Customer has provided written notice to the CAISO that it is declining all or part of such repayment, such amounts shall include any tax gross-up or other tax-related payments associated with the Network Upgrades not refunded to the Interconnection Customer, and shall be paid to the Interconnection Customer by the applicable Participating TO(s) on a dollar-for-dollar basis either through (1) direct payments made on a levelized basis over the five-year period commencing on the applicable date as provided for in this Section 14.3.2.1; or (2) any alternative payment schedule that is mutually agreeable to the Interconnection Customer and Participating TO, provided that such amount is paid within five (5) years of the applicable commencement date.

For Network Upgrades the Interconnection Customer funded but did not receive repayment, the Interconnection Customer will be eligible to receive Merchant Transmission Congestion Revenue Rights (CRRs) in accordance with CAISO Tariff Section 36.11 associated with those Network Upgrades, or portions thereof that were funded by the Interconnection Customer. Such CRRs would take effect upon the Commercial Operation Date of the Generating Facility in accordance with the GIA.

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Appendix 1 Interconnection Request
INTERCONNECTION REQUEST

Provide one copy of this completed form pursuant to Section 7 of this Appendix 1 below.

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3. Requested Deliverability Statuses are (check one in each category):

On-Peak (for purposes of Net Qualifying Capacity):

_ Full Capacity (For Independent Study Process and Queue Cluster Process only)

(Note – Deliverability analysis for Independent Study Process is conducted with the next annual Cluster Study)

_ Partial Deliverability for __ MW of electrical output (For Independent Study Process and Queue Cluster Process only)

_ Energy Only

Off-Peak:

_ Off-Peak Deliverable

_ Economic Only

...

Appendix B Data Form, Pre- System Impact and Facilities Study

DATA FORM TO BE PROVIDED BY THE INTERCONNECTION CUSTOMER PRIOR TO COMMENCEMENT OF THE PHASE II INTERCONNECTION STUDY

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Level of Deliverability Status: Choose one of the following:

_____Energy-Only

_____Full Capacity

_____Partial Capacity (expressed in fraction of Full Capacity)

Off-Peak Deliverability Status: Choose one of the following:

_____ Off-Peak Deliverable

_____ Economic-Only

Please provide any additional modification request pursuant to Section 6.7.2.2 of Appendix DD

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Appendix EE

LARGE GENERATOR INTERCONNECTION AGREEMENT

[INTERCONNECTION CUSTOMER]

Article 1. Definitions

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Area Off-Peak Constraints shall mean a transmission system operating limit that would cause excessive curtailment to a substantial number of Generating Facilities during Off-Peak Load conditions, as described in Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website.

Area Off-Peak Network Upgrades (AOPNUs) shall mean a transmission upgrade or addition the CAISO identifies in the Transmission Planning Process to relieve an Area Off-Peak Constraint.

Assigned Network Upgrade (ANU) shall mean Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to the Interconnection Customer. Assigned Network Upgrades exclude Conditionally Assigned Network Upgrades unless they become Assigned Network Upgrades.

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Conditionally Assigned Network Upgrade (CANU) shall mean Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to an earlier Interconnection Customer, but which may be assigned to the Interconnection Customer.

...

Local Off-Peak Constraints shall mean a transmission system operating limit modeled in the generator interconnection study process that would be exceeded or lead to excessive curtailment, as described in the Off-Peak Deliverability Assessment methodology, if the CAISO were to assign Off-Peak Deliverability Status to one or more Generating Facilities interconnecting to the CAISO Controlled Grid in a specific local area, and that is not an Area Off-Peak Constraint.

Local Off-Peak Network Upgrades (LOPNUs) shall mean a transmission upgrade or addition the CAISO identifies in the generator interconnection study process to relieve a Local Off-Peak Constraint.

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Off-Peak Deliverability Constraints shall mean a transmission system operating limit that constrains Generating Facilities in an area, leading to the excessive curtailment of expected Energy.

Off-Peak Network Upgrades shall mean Network Upgrades needed to relieve Off-Peak Deliverability Constraints. Area Off-Peak Network Upgrades address Area Off-Peak Constraints. Local Off-Peak Network Upgrades address Local Off-Peak Constraints.

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Article 4. Scope of Service

4.1 Interconnection Service. Interconnection Service allows the Interconnection Customer to connect the Large Generating Facility to the Participating TO's Transmission System and be eligible to deliver the Large Generating Facility's output using the available capacity of the CAISO Controlled Grid. To the extent the Interconnection Customer wants to receive Interconnection Service, the Participating TO shall construct facilities identified in Appendices A and C that the Participating TO is responsible to construct.

Interconnection Service does not necessarily provide the Interconnection Customer with the capability to physically deliver the output of its Large Generating Facility to any particular load on the CAISO Controlled Grid without incurring congestion costs. In the event of transmission constraints on the CAISO Controlled Grid, the Interconnection Customer's Large Generating Facility shall be subject to the applicable congestion management procedures in the CAISO Tariff in the same manner as all other resources. Full Capacity Deliverability Status, Partial Capacity Deliverability Status, and Off-Peak Deliverability Status do not confer any priority over other Generating Facilities to deliver Energy; nor provide any warranty or guarantee to deliver any amount of Energy or avoid curtailment at any time.

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ARTICLE 5. INTERCONNECTION FACILITIES ENGINEERING, PROCUREMENT, AND CONSTRUCTION

5.20 Annual Reassessment Process. In accordance with Section 7.4 of the GIDAP, the CAISO will perform an annual reassessment, as part of a queue cluster interconnection study cycle, in which it will update certain base case data prior to beginning the GIDAP Phase II Interconnection Studies. As set forth in Section 7.4, the CAISO may determine through this assessment that Delivery Network Upgrades and Off-Peak Network Upgrades already identified and included in executed generator interconnection agreements should be modified in order to reflect the current circumstances of interconnection customers in the queue, including any withdrawals therefrom, and any additions and upgrades approved in the CAISO's most recent TPP cycle. To the extent that this determination modifies the scope or characteristics of, or the cost responsibility for, any Delivery Network Upgrades and Off-Peak Network Upgrades set forth in Appendix A to this LGIA, such modification(s) will be reflected through an amendment to this LGIA.

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Article 11. Performance Obligation

11.4.1 Repayment of Amounts Advanced for Network Upgrades.

11.4.1.1 Repayment of Amounts Advanced Regarding Non-Phased Generating Facilities

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 5 or earlier, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has been tendered a Generator Interconnection Agreement before December 19, 2014, shall be entitled to a repayment for the Interconnection Customer's contribution to the cost of Network Upgrades commencing upon the Commercial Operation Date of its Generating Facility.

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 6 or later, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has not been tendered an

Interconnection Agreement before December 19, 2014, shall be entitled to repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed in service on or before the Commercial Operation Date of its Generating Facility, commencing upon the Commercial Operation Date of the Generating Facility. Repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed into service after the Commercial Operation Date of its Generating Facility shall, for each of these Network Upgrades, commence no later than the later of: (i) the first month of the calendar year following the year in which the Network Upgrade is placed into service or (ii) 90 days after the Network Upgrade is placed into service.

An Interconnection Customer subject to this Article 11.4.1.1 shall be entitled to repayment for its contribution to the cost of Network Upgrades as follows:

(a) For Reliability Network Upgrades, the Interconnection Customer shall be entitled to a repayment of the amount paid by the Interconnection Customer for Reliability Network Upgrades as set forth in Appendix G, up to a maximum amount established in Section 14.3.2.1 of the GIDAP. For purposes of this determination, generating capacity will be based on the capacity of the Interconnection Customer's Generating Facility at the time it achieves Commercial Operation. To the extent that such repayment does not cover all of the costs of Interconnection Customer's Reliability Network Upgrades, the Interconnection Customer shall receive Merchant Transmission CRRs for that portion of its Reliability Network Upgrades that are not covered by cash repayment.

(b) For Local Delivery Network Upgrades:

i. If the Interconnection Customer is an Option (B) Interconnection Customer and has been allocated and continues to be eligible to receive TP Deliverability pursuant to the GIDAP, the Interconnection Customer shall be entitled to repayment of a portion of the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible, as set forth in Appendix G. The repayment amount shall be determined by dividing the amount of TP Deliverability received by the amount of deliverability requested by the Interconnection Customer, and multiplying that percentage by the total amount paid to the Participating TO by the Interconnection Customer for Local Delivery Network Upgrades

ii. If the Generating Facility is an Option (B) Generating Facility and has not been allocated any TP Deliverability, the Interconnection Customer shall not be entitled to repayment for the costs of Local Delivery Network Upgrades.

iii. If the Generating Facility is an Option (A) Generating Facility, the Interconnection Customer shall be entitled to a repayment equal to the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible, as set forth in Appendix G.

(c) For Area Delivery Network Upgrades, the Interconnection Customer shall not be entitled to repayment for the costs of Area Delivery Network Upgrades.

(d) If an Interconnection Customer having a Option (B) Generating Facility, and is eligible, to construct and own Network Upgrades pursuant to the Merchant Option set forth in Article 5.15 of this LGIA, then the Interconnection Customer shall not be entitled to any repayment pursuant to this LGIA.

(e) For Local Off-Peak Network Upgrades, the Interconnection Customer will be entitled to a repayment equal to the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible, as set forth in Appendix G.

Unless an Interconnection Customer has provided written notice to the CAISO that it is declining all or part of such repayment, such amounts shall include any tax gross-up or other tax-related payments associated with Network Upgrades not refunded to the Interconnection Customer pursuant to Article 5.17.8 or otherwise, and shall be paid to the Interconnection Customer by the Participating TO on a dollar-for-dollar basis either through (1) direct payments made on a levelized basis over the five-year period commencing on the applicable date as provided for in this Article 11.4.1.1; or (2) any alternative payment schedule that is mutually agreeable to the Interconnection Customer and Participating TO, provided that such amount is paid within five (5) years of the applicable commencement date. Notwithstanding the foregoing, if this LGIA terminates within five (5) years of the applicable commencement date, the Participating TO's obligation to pay refunds to the Interconnection Customer shall cease as of the date of termination.

(f) Where the Interconnection Customer finances the construction of Network Upgrades for more than one Participating TO, the cost allocation, Interconnection Financial Security, and repayment will be conducted pursuant to Section 14.4.1 of the GIDAP, and set forth in Appendix G.

...

Appendix FF

Article 1. Scope and Limitations of Agreement

1.1 This Agreement shall be used for all Small Generating Facility Interconnection Requests submitted under the Generator Interconnection and Transmission Allocation Procedures (GIDAP) set forth in Appendix DD except for those submitted under the 10 kW Inverter Process contained in GIDAP Appendix 7. For those Interconnection Requests, GIDAP Appendix 7 contains the terms and conditions which serve as the Interconnection Agreement.

1.2 This Agreement governs the terms and conditions under which the Interconnection Customer's Small Generating Facility will interconnect with, and operate in parallel with, the Participating TO's Transmission System.

1.3 This Agreement does not constitute an agreement to purchase or deliver the Interconnection Customer's power. The purchase or delivery of power and other services that the Interconnection Customer may require will be covered under separate agreements, if any. The Interconnection Customer will be responsible for separately making all necessary arrangements (including scheduling) for delivery of electricity in accordance with the CAISO Tariff. Full Capacity Deliverability Status, Partial Capacity Deliverability Status, and Off-Peak Deliverability Status do not confer any priority over other Generating Facilities to deliver Energy; nor provide any warranty

or guarantee to deliver any amount of Energy or avoid curtailment at any time.

1.4 Nothing in this Agreement is intended to affect any other agreement between or among the Parties.

…

Article 5. Cost Responsibility for Network Upgrades

5.2 Network Upgrades

The Participating TO shall design, procure, construct, install, and own the Network Upgrades described in Attachment 6 of this Agreement, except for Merchant Network Upgrades. If the Participating TO and the Interconnection Customer agree, the Interconnection Customer may construct Network Upgrades that are located on land owned by the Interconnection Customer. The actual cost of the Network Upgrades, including overheads, shall be borne initially by the Interconnection Customer. For costs associated with Area Delivery Network Upgrades and Area Off-Peak Network Upgrades, any cost estimates will be advisory in nature and will not be considered as definitive or as establishing a cap on the maximum cost responsibility of the Interconnection Customer.

…

5.3.1 Repayment of Amounts Advanced for Network Upgrades

…

An Interconnection Customer subject to this Article 5.3.1.1 shall be entitled to repayment for its contribution to the cost of Network Upgrades as follows:

…

(f) For Local Off-Peak Network Upgrades, the Interconnection Customer will be entitled to a repayment equal to the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible.

…

12.13 Annual Reassessment Process

In accordance with Section 7.4 of the GIDAP, the CAISO will perform an annual reassessment in which it will update certain base case data prior to beginning the GIDAP Phase II Interconnection Studies. As set forth in Section 7.4 of the GIDAP, the CAISO may determine through this assessment that Delivery Network Upgrades and Off-Peak Network Upgrades already identified and included in executed Generator Interconnection Agreements should be modified in order to reflect the current circumstances of Interconnection Customers in the queue, including any withdrawals therefrom, and any additions and upgrades approved in the CAISO's most recent Transmission Planning Process cycle. To the extent that this determination modifies the scope or characteristics of, or the financial responsibility for, any Delivery Network Upgrades and Off-Peak Network Upgrades determined pursuant to this SGIA, such modification(s) will be reflected through an amendment to this SGIA.

…

Attachment 1

Glossary of Terms

…

Area Off-Peak Constraints - A transmission system operating limit that would cause excessive curtailment to a substantial number of Generating Facilities during Off-Peak Load conditions, as described in Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website.

Area Off-Peak Network Upgrades (AOPNUs) - A transmission upgrade or addition the CAISO identifies in the Transmission Planning Process to relieve an Area Off-Peak Constraint.

Assigned Network Upgrade (ANU) - Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to the Interconnection Customer. Assigned Network Upgrades exclude Conditionally Assigned Network Upgrades unless they become Assigned Network Upgrades.

…

Conditionally Assigned Network Upgrade (CANU) - Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to an earlier Interconnection Customer, but which may be assigned to the Interconnection Customer.

…

Local Off-Peak Constraints - A transmission system operating limit modeled in the generator interconnection study process that would be exceeded or lead to excessive curtailment, as described in the Off-Peak Deliverability Assessment methodology, if the CAISO were to assign Off-Peak Deliverability Status to one or more Generating Facilities interconnecting to the CAISO Controlled Grid in a specific local area, and that is not an Area Off-Peak Constraint.

Local Off-Peak Network Upgrades (LOPNUs) - A transmission upgrade or addition the CAISO identifies in the generator interconnection study process to relieve a Local Off-Peak Constraint.

…

Off-Peak Deliverability Constraints - A transmission system operating limit that constrains Generating Facilities in an area, leading to the excessive curtailment of expected Energy.

Off-Peak Network Upgrades - Network Upgrades needed to relieve Off-Peak Deliverability Constraints. Area Off-Peak Network Upgrades address Area Off-Peak Constraints. Local Off-Peak Network Upgrades address Local Off-Peak Constraints.

…

Section 30: Bid and Self-Schedule Submission

30.5.2 Supply Bids

30.5.2.2 Supply Bids for Participating Generators

…

30.5.2.2.1 Off-Peak Deliverability Status for Participating Generators

Scheduling Coordinators may submit Self-Schedules on behalf of Participating Generators only where the Participating Generator has Off-Peak Deliverability Status. Scheduling Coordinators for Participating Generators with Economic Only status must submit Economic Bids for Energy. Notwithstanding the foregoing, Scheduling Coordinators may submit Energy Self-Schedules in the Real-Time Market up to the Participating Generator's Day-Ahead Market Schedule in the same Trading Hour. All Participating Generators in the CAISO Markets before March 3, 2020 have Off-Peak Deliverability Status.

…

30.5.6.1 Off-Peak Deliverability Status for Non-Generator Resource Bids

Scheduling Coordinators may submit Self-Schedules on behalf of Non-Generator Resources only where the Non-Generator Resource has Off-Peak Deliverability Status. Scheduling Coordinators for Non-Generator Resources with Economic Only status must submit Economic Bids for Energy. Notwithstanding the foregoing, Scheduling Coordinators may submit Energy Self-Schedules in the Real-Time Market up to the Non-Generator Resource's Day-Ahead Market Schedule in the same Trading Hour. All Non-Generator Resources in the CAISO Markets before March 3, 2020 have Off-Peak Deliverability Status.

Attachment B – Marked Tariff

Deliverability Assessment Methodology Enhancements

California Independent System Operator Corporation

Appendix A

...

- Area Off-Peak Constraints

A transmission system operating limit that would cause excessive curtailment to a substantial number of Generating Facilities during Off-Peak Load conditions, as described in Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website.

- Area Off-Peak Network Upgrades (AOPNUs)

A transmission upgrade or addition the CAISO identifies in the Transmission Planning Process to relieve an Area Off-Peak Constraint.

- Assigned Network Upgrade (ANU)

Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to the Interconnection Customer. Assigned Network Upgrades exclude (1) Conditionally Assigned Network Upgrades unless they become Assigned Network Upgrades, and (2) Precursor Network Upgrades.

...

- Conditionally Assigned Network Upgrade (CANU)

Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to an earlier Interconnection Customer, but which may be assigned to the Interconnection Customer.

...

- Deliverability Assessment

~~An evaluation performed pursuant to the CAISO On-Peak Deliverability Assessment posted on the CAISO website, to determine if a Generating Facility or a group of Generating Facilities could provide Energy to the CAISO Controlled Grid and be delivered to the aggregate of Load on the CAISO Controlled Grid at peak Load, under a variety of severely stressed conditions~~The On-Peak Deliverability Assessment and the Off-Peak Deliverability Assessment.

- Deliverability Status

~~An a~~Attribute~~s~~ of a Generating Facility ~~that is~~ requested by an Interconnection Customer ~~for the Generating Facility~~, assigned by the CAISO to the Generating Facility through the GIP, GIDAP~~,~~ or other process specified in the CAISO tariff, indicating its studied ability to deliver its Energy to Load during different modeled conditions, which ~~and that~~ affects ~~the~~ its maximum Net Qualifying Capacity ~~to which the Generating Facility could be entitled~~.

...

- Economic Only

Status for a Generating Facility that prohibits its Scheduling Coordinator from submitting certain Self-Schedules for Energy, as described in Section 30.5.2.

...

- Local Off-Peak Constraints

A transmission system operating limit modeled in the generator interconnection study process that would be exceeded or lead to excessive curtailment, as described in the Off-Peak Deliverability Assessment methodology, if the CAISO were to assign Off-Peak Deliverability Status to one or more Generating Facilities interconnecting to the CAISO Controlled Grid in a specific local area, and that is not an Area Off-Peak Constraint.

- Local Off-Peak Network Upgrades (LOPNUs)

A transmission upgrade or addition the CAISO identifies in the generator interconnection study process to relieve a Local Off-Peak Constraint.

...

- Off-Peak Deliverability Assessment

The technical study performed under ~~GIP~~ Section 6.3.2.2 ~~set forth in~~of Appendix ~~Y~~DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website, to study if Generating Facilities can provide expected Energy to the CAISO Controlled Grid during modeled off-peak Load conditions without excessive curtailment due to transmission constraints.

- Off-Peak Deliverability Constraints

A transmission system operating limit that constrains Generating Facilities in an area, leading to the excessive curtailment of expected Energy.

- Off-Peak Deliverability Status

Status for a Generating Facility indicating it can provide expected Energy to the CAISO Controlled Grid during modeled off-peak Load conditions without excessive curtailment due to transmission constraints, and that allows its Scheduling Coordinator to submit Self-Schedules consistent with the CAISO Tariff.

- Off-Peak Network Upgrades

Network Upgrades needed to relieve Off-Peak Deliverability Constraints. Area Off-Peak Network Upgrades address Area Off-Peak Constraints. Local Off-Peak Network Upgrades address Local Off-Peak Constraints.

- On-Peak Deliverability Assessment

The technical study performed under ~~GIP Section 6.3.2.1 set forth in Appendix Y or GIDAP~~ Section 6.3.2.1 ~~set forth in~~of Appendix DD and the CAISO On-Peak Deliverability Assessment posted on the CAISO Website, to determine if a Generating Facility or a group of Generating Facilities requesting Full Capacity Deliverability Status or Partial Capacity Deliverability Status can provide Energy to the CAISO Controlled Grid and be delivered to the aggregate of Load on the CAISO Controlled Grid at peak Load, under a variety of modeled stressed conditions.

…

Appendix DD

…

2.4.3 The Interconnection Studies.

For Interconnection Requests in Queue Cluster 5 and subsequent Queue Clusters, the Interconnection Studies consist of a Phase I Interconnection Study, a reassessment conducted prior to the commencement of a Phase II Interconnection Study, a Phase II

Interconnection Study, and an update to the Phase II Interconnection Study report to reflect the results of a reassessment conducted after the TP Deliverability allocation process for the Queue Cluster.

For Interconnection Requests processed under the Independent Study Process, the Interconnection Studies consist of a system impact and facilities study, and, as applicable to Full Capacity or Partial Capacity Deliverability Status, Phase I and Phase II Interconnection Studies and a reassessment.

2.4.3.1 The Phase I Interconnection Studies

The Phase I Interconnection Studies for Queue Cluster Generating Facilities will include, but not be limited to, short circuit/fault duty, steady state (thermal and voltage) and stability analyses. The Phase I Interconnection Studies will identify direct Interconnection Facilities and required Reliability Network Upgrades necessary to interconnect the Generating Facility, mitigate thermal overloads and voltage violations, and address short circuit, stability, and reliability issues associated with the requested Interconnection Service. The Phase I Interconnection Studies will also identify LDNUs and LOPNUs for Generating Facilities, including those being processed under the Independent Study Process, that have selected Full Capacity, ~~or~~ Partial Capacity Deliverability Status, and Off-Peak Deliverability Status, as applicable. Such ~~LDNU~~ Network Upgrades shall be identified in accordance with the ~~On-Peak~~ Deliverability Assessments set forth in Section 6.3.2. The Phase I Interconnection Studies will also provide cost estimates for ADNUs and AOPNUs, as described in Section 6.3.2.~~1.2.~~ The Phase I Interconnection Study report shall include cost estimates for RNUs, LDNUs, ADNUs, LOPNUs, AOPNUs, and Participating TO~~s~~ Interconnection Facilities that shall, as applicable, establish the basis for the initial Interconnection Financial Security postings under Section 11.2.

