Resource Transitions

Resource Adequacy Deliverability Assessment for Resources Transitioning from Outside to Inside the ISO Balancing Authority Area

ISSUE PAPER

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1. Introduction

The California Independent System Operator Corporation ("ISO") publishes this Issue Paper regarding the determination of the Resource Adequacy (RA) deliverability of a resource when the resource transitions from outside to inside the ISO BAA due to a change to either the resource's interconnection point or the ISO balancing authority area (BAA) boundary. The existing ISO tariff and business practice manuals (BPM) describe the process for establishing the RA deliverability of internal resources as reflected in their annual net qualifying capacity (NQC), and for allocating RA deliverability on the interties to load-serving entities. In the resource transition scenario discussed here, a resource that previously contributed to the import schedules used to establish RA deliverability on a particular intertie establishes a direct connection to the ISO grid and thereby becomes an internal resource. This effort is intended to develop a process whereby the ISO can establish the deliverability status of such a resource.

In the following sections, this paper provides a description of the anticipated stakeholder process, relevant background information, some options the ISO has identified for stakeholder review and comment, and an outline of next steps. Stakeholders are welcome to offer any additional workable solution options for consideration in this process.

2. Stakeholder Process

This issue paper will be discussed during a stakeholder conference call as shown in Table 1 below. An ISO objective in this effort is to develop an option that can be adopted under existing tariff authority, and therefore the proposed timetable below does not provide for Board of Governors approval or a FERC filing. The ISO will conduct the usual stakeholder process with a series of three papers prior to initiating the BPM change management process.

Table 1: Schedule

STAKEHOLDER PROCESS	
Feb-11, Fri	Post Issue Paper
Feb-18, Wed	Stakeholder Conference Call, 1:00 PM to 3:00 PM
Mar-02, Wed	Comments on Issue Paper
Mar-16, Wed	Post Straw Proposal
Mar-23, Wed	Stakeholder Conference Call
Mar-30, Wed	Comments on Straw Proposal

Table 1: Schedule	
Apr-13, Wed	Post Draft Final Proposal (DFP)
Apr-20, Wed	Stakeholder Conference Call
Apr-27, Wed	Comments on Straw Proposal
BPM CHANGE MANAGEMENT PROCESS	
5-May	Submit BPM Proposed Revision Request (PRR)
19-May	Open Comment Period on PRR, 10-business days
24-May	BPM Monthly Management Meeting
5-Jun	Post PRR Recommendation
17-Jun	Open Comment Period on PRR, 10-business days
24-Jun	BPM Monthly Management Meeting
1-Jul	Post Final PRR Decision, effective immediately or on a date specified

A web page has been established for this initiative that provides access to meeting materials, proposals, and stakeholder written comments. This information can be found at http://www.caiso.com/2b22/2b229ae739c60.html

3. Background

Deliverability is an essential element of any Resource Adequacy (RA) requirement. Load serving entities (LSEs) must be able to show that the resources they intend to procure to meet their load requirements can deliver energy and capacity to load when and where needed. As described in detail below, Tariff Section 40.4.6.1 Deliverability Within the CAISO Balancing Authority Area and 40.4.6.2 Deliverability of Imports, and BPM Reliability Requirements Sections 5.1.3.4 Deliverability to Aggregate of Load and 5.1.3.6 Deliverability of Imports specify the procedure for establishing deliverability for internal supply resources and for imports on an annual basis. Once the deliverability of resources is established through the ISO's deliverability assessment, LSEs are able to count the deliverable capacity toward their respective annual and monthly RA requirements.

The ISO conducts two types of deliverability assessments: (1) deliverability of generation to the aggregate of system load for internal resources, and (2) deliverability of imports to system load for external resources. For new resources requesting to interconnect as full capacity resources to the ISO BAA, deliverability is assigned based on the interconnection deliverability assessment protocol in the generator interconnection procedures (GIP) process. This process assumes that the energy production of existing full capacity internal resources and the historical scheduled import deliveries will be maintained. In contrast, external resources are not directly

allocated import deliverability. Instead, import capability is allocated to LSEs for contracting with external suppliers to meet their system RA requirements.

3.1. Generation Deliverability -- Internal Resources

The ISO conducts generating facility deliverability assessments to determine a generating facility's ability to deliver its energy to load on the ISO Controlled Grid under peak load conditions. Such a deliverability assessment will provide necessary information regarding the level of deliverability of such resources with and without Network Upgrades (i.e., major transmission facilities), and thus provide information regarding the required Network Upgrades to enable the generating facility to deliver its full output to load on the ISO Controlled Grid based on specified study assumptions.