...

2.4.3.3 The Phase II Interconnection Studies

The Phase II Interconnection Studies will include, but not be limited to, short circuit/fault duty, steady state (thermal and voltage) and stability analyses, and will identify direct Interconnection Facilities and required RNUs necessary to interconnect the Generating Facility, mitigate thermal overloads and voltage violations, and address short circuit, stability, and reliability issues associated with the requested Interconnection Service. The Phase II Interconnection Studies shall identify LDNUs and LOPNUs for Generating Facilities participating in Phase II (including those being processed under the Independent Study Process) that have elected Full Capacity, ~~or~~ Partial Capacity Deliverability Status, and Off-Peak Deliverability Status, as applicable, and ADNUs for Interconnection Customers selecting Option (B) in accordance with Section 7.2.

The Phase II Interconnection Study report shall also set forth the applicable cost estimates for RNUs, LDNUs, ADNUs, LOPNUs, and AOPNUs, and Participating TO~~s~~ Interconnection Facilities that shall, as applicable, establish the basis for the second and third Interconnection Financial Security postings under Section 11.3.

Where an Interconnection Study report identifies specific transmission facilities for Network Upgrade or Interconnection Facilities, the cost estimates determined in accordance with Section 6.4 will be set forth in present dollar costs as well as time-adjusted dollar costs, adjusted to the estimated year of expenditure for construction of the components being constructed.

...

Section 3 Interconnection Requests

3.5 Processing of Interconnection Requests

3.5.1 Initiating an Interconnection Request.

To initiate an Interconnection Request, except as set forth for the Fast Track Process in Section 5, and have the Interconnection Request considered for validation under Section 3.5.2, the Interconnection Customer must submit all of the following during the Cluster Application Window, or at any time during the year for proposed Generating Facilities applying for processing under the Independent Study Process:

(i) An Interconnection Study Deposit of $150,000.

(ii) A completed application in the form of Appendix 1, including requested Deliverability statuses, requested study process (either Queue Cluster or Independent Study Process), preferred Point of Interconnection and voltage level, and all other required technical data, including all data requested in Attachment A to Appendix 1 in Excel format.

...

3.6 Internet Posting

The CAISO will maintain on the CAISO Website a list of all Interconnection Requests. The list will identify, for each Interconnection Request: (i) the maximum summer and winter megawatt electrical output; (ii) the location by county and state; (iii) the station or transmission line or lines where the interconnection will be made; (iv) the most recent projected Commercial Operation Date; (v) the status of the Interconnection Request, including whether it is active or withdrawn; (vi) the availability of any studies related to the Interconnection Request; (vii) the date of the Interconnection Request; (viii) the type of Generating Facility to be constructed (e.g., combined cycle, combustion turbine, wind turbine, and fuel type); (ix) requested Deliverability statuses, and (x) project name.

Section 4 Independent Study Process

4.2.1.2 Requirement Set Number Two: for Requests for Independent Study of Behind-the-Meter Capacity Expansion of Generating Facilities

...

(ii) Business criteria.

1) The Deliverability Status (Full Capacity, Partial Capacity or Energy-Only, and Off-Peak Deliverability Status or Economic Only) of the original Generating Facility will remain the same after the behind-the-meter capacity expansion. The capacity expansion will have Energy-Only, Economic Only Deliverability Statuses unless otherwise specified in this GIDAP, and the original Generating Facility and the behind-the-meter capacity expansion will be metered separately from one another and be assigned separate Resource IDs, except as set forth in (2)

below.

2) If the original Generating Facility has Full Capacity Deliverability Status and/or Off-Peak Deliverability Status and the behind-the-meter capacity expansion will use the same technology as the original Generating Facility, the Interconnection Customer may elect to have the original Generating Facility and the behind-the-meter capacity expansion metered together, in which case both the original Generating Facility and the behind-the-meter capacity expansion may have Partial Capacity Deliverability Status and Off-Peak Deliverability Status, as applicable, pursuant to CAISO study results to determine Deliverability, and a separate Resource ID will not be established for the behind-the-meter capacity expansion.

...

4.6 Deliverability Assessments

Interconnection Customers under the Independent Study Process that request Partial Capacity, ~~or~~ Full Capacity Deliverability Status, or Off-Peak Deliverability Status will be deemed to have selected Option (A) under Section 7.2 and will have ~~a~~ Deliverability Assessments performed as part of the next scheduled Phase I and Phase II Interconnection Studies for the Queue Cluster study performed for the next Queue Cluster Window that opens after the CAISO received the request ~~for Partial Capacity or Full Capacity Deliverability Status~~. If the Deliverability Assessment identifies any ~~LDNUs and ADNUs~~Network Upgrades that are triggered by the Interconnection Request, the Interconnection Customer will be responsible to pay its proportionate share of the costs of those Upgrades, pursuant to Sections 6, 7, and 8, and for posting Interconnection Financial Security pursuant to the rules for Interconnection Customers in Queue Clusters pursuant to Section 11. If the Generating Facility (or increase in capacity of an existing Generating Facility) achieves its Commercial Operation Date before the Deliverability Assessment is completed and before any necessary Delivery Network Upgrades are in service, the proposed Generating Facility (or increase in capacity) will be treated as an Energy-Only, Interim, or Partial Capacity Deliverability Status Generating Facility until such Delivery Network Upgrades are in service. This Section shall not apply to Interconnection Customers requesting behind-the-meter capacity expansion under Section 4.2.1.2. Separate rules regarding the Deliverability Status of such requests are set forth in that Section.

...

4.8 Generator Interconnection Agreement

An Interconnection Customer in the Independent Study Process that requests Off-Peak Deliverability Status, Partial Capacity or Full Capacity Deliverability Status must still negotiate and execute a GIA reflecting Economic Only and Energy-Only Deliverability Status pursuant to the requirements and timelines set forth in Section 13. Upon the completion of the Deliverability Assessments per Section 4.6, the Interconnection Customer's GIA will be amended as appropriate to reflect the results thereof.

Section 5 Fast Track Process

5.1 Applicability and Initiation of Fast Track Process Request

...

5.2.1 Screens

5.2.1.1 The proposed Generating Facility's Point of Interconnection must be on the CAISO Controlled Grid.

5.2.1.2 For interconnection of a proposed Generating Facility to a radial transmission circuit on the CAISO controlled grid, the aggregated generation on the circuit, including the proposed Generating Facility, shall not exceed 15 percent of the line section annual peak load as most recently measured at the substation. For purposes of this Section 5.2.1.2, a line section shall be considered as that portion of a Participating TO's electric system connected to a customer bounded by automatic sectionalizing devices or the end of the transmission line.

This screen will not be required for a proposed interconnection of a Generating Facility to a radial transmission circuit with no load.

In cases where the circuit lacks the telemetry needed to provide the annual peak load measurement data, the CAISO shall use power flow cases from the latest completed Queue Cluster studies (either Phase I or Phase II) to perform this screen.

5.2.1.3 ~~**[Not Used]**~~For Generating Facilities requesting Off-Peak Deliverability Status, the CAISO can determine that the Generating Facility can receive Off-Peak Deliverability Status without participating in the Off-Peak Deliverability Assessment and without Off-Peak Network Upgrades.

5.2.1.4 The proposed Generating Facility, in aggregate with other Generating Facilities on the transmission circuit, shall not contribute more than 10 percent to the transmission circuit's maximum fault current at the point on the high voltage (primary) level nearest the proposed point of change of ownership.

The CAISO shall use the short circuit study data from the latest completed Queue Cluster studies (either Phase I or Phase II) to test this screen.

5.2.1.5 The proposed Generating Facility, in aggregate with other Generating Facilities on the transmission circuit, shall not cause any transmission protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Customer equipment on the system to exceed 87.5 percent of the short circuit interrupting capability; nor shall the interconnection be proposed for a circuit that already exceeds 87.5 percent of the short circuit interrupting capability.

The CAISO shall use the short circuit study data from the most recently completed Queue Cluster studies (either Phase I or Phase II) to test this screen.

5.2.1.6 A Generating Facility will fail this initial review, but will be eligible for a supplemental review, if it proposes to interconnect in an area where there are known transient stability, voltage, or thermal limitations identified in the most recently completed Queue Cluster studies or transmission planning process.

5.2.1.7 No construction of facilities by a Participating TO on its own system shall be required to accommodate the proposed Generating Facility.

…

Section 6 Initial Activities and Phase I of the Interconnection Study Process for Queue Clusters

The provisions of this Section 6 shall apply to all Interconnection Requests except those processed under the Independent Study Process selecting Energy Only Deliverability Status, the Fast Track Process, or the 10 kW inverter process as set forth in Appendix 7.

…

6.2. Scope and Purpose of Phase I Interconnection Study

The Phase I Interconnection Study shall:

(i) evaluate the impact of all Interconnection Requests received during the Cluster Application Window for a particular year on the CAISO Controlled Grid;

(ii) preliminarily identify all LDNUs, LOPNUs, and RNUs needed to address the impacts on the CAISO Controlled Grid of the Interconnection Requests, as Assigned Network Upgrades or Conditionally Assigned Network Upgrades;

(iii) preliminarily identify for each Interconnection Request required Interconnection Facilities;

(iv) assess the Point of Interconnection selected by each Interconnection Customer and potential alternatives to evaluate potential efficiencies in overall transmission upgrades costs;

(v) establish the Current Cost Responsibility, Maximum Cost Responsibility, and Maximum Cost Exposure for each Interconnection Request, until the issuance of the Phase II Interconnection Study report;

(vi) provide a good faith estimate of the cost of Interconnection Facilities for each Interconnection Request;

(vii) provide a cost estimate of ADNUs and AOPNUs for each Generating Facility in a Queue Cluster Group Study;

(viii) identify any Precursor Network Upgrades; and

(ix) identify RNUs as GRNUs or IRNUs.

The Phase I Interconnection Study will consist of a short circuit analysis, a stability analysis to the extent the CAISO and applicable Participating TO(s) reasonably expect transient or voltage stability concerns, a power flow analysis, including off-peak analysis, ~~and~~ an On-Peak Deliverability Assessment, ~~(~~and an Off-Peak Deliverability Assessment ~~which will be for informational purposes only)~~ for the purpose of identifying LDNUs and LOPNUs and estimating the cost of ADNUs and AOPNUs, as applicable.

The Phase I Interconnection Study will state for each Group Study or Interconnection Request studied individually (i) the assumptions upon which it is based, (ii) the results of the analyses, and

(iii) the requirements or potential impediments to providing the requested Interconnection Service to all Interconnection Requests in a Group Study or to the Interconnection Request studied individually.

The Phase I Interconnection Study will provide, without regard to the requested Commercial Operation Dates of the Interconnection Requests, a list of RNUs, LOPNUs, and LDNUs to the CAISO Controlled Grid that are preliminarily identified as Assigned Network Upgrades or Conditionally Assigned Network Upgrades required as a result of the Interconnection Requests in a Group Study or as a result of any Interconnection Request studied individually and Participating TO's Interconnection Facilities associated with each Interconnection Request, the estimated costs of ADNUs and AOPNUs, if applicable, and an estimate of any other financial impacts (i.e., on Local Furnishing Bonds).

6.3 Identification of and Cost Allocation for Network Upgrades

…

6.3.2 Delivery Network Upgrades.

6.3.2.1 The On-Peak Deliverability Assessment.

The CAISO, in coordination with the applicable Participating TO(s), shall perform On-Peak Deliverability Assessments for Interconnection Customers selecting Full Capacity or Partial Capacity Deliverability Status in their Interconnection Requests. Interconnection Customers may request Full or Partial Capacity Deliverability Status regardless of their requested Off-Peak Deliverability Status. The On-Peak Deliverability Assessment shall determine the Interconnection Customer's Generating Facility's ability to deliver its Energy to the CAISO Controlled Grid under peak load conditions, and identify preliminary Delivery Network Upgrades required to provide the Generating Facility with Full Capacity or Partial Capacity Deliverability Status. The Deliverability Assessment will consist of two rounds, the first of which will identify any transmission constraints that limit the Deliverability of the Generating Facilities in the Group Study and will identify LDNUs to relieve the local constraints, and second of which will determine ADNUs to relieve the area constraints. The On-Peak Deliverability Assessment does not convey any right to deliver electricity to any specific customer or Delivery Point, nor guarantee any level of deliverability, or transmission capacity, or avoided curtailment.

6.3.2.1.1 Local Delivery Network Upgrades

The On-Peak Deliverability Assessment will be used to establish the Maximum Cost Responsibility and Maximum Cost Exposure for LDNUs for each Interconnection Customer selecting Full Capacity or Partial Capacity Deliverability Status. Deliverability of a new Generating Facility will be assessed on the same basis as all existing resources interconnected to the CAISO Controlled Grid.

The methodology for the On-Peak Deliverability Assessment will be published on the CAISO Website or, when effective, included in a CAISO Business Practice Manual. The On-Peak Deliverability Assessment does not convey any right to deliver electricity to any specific customer or Delivery Point.

The cost of LDNUs identified in the On-Peak Deliverability Assessment as part of a Phase I Interconnection Study shall be estimated in accordance with Section 6.4. The estimated costs of Delivery Network Upgrades identified in the On-Peak Deliverability Assessment shall be assigned to all Interconnection Requests selecting Full Capacity or Partial Capacity Deliverability Status based on the flow impact of each such Generating Facility on the Delivery Network Upgrades as determined by the Generation distribution factor methodology set forth in the On-Peak Deliverability Assessment methodology.

6.3.2.1.2 Area Delivery Network Upgrades

The On-Peak Deliverability Assessment will be used in the Phase I Interconnection Studies to identify those facilities necessary to provide the incremental Deliverability between the level of TP Deliverability and such additional amount of Deliverability as is necessary for the MW capacity amount of generation targeted in the Phase I Interconnection Studies. Based on such facility cost estimates, the CAISO will calculate a rate for ADNU costs equal to the facility cost estimate divided by the additional amount of Deliverability targeted in the study. The Phase I Interconnection Studies shall provide a cost estimate for each Interconnection Customer which equals the rate multiplied by the requested deliverable MW capacity of the Generating Facility in the Interconnection Request.

6.3.2.1.3 [Intentionally Omitted]

6.3.2.2 Off-Peak Deliverability Assessment.

The CAISO, in coordination with the applicable Participating TO(s), shall perform an Off-Peak Deliverability Assessment for Interconnection Customers selecting Off-Peak Deliverability Status. The Off-Peak Deliverability Assessment will ~~to~~ identify transmission upgrades in addition to those Delivery Network Upgrades identified in the On-Peak Deliverability Assessment, if any, for a Group Study or individual Phase I Interconnection Study that includes one or more Location Constrained Resource Interconnection Generators (LCRIG), where the fuel source or source of energy for the LCRIG substantially occurs during off-peak conditions. Interconnection Customers that (i) are not LCRIGs whose fuel source of source of energy substantially occurs off-peak, and (ii) have Full or Partial Capacity Deliverability Status, will receive Off-Peak Deliverability Status without triggering Off-Peak Network Upgrades. Energy Only Interconnection Customers that are not LCRIGs whose fuel source of source of energy substantially occurs off-peak will be Economic Only. LCRIGs whose fuel source of source of energy substantially occurs off-peak will received Off-Peak Deliverability Status based upon the Off-Peak Deliverability Assessment, regardless of their On-Peak Deliverability Status.

The transmission upgrades identified under this Section shall comprise those needed for the ~~full maximum megawatt electrical~~ expected output of each proposed new LCRIG or the amount of megawatt increase in the generating capacity of each existing LCRIG as listed by the Interconnection Customer in its Interconnection Request, whether studied individually or as a Group Study, to be deliverable to the aggregate of Load on the CAISO Controlled Grid under the Generation dispatch conditions studied without excessive curtailment. The

methodology for the Off-Peak Deliverability Assessment will be published on the CAISO Website or, if applicable, included in a CAISO Business Practice Manual.

The CAISO will perform the Off-Peak Deliverability Assessment ~~for Interconnection Customer informational purposes only~~to identify Off-Peak Network Upgrades required for Generating Facilities to achieve Off-Peak Deliverability Status, and any such upgrades identified in the Off-Peak Deliverability Assessment as part of the Phase I Interconnection Study shall be estimated in accordance with Section 6.4. The Off-Peak Deliverability Assessment does not convey any right to deliver electricity to any specific customer or Delivery Point, nor guarantee any level of deliverability, or transmission capacity, or avoided curtailment.

The estimated costs of Local Off-Peak Network Upgrades identified in the Off-Peak Deliverability Assessment will be assigned or conditionally assigned to Interconnection Requests selecting Off-Peak Deliverability Status based on the flow impact of each such Generating Facility on the Off-Peak Network Upgrades as determined by the Generation distribution factor methodology set forth in the Off-Peak Deliverability Assessment methodology.

The estimated costs of Area Off-Peak Network Upgrades are for information only and not assigned to any Interconnection Requests.

~~The estimated costs of such upgrades identified in the assessment will be referred to as "off peak Deliverability transmission upgrades,' the description of such upgrades in any report will be conceptual in nature, and such transmission upgrades will not be included as an Assigned Network Upgrade or Conditionally Assigned Network Upgrade within the applicable Interconnection Study report.~~

~~The cost of all transmission upgrades identified in the Off-Peak Deliverability Assessment performed during the course of the Phase I Interconnection Study shall be estimated in accordance with Section 6.4. However, because these transmission upgrades shall be conceptual in nature only these upgrades shall be treated as follows:~~

~~(i) these transmission upgrades will not be required for the proposed Generating Facility (or proposed increase in capacity) that is the subject to the Interconnection Request to achieve Full Capacity Deliverability Status;~~

~~(ii) the estimated costs for these transmission upgrades shall not be assigned to any Interconnection Customer in an Interconnection Study report, such costs shall not be considered in determining the Current Cost Responsibility or Maximum Cost Responsibility of the Interconnection Customer for Network Upgrades under this or in determining the Interconnection Financial Security than an Interconnection Customer must post under Section 11;~~

~~(iii) and the applicable Participating TO(s) shall not be responsible under this for financing or constructing such transmission upgrades.~~

6.3.2.3 Transition to Off-Peak Deliverability Status

Active CAISO Interconnection Requests received before March 3, 2020 for Energy Only Generating Facilities that would be eligible to receive Off-Peak Deliverability Status pursuant to this Section 6.3.2 will have a one-time opportunity to request Off-Peak

Deliverability Status. Notwithstanding any provision of this GIDAP, if such Interconnection Customers request Off-Peak Deliverability Status, the CAISO will study those requests in the next Interconnection Study, and assign any required Local Off-Peak Network Upgrades to them pursuant to this Section 6.3.2, and their Interconnection Studies will be amended to include the assigned costs for those Network Upgrades. Such Interconnection Customers' GIAs, Current Cost Responsibilities, Maximum Cost Responsibilities, and Maximum Cost Exposures also will be amended to reflect the additional costs of assigned Local Off-Peak Network Upgrades.

All CAISO Interconnection Requests for Full Capacity Deliverability Status or Partial Capacity Deliverability Status received before March 3, 2020 will automatically receive Off-Peak Deliverability Status. All CAISO Interconnection Requests received before March 3, 2020 for Generating Facilities that are not Location Constrained Resource Interconnection Generators, regardless of Deliverability Status, will automatically receive Off-Peak Deliverability Status.

Interconnection Customers that achieved their Commercial Operation Date before March 3, 2020 will have Off-Peak Deliverability Status pursuant to Sections 30.5.2.2.1 and 30.5.6.1 of the CAISO Tariff.

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6.7.2 Modifications.

6.7.2.1 At any time during the course of the Interconnection Studies, the Interconnection Customer, the applicable Participating TO(s), or the CAISO may identify changes to the planned interconnection that may improve the costs and benefits (including reliability) of the interconnection, and the ability of the proposed change to accommodate the Interconnection Request. To the extent the identified changes are acceptable to the applicable Participating TO(s), the CAISO, and Interconnection Customer, such acceptance not to be unreasonably withheld, the CAISO shall modify the Point of Interconnection and/or configuration in accordance with such changes without altering the Interconnection Request's eligibility for participating in Interconnection Studies.

6.7.2.2 At the Phase I Interconnection Study Results Meeting, the Interconnection Customer should be prepared to discuss any desired modifications to the Interconnection Request. After the issuance of the final Phase I Interconnection Study, but no later than ten (10) Business Days following the Phase I Interconnection Study Results Meeting, the Interconnection Customer shall submit to the CAISO, in writing, modifications to any information provided in the Interconnection Request. The CAISO will forward the Interconnection Customer's modification to the applicable Participating TO(s) within one (1) Business Day of receipt.

Modifications permitted under this Section shall include specifically: (a) a decrease in the electrical output (MW) of the proposed project; (b) modifying the technical parameters associated with the Generating Facility technology or the Generating Facility step-up transformer impedance characteristics; (c) modifying the interconnection configuration; (d) modifying the In-Service Date, Initial Synchronization Date, Trial Operation Date, and/or Commercial Operation Date that meets the criteria set forth in Section 3.5.1.4 and is acceptable to the applicable Participating TO(s) and the CAISO, such acceptance not to be unreasonably withheld; (e) change in Point of Interconnection as set forth in Section 6.7.2.1; ~~and~~ (f) change in Deliverability Status to Energy Only Deliverability Status, Partial Capacity Deliverability Status, or a lower fraction of

Partial Capacity Deliverability Status; and (g) change from Off-Peak Deliverability Status to Economic Only.

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7.2 Full/Partial Capacity Deliverability Options for Interconnection Customers

This section applies to Interconnection Requests for which the Generating Facility Deliverability Status is either Full Capacity or Partial Capacity.