As described in the Reliability Requirements BPM, to the extent the deliverability analysis shows that the Qualifying Capacity of a Generating Unit is not deliverable to the aggregate of Load under the conditions studied, the Qualifying Capacity of the Generating Unit is reduced on a MW basis for the capacity that is undeliverable. At the conclusion of a deliverability study, a particular Generating Facility is classified into one of three distinct categories:

- Fully Deliverable: 100% of the capacity of the resource can be counted as deliverable for resource adequacy purposes;
- Partially Deliverable: Without mitigation, a fractional amount of the capacity cited must be discounted due to deliverability problems;
- Non-Deliverable: Without mitigation, none of the cited capacity can be utilized for resource adequacy purposes.

This is described in more detail in the following deliverability study document:

- *Preliminary Deliverability Baseline Analysis Study Report*, Appendix 1: *Generation and Import Deliverability to the Aggregate of Load (Baseline) Study Methodology, Executive Summary, 4/8/2005,* *http://www.caiso.com/docs/2005/05/03/2005050317085664410.pdf*

Deliverability is assigned to internal resources based on the interconnection deliverability assessment protocol in the generator interconnection procedures (GIP) process. This assessment process assumes historical import scheduled deliveries will be maintained when making assessment for deliverability for a new internal resource. Deliverable capacity associated with existing resources is updated annually on the Net Qualifying Capacity (NQC) list, posted on the ISO website as the *NQC Local Area Data for Compliance Year 2011*, http://www.caiso.com/1796/179688b22c970.html#1b8eaa2643ed0

Neither the NQC process or the generator interconnection procedures (GIP) process addresses the issue of a potential resource transition, in which an internal resource would either establish a new external point of interconnection or be reclassified due to ISO-BAA boundary change as an external resource. Resource transitions are not currently addressed in ISO BPMs.

3.2. Import Deliverability -- External Resources

For Resource Adequacy capacity accounting purposes, the import capability of the system is determined by the ISO and then allocated to LSEs and other Market Participants, in accordance with the detailed 13-step process set forth in Tariff Section 40.4.6.2. In Step 1, the Maximum Import Capability (MIC) for each intertie is determined based on actual historical import scheduled deliveries or tags attributable to specific resources. For example, the current import capability values were posted to the ISO website in July 2010, *California ISO Maximum RA Import Capability for Year 2011*, http://www.caiso.com/27c6/27c675b81c230.pdf

The methodology for the determination of the Maximum Import Capability (MIC) at each intertie is briefly described in the BPM but is set forth in two referenced documents developed in the now-archived Resource Adequacy Initiative on Deliverability.[1]

- *Preliminary Deliverability Baseline Analysis Study Report*, Appendix 2: Initial CAISO Import Level for the Deliverability of Imports Assessment, CAISO, 4/12/2005, http://www.caiso.com/docs/2005/05/03/200505031710356864.pdf

    - Historical Import Scheduled Deliveries Methodology. The methodology to establish historical import scheduled deliveries is described in the Appendix 2 document. Specifically, the prior two years of historical import schedule data is examined during high load periods. The sample hours are selected by choosing hours with the highest total import level when peak load was at least 90% of the annual system peak load (Appendix 2, p.1).

    - Screening for Abnormally Low Historical Import Values. To prevent the use of abnormally low historical import schedule values for a particular Branch Group, the ISO has applied the following screening test to identify significantly abnormal data for a particular Branch Group. Two tests are performed on Branch Group data to screen for significantly abnormal data. The first test is applied to all Branch Groups and the second test is applied to Branch Groups identified in the first test. The first test is based on calculating the average and Standard Deviation for each set of Branch Group data. Then if the minimum Scheduled Net Interchange value for a Branch Group deviated significantly from the average value for that Branch Group then the second test was applied to that Branch Group. It is assumed that the data fit a normal distribution and that 95% of the samples should be within 2 Standard Deviations of the average. Therefore a significant deviation from the average would be at least two Standard Deviations. However, because of the small number of samples a less restrictive test was applied, and a significant deviation from the average was assumed to be a deviation of more than 1.3 Standard Deviations from the average (80% of the samples should be within 1.3 Standard Deviations of the Average). (Appendix 2, p.2)

- *Supplemental Deliverability Study*. September 23, 2005 -- Import Levels for RA Planning Purposes, Explicit Consideration of Existing Resource Contracts, Expiring Transmission Contracts, and East of River Short-Term Upgrades, http://www.caiso.com/docs/2005/09/23/20050923165719616.pdf

[1] Resource Adequacy Initiative on Deliverability, http://www.caiso.com/181c/181c902120c80.html

This current Maximum Import Capability (MIC) methodology does not address the issue of a potential resource transition in which an external resource would either establish a new internal point of interconnection or be reclassified due to ISO-BAA boundary change as an internal resource.