Within such Appendix B, the Interconnection Customer must select one of two options with respect to its Generating Facility:

Option (A), which means that the Generating Facility requires TP Deliverability to be able to continue to Commercial Operation. If the Interconnection Customer selects Option (A), then the Interconnection Customer shall be required to make an initial posting of Interconnection Financial Security under Section 11.2 for the cost responsibility assigned to it in the Phase I Interconnection Study for RNUs, LOPNUs, and LDNUs; or,

Option (B), which means that the Interconnection Customer will assume cost responsibility for Delivery Network Upgrades (both ADNUs and LDNUs, to the extent applicable) without cash repayment under Section 14.2.1 to the extent that sufficient TP Deliverability is not allocated to the Generating Facility to provide its requested Deliverability Status. If the Interconnection Customer selects Option (B) then the Interconnection Customer shall be required to make an initial posting of Interconnection Financial Security under Section 11.2 for the cost responsibility assigned to it in the Phase I Interconnection Study for RNUs, LDNUs, LOPNUs, and ADNUs. To qualify to receive any allocation of TP Deliverability, Interconnection Customers selecting Option (B) must still meet the minimum criteria identified in Section 8.9.2.

7.3 Postings and Cost Estimates for Network Upgrades

Notwithstanding the Interconnection Customer's Maximum Cost Responsibility and Maximum Cost Exposure, until such time as the Phase II Interconnection Study report is issued to the Interconnection Customer, the allocated costs for Assigned Network Upgrades for each Interconnection Customer for RNUs, LOPNUs, and LDNUs in the Phase I Interconnection Study report shall establish the value for

(i) each Interconnection Customer's Current Cost Responsibility; and

(ii) the initial posting of Interconnection Financial Security required from each Interconnection Customer under Section 11.2 for such Network Upgrades.

...

Section 8 Phase II Interconnection Study and TP Deliverability Allocation Processes

The provisions of this Section 8 shall apply to all Interconnection Requests under this GIDAP except those processed under the Independent Study Process selecting Energy Only Deliverability Status, the Fast Track Process, or the 10 kW inverter process.

8.1 Scope of Phase II Interconnection Study

8.1.1 Purpose of the Phase II Interconnection Study

The CAISO, in coordination with the applicable Participating TO(s), will conduct a Phase II Interconnection Study that will incorporate eligible Interconnection Requests from the

previous Phase I Interconnection Study. The Phase II Interconnection Study shall:

(i) update, as necessary, analyses performed in the Phase I Interconnection Studies to account for the withdrawal of Interconnection Requests from the current Queue Cluster;

(ii) identify final GRNUs and IRNUs needed in order to achieve Commercial Operation status for the Generating Facilities and provide final cost estimates;

(iii) identify final LDNUs needed to interconnect those Generating Facilities selecting Full Capacity or Partial Capacity Deliverability Status and provide final cost estimates;

(iv) identify final ADNUs for Interconnection Customers selecting Option (B), as provided below and provide revised cost estimates;

(v) identify, for each Interconnection Request, the Participating TO's Interconnection Facilities for the final Point of Interconnection and provide a +/-20% cost estimate;

(vi) coordinate in-service timing requirements based on operational studies in order to facilitate achievement of the Commercial Operation Dates of the Generating Facilities;

(vii) update the Interconnection Customer's Current Cost Responsibility, Maximum Cost Responsibility, and Maximum Cost Exposure, as applicable;

(viii) provide updated Precursor Network Upgrades needed to achieve the Commercial Operation status and Deliverability Status for the Generating Facilities; and

(ix) and identify LOPNUs needed for Generating Facilities selecting Off-Peak Deliverability Status, and provide final cost estimates.

The Phase II Interconnection Study report shall set forth the applicable cost estimates for Network Upgrades and Participating TOs Interconnection Facilities that shall be the basis for Interconnection Financial Security Postings under Section 11.3. Where the Maximum Cost Responsibility is based upon the Phase I Interconnection Study (because it is lower under Section 10.1), the Phase II Interconnection Study report shall recite this fact.

To the extent the CAISO determines that previously identified Conditionally Assigned Network Upgrades become Precursor Network Upgrades pursuant to Section 14.2.2, or are otherwise removed, the CAISO will reduce the Interconnection Customer's Maximum Cost Exposure, as applicable. To the extent the CAISO determines that a Conditionally Assigned Network Upgrade becomes an Assigned Network Upgrade, the CAISO will adjust the Interconnection Customer's Current Cost Responsibility and Maximum Cost Responsibility.

…

8.2 Determining Phase II Network Upgrades

8.2.1 Reliability Network Upgrades, ~~and~~ Local Delivery Network Upgrades, and Local Off-Peak Network Upgrades

RNUs, LOPNUs, and LDNUs will be identified on the basis of all Interconnection

Customers in the current Queue Cluster regardless of whether they have selected Option (A) or (B).

...

8.4.1 Cost Responsibility for Local Off-Peak Network Upgrades

The estimated costs of Local Off-Peak Network Upgrades identified in the Off-Peak Deliverability Assessment will be assigned or conditionally assigned to Interconnection Requests selecting Off-Peak Deliverability Status based on the flow impact of each such Generating Facility on the Off-Peak Network Upgrades as determined by the Generation distribution factor methodology set forth in the Off-Peak Deliverability Assessment methodology.

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Section 9 Additional Deliverability Assessment Options

9.1 ~~[Intentionally Omitted]~~ 2020 One-Time TP Deliverability Allocation Process

Notwithstanding the allocation order described in Section 8.9.2, following the process set forth in Section 8.9.1, the CAISO will allocate any remaining TP Deliverability in the following order for the 2020 TP Deliverability allocation cycle. Following the 2020 allocation cycle, this Section 9.1 will not be used, and the CAISO will allocate TP Deliverability pursuant to Section 8.9.2. All other provisions of Section 8.9 will apply to the 2020 allocation cycle unless expressly excepted in this Section 9.1.

The CAISO will allocate available TP Deliverability to all or a portion of the full MW capacity of the Generating Facility as specified in the Interconnection Request. Where a criterion is met by a portion of the full MW generating capacity of the Generating Facility, the eligibility score associated with that criterion will apply to the portion that meets the criterion. The demonstration must relate to the same proposed Generating Facility as described in the Interconnection Request. The CAISO will allocate TP Deliverability in the following order:

(1) To Interconnection Customers in the current Queue Cluster or coming out of parking that have executed power purchase agreements, and to Interconnection Customers in the current Queue Cluster that are Load Serving Entities serving their own Load.

(2) To Interconnection Customers in the current Queue Cluster or coming out of parking that are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement.

(3) To Energy Only Interconnection Customers that have not achieved their Commercial Operation Date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and have executed power purchase agreements; and to Energy Only Interconnection Customers that have achieved their Commercial Operation Date and have executed power purchase agreements.

(4) To Energy Only Interconnection Customers that have not achieved their Commercial Operation Date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; and to Energy Only Interconnection Customers that have achieved their Commercial Operation Date and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement.

(5) To Energy Only Interconnection Customers that originally requested Full Capacity

Deliverability Status or Partial Capacity Deliverability Status but achieved their Commercial Operation Date as Energy Only.

(6) To Energy Only Interconnection Customers that achieved their Commercial Operation Date.

(7) To Interconnection Customers, including Interconnection Customers that have parked, that elect to proceed without a power purchase agreement, and elect to be subject to Section 8.9.2.2.

Only groups one and two and Interconnection Customers in group seven that have not converted to Energy Only may trigger the construction of new Delivery Network Upgrades pursuant to Section 6.3.2. The CAISO will allocate TP Deliverability to groups three, four, five, six, and Energy Only Interconnection Customers in group seven based on TP Deliverability available from existing transmission facilities, from already approved upgrades in the CAISO Transmission Planning Process, or upgrades under construction.

Energy Only Interconnection Customers requesting Deliverability must submit to the CAISO a $60,000 study deposit for each Interconnection Request seeking TP Deliverability. The CAISO will deposit these funds in an interest bearing account at a bank or financial institution designated by the CAISO. The funds will be applied to pay for prudent costs incurred by the CAISO, the Participating TO(s), and/or third parties at the direction of the CAISO or applicable Participating TO(s), as applicable, to perform and administer the TP Deliverability studies for the Energy Only Interconnection Customers. Any and all costs of the Energy Only TP Deliverability study will be borne by the Interconnection Customer. The CAISO will coordinate the study with the Participating TO(s). The Participating TO(s) will invoice the CAISO for any work within seventy-five (75) calendar days of completion of the study, and, within thirty (30) days thereafter, the CAISO will issue an invoice or refund to the Interconnection Customer, as applicable, based upon such submitted Participating TO invoices and the CAISO's own costs for the study. If the actual costs of the study are greater than the deposit provided by the Interconnection Customer, the Interconnection Customer will pay the balance within thirty (30) days of being invoiced.

All power purchase agreements in this Section 9.1 must require Deliverability for the Interconnection Customer to represent that it has, is negotiating, or is shortlisted for a power purchase agreement. For all TP Deliverability allocations based upon having, negotiating, or being shortlisted for power purchase agreements, the CAISO will allocate TP Deliverability up to the amount of deliverable MW capacity procured by the power purchase agreement. All Load Serving Entities building Generating Facilities to serve their own Load must be doing so to fulfill a regulatory requirement that warrants Deliverability. Load Serving Entities acting as Interconnection Customers are otherwise eligible for all other attestations.

Interconnection Customers will be assigned a numerical score reflecting their demonstration of having met the criteria described in 8.9.2.1 under the methodology set forth in the Business Practice Manual, and a fourth criteria:

(4) Commercial Operation Date

a. The Interconnection Customer's Commercial Operation Date is in 2020 or earlier.

b. The Interconnection Customer's Commercial Operation Date is in 2021.

c. The Interconnection Customer's Commercial Operation Date is in 2022.

d. The Interconnection Customer's Commercial Operation Date is in 2023.

In allocating TP Deliverability, in a situation where the TP Deliverability cannot accommodate all

of the Interconnection Customers in a qualifying group, the CAISO will allocate TP Deliverability based on the highest numerical score. In a situation where the available amount of TP Deliverability cannot accommodate all Interconnection Customers with equal scores, the CAISO will allocate the TP Deliverability to the Interconnection Customers with the lowest LDNU cost estimates, then based on the weighted least square algorithm. For all TP Deliverability allocations based upon having, negotiating, or being shortlisted for power purchase agreements, the CAISO will allocate TP Deliverability up to the amount of deliverable MW capacity procured by the power purchase agreement.

9.2 [Intentionally Omitted]

Section 10 Cost Responsibility for Interconnection Customers

10.1 Interconnection Customers in a Queue Cluster.

(a) RNUs, LOPNUs, and LDNUs. The Interconnection Studies will establish Interconnection Customers' Current Cost Responsibility, Maximum Cost Responsibility, and Maximum Cost Exposure consistent with the cost allocations described in Section 8. The CAISO will adjust Interconnection Customers' cost responsibilities as described in this GIDAP. Interconnection Customers will post Interconnection Financial Security based on their Current Cost Responsibility.

(b) AOPNUs and ADNUs. Interconnection Customers selecting Option (A) do not post Interconnection Financial Security for ADNUs. Interconnection Customers do not post Interconnection Financial Security for AOPNUs. The Current Cost Responsibility provided in the Phase I Interconnection Studies establishes the basis for the initial Interconnection Financial Security Posting under Section 11.2. For Interconnection Customers selecting Option (B), the Phase II Interconnection Studies shall refresh the Current Cost Responsibility for ADNUs and shall provide the basis for second and third Interconnection Financial Postings as specified in Section 11.

The ADNU and AOPNU cost estimates provided in any Interconnection Study report are estimates only and do not provide a maximum value for cost responsibility to an Interconnection Customer for ADNUs or AOPNUs. However, subsequent to the Interconnection Customer's receipt of its Phase II Interconnection Study report, an Interconnection Customer having selected Option (B) may have its ADNUs adjusted in the reassessment process undertaken under Section 7.4. Accordingly, for such Interconnection Customers, the most recent annual reassessment undertaken under Section 7.4 shall provide the most recent cost estimates for the Interconnection Customer's ADNUs.

10.2 Interconnection Customers in the Independent Study Process.

(a) Assigned Network Upgrades. The Current Cost Responsibility for the Interconnection Customer's Financial Security for RNUs shall be established by the costs for such Network Upgrades assigned to the Interconnection Customer in the final system impact and facilities study report.

For such Interconnection Customers choosing Full Capacity or Partial Capacity Deliverability status, the maximum value of LDNUs shall be established by 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.

For such Interconnection Customers choosing Off-Peak Deliverability Status, the maximum value of LOPNUs will be established by 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.

The Interconnection Customer's Maximum Cost Responsibility shall be subject to further adjustment based on the results of the annual reassessment process, as set forth in Section 7.4.

(b) ADNUs and AOPNUs. Interconnection Customers selecting Option (A) do not post Interconnection Financial Security for ADNUs. The Current Cost Responsibility provided in the Phase I Interconnection Studies establishes the basis for the initial Interconnection Financial Security posting under Section 11.2. For Interconnection Customers selecting Option (B), the Phase II Interconnection Studies shall refresh the Current Cost Responsibility for ADNUs and shall provide the basis for second and third Interconnection Financial Postings as specified in Section 11.

The ADNU cost estimates provided in any study report are estimates only and do not provide a maximum value for cost responsibility to an Interconnection Customer for ADNUs However, subsequent to the Interconnection Customer's receipt of its Phase II Interconnection Study report, an Interconnection Customer having selected Option (B) may have its ADNU adjusted in the reassessment process undertaken under Section 7.4.

Interconnection Customers do not post Interconnection Financial Security for AOPNUs.

...

11.2.3 Posting Amount for Network Upgrades.

11.2.3.1 Small Generator Interconnection Customers

Each Interconnection Customer for a Small Generating Facility assigned to a Queue Cluster shall post an Interconnection Financial Security instrument as follows:

1) Interconnection Customers selecting Energy Only Deliverability Status must post for assigned RNUs and assigned LOPNUs, if any.

The posting amount for such RNUs and LOPNUs shall equal the lesser of fifteen percent (15%) of the Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades or (ii) $20,000 per megawatt of electrical output of the Small Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, but in no event less than $50,000.

2) Interconnection Customers selecting Option (A) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LOPNUs, and LDNUs, if any.

The posting amount for such RNUs, LOPNUs, and LDNUs shall equal the lesser of fifteen percent (15%) of the Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades or (ii) $20,000 per megawatt of electrical output of the Small Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its

Interconnection Request, including any requested modifications thereto, but in no event less than $50,000.

3) Interconnection Customers selecting Option (B) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LDNUs, LOPNUs, and ADNUs, if any.

The posting amount for such RNUs, LDNUs, LOPNUs, and ADNUs shall equal the lesser of fifteen percent (15%) of the ADNU costs and total Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades or (ii) $20,000 per megawatt of electrical output of the Small Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, but in no event less than $50,000.

11.2.3.2 Large Generator Interconnection Customers

Each Interconnection Customer for a Large Generating Facility assigned to a Queue Cluster shall post an Interconnection Financial Security instrument as follows:

1) Interconnection Customers selecting Energy Only Deliverability Status must post for assigned RNUs and assigned LOPNUs, if any.

The posting amount for such RNUs and LOPNUs shall equal the lesser of (i) fifteen percent (15%) of the total RNU Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades, (ii) $20,000 per megawatt of electrical output of the Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, or (iii) $7,500,000, but in no event less than $500,000.

In addition, if an Interconnection Customer switches its status from Full Capacity Deliverability Status or Partial Capacity Deliverability Status to Energy-Only Deliverability Status within ten (10) Business Days following the Phase I Interconnection Study Results Meeting, the required Interconnection Financial Security for Network Upgrades shall, for purposes of this section, be additionally capped at an amount no greater than the Current Cost Responsibility assigned to the Interconnection Customer in the Phase I Interconnection Study for Reliability Network Upgrades.

2) Interconnection Customers selecting Option (A) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LOPNUs, and LDNUs, if any.

The posting amount for such RNUs and LDNUs shall equal the lesser of (i) fifteen percent (15%) of the Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades, (ii) $20,000 per megawatt of electrical output of the Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the

Interconnection Customer in its Interconnection Request, including any requested modifications thereto, or (iii) $7,500,000, but in no event less than $500,000.

3) Interconnection Customers selecting Option (B) Full Capacity or Partial Capacity Deliverability Status must post for assigned RNUs, LDNUs, LOPNUs, and ADNUs, if any.

The posting amount for such RNUs, LDNUs, LOPNUs, and ADNUs shall equal the lesser of (i) fifteen percent (15%) of the ADNU costs and the total Current Cost Responsibility assigned to the Interconnection Customer in the final Phase I Interconnection Study for Network Upgrades, (ii) $20,000 per megawatt of electrical output of the Large Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request, including any requested modifications thereto, or (iii) $7,500,000, but in no event less than $500,000.

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11.3.1.3 Posting Requirements and Timing for Parked Option (A) Generating Facilities

For an Interconnection Customer choosing Option (A) whose Generating Facility was not allocated TP Deliverability in either the first TP Deliverability allocation following its receipt of the final Phase II Interconnection Study or the TP Deliverability allocation after parking, and who chooses to park the Interconnection Request, the posting due date will be extended by 12 months consistent with each parking election after the initial allocation process.

For an Interconnection Customer choosing Option (A) whose Generating Facility was allocated TP Deliverability for less than the full amount of its Interconnection Request, and who chooses to seek additional TP Deliverability for the remainder of the requested Deliverability of the Interconnection Request in the next allocation cycle, the postings for RNU, Participating TO Interconnection Facilities, LOPNUs, and for LDNUs corresponding to the initial allocation of TP Deliverability will be due in accordance with the dates specified in this Section 11. The posting due date for the LDNUs corresponding to the remainder of the requested Deliverability will be extended by 12 months consistent with each parking election after the initial allocation process.

11.3.1.4 Network Upgrade Posting Amounts

11.3.1.4.1 Small Generator Interconnection Customers

Each Interconnection Customer for a Small Generating Facility assigned to a Queue Cluster or an Interconnection Customer for a Small Generating Facility in the Independent Study Process shall post an Interconnection Financial Security instrument that brings the security amount up to the following:

1) For Interconnection Customers selecting Energy Only Deliverability Status: the lesser of (i) $1 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs and LOPNUs in either the

final Phase II Interconnection Study report, or for Independent Study Process Interconnection Customers, the system impact and facilities study. In no event shall the total amount posted be less than $100,000.

2) For Interconnection Customers who have Option (A) Generating Facilities, the lesser of (i) $1 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study.

However, in no event shall the total amount posted be less than $100,000.

3) For Interconnection Customers who have Option (B) Generating Facilities: the lesser of (i) $1 million or (ii) the sum of:

(a) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study; plus

(b) thirty (30) percent of the cost responsibility assigned to the Interconnection Customer for ADNUs in the final Phase II Interconnection Study. However, to the extent that the Option (B) Interconnection Customer's Generating Facility is allocated TP Deliverability, the cost responsibility assigned to the Interconnection Customer for ADNUs will be adjusted to reflect the allocation of TP Deliverability. If the allocation of TP Deliverability is for the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will equal zero (0). If the allocation of TP Deliverability is less than the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will be reduced pro rata.

However, in no event shall the total amount posted be less than $100,000.

11.3.1.4.2 Large Generator Interconnection Customers

Each Interconnection Customer for a Large Generating Facility assigned to a Queue Cluster and each Interconnection Customer for a Large Generating Facility in the Independent Study Process shall post an Interconnection Financial Security instrument that brings the security amount up to the following:

1) For Interconnection Customers selecting Energy Only Deliverability Status: the lesser of (i) $15 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs and LOPNUs in the, final Phase II Interconnection Study, system impact and facilities

study. In no event shall the total amount posted be less than $500,000.

2) For Interconnection Customers, who have Option (A) Generating Facilities the lesser of (i) $15 million or (ii) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study.

However, in no event shall the total amount posted be less than $500,000.

3) For Interconnection Customers who have Option (B) Generating Facilities: the lesser of (i) $15 million or (ii) the sum of:

(a) thirty (30) percent of the Current Cost Responsibility assigned to the Interconnection Customer for RNUs, LOPNUs, and LDNUs in the final Phase II Interconnection Study or, for Independent Study Process Interconnection Customers, in the system impact and facilities study; plus

(b) thirty (30) percent of the cost responsibility assigned to the Interconnection Customer for ADNUs in the final Phase II Interconnection Study. However, to the extent that the Option (B) Interconnection Customer's Generating Facility is allocated TP Deliverability, the cost responsibility assigned to the Interconnection Customer for ADNUs will be adjusted to reflect the allocation of TP Deliverability. If the allocation of TP Deliverability is for the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will equal zero (0). If the allocation of TP Deliverability is less than the full Deliverability of the Interconnection Request, then the ADNU cost responsibility will be reduced pro rata.

However, in no event shall the total amount posted be less than $500,000.

...

14.3.1 Initial Funding

Assigned Network Upgrades shall be funded by the Interconnection Customer(s) either by means of drawing down the Interconnection Financial Security or by the provision of additional capital, at each Interconnection Customer's election, up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to each Interconnection Customer(s). Current Cost Responsibility may be adjusted consistent with this GIDAP and up to the Interconnection Customer's Maximum Cost Responsibility, but the applicable Participating TO(s) shall be responsible for funding any capital costs for the Assigned Network Upgrades that exceed the Current Cost Responsibility assigned to the Interconnection Customer(s).

(a) Where the funding responsibility for any RNUs, LOPNUs, and LDNUs has been assigned to a single Interconnection Customer, the applicable Participating TO(s)

shall invoice the Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to each Interconnection Customer(s) for the RNUs, LOPNUs, or LDNUs, respectively.

(b) Where the funding responsibility for an RNU, LOPNU, or LDNU has been assigned to more than one Interconnection Customer in accordance with this GIDAP, the applicable Participating TO(s) shall invoice each Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, for such ~~RNU~~ Network Upgrades in accordance with their respective Current Cost Responsibilities. Each Interconnection Customer may be invoiced up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to that Interconnection Customer.

~~(c) Where the funding responsibility for an LDNU has been assigned to more than one Interconnection Customer, the applicable Participating TO(s) shall invoice each Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, for such LDNUs based on their respective Current Cost Responsibilities. Each Interconnection Customer may be invoiced up to a maximum amount no greater than that established by the Current Cost Responsibility assigned to that Interconnection Customer.~~

(c~~d~~) Where the funding responsibility for an ADNU being constructed by one or more Participating TO has been assigned to more than one Option (B) Interconnection Customer, the applicable Participating TO(s) shall invoice each Interconnection Customer under LGIA Article 12.1 or SGIA Article 6.1, whichever is applicable, for such ADNUs based on their respective Current Cost Responsibilities.

Any permissible extension of the Commercial Operation Date of a Generating Facility will not alter the Interconnection Customer's obligation to finance its Assigned Network Upgrades where the Network Upgrades are required to meet the earlier Commercial Operation Date(s) of other Generating Facilities that have also been assigned cost responsibility for the Network Upgrades.

14.3.2 Repayment of Amounts Advanced for Network Upgrades and Refund of Interconnection Financial Security

14.3.2.1 Repayment of Amounts Advanced Regarding Non-Phased Generating Facilities

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 5 or earlier, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has been tendered a Generator Interconnection Agreement before December 19, 2014, shall be entitled to a repayment for the Interconnection Customer's contribution to the cost of Network Upgrades commencing upon the Commercial Operation Date of its Generating Facility.

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 6 or later, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has not been tendered an Interconnection Agreement before December 19, 2014, shall be entitled to repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed in service on or before the Commercial Operation Date of its Generating Facility, commencing upon the Commercial Operation Date of the Generating Facility. Repayment for the Interconnection Customer's contribution

to the cost of Network Upgrades placed into service after the Commercial Operation Date of its Generating Facility shall, for each of these Network Upgrades, commence no later than the later of: (i) the first month of the calendar year following the year in which the Network Upgrade is placed into service or (ii) 90 days after the Network Upgrade is placed into service.

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:

(1) 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. The CAISO will publish an annual inflation factor and adjusted amount for this figure with the per unit cost publication on the CAISO Website pursuant to Section 6.4 of this GIDAP. Interconnection Customers will be entitled to repayment subject to the figure corresponding to their Commercial Operation Date.

(2) For LDNUs and LOPNUs, except for LDNUs for Option (B) Generating Facilities that were not allocated TP Deliverability, in accordance with the Interconnection Customer's Current Cost Responsibility.

(3) Option (B) Generating Facilities that were not allocated TP Deliverability will not receive repayment for LDNUs or ADNUs.

Unless an Interconnection Customer has provided written notice to the CAISO that it is declining all or part of such repayment, such amounts shall include any tax gross-up or other tax-related payments associated with the Network Upgrades not refunded to the Interconnection Customer, and shall be paid to the Interconnection Customer by the applicable Participating TO(s) on a dollar-for-dollar basis either through (1) direct payments made on a levelized basis over the five-year period commencing on the applicable date as provided for in this Section 14.3.2.1; or (2) any alternative payment schedule that is mutually agreeable to the Interconnection Customer and Participating TO, provided that such amount is paid within five (5) years of the applicable commencement date.

For Network Upgrades the Interconnection Customer funded but did not receive repayment, the Interconnection Customer will be eligible to receive Merchant Transmission Congestion Revenue Rights (CRRs) in accordance with CAISO Tariff Section 36.11 associated with those Network Upgrades, or portions thereof that were funded by the Interconnection Customer. Such CRRs would take effect upon the Commercial Operation Date of the Generating Facility in accordance with the GIA.

...

Appendix 1 Interconnection Request
INTERCONNECTION REQUEST

Provide one copy of this completed form pursuant to Section 7 of this Appendix 1 below.

...

3. Requested Deliverability Statuses ~~is for~~are (check one in each category):

On-Peak (for purposes of Net Qualifying Capacity):

_ Full Capacity (For Independent Study Process and Queue Cluster Process only)

(Note – Deliverability analysis for Independent Study Process is conducted with the next annual Cluster Study)

_ Partial Deliverability for __ MW of electrical output (For Independent Study Process and Queue Cluster Process only)

_ Energy Only

Off-Peak:

__ Off-Peak Deliverable

__ Economic Only

...

Appendix B Data Form, Pre- System Impact and Facilities Study

DATA FORM TO BE PROVIDED BY THE INTERCONNECTION CUSTOMER PRIOR TO COMMENCEMENT OF THE ~~SYSTEM IMPACT AND FACILITIES STUDY~~ PHASE II INTERCONNECTION STUDY

...

Level of Deliverability Status: Choose one of the following:

_____Energy-Only

_____Full Capacity

_____Partial Capacity (expressed in fraction of Full Capacity)

Off-Peak Deliverability Status: Choose one of the following:

_____ Off-Peak Deliverable

_____ Economic-Only

Please provide any additional modification request pursuant to Section 6.7.2.2 of Appendix DD

...

Appendix EE

LARGE GENERATOR INTERCONNECTION AGREEMENT

[INTERCONNECTION CUSTOMER]

Article 1. Definitions

...

Area Off-Peak Constraints shall mean a transmission system operating limit that would cause excessive curtailment to a substantial number of Generating Facilities during Off-Peak Load conditions, as described in Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website.

Area Off-Peak Network Upgrades (AOPNUs) shall mean a transmission upgrade or addition the CAISO identifies in the Transmission Planning Process to relieve an Area Off-Peak Constraint.

Assigned Network Upgrade (ANU) shall mean Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to the Interconnection Customer. Assigned Network Upgrades exclude Conditionally Assigned Network Upgrades unless they become Assigned Network Upgrades.

...

Conditionally Assigned Network Upgrade (CANU) shall mean Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to an earlier Interconnection Customer, but which may be assigned to the Interconnection Customer.

...

Local Off-Peak Constraints shall mean a transmission system operating limit modeled in the generator interconnection study process that would be exceeded or lead to excessive curtailment, as described in the Off-Peak Deliverability Assessment methodology, if the CAISO were to assign Off-Peak Deliverability Status to one or more Generating Facilities interconnecting to the CAISO Controlled Grid in a specific local area, and that is not an Area Off-Peak Constraint.

Local Off-Peak Network Upgrades (LOPNUs) shall mean a transmission upgrade or addition the CAISO identifies in the generator interconnection study process to relieve a Local Off-Peak Constraint.

...

Off-Peak Deliverability Constraints shall mean a transmission system operating limit that constrains Generating Facilities in an area, leading to the excessive curtailment of expected Energy.

Off-Peak Network Upgrades shall mean Network Upgrades needed to relieve Off-Peak Deliverability Constraints. Area Off-Peak Network Upgrades address Area Off-Peak Constraints. Local Off-Peak Network Upgrades address Local Off-Peak Constraints.

...

Article 4. Scope of Service

4.1 Interconnection Service. Interconnection Service allows the Interconnection Customer to connect the Large Generating Facility to the Participating TO's Transmission System and be eligible to deliver the Large Generating Facility's output using the available capacity of the CAISO Controlled Grid. To the extent the Interconnection Customer wants to receive Interconnection Service, the Participating TO shall construct facilities identified in Appendices A and C that the Participating TO is responsible to construct.

Interconnection Service does not necessarily provide the Interconnection Customer with the capability to physically deliver the output of its Large Generating Facility to any particular load on the CAISO Controlled Grid without incurring congestion costs. In the event of transmission constraints on the CAISO Controlled Grid, the Interconnection Customer's Large Generating Facility shall be subject to the applicable congestion management procedures in the CAISO Tariff in the same manner as all other resources. Full Capacity Deliverability Status, Partial Capacity Deliverability Status, and Off-Peak Deliverability Status do not confer any priority over other Generating Facilities to deliver Energy; nor provide any warranty or guarantee to deliver any amount of Energy or avoid curtailment at any time.

...

ARTICLE 5. INTERCONNECTION FACILITIES ENGINEERING, PROCUREMENT, AND CONSTRUCTION

5.20 Annual Reassessment Process. In accordance with Section 7.4 of the GIDAP, the CAISO will perform an annual reassessment, as part of a queue cluster interconnection study cycle, in which it will update certain base case data prior to beginning the GIDAP Phase II Interconnection Studies. As set forth in Section 7.4, the CAISO may determine through this assessment that Delivery Network Upgrades and Off-Peak Network Upgrades already identified and included in executed generator interconnection agreements should be modified in order to reflect the current circumstances of interconnection customers in the queue, including any withdrawals therefrom, and any additions and upgrades approved in the CAISO's most recent TPP cycle. To the extent that this determination modifies the scope or characteristics of, or the cost responsibility for, any Delivery Network Upgrades and Off-Peak Network Upgrades set forth in Appendix A to this LGIA, such modification(s) will be reflected through an amendment to this LGIA.

...

Article 11. Performance Obligation

11.4.1 Repayment of Amounts Advanced for Network Upgrades.

11.4.1.1 Repayment of Amounts Advanced Regarding Non-Phased Generating Facilities

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 5 or earlier, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has been tendered a Generator Interconnection Agreement before December 19, 2014, shall be entitled to a repayment for the Interconnection Customer's contribution to the cost of Network Upgrades commencing upon the Commercial Operation Date of its Generating Facility.

An Interconnection Customer with a non-Phased Generating Facility in Queue Cluster 6 or later, or an Interconnection Customer in the Independent Study Process or the Fast Track Process that has not been tendered an

Interconnection Agreement before December 19, 2014, shall be entitled to repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed in service on or before the Commercial Operation Date of its Generating Facility, commencing upon the Commercial Operation Date of the Generating Facility. Repayment for the Interconnection Customer's contribution to the cost of Network Upgrades placed into service after the Commercial Operation Date of its Generating Facility shall, for each of these Network Upgrades, commence no later than the later of: (i) the first month of the calendar year following the year in which the Network Upgrade is placed into service or (ii) 90 days after the Network Upgrade is placed into service.

An Interconnection Customer subject to this Article 11.4.1.1 shall be entitled to repayment for its contribution to the cost of Network Upgrades as follows:

(a) For Reliability Network Upgrades, the Interconnection Customer shall be entitled to a repayment of the amount paid by the Interconnection Customer for Reliability Network Upgrades as set forth in Appendix G, up to a maximum amount established in Section 14.3.2.1 of the GIDAP. For purposes of this determination, generating capacity will be based on the capacity of the Interconnection Customer's Generating Facility at the time it achieves Commercial Operation. To the extent that such repayment does not cover all of the costs of Interconnection Customer's Reliability Network Upgrades, the Interconnection Customer shall receive Merchant Transmission CRRs for that portion of its Reliability Network Upgrades that are not covered by cash repayment.

(b) For Local Delivery Network Upgrades:

i. If the Interconnection Customer is an Option (B) Interconnection Customer and has been allocated and continues to be eligible to receive TP Deliverability pursuant to the GIDAP, the Interconnection Customer shall be entitled to repayment of a portion of the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible, as set forth in Appendix G. The repayment amount shall be determined by dividing the amount of TP Deliverability received by the amount of deliverability requested by the Interconnection Customer, and multiplying that percentage by the total amount paid to the Participating TO by the Interconnection Customer for Local Delivery Network Upgrades

ii. If the Generating Facility is an Option (B) Generating Facility and has not been allocated any TP Deliverability, the Interconnection Customer shall not be entitled to repayment for the costs of Local Delivery Network Upgrades.

iii. If the Generating Facility ~~-~~is an Option (A) Generating Facility, ~~,~~ the Interconnection Customer shall be entitled to a repayment equal to the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible, as set forth in Appendix G.

(c) For Area Delivery Network Upgrades, the Interconnection Customer shall not be entitled to repayment for the costs of Area Delivery Network Upgrades.

(d) If an Interconnection Customer having a Option (B) Generating Facility, and is eligible, to construct and own Network Upgrades pursuant to the Merchant Option set forth in Article 5.15 of this LGIA, then the Interconnection Customer shall not be entitled to any repayment pursuant to this LGIA.

(e) For Local Off-Peak Network Upgrades, the Interconnection Customer will be entitled to a repayment equal to the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible, as set forth in Appendix G.

Unless an Interconnection Customer has provided written notice to the CAISO that it is declining all or part of such repayment, such amounts shall include any tax gross-up or other tax-related payments associated with Network Upgrades not refunded to the Interconnection Customer pursuant to Article 5.17.8 or otherwise, and shall be paid to the Interconnection Customer by the Participating TO on a dollar-for-dollar basis either through (1) direct payments made on a levelized basis over the five-year period commencing on the applicable date as provided for in this Article 11.4.1.1; or (2) any alternative payment schedule that is mutually agreeable to the Interconnection Customer and Participating TO, provided that such amount is paid within five (5) years of the applicable commencement date. Notwithstanding the foregoing, if this LGIA terminates within five (5) years of the applicable commencement date, the Participating TO's obligation to pay refunds to the Interconnection Customer shall cease as of the date of termination.

(fe) Where the Interconnection Customer finances the construction of Network Upgrades for more than one Participating TO, the cost allocation, Interconnection Financial Security, and repayment will be conducted pursuant to Section 14.4.1 of the GIDAP, and set forth in Appendix G.

...

Appendix FF

Article 1. Scope and Limitations of Agreement

1.1 This Agreement shall be used for all Small Generating Facility Interconnection Requests submitted under the Generator Interconnection and Transmission Allocation Procedures (GIDAP) set forth in Appendix DD except for those submitted under the 10 kW Inverter Process contained in GIDAP Appendix 7. For those Interconnection Requests, GIDAP Appendix 7 contains the terms and conditions which serve as the Interconnection Agreement.

1.2 This Agreement governs the terms and conditions under which the Interconnection Customer's Small Generating Facility will interconnect with, and operate in parallel with, the Participating TO's Transmission System.

1.3 This Agreement does not constitute an agreement to purchase or deliver the Interconnection Customer's power. The purchase or delivery of power and other services that the Interconnection Customer may require will be covered under separate agreements, if any. The Interconnection Customer will be responsible for separately making all necessary arrangements (including scheduling) for delivery of electricity in accordance with the CAISO Tariff. Full Capacity Deliverability Status, Partial Capacity Deliverability Status, and Off-Peak Deliverability Status do not confer any priority over other Generating Facilities to deliver Energy; nor provide any warranty

or guarantee to deliver any amount of Energy or avoid curtailment at any time.

1.4 Nothing in this Agreement is intended to affect any other agreement between or among the Parties.

…

Article 5. Cost Responsibility for Network Upgrades

5.2 Network Upgrades

The Participating TO shall design, procure, construct, install, and own the Network Upgrades described in Attachment 6 of this Agreement, except for Merchant Network Upgrades. If the Participating TO and the Interconnection Customer agree, the Interconnection Customer may construct Network Upgrades that are located on land owned by the Interconnection Customer. The actual cost of the Network Upgrades, including overheads, shall be borne initially by the Interconnection Customer. For costs associated with Area Delivery Network Upgrades and Area Off-Peak Network Upgrades, any cost estimates will be advisory in nature and will not be considered as definitive or as establishing a cap on the maximum cost responsibility of the Interconnection Customer ~~for Area Delivery Network Upgrades~~.

…

5.3.1 Repayment of Amounts Advanced for Network Upgrades

…

An Interconnection Customer subject to this Article 5.3.1.1 shall be entitled to repayment for its contribution to the cost of Network Upgrades as follows:

…

(f) For Local Off-Peak Network Upgrades, the Interconnection Customer will be entitled to a repayment equal to the total amount paid to the Participating TO for the costs of Local Delivery Network Upgrades for which it is responsible.

…

12.13 Annual Reassessment Process

In accordance with Section 7.4 of the GIDAP, the CAISO will perform an annual reassessment in which it will update certain base case data prior to beginning the GIDAP Phase II Interconnection Studies. As set forth in Section 7.4 of the GIDAP, the CAISO may determine through this assessment that Delivery Network Upgrades and Off-Peak Network Upgrades already identified and included in executed Generator Interconnection Agreements should be modified in order to reflect the current circumstances of Interconnection Customers in the queue, including any withdrawals therefrom, and any additions and upgrades approved in the CAISO's most recent Transmission Planning Process cycle. To the extent that this determination modifies the scope or characteristics of, or the financial responsibility for, any Delivery Network Upgrades and Off-Peak Network Upgrades determined pursuant to this SGIA, such modification(s) will be reflected through an amendment to this SGIA.

…

Attachment 1

Glossary of Terms

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Area Off-Peak Constraints - A transmission system operating limit that would cause excessive curtailment to a substantial number of Generating Facilities during Off-Peak Load conditions, as described in Section 6.3.2.2 of Appendix DD and the CAISO Off-Peak Deliverability Assessment posted on the CAISO Website.

Area Off-Peak Network Upgrades (AOPNUs) - A transmission upgrade or addition the CAISO identifies in the Transmission Planning Process to relieve an Area Off-Peak Constraint.

Assigned Network Upgrade (ANU) - Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to the Interconnection Customer. Assigned Network Upgrades exclude Conditionally Assigned Network Upgrades unless they become Assigned Network Upgrades.

…

Conditionally Assigned Network Upgrade (CANU) - Reliability Network Upgrades, Local Off-Peak Network Upgrades, and Local Delivery Network Upgrades currently assigned to an earlier Interconnection Customer, but which may be assigned to the Interconnection Customer.

…

Local Off-Peak Constraints - A transmission system operating limit modeled in the generator interconnection study process that would be exceeded or lead to excessive curtailment, as described in the Off-Peak Deliverability Assessment methodology, if the CAISO were to assign Off-Peak Deliverability Status to one or more Generating Facilities interconnecting to the CAISO Controlled Grid in a specific local area, and that is not an Area Off-Peak Constraint.

Local Off-Peak Network Upgrades (LOPNUs) - A transmission upgrade or addition the CAISO identifies in the generator interconnection study process to relieve a Local Off-Peak Constraint.

…

Off-Peak Deliverability Constraints - A transmission system operating limit that constrains Generating Facilities in an area, leading to the excessive curtailment of expected Energy.

Off-Peak Network Upgrades - Network Upgrades needed to relieve Off-Peak Deliverability Constraints. Area Off-Peak Network Upgrades address Area Off-Peak Constraints. Local Off-Peak Network Upgrades address Local Off-Peak Constraints.

…

Section 30: Bid and Self-Schedule Submission

30.5.2 Supply Bids

30.5.2.2 Supply Bids for Participating Generators

…

30.5.2.2.1 Off-Peak Deliverability Status for Participating Generators

Scheduling Coordinators may submit Self-Schedules on behalf of Participating Generators only where the Participating Generator has Off-Peak Deliverability Status. Scheduling Coordinators for Participating Generators with Economic Only status must submit Economic Bids for Energy. Notwithstanding the foregoing, Scheduling Coordinators may submit Energy Self-Schedules in the Real-Time Market up to the Participating Generator's Day-Ahead Market Schedule in the same Trading Hour. All Participating Generators in the CAISO Markets before March 3, 2020 have Off-Peak Deliverability Status.

…

30.5.6.1 Off-Peak Deliverability Status for Non-Generator Resource Bids

Scheduling Coordinators may submit Self-Schedules on behalf of Non-Generator Resources only where the Non-Generator Resource has Off-Peak Deliverability Status. Scheduling Coordinators for Non-Generator Resources with Economic Only status must submit Economic Bids for Energy. Notwithstanding the foregoing, Scheduling Coordinators may submit Energy Self-Schedules in the Real-Time Market up to the Non-Generator Resource's Day-Ahead Market Schedule in the same Trading Hour. All Non-Generator Resources in the CAISO Markets before March 3, 2020 have Off-Peak Deliverability Status.

Attachment C – Final Policy Papers

Deliverability Assessment Methodology Enhancements

California Independent System Operator Corporation

Deliverability Assessment Methodology Revisions

Draft Final Proposal

October 30, 2019

Regional Transmission

Table of Contents

Deliverability Assessment Methodology Final Draft Proposal

1 Introduction

The deliverability assessment methodology is a CAISO methodology developed for generation interconnection study purposes pursuant to the CAISO tariff, and is used in support of resource adequacy assessments. The CAISO last modified the existing methodology in 2009, and it has largely remained unchanged since its initial development in 2004. Given the significant changes in the composition of the existing generation fleet and the further changes anticipated over the forecast horizon, the CAISO is considering revisions to the study assumptions used in the existing methodology.

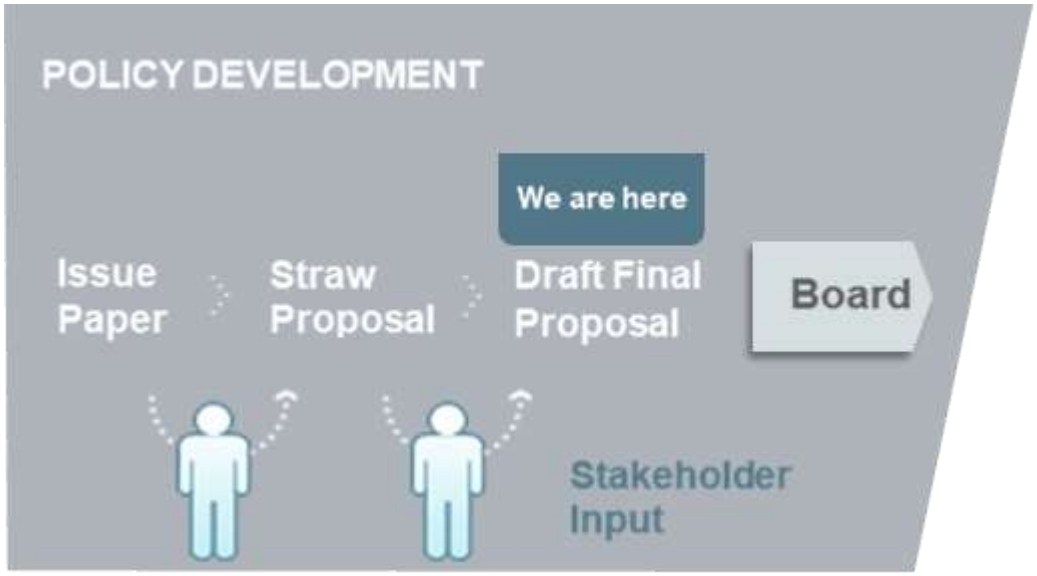
The focus of these CAISO's deliverability assessment methodology considerations is to adapt the study assumptions in the On-Peak Deliverability Assessment methodology to changing system conditions that affect or drive when resource adequacy resources are needed the most. The CAISO initially proposed revisions in the course of its 2018-2019 transmission planning cycle, and based on stakeholder feedback, the CAISO has undertaken this separate stakeholder initiative to review the issue more comprehensively and address stakeholder concerns with the potential impacts of the proposed revisions.