4. Options for Discussion

The existing ISO tariff and business practice manuals (BPM) describe the process for establishing the RA deliverability of internal resources as reflected in their annual net qualifying capacity (NQC), and for allocating RA deliverability on the interties to load-serving entities. In the resource transition scenario discussed here, a resource that previously contributed to the import schedules used to establish RA deliverability on a particular intertie establishes a direct connection to the ISO grid and thereby becomes an internal resource. This may occur through either the resource creating a new connection to a point on the ISO grid, or a change to the boundary of the ISO grid that brings the resource's existing connection point inside the ISO grid. The present effort is intended to develop a process whereby the ISO can establish the RA deliverability status of such a resource, i.e., its NQC.

A fundamental question in developing such a process is whether – and if so, how – the resource's previous contribution to the import schedules used to establish RA deliverability on the relevant intertie should transfer over to the resource's deliverability status and its NQC value once it is internal to the ISO grid. This issue paper identifies three potential options based on different answers to the last question.

> **Option 1, New Resource**: Treat the resource as a new interconnection customer and address its deliverability status through the generation interconnection procedures (GIP), with no ex ante allowance for its previous contribution to the RA import deliverability on the associated intertie;
>
> **Option 2, Interim Basis**: Grant the resource, on an interim basis, a MW value of deliverability status that reflects its contribution to the RA deliverability on the associated intertie, and require the resource to utilize the GIP as a new interconnection customer to establish its deliverability status on a permanent basis;
>
> **Option 3, Permanent Basis**: Grant the resource, on a permanent basis, a MW value of deliverability status that reflects its contribution to the RA deliverability on the associated intertie; if that MW value is less than the resource's full qualifying capacity (QC) value under the prevailing counting rules, however, and the resource wants to obtain full capacity deliverability status up to its QC value, it would have to utilize the GIP to obtain the additional MW.

It is important to recognize that in both options (2) and (3) what the ISO is considering to grant to the resource in question is the MW value of its deliverability status, which is not a guarantee that its NQC value will be the same for every year that such status is granted. At this time the ISO is not considering an option that exempts the resource from the annual process used to establish annual NQC values. Although the ISO's planning and interconnection processes are designed to maintain the deliverability of existing RA capacity to the ISO grid, the annual NQC process could in some circumstances reduce a given resource's NQC below its previous year value due to changes in grid conditions.

Each of these potential options is described in more detail below. A numerical illustration is shown in Table 2, Resource Transitions Accounting Illustration for Power Station 1, and is used as an example in the discussion of the three options below. This example assumes that the transitioning resource has a PMax of 1000 (which equals its qualifying capacity under the counting rules), and based on historical schedule and e-tag data is shown to account for 750 MW of the RA import capacity on the intertie. The total RA import capacity on the intertie is 2000 MW including the transitioning resource.

4.1. Option 1: Treat the Resource as a New Interconnection Request in GIP

Under this option, the ISO would treat the transitioning resource as if it were an entirely new resource interconnection, which would require the resource to submit a new generation interconnection request to the ISO. The previous contribution of the resource to the RA import capability of the associated intertie would not be converted to internal generation deliverability, and the existing procedure for determining the RA import capability on that intertie would not be modified to reflect the resource transition. The deliverability status of the resource would be determined through the GIP in accordance with the queue position of the resource. The figures in the following bullets are illustrative values from Table 2.

- **GIP Queue**. The resource submits an interconnection request for full capacity deliverability status for its 1,000 MW capacity, and is processed by the ISO in accordance with the GIP.
- **Interim Generation Deliverability.** None. Assuming the ISO determines that the resource transition can occur without creating any reliability issues that need to be mitigated, the resource would be interconnected to the ISO grid with energy-only deliverability status.
- **Permanent Deliverability Status.** Determined in the GIP process.
- **Resource Adequacy.** Determined in the GIP and NQC processes.
- **Intertie RA Capacity**. Determined according to existing process with no change as a result of the resource transition.

Unless the resource enters the interconnection queue with enough lead time to allow its full capacity status to be established through the GIP by the time the transition occurs, Option 1 would result in zero deliverability. The resource could, however, still apply for partial “as available” deliverability through the ISO’s annual process specified in Tariff Section 40.4.6.1. For purposes of this assessment, historical RA import capacity and the energy production of existing full capacity internal resources would remain unchanged. As a result, there may not be much transmission capacity available for the deliverability of the transitioning resource, and the resource would have to wait for the completion of any needed deliverability network upgrades identified through the GIP.