2 Stakeholder Process

The CAISO first proposed possible revisions to the on-peak generation deliverability assessment methodology originally discussed in the 2018-2019 transmission planning process meeting on November 16, 2018. The CAISO then held a stakeholder call on December 18, 2018 to offer a more in-depth review of the proposed revisions. Stakeholders' written comments were generally supportive of the proposed changes, but raised various concerns regarding impacts to other processes and existing generation and recommended that the CAISO take more time to address these concerns. The CAISO considered those comments and decided to reconsider the proposed revisions through a broader stakeholder initiative and to continue to apply the current methodology in studies required by the Generation Interconnection and Deliverability Allocation Procedures for Cluster 11 phase 2 and Cluster 12 phase 1 efforts. The CAISO posted an issue paper and started the stakeholder initiative on April 25. The first stakeholder call was held on May 2, 2019 to garner additional stakeholder input needed to develop a straw proposal that addresses the comments provided on the proposed on-peak generation deliverability methodology revisions. The CAISO reviewed comments to the issue paper and then developed the straw proposal on July 29. The second stakeholder meeting was held on August 5 that further clarified the on-peak deliverability methodology revision and introduced an off-

peak deliverability methodology revision to address stakeholders' concerns. The CAISO reviewed the comments to the straw proposal and refined the straw proposal in a draft final proposal posted on September 27, 2019. A third stakeholder meeting was held on October 4, 2019 and the ISO has posted this Revised Draft Final Proposal. CAISO responses to comments from the October 4, 2019 meeting will be posted in a separate document along with the stakeholder comments.

Figure 1: Stakeholder Process for Deliverability Assessment Methodology



3 Background and Issues

In the Issue Paper the CAISO explained that the addition of large amounts of solar resources have resulted in reducing the resource adequacy value of these resources, and therefore the deliverability assessment methodology needs to be revised to reflect these changing system conditions. The Issue Paper notes that starting in 2018, the CPUC has replaced the exceedance based Qualifying Capacity (QC) calculation with an Effective Load Carrying Capability (ELCC) approach to account for the growth of intermittent resources. In response to this change, the CAISO began this initiative to revise the on-peak deliverability methodology assumptions. An objective of this initiative is to examine the impacts of load peak shifting and the factors underpinning the shift to ELCC-based QC calculations on the appropriateness of the current deliverability methodology. As noted previously, the ELCC methodology considers the potential contribution of the particular resources in supporting additional firm load while maintaining an overall probabilistically determined reliability level over a period of time, generally a year, so the transmission system reasonably also needs to be able to deliver that contribution over a broader range of times than a single peak load period. Regarding the load peak shifting to later in the day, the load shape seen from the transmission grid will continue to change as the behind-the-meter distributed generation grows significantly in the future. The load peak will continue to shift to a later hour in the day

when the solar production has dropped and the load consumption is still high. As well, a certain amount of the solar resources can be needed for system resource adequacy during the peak gross consumption hour, which occurs earlier in the day when customers' gross consumption is at its highest, but sales have been reduced by behind-the-meter generation. However, the incremental reliability benefit to the peak gross consumption hour of adding more solar hits a saturation point after enough capacity is installed. Additional solar resources provide a much lower incremental reliability benefit to the system than the initial solar resources, because their output profile ceases to align with the need during the peak sale hour that has shifted from the gross consumption period to later in the day. As a result, the need for transmission upgrades identified under the peak gross consumption condition to support deliverability of additional solar resources becomes more of an economic or policy decision focused on reducing curtailment of solar resources due to transmission limitations than a reliability decision. In other words, there may be an economic or policy benefit derived from these transmission upgrades relieving curtailment, but there is less likely to be a substantial capacity benefit because there is more likely to be sufficient capacity during the peak gross consumption hour with very high solar production both behind the meter, and in other unconstrained areas. A separation of the transmission upgrades driven by resource adequacy need from those driven by economic or policy benefit is necessary. Transmission upgrades to deliver renewable energy reliably and economically is evaluated and approved through the CAISO transmission planning process. However, there is a concern with the TPP's ability to identify the upgrades timely enough for generation development, especially those depending on the exact point of interconnection of the future generations. Therefore, additional studies through the generation interconnection study could fill in the gap by identifying curtailment risk and tranmssion upgrades to reduce such risk at the early generation development stage.

4 Stakeholder Inputs

4.1 Study Assumptions and Network Upgrade Identification in On-Peak Deliverability Assessment

Stakeholder Input

Stakeholders generally support the proposed revisions to the on-peak deliverability methodology. However, several stakeholders still have questions on the study assumptions in the on-peak deliverability methodology. The questions are around why the wind and solar deliverability is not tested at the ELCC levels, why a 20% production exceedance level is used for the highest system need (HSN) assessment while a 50% exceedance level is used for the secondary system need (SSN) assessment, and what the study assumptions are for hybrid projects involving energy storage. Also, EDF Renewables, Nextera, and LSA proposed that Local Delivery Network Upgrades (DNUs) be triggered in the SSN assessment.

CAISO Response

The QC ELCC factor calculated by CPUC is a monthly number based on an hourly stochastic simulation of resource and load profiles. It represents the equivalent perfect capacity to provide the same reliability benefit. To achieve this equivalent capacity, the wind/solar must produce higher than the ELCC level in many hours to compensate for the other hours when the output is lower than the ELCC value. Therefore, the deliverability methodology uses two scenarios which are the HSN and SSN assessments to evaluate deliverability. The HSN represents the most important hours for resource adequacy purposes and reflects the reality that the solar resources contribute little to the system reliability during this period. The SSN represents the hours when solar resources contribute to the system reliability. As such, the study assumption for solar in the SSN assessment should be higher than the summer month ELCC factor. Comparing the study assumptions for solar in the SSN to the ELCC factor, the study amount for solar in SDG&E is lower than the July ELCC factor (Table 4.1). This is because ELCC factor is calculated for the entire CAISO, while the study assumptions are derived at a higher geographic granularity. To account for this technical difference, the CAISO has included in the straw proposal that the study amount shall not be lower than the average summer month ELCC factor, which is 40.2% in SDGE based on 2019 ELCC factor. The ELCC factors are anticipated to reduce in the future as more and more solar is installed. The 2020 ELCC factors are shown in the table below and are incrementally lower than the 2019 ELCC factors that are shown in the Deliverability Assessment Issue Paper. The study assumptions, on the other hand, are based on a subset of the output profiles of solar resources in a time window and remained relatively stable when comparing the 2018 data with the 2019 data. However, the CAISO will continue to monitor the ELCC values and the study assumptions and update the study assumptions through stakeholder consultations, as needed.

Table 4.1: On-Peak Solar Generation Assumption vs. CPUC ELCC Factors

ELCC for Solar PV and Solar Thermal		Study Assumptions for Solar PV and Solar Thermal in SSN		
Month	CY 2020 Solar ELCC		Area	Study Amount
1	4.0%	Issue Paper	SDG&E	35.9%
2	3.0%		SCE	42.7%
3	18.0%		PG&E	55.6%
4	15.0%			
5	16.0%	Straw Proposal	SDG&E	40.2%
6	31.0%		SCE	42.7%
7	39.0%		PG&E	55.6%
8	27.0%			
9	14.0%			
10	2.0%			
11	2.0%			
12	0.0%			

The CAISO proposed study assumptions reasonably ensure system reliability and account for saturation effect of incremental installed capacity. For the same reason, a lower output (50% exceedance level instead of 20% exceedance level) is used in the SSN assessment for solar and wind resources and only ADNUs are identified in the SSN assessment. In either the generation interconnection study or the TPP policy study, there is often a significant over-supply during the high load consumption hours. Therefore, generation from one or two small local pockets not being deliverable is less likely to affect the overall system reliability than generation not deliverable in a larger area. Therefore, the SSN assessment focuses only on the area constraints. The need for local transmission upgrades under a higher solar output assumption is more effectively addressed in the off-peak deliverability assessment.

The study assumptions for energy storage resources and hybrid resources were provided in the initial straw proposal and are reiterated below –

For energy storage generation, the Pmax is set to the 4-hour discharging capacity limited by the requested maximum output from the generator. For hybrid projects, the study amount for each technology is first calculated separately as above. Then the total study amount among all technologies is based on the sum of each technology, but then limited by the requested maximum output of the generation project.

4.2 Study Assumptions in Off-Peak Deliverability Assessment

Stakeholder Input

LSA asked for a definition of the off-peak hours that are studied in the off-peak deliverability assessment.

CAISO Response

The peak load levels are defined in the on-peak deliverability methodology as the 1 in 5 peak sale level and the 1 in 5 peak consumption level. However, these load levels can be considered to generally represent when load exceeds 90% of the peak load level, and the hours that occurs. In the context of this off-peak deliverability study methodology, all hours other than the peak hours are off-peak. It is an extensive window of time. Therefore, the off-peak assessment methodology does not focus on a particular time window. Instead, the assessment is established upon system conditions when the generation is likely to be curtailed due to transmission constraints, but there is also sufficient capacity in the system to substitute for the constrained capacity, without system oversupply. As explained in the straw proposal, the system condition selected for study in the off-peak deliverability methodology is 55% to 60% of the summer peak load and about 6000 MW import. This generally corresponds to spring afternoon or fall morning conditions.

4.3 Value and Impact of OPDS to Market Operation

Stakeholder Inputs

Avangrid Renewables, AWEA-California, First Solar stated that the value of OPDS is not clear. They pointed out that there currently isn't much curtailment of self-scheduling. AvanGrid Renewables, BAMx, EDF Renewables, Nextera, LSA, Intersect Power, SPower noted that OPDS scheduling priority is not understood and could create adverse incentives.

CAISO Response

Option 5 is constructed to provide an incentive for the interconnection customers to up-front fund the local inexpensive transmission upgrades. The OPDS scheduling priority is intended to encourage resources to develop in locations that do not trigger upgrades or trigger only low cost localized transmission upgrades. Conversely, it should discourage resources from developing in locations that trigger high cost transmission upgrades. Having the OPDS label as part of the framework is intended to maximize the incentive for generators to site in good locations from a transmission perspective and to minimize excessive curtailment risk. The OPDS scheduling priority together with reimbursable funding is a viable tool for the interconnection customer to proactively manage curtailment risk due to local transmission constraints. This is the intended value of Option 5. In addition, it provides valuable information for those reviewing the resource project for financing purposes. As pointed out by Avangrid, AWEA-California and other stakeholders, it is expected that "off-takers" will require OPDS.

The scheduling priority associated with OPDS also addresses the free-rider concern. This is accomplished by differentiating resources that select OPDS and potentially need to fund transmission upgrades from resources that do not select OPDS.

4.4 Scheduling Priority of FCDS Resources

Stakeholder Inputs

Avangrid and SPower objected to a proposal where OPDS resources would have a higher scheduling priority than FCDS resources.

CAISO Response

The CAISO proposes an alternative approach for implementing the scheduling priority. With this alternative, no new penalty prices are introduced, which eases the concerns on how the penalty prices would be set. The generators that are eligible for OPDS, but not selecting OPDS, will not be allowed to self-schedule in the day-ahead or real-time markets. In other words, they must submit economic bids in the day-ahead and real-time markets. The OPDS generators are allowed to self-schedule in either the day-ahead or real-time markets. The new generators that are not eligible for OPDS will be allowed to self-schedule based on selecting full capacity deliverability status. Relative to the approach described in the original straw proposal, this new alternative approach should result in fewer self-schedules and

more economic bids for market efficiency. Currently, a resource, regardless of the technology type, can self schedule in the real-time market up to its day-ahead award; this feature will remain in place for all generators, regardless if they are OPDS or not.

4.5 Scheduling Priority under All Conditions

Stakeholder Inputs

Many stakeholders, including AvanGrid Renewables, BAMx, EDF Renewables, Nextera, LSA, Intersect Power, SPower, expressed concern that the scheduling priority associated with OPDS is applied under all conditions.

CAISO Response

The scheduling priority is to provide some incentive for the interconnection customers to select the OPDS option and if necessary, up-front fund inexpensive local transmission upgrades. As described in the response above, the scheduling priority associated with the OPDS label is to maximize the incentive for generators to site in good locations from a transmission perspective and to minimize excessive curtailment risk. Ideally, the generators will not trigger any transmission upgrades or at most only simple low cost transmission upgrades. The reward for siting their resource in a good location from a transmission perspective includes a scheduling priority regardless of whether transmission upgrades are triggered or not. It is not necessary and not feasible to associate the priority with a specific transmission constraint and a specific time period. First, if the local constraint identified in the off-peak deliverability study were not mitigated, then it would be expected to be binding before the system gets into oversupply conditions as well as during over-supply conditions, so the scheduling priority is aligned with the local constraint even during over-supply conditions. Secondly, accurate association of generation curtailment with a transmission upgrade is not feasible during the market runs, especially when there are multiple binding constraints.

4.6 Funding Off-Peak Deliverability Upgrades

Stakeholder Inputs

Some stakeholders, e.g. BAMx and SDGE, do not agree with full reimbursement of off peak transmission upgrades. They believe this would lead to upgrades that are not in the ratepayer's interest. BAMx stated that Option 5 is not needed because the TEAM is adequate and curtailment is not a issue.

CAISO Response

The straw proposal elaborated on the principles and objectives of the off-peak deliverability assessment. The cost being reimbursable is a strong incentive for the generators to elect OPDS and up-front fund inexpensive local upgrades. Such upgrades, due to low cost and only moving forward together with generation development, are expected to improve the

market efficiency and benefit the ratepayers. Not identifying the need for these local upgrades could result in poor generation siting decisions from a transmission and ratepayer perspective. Procurement processes take into account the cost of identified upgrades in their selection process of renewable generation contracts, so the combined cost of the resource and the upgrades are considered and the transmission costs are only triggered if they are in the ratepayer's interest.

4.7 Transition into the Revised Methodology

Stakeholder Inputs

With the revised on-peak deliverability assessment assumptions, it is expected that more generation would be deliverable without further transmission upgrades. One benefit would be that more Transmission Plan Deliverability (TPD) allocation would become available. First Solar and LS Power proposed that EO (converted from FC due to not allocated TPD) should have a one-time opportunity to receive a TPD allocation ahead of other queue projects seeking TPD. First Solar, Golden State Clean Energy and LS Power also asked for a one-time option for EO to get OPDS.

CAISO Response

Please see section 6.2 for the CAISO's response to the comment regarding the incremental TPD created due to the on-peak deliverability assumption changes.

The CAISO agrees that resources have not had the opportunity to select the OPDS option, so a one-time opportunity should be provided for the EO generation projects to request OPDS in the next cluster window upon approval and implementation of the proposal. They will be studied together with that cluster window projects and share cost responsibility, as needed.

4.8 Implementation Details

Stakeholder Inputs

There are some comments regarding the interconnection procedure details. EDF-R, LSA and SPower raised the question that OPDS is selected before knowing the upgrade cost and there is no opportunity to de-select.

ISO response:

Additional implementation details have been added to the final proposal. Between Phase I and Phase II, the IC can de-select OPDS. After that, the IC could always request an MMA for changing from OPDS to non-OPDS.

5 Draft Final Proposal to Revise the Deliverability Assessment Methodology

The deliverability assessment will be a test under multiple system conditions: the highest system need scenario, the secondary system need scenario, and off- peak scenario.

The highest system need scenario and the secondary system need scenario assessments follow the current deliverability assessment procedure. The dispatch assumptions align with the particular load condition being studied. The two scenarios play a different role in determining the available transmission capability and the required delivery network upgrades.

The off-peak (*i.e.* non-summer peak) scenario is a supplemental study to determine the available transmission capability and the required delivery network upgrades needed to reduce the risk of excessive renewable curtailment. The study conditions in the off-peak scenario are in general not aligned with resource adequacy purposes. This straw proposal recommends the evaluation of the off-peak scenario and the assignment of local area, low cost upgrades to generation interconnection projects, as needed, to avoid excessive local curtailment, but relying on the transmission planning process to comprehensively identify transmission upgrades needed to address large area, high cost transmission constraints to avoid large area renewable curtailment.

5.1 Highest System Need Scenario

The highest system need (HSN) scenario represents when the capacity shortage is most likely to occur. In this scenario, the system reaches peak sale with low solar output. The highest system need hours are hours ending 18 to 22 in the summer months with an unloaded capacity margin less than 6% in the CAISO annual summer assessment or identified as loss of load hour in the CPUC ELCC study for wind and solar resources.

The CEC 1-in-5 peak sale forecast for each planning area is distributed to all the load buses in study.

The net scheduled imports at all branch groups as determined in the latest annual Maximum Import Capability (MIC) assessment set the imports in the study. Approved MIC expansions, if not yet implemented, are added to the import levels.

The study amount for each generator, the maximum output tested in the deliverability assessment, depends on the technology, the installed capacity and the Qualitying Capacity.

The intermittent resources are modeled based on the output profiles during the highest system need hours. A 20% exceedance production level for wind and solar resources during these hours sets the study amount tested in the deliverability assessment. The CAISO will review the latest available CPUC ELCC study data and CAISO annual summer assessment data to annually update the modeling assumptions, as needed.

The study amount for the non-intermittent resources are set to the highest summer month Qualifying Capacity in the last three years. For proposed new non-intermittent generators that do not have Qualifying Capacity value, the study amount is the capacity requesting full deliverability. For energy storage generation, the study amount is set to the 4-hour discharging capacity limited by the requested maximum output from the generator. For hybrid projects, the study amount for each technology is first calculated separately as above. Then the total study amount among all technologies is based on the sum of each technology, but limited by the requested maximum output of the generation project.

Table 5.1: Modeling Assumptions for Highest System Need Scenario

Selected Hours	HE18 ~ 22 in summer month and (loss of load event in ELCC simulation by CPUC or UCM < 6% in CAISO summer assessment)
Load	1-in-5 peak sale forecast by CEC
Non-Intermittent Generators	Study amount set to highest summer month Qualifying Capacity in last three years
Intermittent Generators	Study amount set to 20% exceedance level during the selected hours
Import	MIC data with expansion approved in TPP

The deliverability assessment then follows the steps in the current methodology. Deliverability constraints are identified and delivery network upgrades are identified for each constraint. The delivery network upgrades are categorized as either LDNUs or ADNUs following the current study process.

5.2 Secondary System Need Scenario

The secondary system need (SSN) scenario represents when the capacity shortage risk will increase if the intermittent generation while producing at a significant output level is not deliverable. In this scenario, the system load is modeled to represent the peak consumption level and solar output is modeled at a significantly high output. The secondary system need hours are hours ending 15 to 17 in the summer months with an unloaded capacity margin less than 6% in the CAISO annual summer assessment or identified as loss of load hour in the CPUC ELCC study for wind and solar resources.

The hour with the highest total net imports among all secondary system need hours from the latest MIC assessment data is selected. Net scheduled imports for the hour set the imports in the study. Approved MIC expansions, if not yet implemented, are added to the import levels.

The intermittent resources are modeled based on the output profiles during the secondary system need hours. A 50% exceedance production level for wind and solar resources during

the selected hours sets the study amount tested in the deliverability assessment. The CAISO will review the latest available CPUC ELCC study data and CAISO annual summer assessment data to annually update the modeling assumptions, as needed.

The study amount for the non-intermittent resources are set to the highest summer month Qualifying Capacity in the last three years. For proposed new non-intermittent generators that do not have Qualifying Capacity value, the study amount is the capacity requesting full deliverability. For energy storage generation, the Pmax is set to the 4-hour discharging capacity limited by the requested maximum output from the generator. For hybrid projects, the study amount for each technology is first calculated separately as above. Then the total study amount among all technologies is limited by the requested maximum output of the generation project.

Table 5.2: Modeling Assumptions for Secondary System Need Scenario

Select Hours	HE15 ~ 17 in summer month and (loss of load event in ELCC simulation by CPUC or UCM < 6% in CAISO summer assessment)
Load	1-in-5 peak sale forecast by CEC adjusted to peak consumption hour
Non-Intermittent Generators	Study amount set to highest summer month Qualifying Capacity in last three years
Intermittent Generators	Study amount set to 50% exceedance level during the selected hours, but no lower than the average QC ELCC factor during the summer months
Import	Highest import schedules for the selected hours

The deliverability assessment then generally follows the steps in the current methodology. As the load is lower, it may not be feasible to dispatch all existing generators at 80% ~ 92% of the Pmax. The initial dispatch may be lowered to less than 80%, but not lower than the LCR requirement in each LCA.

5.3 Delivery Network Upgrades – Use of HSN and SSN Scenarios

Network upgrades are identified to mitigate all the deliverability constraints from both the primary and the secondary system need scenarios.

In the generation interconnection process,

- The highest system need scenario represents when a capacity shortage is most likely to occur. As a result, if the addition of a resource will cause a deliverability deficiency determined based on a deliverability test under the highest system need scenario, then the constraint will be classified as either a Local Deliverability Constraint or an Area Deliverability Constraint.

- The secondary system need scenario represents when the capacity shortage risk will increase if the intermittent generation while producing at a significant output level is not deliverable. If the addition of a resource will cause a deliverability deficiency determined based on a deliverability test under the secondary system need scenario, and is not identified in the highest system need scenario, then the constraint can be classified as an Area Deliverability Constraint following the classification guidelines in the BPM for the Generator Interconnection and Deliverability Allocation Procedures.

In the transmission planning process,

- Transmission upgrades identified under the highest system need scenario are approved as policy driven upgrades.
- Transmission upgrades identified under the secondary system need scenario need additional economic or reliability justification to be approved as policy driven or economic upgrades. The transmission planning process could make a determination that no upgrades are needed for the secondary system need deliverability constraint. If the transmission planning process decides not to pursue upgrades to support the deliverability test in the secondary system need scenario, generation up to the amount assessed for the renewable portfolio behind the associated deliverability constraints are deemed deliverable in the Transmission Plan Deliverability allocation and annual NQC determination.

5.4 Off-Peak Deliverability Assessment

Once the precise location and amounts of future resources are known, the most robust approach to approve transmission upgrades to deliver renewable energy reliably and economically is through the transmission planning process framework of reliability, economic and policy upgrades. However, there is a concern with the TPP's ability to identify the upgrades timely enough for generation development, especially those depending on the exact point of interconnection of the future generations. Therefore, a supplemental study that focuses on renewable energy delivery during hours outside of the summer peak load period would inform generators of their curtailment risk and how to reduce such risk at the early development stage. The generators would be given an opportunity to fund network upgrades. To enable this, the CAISO proposes revisions to the off-peak deliverability assessment around the following principles:

1. Identify transmission bottlenecks that would cause excessive renewable curtailment, but the study assumptions should focus on system conditions when oversupply is not likely.
2. Identify transmission upgrades for local constraints that tend to be less expensive. The need for such upgrades are highly dependent on the development of specific generation projects interconnecting in a small localized area. These local constraints are hit by a relatively high simultaneous output of local generation before the system-wide over supply situation occurs.
3. It is prudent to rely on the TPP framework to approve transmission upgrades for area constraints that tend to be expensive. For area constraints, the general placement of new renewable generation in the portfolio is sufficient to identify the need.

4. The curtailment risk is regardless of the generator's deliverability status, so this study should consider both full capacity and energy only generators.

The CAISO proposed five options to revise the off-peak deliverability study procedure in the straw proposal. After considering stakeholders' comments, the CAISO adopted Option 5 with an alternative implementation of scheduling priority. The key elements of the off-peak deliverability assessment revision include:

1. Update the off-peak deliverability methodology assumptions and include solar as a resource that primarily produces during the off-peak period.
2. Resources that primarily produce during the off-peak period would be eligible to select an Off-Peak Deliverability Status (OPDS).
3. Identify local and area off-peak deliverability constraints. Classification of the local vs. area contraints follows the same methodology as for the on-peak deliverability methodology.
4. Area constraints are for information only – provide conceptual upgrades and deliverable amount without upgrades.
5. Upgrades to mitigate local constraints are mandatory for the ICs that request OPDS to fund.
6. The local upgrades belong to their own cost category, not under the current cost responsibility and maximum cost responsibility for LDNUs and RNUs.
7. The upgrade costs would be fully reimbursed.
8. Require interconnection financial security posting for the upgrades.
9. The upgrade costs funded by the interconnection customer would be capped.
10. The upgrades could be identified, upsized or reconfigured in the TPP and the cost responsibility would be removed from the interconnection customers.
11. The following future generators could be self-scheduled in the market:
    a. OPDS generators
    b. FCDS/PCDS generators not eligble for OPDS
12. All existing generators could self-schedule in the market.

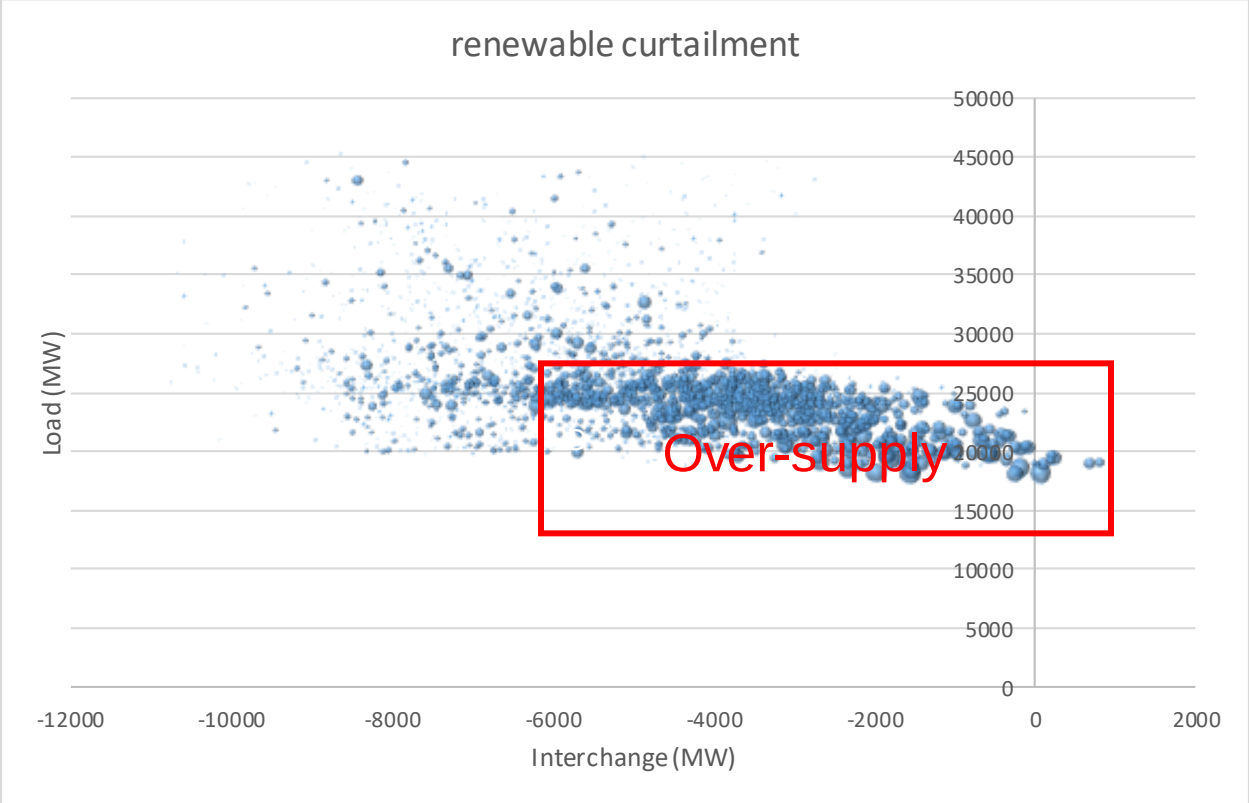
Details of the CAISO proposal are discussed below.

General System Conditions for the Off-Peak Deliverability Assessment

As renewable penetration increases, curtailments are expected to be more severe under lighter load conditions. Therefore, the off-peak condition would be studied to supplement the on-peak deliverability assessment. The objective of the off-peak deliverability assessment is to identify transmission upgrades needed to relieve excessive renewable curtailment caused by transmission constraints. The general system study conditions should capture a reasonable scenario of the load, generation, and imports that stress the transmission system, but not coinciding with an over-supply situation. The renewable curtailment data from 2018 was examined to establish this general system condition. Figure 2 shows an hourly renewable curtailment scatter plot with assocated load and import levels. The size of the bubbles in the figure are proportional to the MW being curtailed. The curtailments in the

right lower corner of the scatter plot are most likely to be due to system-wide over-supply. The general system conditions to assess the off-peak transmission constraints are selected just outside the top left corner of the box in Figure 2 to stress the transmission system. The load is 55% to 60% of the summer peak load and the import is about 6000 MW.

Figure 2: Renewable Curtailment



The production of wind and solar resources under the selected system conditions varies widely. The production duration curves for solar and wind were examined. The production level under which 90% of the annual energy is produced set the outputs to be tested in the off-peak deliverability assessment. As seen in Figure 3 and Figure 4, the 90% energy levels are 68% of installed capacity for solar and 44% for wind.

Figure 3: Normalized CAISO Total Solar Output Duration Curve

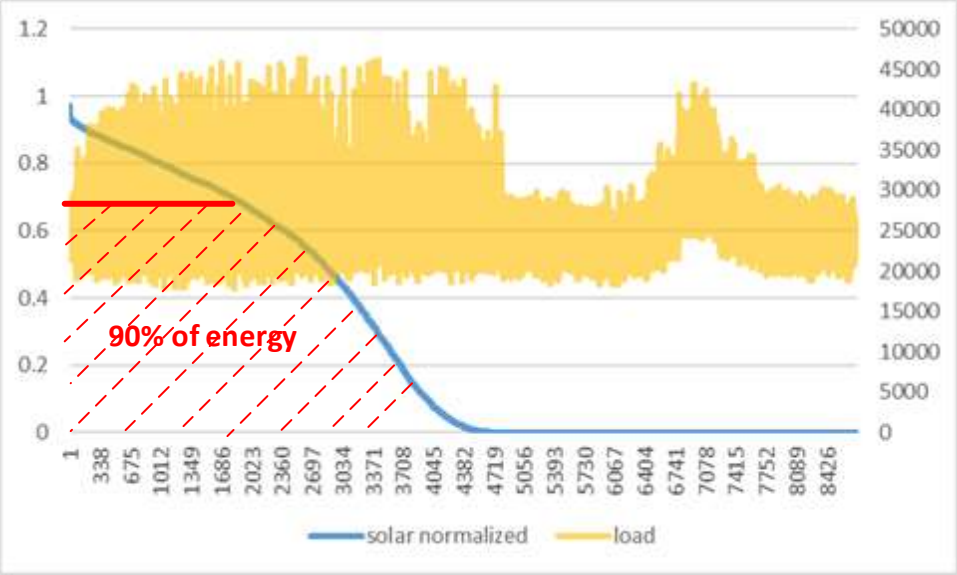
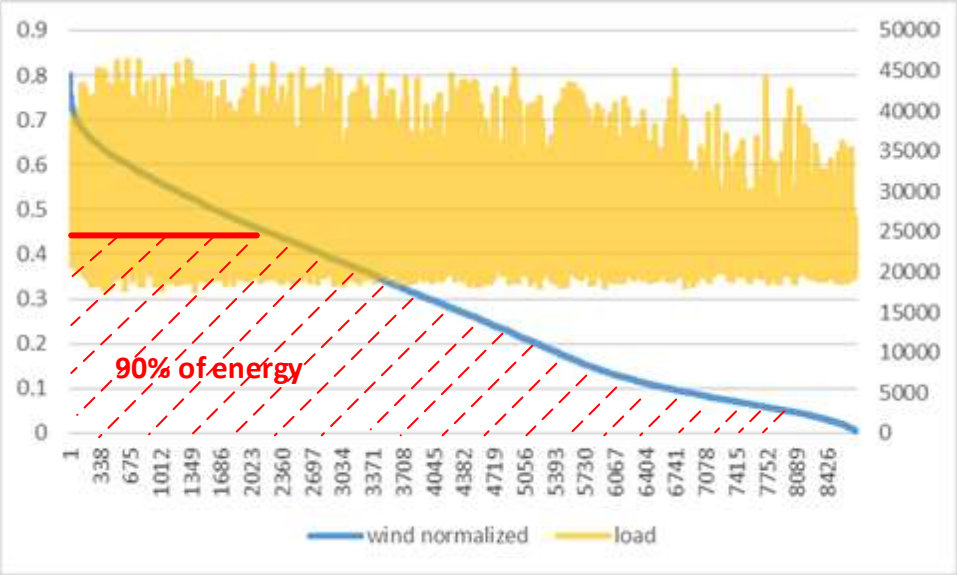


Figure 4: Normalized CAISO Total Wind Output Duration Curve



The dispatch of the remaining generation fleet is set by examining historical production associated with the selected renewable production levels. The hydro dispatch is about 30% of the installed capacity and the thermal dispatch is about 15%. All energy storage facilities are assumed offline.

The dispatch assumptions discussed above apply to both full capacity and energy-only resources. However, with the large amount generation in the interconnection study queue, it is impossible to balance load and resources under such conditions with all queued generation dispatched. The dispatch assumptions are applied to all existing generators first,

then some future generators if needed to balance load and resources. This establishes a system-wide dispatch base case that is the starting case for developing each of the study area base cases that the off-peak deliverability assessments are based on. Table 5.3 summarizes the generation dispatch assumptions.

Table 5.3: CAISO System-Wide Generator Dispatch Assumptions

	Dispatch Level
wind	44%
solar	68%
Battery Storage	0
hydro	30%
thermal	15%

The off-peak deliverability assessment models all the approved transmission upgrades, as well as RNUs and LDNUs required under the on-peak deliverability assessment.

Off-Peak Deliverability Assessment Procedure

The off-peak deliverability assessment is performed for each study area separately. The study areas in general are the same as the reliability assessment areas in the generation interconnection studies. However, to avoid excessive generation being dispatch in one study area, one reliability assessment area may be broken into several smaller gen-pockets that separate wind/solar areas and align with TPP study areas. Below is the preliminary list of the study areas –

- PG&E north
- PG&E Fresno
- PG&E Kern
- SCE Northern
- SCE North of Lugo
- SCE/VEA/GWL East of Pisgah
- SCE/DCRT Eastern
- SDGE Inland
- SDGE East

Study area base cases are created from the system-wide dispatch base case. All generators in the study area, existing or new, are dispatched to a consistent output level. In order to capture local curtailment, the renewable dispatch is increased to the 90% energy level for the study area, which is higher than the system 90% energy level. The study area 90% energy level was determined from representing individual plants in different areas.

- If the renewables inside the study area are predominantly wind resources (more than 70% of total study area capacity), increase wind resource dispatch as shown in Table 5.4. All the solar resources in the wind pocket are dispatched at the system-wide level of 68%. If not a wind pocket, dispatch assumptions in Table 5.5 are used.

Table 5.4: Solar and Wind Dispatch Assumptions in Wind Area

	Wind Dispatch Level	Solar Dispatch Level
SDG&E	69%	68%
SCE	64%	
PG&E	63%	

Table 5.5: Solar and Wind Dispatch Assumptions in Solar Area

	Solar Dispatch Level	Wind Dispatch Level
SDG&E	79%	44%
SCE	77%	
PG&E	79%	

As the generation dispatch increases inside the study area, the following could be done to balance the load and resources:

- Reduce new generation outside the study area with a limitation of Path 26 4000 MW north to south or 3000 MW south to north.
- Reduce thermal generation inside the study area.
- Reduce import.
- Reduce thermal generation outside the study area.

A contingency analysis is performed for normal conditions and selected contingencies:

- Normal conditions (P0).
- Single contingency of transmission circuit (P1.2), transformer (P1.3), single pole of DC lines (P1.5) and two poles of PDCI if impacting the study area.
- Multiple contingency of two adjacent circuits on common structure (P7.1) and loss of a bipolar DC line (P7.2).
- Two adjacent transmission circuit according to WECC's Project Coordination, Path Rating and Progress Report Processes.

For overloads identified under such dispatch, resources that can be re-dispatched to relieve the overloads are analyzed first:

- Existing energy storage resources are dispatched to full four hour charging capacity to relieve the overload.
- Thermal generators contributing to the overloads are turned off.

- Imports contributing to the overloads are reduced to the level required to support out-of-state renewables in the RPS portfolios.

The remaining overloads after the re-dispatch will be mitigated by the identification of transmission upgrades. First, the overloads are identified as local constraints or area constraints. The CAISO will apply the same local vs. area constraint classification methodology as in the on-peak deliverability assessment. Then, the transmission upgrades to mitigate local constraints are labeled as off-peak local network upgrades and the transmission upgrades to mitigate area constraints are labeled as off-peak area network upgrades.

Off-Peak Network Upgrades (OPNU)

As the off-peak deliverability assessment is performed for generators regardless of their on-peak deliverability status to identify transmission contraints impacting renewable production, a new upgrade framework is needed to separate them from the Delivery Network Upgrades associated with the Full Capacity Deliverability Status.

Off-Peak Local Network Upgrades

The interconnection customers for wind and solar resources are provided an opportunity to fund off-peak local network upgrades in the generation interconnection process. The off-peak local network upgrades belong to a separate cost category from the Reliability Network Upgrades and Delivery Network Upgrades. Therefore, inclusion of the off-peak upgrades would not impact the cost responsibility and maximum cost responsibility for RNUs and DNUs.

The off-peak upgrades are assigned to the interconnection requests in the study cluster that have 5% or more contribution to the transmission constaint and elect OPDS. The cost is allocated among these interconnection requests in proportion to the flow impacts on the upgrade.

If the off-peak upgrades are identified, upsized or reconfigured in a subsequent TPP cycle, the network upgrade requirement and cost allocation will be removed from the interconnect customers' responsibility.

The off-peak upgrades identified for an early queue cluster may be needed to obtain FCDS/PCDS for the later clusters. In such case, the off-peak upgrades for the early cluster are Conditionally Assigned Network Upgrades (CANU) for the later clusters. Otherwise, the off-peak upgrades for the early cluster are conditionally assigned to later cluster as off-peak upgrades to be included in the cost cap for the OPNU.

The off-peak upgrade cost, including both triggered OPNU and conditionally assigned OPNU, is capped by the lower of the allocated cost of network upgrades between the Phase I and the Phase II study. During the reassessment, the need for the OPNU is reassessed and the the cost is reallocated among the still active generation projects in the same cluster. The total reallocated OPNU cost does not exceed the maximum OPNU cost responsibility. The maximum OPNU cost responsibility is not modified by the reassessment.

Out of the total OPNU cost, the portion corresponding to the triggered OPNU is included in the overall network upgrade cost calculation for the interconnection financial security posting.

The off-peak upgrades costs assigned to the interconnection customers are reimburseable.

Off-Peak Area Network Upgrades

Off-peak area network upgrades are identified for information purpose only, same as the current off-peak deliverability assessment. The estimated scope and cost will be provided. In addition, information will be provided on how much renewable generation would need to be curtailed in order to mitigate the remaining overloads after the re-dispatch described above without the area network upgrades.

Off-Peak Deliverability Status (OPDS)

The off-peak deliverability status selection (OPDS/non-OPDS/NA) is made in the initial Interconnection Request. There isn't a selection for partial OPDS. OPNU cost responsibility is identified in the Phase I Interconnection Study. Between Phase I and Phase II interconnection studies, the IC may change from OPDS to non-OPDS within 10 business days from the Phase I interconnection study results meeting. At any other time, a change from OPDS to non-OPDS must be evaluated through a material modification analysis. A change from non-OPDS to OPDS is not allowed.

OPDS will provide a scheduling priority by continuing to allow self-scheduling upon commercial operation for new wind and solar resources that select OPDS. For new non wind and solar resources having FCDS will provide a scheduling priority by continuing to allow self-scheduling. OPDS is not applicable to any existing generators that are already operational before the proposed methodology becomes effective. Existing generators will continue to be allowed to self-schedule. New non wind and solar resources with Energy Only Deliverability Status and new wind and solar resources with non-OPDS will not be allowed to self schedule. Resources not allowed to self schedule cannot self-schedule in both the day-ahead and real-time markets. Tables showing which resources can self-schedule and which cannot are provided in Table 5.6 and Table 5.7. Currently, a resource can self schedule in the real-time market up to its day-ahead award; this feature will remain in place for all generators, regardless if they are OPDS, FCDS, or not.

Hybrid interconnection requests, if including solar or wind component, will elect OPDS in the same manner as a solar or wind interconnection request.

Table 5.6: Self-schedule for Wind/Solar Generation

	FCDS & PCDS		EO	
	OPDS	Non-OPDS	OPDS	Non-OPDS
Existing wind/solar generation	Self Scheduling Allowed (Grandfathered)		Self Scheduling Allowed (Grandfathered)	
New wind and solar in the queue prior to the OPDS implementation	Self Scheduling Allowed (OPDS selection assumed)		One-time chance to request OPDS	
			Self Scheduling Allowed	No-Self Scheduling
New wind and solar to the queue after the OPDS implementation	Self Scheduling Allowed	No-Self Scheduling	Self Scheduling Allowed	No-Self Scheduling

Table 5.7: Self-schedule for non-Wind/Solar Generation

	FCDS & PCDS	EO
	OPDS not applicable	
Existing non-wind/solar generation	Self Scheduling Allowed	
New non-wind/solar in the queue prior to the OPDS implementation	Self Scheduling Allowed	
New non-wind/solar generation after the OPDS implementation	Self Scheduling Allowed	No-Self Scheduling

A one-time opportunity will be provided for the EO generation projects currently in the queue to request OPDS in the next cluster window upon approval and implementation of the proposal. They will be studied together with that cluster window projects and share OPNU cost responsibility.

6 Transition into the Proposed Methodology

Assuming the proposed methodology is effective at the beginning of 2020, the one-time window for EO generation projects in the queue to request OPDS would be the Queue Cluster 13 window from April 1 to 15, 2020.

6.1 OPDS Selection for Queue Clusters 10 to 12

Wind and Solar projects in Queue Cluster 10, 11, 12 and Independent Study Process that initially requested FCDS or PCDS and have not been converted to EO, will be assumed to select OPDS.

6.2 One-Time TPD Allocation Process

The new deliverability assessment methodology will make a substantial amount of existing deliverability capacity available to interconnection customers. At the same time, the CAISO expects a generating capacity shortfall in the near future. This shortfall warrants expedited generation development to ensure the reliable operation of the CAISO controlled grid.

In light of these facts, the CAISO proposes to create a one-time TPD allocation process for the upcoming cycle. The one-time process will supplant all current rules regarding TPD allocation. The one-time process will end with this one cycle, and the CAISO will revert to the current tariff TPD allocation process thereafter.

The principle difference between the one-time process and the current process is that the one-time process will allow any interconnection customer with a completed Phase II study that is still an active project in the interconnection queue to seek deliverability by representing that it elects to proceed without a PPA, and will be subject to the restrictions described in Section 8.9.2.2 of Appendix DD going forward. Regardless of what queue cluster the interconnection customer is in, any interconnection customer selecting this option will be allocated TPD last, meaning that the previous allocation group three will now be allocation group seven, and groups previously four, five, six, and seven will move up. Allocation groups one and two are unchanged.

All interconnection customers currently designated Energy Only must submit a $60,000 study deposit to request a TPD allocation.