For example, under Option 1, a transitioning resource with 1000 MW PMax and an RA import value of 750 MW based on its contribution to RA imports on the intertie import would enter the generation interconnection queue to obtain full capacity deliverability status as a new 1,000 MW internal resource. This resource would obtain full capacity status only after the ISO has conducted the required deliverability studies and the relevant PTO has completed the network

upgrades.

4.2. Option 2: Grant Interim Deliverability Status

Under Option 2, a transitioning resource would enter the interconnection queue at its full MW capacity and, for an interim period, be granted deliverability status for the MW capacity value supported by its historically demonstrated contribution to the RA import capacity on the intertie. The resource's contribution to the RA import capacity on the intertie would have to be demonstrated through import schedules to the ISO and associated e-tags identifying the resource as the source of the scheduled energy, for the hours that were used to by the ISO in the annual determination of RA import capacity. The length of the interim period would depend on when other full capacity resources with higher queue positions achieve commercial operation and would have priority to the transmission needed for deliverability.

In addition, under this option the MW deliverability value granted to the transitioning resource would be deducted from the RA import capacity for the associated intertie for the first year of the resource transition. In subsequent years, the RA import capacity for the intertie could be modified based on the historical data used in the ISO's annual determination process.

The figures in the following bullets are illustrative values from Table 2.

- **GIP Queue**. The resource submits an interconnection request for full capacity deliverability status of its 1,000 MW and enters the GIP.
- **Interim Generation Deliverability.** 750 MW, duration depending on the actual commercial operation dates of full capacity resources with higher queue positions.
- **Permanent Deliverability Status.** Full capacity status is achieved through the GIP.
- **Resource Adequacy.** RA value is based on interim deliverability status, 750 MW, as confirmed or potentially modified in the annual NQC process.
- **Intertie RA Capacity**. Decreased from 2,000 MW to 1,250 MW in the first year of the resource transmission as a result of granting the resource interim deliverability of 750 MW. Re-evaluated in subsequent years through the ISO's normal annual deliverability process. The ISO will use these intertie RA deliverability values for its deliverability studies performed under the GIP for the resource transition year and subsequent years.

Consider the following illustration for Option 2:

i. Power Station 1 with a PMax of 1,000 MW transitions into the ISO BAA through an ISO-BAA boundary change.

ii. The resource can prove 750 MW of historical average import schedules during the exact peak hours used in establishing the maximum RA import capability for the pre-transition intertie. The ISO's existing procedure for RA import capability will determine the exact dates and hours required.

iii. Annual RA import allocation process assumes this 750 MW former import is no longer available for next year's RA import allocation on the post-transition intertie. Thus, the RA import capability on the intertie will be 1,250 MW for the first year of

the transition. In subsequent years the ISO will use actual schedule data for the intertie to establish its RA import capability.

iv. On an interim basis, until the Power Station 1 deliverability studies are finished and the transmission network upgrades are in service to make the resource fully deliverable, the NQC of the resource will be based on its interim deliverability status of 750 MW, adjusted if necessary through the ISO's annual NQC process, and potentially reduced to accommodate the commercial operation of other full capacity generators with higher queue positions.

4.3. Option 3: Conversion of Import to Permanent Deliverability Status

Under Option 3, a transitioning resource would be granted permanent deliverability status for capacity associated with historically demonstrated imports during the RA import deliverability assessment hours. If this MW value is less than the resource's PMax, the resource could either accept this MW value on a permanent basis or enter the GIP interconnection queue to obtain full capacity deliverability status up to its PMax. Thus, the resource will not be required to enter the ISO GIP process for the proven historical contribution to the ISO Maximum RA Import Capability. However it will be required to enter the ISO GIP process for any incremental deliverability status request above its contribution to the Maximum RA Import Capability. The figures in the following bullets are illustrative values from Table 2.

- **GIP Queue**. The resource may submit an interconnection request for full capacity status up to 1000 MW, but any needed deliverability upgrades will be based on accommodating the incremental 250 MW.
- **Interim Deliverability Status.** Not applicable.
- **Permanent Deliverability Status.** 750 MW, potentially increasing to 1000 MW if the resource enters the GIP.
- **Resource Adequacy.** RA value is based on the permanent deliverability granted for 750 MW, as adjusted if necessary through the annual NQC process.
- **Intertie RA Capacity**. Decreased from 2,000 MW to 1,250 MW in the first year of the resource transmission as a result of granting the resource interim deliverability of 750 MW. Re-evaluated in subsequent years through the ISO's normal annual deliverability process. The ISO will use these intertie RA deliverability values for its deliverability studies performed under the GIP for the resource transition year and subsequent years.