Only three sets of interconnection customers will be eligible to trigger the assignment and construction of new LDNUs: allocation group one, allocation group two, and interconnection customers electing to proceed without a PPA that currently have FCDS status (i.e., before this one-time TPD allocation process). Any interconnection customer that is currently designated Energy Only—regardless of what it previously requested—cannot require new LDNUs to achieve FCDS or PCDS. The one-time TPD allocation order will thus be:

(1) To Interconnection Customers in the current Queue Cluster or coming out of parking that have executed power purchase agreements, and to Interconnection Customers in the current Queue Cluster that are Load Serving Entities serving their own Load.

(2) To Interconnection Customers in the current Queue Cluster or coming out of parking that are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement.

(3) To Interconnection Customers that have not achieved their Commercial Operation Date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability

Status, and have executed power purchase agreements; and to Interconnection Customers that have achieved their Commercial Operation Date and have executed power purchase agreements.

(4) To Interconnection Customers that have not achieved their Commercial Operation Date, originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status, and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement; and to Interconnection Customers that have achieved their Commercial Operation Date and are actively negotiating a power purchase agreement or on an active short list to receive a power purchase agreement.

(5) To Interconnection Customers that originally requested Full Capacity Deliverability Status or Partial Capacity Deliverability Status but achieved their Commercial Operation Date as Energy Only.

(6) To Interconnection Customers that achieved their Commercial Operation Date.

(7) To Interconnection Customers with a completed Phase II Interconnection Study electing to proceed without a power purchase agreement, subject to Section 8.9.2.2 of Appendix DD.

On their TPD affidavits, interconnection customers will be able to update their proposed CODs. Interconnection customers electing to update their CODs must submit a material modification assessment request and a $10,000 study deposit pursuant to Section 6.7.2 of Appendix DD. If they elect to proceed without a PPA, they will be ineligible to extend this COD after the one-time COD change (in addition to the other restrictions described in Section 8.9.2.2). The CAISO will evaluate COD extensions during the annual reassessment. Results may not be available until after TPD allocation results. If an interconnection customer fails the material modification assessment request—either because it cannot mitigate its impact or elects not to—the interconnection customer will lose its TPD allocation regardless of which TPD allocation group it selected. Interconnection customers whose COD modifications will move their CODs beyond (or further beyond) the seven or ten years in queue anticipated by the tariff will be subject to the commercial viability criteria described in Section 6.7.4 of Appendix DD (or applicable procedure).

If the CAISO does not have sufficient TPD to accommodate all interconnection customers in any particular group, it will allocate available TPD to the qualifying group based on highest numerical score. In addition to the three current scoring categories, the CAISO will include a fourth scoring category that allocates points by COD (earlier CODs receive more points). In the unanticipated event of point ties, the CAISO will use LDNU cost estimates as the tiebreaker, followed by an allocation using the weighted least square algorithm..

TPD affidavits are due December 3, 2019. Energy Only interconnection customers must also submit their $60,000 study deposits by then. Interconnection customers requesting to modify their CODs must submit their material modification requests and $10,000 deposits by then as well (in addition to their $60,000 deposit if they are Energy Only).

The CAISO recognizes that stakeholders have raised other issues with the CAISO's draft final proposal that these changes may not address. The CAISO has issued this revised draft final proposal to notify stakeholders of these substantial changes and solicit additional

stakeholder feedback before presenting this proposal to the Board of Governors. The CAISO intends to continue to address stakeholders' concerns and clarify outstanding issues through the development of the draft tariff revisions and revised on-peak and off-peak deliverability assessment methodology papers the CAISO will include with its ultimate FERC filing.

7 Next Steps

In this final proposal the CAISO has summarized stakeholder's comments and completed the off-peak deliverability status proposal to address stakeholders' concern. The CAISO will hold the fourth stakeholder meeting on November 4, 2019 to review this revised draft final proposal and seek Board approval of the proposal in November.

Attachment D – Board Memorandum

Deliverability Assessment Methodology Enhancements

California Independent System Operator Corporation

Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President, Market and Infrastructure Development

Date: November 6, 2019

Re: **Decision on Deliverability Methodology Revisions**

This memorandum requires Board action

EXECUTIVE SUMMARY

The ISO's deliverability assessment methodology was developed for generation interconnection study purposes and is used for resource adequacy purposes to assess the sufficiency of transmission such that generation resources can be relied upon to provide reliable capacity when most needed. The ISO last modified the existing methodology in 2009, and it has largely remained unchanged since its initial development in 2004. Given the significant changes in the composition of the existing generation fleet and the further changes anticipated over the forecast horizon, the ISO proposes revisions to adapt the study assumptions to changing system conditions that affect or drive when resource adequacy resources are needed the most.

The addition of large amounts of solar resources (grid-connected and behind-the-meter) have resulted in reducing the resource adequacy value of grid-connected solar resources. Therefore, the deliverability assessment methodology needs to be revised to reflect the changing contribution of solar to meeting system needs. In 2018, the CPUC replaced the exceedance-based Qualifying Capacity calculation for wind and solar with an Effective Load Carrying Capability approach to account for the growth of renewable energy resources. The incremental reliability benefit of adding more solar hits a saturation point after enough capacity is installed. Additional solar resources provide a much lower incremental reliability benefit to the system than the initial solar resources, because their output profile ceases to align with the peak hour of demand on the transmission system which has shifted to later in the day due to the proliferation of behind-the-meter solar. As a result, there is a reduced need for transmission upgrades to support deliverability of additional solar resources for resource adequacy purposes.

In response to this change, the ISO began this initiative to revise the on-peak deliverability methodology assumptions. At the same time, generation developers noted that the existing deliverability study process, combined with the "full capacity

deliverability status" conferred on resources meeting those requirements, was the one mechanism available and relied upon by developers to ensure that generation would not be exposed to excessive curtailment due to transmission limitations. Although transmission upgrades to deliver renewable energy reliably and economically are evaluated and approved through the ISO transmission planning process, concerns remain with the ability of the transmission planning process to identify on a timely basis the upgrades to facilitate generation development, especially local transmission upgrades that depend on the exact point of interconnection of the future generation. Therefore, the ISO initiative considered both modifications to the deliverability methodology to address requirements at peak system need, and to renewable energy delivery during hours outside of the summer peak load period to ensure some minimal level of protection to otherwise potentially unlimited curtailment.

The existing tariff requires the ISO to perform an on-peak deliverability study to ensure system needs are met at periods of greatest need, as well as an informational off-peak deliverability study. The ISO proposes revisions to the off-peak deliverability assessment to make it a binding study and to identify transmission upgrades needed to avoid excessive renewable curtailment. The changes to the on-peak and off-peak deliverability assessments will require tariff amendments and modifications to the business practice manuals.

Finally, the ISO proposes to create a one-time modification to its transmission deliverability allocation process for the upcoming 2020 cycle. The one-time process will supplant all current rules regarding transmission deliverability allocation and will allow for additional projects in the ISO interconnection queue to be eligible for transmission deliverability. The one-time process will end with this one cycle, and the ISO will revert to the current tariff transmission deliverability allocation process thereafter.

Management recommends the following motion:

> ***Moved, that the ISO Board of Governors approves the proposed deliverability methodology revisions, as described in the memorandum dated November 6, 2019; and***
>
> ***Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed deliverability methodology revisions, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.***

DISCUSSION AND ANALYSIS

To address the changing needs of the ISO system, Management proposes three changes to the deliverability assessment scenarios used in its resource interconnection study process. The on-peak deliverability assessment will consist of two scenarios and

the off-peak deliverability assessment will consist of one scenario. Each of these is discussed in turn.

Changes to on-peak deliverability assessment scenarios

The primary objective of this proposal is to align the renewable resource output levels used in on-peak deliverability assessments with the later peak load periods now being experienced on the ISO system. Additional solar resources provide a much lower incremental reliability benefit to meeting peak system needs because the peak hour of demand on the transmission system has shifted to later in the day due to the proliferation of behind-the-meter solar. To assess on-peak deliverability, Management proposes to use both a "high system need scenario" and a "secondary system need" scenario.

The high system need scenario represents conditions when a capacity shortage is most likely to occur. In this scenario, the system reaches peak demand with low solar output. The highest system need hours are hours ending 18 to 22 in the summer months. If the addition of a resource under this scenario causes a deliverability deficiency determined based on a deliverability test, then the constraint will be classified as either a local constraint requiring mandatory transmission or an area constraint with optional transmission upgrades.

The secondary system need scenario represents conditions when the capacity shortage risk will increase if the renewable generation, when producing at a significant output level, is not deliverable. In this scenario, the system load is modeled to represent the peak gross consumption level (i.e., total electricity consumption including consumption served by behind-the-meter resources) and solar output is modeled at a significantly higher output than in the high system need scenario. The secondary system need hours are hours ending 15 to 17 in the summer months. If the addition of a resource under this scenario causes a deliverability deficiency determined based on a deliverability test and the limiting transmission constraint is not identified in the high system need scenario, then the constraint can be classified as an area constraint with optional transmission upgrades.

Changes to off-peak deliverability assessment scenarios

Under the proposed changes to the on-peak deliverability assessment methodology, solar resources will be modeled at a much lower output level, which should significantly reduce the need for transmission upgrades to support their deliverability status for resource adequacy purposes. However, assessing relatively low solar output in the early evening periods means that the on-peak deliverability study alone would no longer provide assurance against excessive curtailment that developers have come to rely on from the current on-peak deliverability methodology.

While transmission upgrades to deliver renewable energy reliably and economically are evaluated and approved through the ISO transmission planning process, there is a concern with the ability of the ISO's transmission planning process to identify the upgrades timely enough for generation development, especially local transmission upgrades that depend on the exact point of interconnection of the future generation. Policy-driven upgrades identified in the transmission planning process are based on the renewable portfolio assumptions provided by the CPUC through their integrated resource planning process. However, the portfolios only consist of generic generation amounts by technology and within identified transmission zones. The portfolios are effective at identifying large area transmission upgrades such that the need for the upgrade is not affected by the exact generation project locations within the transmission zone. The need for local transmission upgrades is affected by which generation project locations are ultimately built-out, so the transmission plan can only identify the need for local transmission upgrades once the actual generation project locations have been contracted with and approved by the CPUC. Unfortunately, this can result in the local transmission projects going into service many years after the generation project is in-service and experiencing excessive curtailment.

To address this concern, Management proposes revisions to its interconnection study methodology for off-peak deliverability that will result in directly assigning local transmission upgrades to generation projects seeking off-peak deliverability assurance. This results in the creation of a new service option, referred to as Off-Peak Deliverability Status. This approach will allow the cost of these local transmission upgrades to be considered in the procurement process and proceed in parallel with the development of the generation project. The ISO transmission planning process will, however, still be relied on to comprehensively identify larger and more costly transmission upgrades needed to avoid larger area renewable curtailment.

Interconnection customers will have the option to request Off-Peak Deliverability Status in order for their generation project to be included in the off-peak deliverability assessment. Off-Peak Deliverability Status will provide a scheduling priority in both the day-ahead and the real time market by continuing to allow self-scheduling for new renewable energy resources that select Off-Peak Deliverability Status, but not for new renewable energy resources that do not. The self-scheduling remains available to existing resources and new non-renewable energy resources that select Full Capacity Deliverability Status. Currently, a resource can self-schedule in the real-time market up to its day-ahead award; this feature will remain in place for all resources, regardless of whether they have Off-Peak Deliverability Status, Full Capacity Deliverability Status or not.

One-time change to the transmission planning deliverability allocation process

The new deliverability assessment methodology should make a substantial amount of existing transmission capacity available to interconnection customers and should enable many of them to achieve full capacity deliverability status. At the same time, the ISO is

projecting a significant generating capacity shortfall for meeting peak system needs beginning in 2021. Addressing this shortfall will require expedited generation development to ensure the reliable operation of the ISO controlled grid. Additionally, solar developers and load serving entities are seeking to accelerate development of new solar projects to take advantage of the higher federal investment tax credits that will sunset in 2022. In light of these facts, the ISO proposes to create a one-time modification to its transmission deliverability allocation process for the upcoming 2020 cycle. The one-time process will supplant all current rules regarding transmission deliverability allocation and will allow for additional "energy only" projects in the ISO interconnection queue to be eligible for transmission deliverability. The one-time process will end with this one cycle, and the ISO will revert to the current tariff transmission deliverability allocation process thereafter.

The principle difference between the one-time process and the current process is that the one-time process will allow any interconnection customer with a completed Phase II study that is still an active project in the interconnection queue to seek deliverability by representing that it elects to proceed without a Power Purchase Agreement, and will be subject to the restrictions described in Section 8.9.2.2 of Appendix DD going forward. Regardless of what queue cluster the interconnection customer is in, any interconnection customer selecting this option will be allocated transmission planning deliverability last, meaning that the previous allocation group three will now be allocation group seven, and groups previously four, five, six, and seven will move up. Allocation groups one and two are unchanged. In addition, to the extent there is insufficient transmission deliverability to allocate among an allocation group, Management propose to modify the existing point scoring method for determining allocation priority by adding the project's commercial operation date as a fourth scoring category. Under this proposed change, projects with earlier commercial dates will receive a higher point score.

POSITIONS OF THE PARTIES

The ISO first proposed possible revisions to the on-peak generation deliverability assessment methodology in the 2018-2019 transmission planning process meeting on November 16, 2018. The ISO then held a stakeholder call on December 18, 2018 to offer a more in-depth review of the proposed revisions. Stakeholders' written comments were generally supportive of the proposed changes, but raised various concerns regarding impacts to other processes and existing generation and recommended that the ISO take more time to address these concerns. The ISO considered those comments and decided to reconsider the proposed revisions through a broader stakeholder initiative and to continue to apply the current methodology in studies required by the Generation Interconnection and Deliverability Allocation Procedures for Cluster 11 phase II and Cluster 12 phase I efforts. The ISO posted an issue paper and started the stakeholder initiative on April 25. The first stakeholder call was held on May 2, 2019 to garner additional stakeholder input needed to develop a straw proposal that addresses the comments provided on the proposed on-peak generation deliverability methodology revisions. The ISO reviewed comments to the issue paper and then

developed the straw proposal on July 29 that further clarified the on-peak deliverability methodology revision and introduced an off-peak deliverability methodology revision to address stakeholders' concerns. Additional stakeholder meetings were held on August 5, October 4, and November 4 to review the straw proposal, draft final proposal, and revised draft final proposal. The ISO reviewed all comments, resulting in this refined final proposal.

The ISO believes that most stakeholder concerns have been addressed, and carefully considered two remaining issues where there is not consensus. First, some stakeholders who desire to see the benefits of the revised on-peak deliverability methodology sought to have the ISO move forward only with the on-peak deliverability methodology and defer the off-peak concerns, to reduce the risk of delayed implementation. Second, some stakeholders expressed concerns on providing any level of curtailment protection via the generation interconnection process study process, rather than exclusively dealing with the risk of congestion in the transmission planning process.

Both of these concerns are in conflict with the views expressed by the majority of project developers who support addressing the off-peak deliverability risk now and in a more effective manner than could be accomplished through leaving it entirely to the ISO transmission planning process.

While most stakeholders are generally supportive of the proposed changes, a number of them raised various more detailed concerns or questions that could not be fully addressed in the limited time available to develop this proposal. In order for these proposed changes to take effect for the next deliverability reassessment study that occurs early next year, Management will need to file these proposed changes, pending Board approval, to FERC by the end of this year. The majority of stakeholders strongly support having these changes go into effect early next year. The ISO nonetheless intends to continue to address stakeholders' concerns and clarify outstanding issues through the development of the draft tariff revisions and revised on-peak and off-peak deliverability assessment methodology papers the ISO will include with its ultimate FERC filing.

CONCLUSION

Management recommends that the Board approve the revisions proposed in this memorandum. These revisions are generally supported by stakeholders and were refined to address many of their comments and concerns throughout the stakeholder process. The proposed modifications will continue to improve the ISO's ability to efficiently interconnect generation resources needed to meet California's ambitious renewable energy and environmental goals.

Attachment E – On-peak Deliverability Assessment Methodology

Deliverability Assessment Methodology Enhancements

California Independent System Operator Corporation

On-Peak Deliverability Assessment Methodology (for Resource Adequacy Purposes)

Background

The CAISO's deliverability study methodology for resource adequacy purposes was discussed extensively in the CPUC's Resource Adequacy Proceeding in 2004, and was generally adopted in that proceeding. It was also accepted by FERC as a reasonable implementation of LGIP Section 3.3.3, during the FERC Order 2003 compliance filing process. At that time, the generating resources were predominantly non-intermittent, such as thermal plants and hydro plants. The Qualifying Capacity (QC) values used in the deliverability assessment were the respective maximum output for the resource. When the 20% and 33% RPS targets were adopted, that drove a high volume of renewable generation interconnection requests to the grid; hence the methodology was expanded to account for intermittent resources. The QC values for wind and solar resources were calculated based on resource production exceedance values. Aligned with the 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 for selecting capacity assumptions for use in the deliverability assessment has been applied in the CAISO generation interconnection studies and transmission planning studies since that time. Further, policy driven transmission upgrades have been identified and approved to support deliverability of the 33% RPS portfolio relying on the capacity assumption methodology and deliverability assessment methodology.

As the resource portfolio keeps evolving toward a higher RPS target, 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 which are driving the need to revise the capacity assumptions used in the deliverability methodology. Starting in 2018, the CPUC replaced the exceedance based QC calculation with an interim Effective Load Carrying Capacity (ELCC) approach. ELCC is a statistical modeling approach to determine the capacity value of different resources relative to "perfect capacity". In response to these changes, the CAISO proposed modifications to the methodology for selecting capacity assumptions and vetted with the stakeholders during the fourth quarter of 2018.

1.0 Introduction

A generator deliverability test is applied to ensure that capacity is not "bottled" from a resource adequacy perspective. This would require that each electrical area be able to accommodate the full output of all of its capacity resources and export, at a minimum, whatever power is not consumed by local loads during periods of peak system load.

Export capabilities at lower load levels can affect the economics of both the system and area generation, but generally they do not affect resource adequacy. Therefore, export

capabilities at lower system load levels are not assessed in this deliverability test procedure.

Deliverability, from the perspective of individual generator resources, ensures that, under normal transmission system conditions, if capacity resources are available and called on, their ability to provide energy to the system at peak load will not be limited by the dispatch of other capacity resources in the vicinity. This test does not guarantee that a given resource will be chosen to produce energy at any given system load condition. Rather, its purpose is to demonstrate that the capacity in any electrical area can be run simultaneously, at peak load, and that the excess energy above load in that electrical area can be exported to the remainder of the control area, subject to contingency testing. Due to the increasing installation of behind-of-the-meter solar PV generation, the peak net load observed from the transmission grid, i.e. peak sales, shifts to later hours when the solar PV output is down and the gross load consumption is still high, which becomes the most critical system condition for non-solar resources to deliver their energy to the aggregated load. For grid connected solar resources, the most critical time period is the peak consumption hours coincident with substantial solar output. The deliverability test assesses both peak load conditions – peak sale and peak consumption.

In short, the test ensures that bottled capacity conditions will not exist at peak load, limiting the availability and usefulness of capacity resources for meeting resource adequacy requirements.

In actual operating conditions energy-only resources may displace capacity resources in the economic dispatch that serves load. This test would demonstrate that the existing and proposed capacity units in any given electrical area could simultaneously deliver energy output to the control area.

The electrical regions, from which generation must be deliverable, range from individual buses to all of the generation in the vicinity of the generator under study. The premise of the test is that all capacity in the vicinity of the generator under study is required, hence the remainder of the system is experiencing a significant reduction in available capacity. However, since localized capacity deficiencies should be tested when evaluating deliverability from the load perspective, the dispatch pattern in the remainder of the system is appropriately distributed as proposed in Table 4.1.

Failure of the generator deliverability test when evaluating a new resource in the generation interconnection studies brings about the following possible consequences. If the addition of the resource will cause a deliverability deficiency, then the resource should not be fully counted towards resource adequacy reserve requirements until transmission system upgrades are completed to correct the deficiency.

A generator that meets this deliverability test may still experience substantial congestion in the local area. To adequately analyze the potential for congestion, various stressed conditions (i.e., besides the system peak load conditions) will be studied as part of the overall interconnection study for the new generation project. Depending on the results of

these other studies, a new generator may wish to fund transmission reinforcements beyond those needed to pass the deliverability test to further mitigate potential congestion—or relocate to a less congested location.

The procedure proposed for testing generator deliverability follows.

2.0 Study Objectives

The goal of the proposed ISO Generator deliverability study methodology is to determine if the aggregate of generation output in a given area can be simultaneously transferred to the remainder of ISO Control Area. Any generators requesting Full Capacity Deliverability Status or Partial Capacity Deliverability Status in their interconnection request to the ISO Controlled Grid will be analyzed for "deliverability" in order to identify the Delivery Network Upgrades necessary to obtain this status.

The ISO deliverability test methodology is designed to ensure that facility enhancements and cost responsibilities can be identified in a fair and nondiscriminatory manner.

3.0 Modeling Assumptions

The deliverability assessment is performed under two distinct system conditions – the highest system need scenario and the secondary system need scenario.

3.1 Highest System Need Scenario

The highest system need scenario represents when the capacity shortage is most likely to occur. In this scenario, the system reaches peak sale with low solar output. The highest system need hours are hours ending 18 to 22 in the summer months with an unloaded capacity margin less than 6% in the CAISO annual summer assessment or identified as loss of load hour in the CPUC ELCC study for wind and solar resources.

The CEC 1-in-5 peak sale forecast for each planning area is distributed to all the load buses in study.

The net scheduled imports at all branch groups as determined in the latest annual Maximum Import Capability (MIC) assessment set the imports in the study. Approved MIC expansions, if not yet implemented, are added to the import levels.

The intermittent resources are modeled based on the output profiles during the highest system need hours. A 20% exceedance production level for wind and solar resources during these hours sets the Pmax tested in the deliverability assessment. The CAISO will review the latest available CPUC ELCC study data and CAISO annual summer assessment data to update the modeling assumptions, as needed.

Pmax for the non-intermittent resources are set to the highest summer month Qualifying Capacity in the last three years. For proposed new non-intermittent generators that do not have Qualifying Capacity value, the Pmax is set according to the interconnection request. For energy storage generation, the Pmax is set to the 4-hour discharging capacity limited by the requested maximum output from the generator. For hybrid projects, the study amount for each technology is first calculated separately as above. Then the total study amount among all technologies is based on the sum of each technology, but limited by the requested maximum output of the generation project.

Table 3.1: Modeling Assumptions for Highest System Need Scenario

Selected Hours	HE18 ~ 22 in summer month and (loss of load event in ELCC simulation by CPUC or UCM < 6% in CAISO summer assessment)
Load	1-in-5 peak sale forecast by CEC
Non-Intermittent Generators	Pmax set to highest summer month Qualifying Capacity in last three years
Intermittent Generators	Pmax set to 20% exceedance level during the selected hours
Import	MIC data with expansion approved in TPP

3.2 Secondary System Need Scenario

The secondary system need scenario represents when the capacity shortage risk will increase if the intermittent generation while producing at a significant output level is not deliverable. In this scenario, the system load is modeled to represent the peak consumption level and solar output is modeled at a significantly high output. The secondary system need hours are hours ending 15 to 17 in the summer months with an unloaded capacity margin less than 6% in the CAISO annual summer assessment or identified as loss of load hour in the CPUC ELCC study for wind and solar resources.

The hour with the highest total net imports among all secondary system need hours from the latest MIC assessment data is selected. Net scheduled imports for the hour set the imports in the study. Approved MIC expansions, if not yet implemented, are added to the import levels.

The intermittent resources are modeled based on the output profiles during the secondary system need hours. 50% exceedance production level for wind and solar resources during the hours sets the Pmax tested in the deliverability assessment. The CAISO will review the latest available CPUC ELCC study data and CAISO annual summer assessment data to update the modeling assumptions, as needed.

Pmax for the non-intermittent resources are set to the highest summer month Qualifying Capacity in the last three years. For proposed new non-intermittent generators that do not have Qualifying Capacity value, the Pmax is set according to the interconnection request. For energy storage generation, the Pmax is set to the 4-hour discharging capacity limited by the requested maximum output from the generator. For hybrid projects, the study amount for each technology is first calculated separately as above. Then the total study amount among all technologies is limited by the requested maximum output of the generation project.

Table 3.2: Modeling Assumptions for Secondary System Need Scenario

Select Hours	HE15 ~ 17 in summer month and (loss of load event in ELCC simulation by CPUC or UCM < 6% in CAISO summer assessment)
Load	1-in-5 peak sale forecast by CEC adjusted to peak consumption hour
Non-Intermittent Generators	Pmax set to highest summer month Qualifying Capacity in last three years
Intermittent Generators	Pmax set to 50% exceedance level during the selected hours, but no lower than the average QC ELCC factor during the summer months
Import	Highest import schedules for the selected hours

4.0 General Procedures and Assumptions

Step 1: Electrically group the proposed new generation units that are to be tested for deliverability. These electrical groups will be based on engineering knowledge of the transmission system constraints on existing and new generation dispatch. Generating units will be grouped by transmission limitations that will be expected to constrain the generation. Base cases will be built that focus on each group. Because the total MW of proposed generation usually exceeds the amount that is needed to balance loads and resources, several base cases may need to be created, each of which will focus on at least one of the groups. If a group is not the focus, then generation in that group will be dispatched at zero, but will be available to be turned on during the analysis.

Step 2: For each base case created in step 1, dispatch ISO resources and imports as shown in Table 1. This base case will be used for two purposes: (1) it will be analyzed using a DC transfer capability/contingency analysis tool to screen for potential deliverability problems, (2) it will be used to verify the problems identified during the screening test, using an AC power flow analysis tool.

Step 3: Using the screening tool, the ISO transmission system is essentially analyzed facility by facility to determine if normal or contingency overloads can occur. For each analyzed facility, an electrical circle is drawn which includes all units (including unused Existing Transmission Contract (ETC) injections) that have a 5% or greater distribution factor (DFAX) or Flow Impact[1] on the facility being analyzed. Then load flow simulations are performed, which study the worst-case combination of generator output within each 5% Circle. The 5% Circle can also be referred to as the Study Area for the particular facility being analyzed.

Step 4: Using an AC power flow analysis tool and post processing software, verify and refine the analysis of the overload scenarios identified in the screening analysis.

The outputs of capacity units in the 5% Circle are increased starting with units with the largest impact on the transmission facility. No more than twenty[2] units are increased to their maximum output. In addition, no more than 1500 MW of generation is increased. All remaining generation within the Control Area is proportionally displaced, to maintain a load and resource balance. The number of units to be increased within a local area is limited because the likelihood of all of the units within a local area being available at the same time becomes smaller as the number of units in the local area increases. The amount of generation increased also needs to be limited because decreasing the remaining generation can cause problems that are more closely related to a deficiency in local generation rather than a generation deliverability problem.

[1] See note on Flow Impact in Section 4.1 Specific Assumptions. The electrical circle drawn which includes all generators that have a 5% or greater distribution factor (DFAX) or Flow Impact on the facility being analyzed is referred to as the 5% Circle.

[2] The cumulative availability of twenty units with a 7.5% forced outage rate would be 21%--the ISO proposes that this is a reasonable cutoff that should be consistently applied in the analysis of large study areas with more than 20 units. Hydro units that are operated on a coordinated basis because of the hydrological dependencies should be moved together, even if some of the units are outside the study area, and could result in moving more than 20 units.

For Study Areas where the 20 units with the highest impact on the facility can be increased more than 1500 MW, the impact of the remaining amount of generation to be increased will be considered using a Facility Loading Adder. The Facility Loading Adder is calculated by taking the remaining MW amount available from the 20 units with the highest impact times the DFAX for each unit. An equivalent MW amount of generation with negative DFAXs will also be included in the Facility Loading Adder, up to 20 units. Negative Facility Loading Adders should be set to zero.

Step 5: Once the initially identified overloaded facilities are verified, all new generators inside the 5% Circle are responsible for mitigating the overload. Once a mitigation plan has been identified it will be modeled and the deliverability assessment will be repeated to demonstrate that all of the new generation is deliverable with the mitigation plan modeled. If additional overloaded facilities are found, then the mitigation plan will be modified or expanded, as needed, to ensure the deliverability of the new generation.

Table 4.1: Resource Dispatch Assumptions

Resource Type	**Base Case Dispatch**	**Available to Selectively Increase Output for Worst-Case Dispatch?**	**Available to Scale Down Output Proportionally with all Control Area Capacity Resources?**
Existing Capacity Resources (Note 2)	80% to 95% of PMAX (Note 1)	Y Up to 100% of PMAX	Y
Proposed Full Capacity Resources (Note ~~2~~3)	80% to 95% of PMAX (Note 1)	Y Up to 100% of PMAX	N
Energy-Only Resources	Minimum commitment and dispatch to balance load and maintain expected imports	N	Y
Imports (Note ~~3~~4)	Maximum summer peak simultaneous historical net imports by branch group during selected hours		
Load			
• Non-pump load	1 in 5 peak sale level for CAISO in the highest system need scenario and net sale for the peak consumption hours in the secondary system need scenario	N	N
• Pump load	Within expected range for the scenario hours	N	N

Note 1: Refer to Section 3 for Pmax for different types of resources in the highest system need scenario and the secondary system need scenario.
Note 2: All existing units should be dispatched at the same percentage of their Pmax, but this level may fluctuate to account for differing expectations of system-wide forced outages, retirements, and spinning reserve levels. Some large units with a high likelihood of retirement within the near future may be dispatched at zero to balance loads and resources, but will be available to be turned on during the analysis.
Note 3: Proposed capacity resources will be grouped electrically. Base cases will be developed that focus on each of the groups. If a group is not the focus, it will be dispatched at zero in that case.
Note 4: Refer to Section 3 for imports in the highest system need scenario and the secondary system need scenario. Maximum summer peak simultaneous historical net imports by branch group in the highest system need scenario are the basis for determining the maximum import capability that can be allocated for resource adequacy purposes. Historically unused ETCs will be considered during the analysis, but will not be simultaneously represented in the base case. Historically unused Existing Transmission Contracts (ETC's) crossing control area boundaries will be modeled as zero MW injections at the tie point, but available to be turned on at remaining contract amounts for screening analysis. For historically congested import paths expected to be increased by upgrades with all regulatory approvals in place, the portion of the incremental upgrade expected to be utilized immediately during summer peak can also be represented in the analysis similar to unused Existing Transmission Contracts. During the base case development, import flows on Branch Groups electrically remote from the generation group, that is the focus of the base case being created in Steps 1 and 2, can be moderately reduced to balance loads and resources.

4.1 Specific Assumptions

Distribution Factor (DFAX)
Percentage of a particular generation unit's incremental increase in output that flows on a particular transmission line or transformer when the displaced generation is spread proportionally, across all dispatched resources "available to scale down output proportionally with all control area capacity resources in the Control Area", shown in Table 1. Generation units are scaled down in proportion to the dispatch level of the unit.

Municipal Units
Treat like all other Capacity Resources unless existing system analysis identifies problems.

Energy-Only Resources
If it is necessary to dispatch Energy Resources to balance load and maintain expected import levels, these units should not contribute to any facility overloads with a DFAX of greater than 5%. Energy Resource units should also not mitigate any overloads with a DFAX of greater than 5%.

WECC Path Ratings
All WECC Path ratings (e.g. Path 15 and Path 26) must be observed during the deliverability test.

Flow Impact
Generators that have a Flow Impact (DFAX*Generation Capacity) > 5% of applicable facility rating or OTC will also be included in the Study Area.

5.0 Application of Highest System Need Scenario and the Secondary System Need Scenario study results

The highest system need scenario represents when a capacity shortage is most likely to occur. As a result, if the addition of a resource will cause a deliverability deficiency determined based on a deliverability test under the HSN scenario, then the constraint will be classified as either a Local Deliverability Constraint or an Area Deliverability Constraint.

The secondary system need scenario represents when the capacity shortage risk will increase if the intermittent generation while producing at a significant output level is not deliverable. If the addition of a resource will cause a deliverability deficiency determined based on a deliverability test under the secondary system need scenario, and is not identified in the highest system need scenario, then the constraint can be classified as an Area Deliverability Constraint following the classification guidelines in the BPM for the Generator Interconnection and Deliverability Allocation Procedures.

A transmission upgrade identified as needed in the Transmission Planning Process under the highest system need scenario analysis can be considered for a recommendation of approval as a policy driven upgrade, based on that analysis alone.

A transmission upgrade identified as needed in the Transmission Planning Process under the secondary system need scenario analysis will go through a comprehensive economic, policy, and reliability benefit analysis to determine if the upgrade would provide sufficient benefits to be considered for a recommendation of approval as a policy driven or economic upgrade. The transmission planning process could make a determination that an upgrade is not needed for the identified secondary system need deliverability constraint. If the transmission planning process decides not to pursue an upgrade to mitigate the constraint identified in the secondary system need scenario, generation up to the amount assessed for the renewable portfolio behind the identified deliverability constraint will be deemed deliverable in the Transmission Plan Deliverability allocation and annual NQC determination.

Attachment F – Off-peak Deliverability Assessment Methodology

Deliverability Assessment Methodology Enhancements

California Independent System Operator Corporation

Off-Peak Deliverability Assessment Methodology

1.0 Introduction

The ISO modified its on-peak deliverability assessment to reflect the changing contribution of solar to meeting resource adequacy needs. Additional solar resources provide a much lower incremental reliability benefit to the system than the initial solar resources, because their output profile ceases to align with the peak hour of demand on the transmission system which has shifted to later in the day due to the proliferation of behind-the-meter solar. As a result, there is a reduced need for transmission upgrades to support deliverability of additional solar resources for resource adequacy purposes. Generation developers have been relying on transmission upgrades required under the previous on-peak deliverability assessment methodology to ensure that generation would not be exposed to excessive curtailment due to transmission limitations. Although transmission upgrades to deliver renewable energy reliably and economically are evaluated and approved through the ISO transmission planning process, concerns remain with the ability of the transmission planning process to identify the upgrades on a timely basis to facilitate generation development, especially local transmission upgrades that depend on the exact point of interconnection of the future generation. Therefore, the off-peak deliverability methodology was developed to address renewable energy delivery during hours outside of the summer peak load period to ensure some minimal level of protection from otherwise potentially unlimited curtailment.

2.0 Principles of Off-Peak Deliverability Assessment

The off-peak deliverability assessment is not for resource adequacy purposes. It is a supplemental study that focuses on renewable energy delivery during hours outside of the summer peak load period. The objective of the off-peak deliverability assessment is to identify transmission upgrades needed to relieve excessive renewable curtailment caused by transmission constraints. It informs generators of their curtailment risk and how to reduce such risk at the early development stage. The off-peak deliverability assessment is built around the following principles:

1. Identify transmission bottlenecks that would cause excessive renewable curtailment, but the study assumptions should focus on system conditions when a system-wide oversupply of resources is not likely.
2. Identify transmission upgrades for local constraints that tend to be less expensive. The need for such upgrades are highly dependent on the development of specific generation projects interconnecting in a small localized area. These local constraints are hit by a relatively high simultaneous output of local generation before the system-wide oversupply situation occurs.

3. It is prudent to rely on the TPP framework to approve transmission upgrades for area constraints that tend to be expensive. For area constraints, the general placement of new renewable generation in the portfolio is sufficient to identify the need.
4. The curtailment risk is regardless of the generator's deliverability status, so this study should consider both full capacity and energy only generators.

3.0 Off-Peak Deliverability Assessment Modeling Assumptions

The general system study conditions should capture a reasonable scenario for the load, generation, and imports that stress the transmission system, but not coinciding with an oversupply situation. By examining the renewable curtailment data from 2018, a load level of about 55% to 60% of the summer peak load and an import level of about 6000 MW was selected for the off-peak deliverability assessment.

The production of wind and solar resources under the selected load and import conditions varies widely. The production duration curves for solar and wind were examined. The production level under which 90% of the annual energy was selected to set the outputs to be tested in the off-peak deliverability assessment. As seen in Figure 1 and Figure 2, the 90% energy levels are 68% of installed capacity for solar and 44% for wind.

Figure 1: Normalized CAISO Total Solar Output Duration Curve

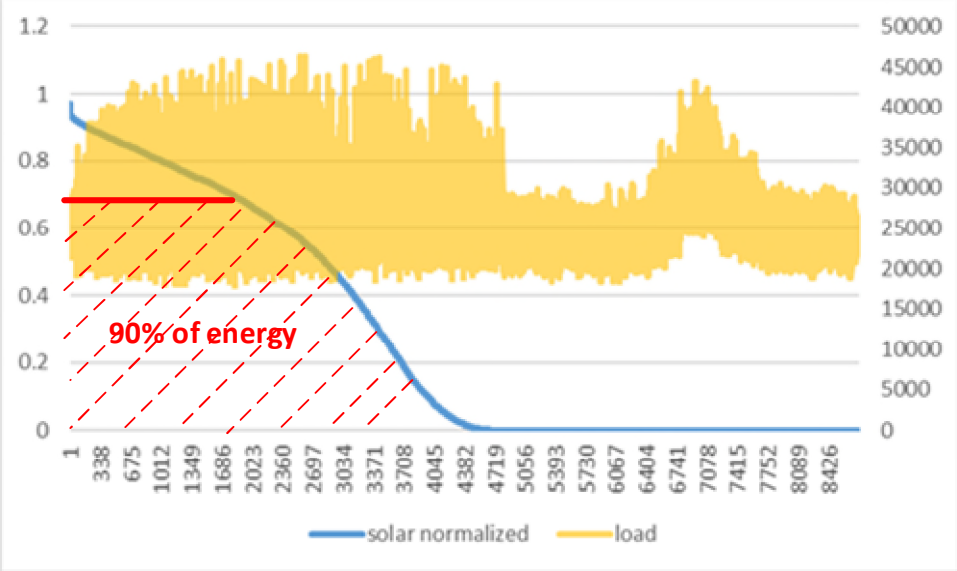
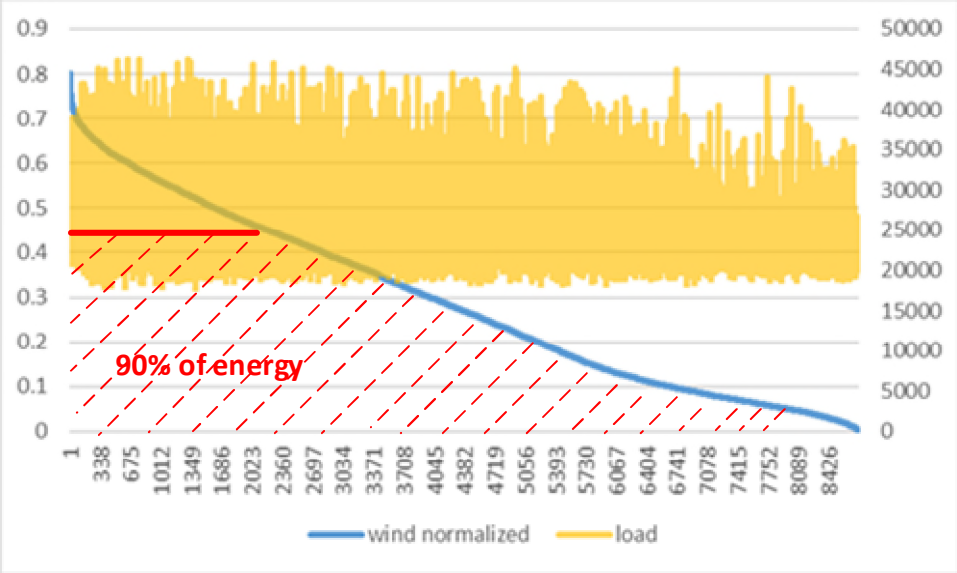


Figure 2: Normalized CAISO Total Wind Output Duration Curve



The dispatch of the remaining generation fleet is set by examining historical production associated with the selected renewable production levels. The hydro dispatch is about 30% of the installed capacity and the thermal dispatch is about 15%. All energy storage facilities are assumed offline.

The dispatch assumptions discussed above apply to both full capacity and energy-only resources. However, with the large amount of generation in the interconnection study queue, it is impossible to balance load and resources under such conditions with all queued generation dispatched. The dispatch assumptions are applied to all existing generators first, then some future generators if needed to balance load and resources. This establishes a system-wide dispatch base case that is the starting case for developing each of the study area base cases to be used in the off-peak deliverability assessments. Table 1 summarizes the generation dispatch assumptions in the starting base case.

Table 1: CAISO System-Wide Generator Dispatch Assumptions

	Dispatch Level
wind	44%
solar	68%
battery storage	0
hydro	30%
thermal	15%

The off-peak deliverability assessment models all the approved transmission upgrades, as well as RNUs and LDNUs required under the on-peak deliverability assessment.

4.0 Off-Peak Deliverability Assessment Procedure

The off-peak deliverability assessment is performed for each study area separately. The study areas in general are the same as the reliability assessment areas in the generation interconnection studies. However, to avoid excessive generation being dispatched in one study area, one reliability assessment area may be broken into several smaller gen-pockets that separate wind/solar areas and align with TPP study areas. Below is the preliminary list of the study areas –

- PG&E north
- PG&E Fresno
- PG&E Kern
- SCE Northern
- SCE North of Lugo
- SCE/VEA/GWL East of Pisgah
- SCE/DCRT Eastern
- SDGE Inland
- SDGE East

Study area base cases are created from the system-wide dispatch base case. All generators in the study area, existing or new, are dispatched to a consistent output level. In order to capture local curtailment, the renewable dispatch is increased to the 90% energy level for the study area, which is higher than the system-wide 90% energy level. The study area 90% energy level was determined from representing individual plants in different areas.

If the renewables inside the study area are predominantly wind resources (more than 70% of total study area capacity), increase wind resource dispatch as shown in Table 2. All the solar resources in the wind pocket are dispatched at the system-wide level of 68%. If the renewables inside the study area are not predominantly wind resources, then the dispatch assumptions in Table 3 are used.

Table 2: Local Area Solar and Wind Dispatch Assumptions in Wind Area

	Wind Dispatch Level	Solar Dispatch Level
SDG&E	69%	68%
SCE	64%	
PG&E	63%	

Table 3: Local Area Solar and Wind Dispatch Assumptions in Solar Area

	Solar Dispatch Level	Wind Dispatch Level
SDG&E	79%	44%
SCE	77%	
PG&E	79%	

As the generation dispatch increases inside the study area, the following resource adjustment can be performed to balance the loads and resources:

- Reduce new generation outside the study area (staying within the Path 26, 4000 MW north to south, and 3000 MW south to north limits).
- Reduce thermal generation inside the study area.
- Reduce imports.
- Reduce thermal generation outside the study area.

Once each study area case has been developed, a contingency analysis is performed for normal conditions and selected contingencies:

- Normal conditions (P0).
- Single contingency of transmission circuit (P1.2), transformer (P1.3), single pole of DC lines (P1.5) and two poles of PDCI if impacting the study area.
- Multiple contingency of two adjacent circuits on common structures (P7.1) and loss of a bipolar DC line (P7.2).
- Two adjacent transmission circuit according to WECC's Project Coordination, Path Rating and Progress Report Processes.

For overloads identified under such dispatch, resources that can be re-dispatched to relieve the overloads are adjusted to determine if the overload can be mitigated:

- Existing energy storage resources are dispatched to their full four hour charging capacity to relieve the overload.
- Thermal generators contributing to the overloads are turned off.
- Imports contributing to the overloads are reduced to the level required to support out-of-state renewables in the RPS portfolios.

The remaining overloads after the re-dispatch will be mitigated by the identification of transmission upgrades. First, the overloads are identified as local constraints or area constraints. The CAISO will apply a local vs. area constraint classification methodology similar to the on-peak deliverability assessment. Then, the transmission upgrades to mitigate local constraints are labeled as off-

peak local network upgrades and the transmission upgrades to mitigate area constraints are labeled as off-peak area network upgrades.