  Consider the following illustration under Option 3, where the first three items below are the same as under the previous option:

  i. Power Station 1 with a PMax of 1,000 MW transitions into the ISO BAA through an ISO-BAA boundary change.

  ii. The resource can prove 750 MW of historical average import schedules during the exact peak hours used in establishing the maximum RA import capability for the pre-transition intertie. The ISO's existing procedure for RA import capability will determine the exact dates and hours required.

iii. Annual RA import allocation process assumes this 750 MW former import is no longer available for next year's RA import allocation on the post-transition intertie. Thus, the RA import capability on the intertie will be 1,250 MW for the first year of the transition. In subsequent years the ISO will use actual schedule data for the intertie to establish its RA import capability.

iv. On an permanent basis, Power Station 1 would be granted permanent deliverability status for 750 MW associated with historically demonstrated imports. Power Station 1 can either accept the 750 MW value on a permanent basis or enter the GIP interconnection queue to obtain full capacity deliverability status up to its Pmax of 1000 MW. Power Station 1 will not be required to enter the ISO GIP process for 750 MW. However, it will be required to enter the ISO GIP process for the additional 250 MW above its contribution to the historically demonstrated Maximum RA Import Capability.

Summary

None of the three options are prohibited by the tariff or BPM. Option 1 requires the transitioning generator to establish its deliverability status by entering the GIP with a new interconnection request. It does not provide the transitioning generator any interim deliverability status and therefore does not require any reduction in the RA import capability of the associated intertie. Options 2 and 3 grant deliverability status to the transitioning resource based on schedule and e-tag data that demonstrates the resource's contribution to the RA import capability of the intertie, and therefore these options reduce the intertie RA import capability by the same amount. Option 2 grants such deliverability to the resource only on an interim basis and requires the resource to submit an interconnection request for full capacity status to the GIP. The length of the interim period depends on when other full capacity resources with higher queue positions achieve commercial operation and have a prior entitlement to the deliverability. Option 3 grants permanent deliverability status based on the historic schedule and e-tag data, and allows the resource the option of entering the GIP if it wants to obtain full capacity deliverability status up to its full PMax.

Finally, in both Options 2 and 3, what the ISO is considering to grant to the resource in question is the MW value of its deliverability status, which is not a guarantee that its NQC value will be the same for every year that such status is granted. At this time the ISO is not considering an option that exempts the resource from the annual process used to establish annual NQC values. Although the ISO's planning and interconnection processes are designed to maintain the deliverability of existing RA capacity to the ISO grid, the annual NQC process could in some circumstances reduce a given resource's NQC below its previous year value due to changes in grid conditions, and this could occur under both Options 2 and 3.

Table 2 illustrates how the same resource, Power Station 1 with a PMax of 1000 MW, would fair under each of the three options. Before the resource transition, the empirical data indicate that Power Station 1 contributed 750 MW to the 2000 MW of RA import deliverability on the associated intertie. For simplicity, this example assumes that Power Station 1 is a conventional thermal generator, so that its qualifying capacity (QC) under the counting rules equals its PMax.

Table 2
Resource Transitions Accounting Illustration For Power Station 1

Line No.	Description	Option #1 New Resource (MW)	Option #2 Interim Deliverability Status (MW)	Option #3 Permanent Deliverability Status (MW)
1	PMax of resource, assumed equal to its qualifying capacity under the counting rules	1,000	1,000	1,000
BEFORE TRANSITION				
2	Power Station 1: Contribution to Import Deliverability	750	750	750
3	Other Resources: Contribution to Intertie Deliverability	1,250	1,250	1,250
4	Intertie: Total Deliverable Capacity	2,000	2,000	2,000
5	Power Station 1: Internal ISO Deliverability	0	0	0
AFTER TRANSITION				
6	Interim Deliverability Status for Power Station 1	0	750	0
7	Permanent Deliverability Status for Power Station 1	0	0	750
8	Power Station 1: ISO deliverability request through GIP	1,000	1,000	250
9	New Intertie Total RA Import Capacity for the first year	2,000	1,250	1,250

5. Next Steps

The ISO will host a stakeholder conference call on February 18, 2011 from 1:00 p.m. - 3:00 p.m. to review and discuss this Issue Paper. Stakeholders are encouraged to submit written comments on the Issue Paper to ResTrans@caiso.com by close of business March 2, 2011. The ISO will develop a template that it asks stakeholders to use to submit their written comments. The ISO will post the written comments that it receives to that web address by March 4, 2011.