Resource Adequacy Deliverability For Distributed Generation

Draft Final Proposal

Market and Infrastructure Policy

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Table of Contents

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1. Executive Summary

The draft final proposal described in this document is the work product of a stakeholder process launched in December 2011 that has included several rounds of proposals, stakeholder conference calls, and extensive and constructive written stakeholder comments. At this point the ISO expects that the proposal it will present to the ISO Board of Governors at the May 16-17, 2012 meeting will be essentially the same as the proposal described here, with the possible exception of design details that may be refined between now and the Board meeting in response to discussions during the upcoming April 5 stakeholder conference call and the written stakeholder comments due on April 12.

The purpose of this initiative and this draft final proposal is to develop a process for providing Resource Adequacy (RA) deliverability status to distributed generation (DG) resources[1] without any additional delivery network upgrades[2].

The development of substantial amounts of DG resources – relatively small-scale resources connected to utility distribution systems and located close to load – is a key element of California's strategy for increasing the share of renewable resource production in the state's annual consumption of electricity[3]. Because load-serving entities (LSEs) in the coming years will

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1 For purposes of this initiative, the term "distributed generation" will refer to generating facilities connected to the distribution system of a utility distribution company, irrespective of the size of the facility or the resource type. The ISO recognizes that the term is used slightly differently in other contexts, however, and therefore provides clarification in this proposal where needed to reconcile different usages.

2 Despite this, it is possible that some reliability network upgrades, distribution upgrades or other mitigation may be required in conjunction with the deliverable DG resources. See footnote 14.

3 It is not the ISO's intent to exclude non-renewable DG resources from this proposal. The ISO assumes that the decision whether to allocate DG deliverability to non-renewable DG resources is a decision more appropriately left to the local regulatory authorities (LRAs) that oversee procurement

be procuring significant amounts of their energy needs from DG resources, they will likely want to count the capacity of these resources towards their annual RA requirements. The ability of a specific resource to count towards RA requirements depends on, among other things, a demonstration that the energy from the resource is "deliverable" to load within the ISO area. Deliverability means that the energy from the resource can be dispatched, simultaneously with all other deliverable capacity within an electrically-connected study area of the ISO network, to meet peak load conditions without overloading any transmission facilities or causing other reliability problems.[4]

Generally, individual resources receive their deliverability status by either (a) participating in the ISO's generation interconnection procedures (GIP), or (b) if the resource intends to connect to a utility distribution system and is not "behind the [end-use customer] meter," by participating in the distribution company's wholesale distribution access tariff (WDAT) process and being studied in the GIP. For purposes of achieving the state's goals for expansion of DG resources, however, the GIP and WDAT processes may be both too lengthy and too cumbersome for the sheer number of small-scale projects that will need to be connected to meet the goals. In addition, LSEs are expected to meet some portion of their DG goals from behind-the-meter resources that interconnect under the California Public Utilities Commission's (CPUC) Rule 21. There is a need therefore to develop a more streamlined approach for providing deliverability status to DG resources interconnecting under these three processes.[5] The proposed approach should apply to both Rule 21[6] and WDAT interconnections, and should not impose any adverse

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by LSEs within the ISO. Moreover, for the purposes of this proposal, the ISO is not placing a size limit on DG resources, but instead is defining it as any generation connected at the distribution level.

4 Several stakeholders make the argument that DG resources should be considered deliverable as long as the total DG production below (or downstream from) any given ISO network node does not exceed the amount of load at that node, i.e., there is no "backflow" of energy from the distribution system onto the ISO grid. As explained and illustrated by examples later in this document, the intuitively-appealing backflow criterion is not sufficient – in fact it is not even relevant – for establishing the deliverability of DG resources. What matters in testing deliverability is the assumed amount and pattern of load for which the deliverable resources are being dispatched. Because the operation of DG resources will affect this pattern, their production will affect the deliverability assessment.

5 The process described in the revised straw proposal is not an interconnection process and, thus, is not intended to substitute for either the GIP, Rule 21, or WDAT interconnection processes. Rather, the proposed process is a means of determining available deliverability for DG resources pursuing distribution-level interconnection at specific nodes on the ISO grid, either under Rule 21 or WDAT, without requiring additional network upgrades. The proposed process may therefore provide an earlier determination of deliverability for such resources, but would not supersede any other requirements of the Rule 21 or WDAT processes.

6 The ISO understands that Rule 21 applies to both "net energy metering" ("NEM") resources, which do not count toward RA requirements but instead are taken into account as reductions to each LSE's load forecast, as well as resources that plan to export power to the distribution system and are able to

impacts on resources going through the normal GIP, in terms of either cost or time to complete needed network upgrades.

The present paper describes the ISO's draft final proposal for a streamlined[7] approach for providing RA deliverability status to DG resources, subject to the capability of the ISO grid to support such deliverability without additional delivery network upgrades.

The ISO proposes to conduct an annual process consisting of two parts to provide RA deliverability status to DG resources. In the first part of the process, the ISO will determine MW amounts of deliverability available for DG resources at specific network nodes on the ISO grid without requiring additional network upgrades. In the second part of the process, the ISO will allocate the use of such deliverability to LRAs that oversee procurement by their regulated LSEs. The intent of this streamlined process is to enable LSEs to procure deliverable DG resources up to these MW amounts without requiring further assessment to establish deliverability in the interconnection processes (DG resources are still required to apply to and complete the appropriate Rule 21 or WDAT interconnection process, however). The timeline for this annual process would run from the fourth quarter of one year to mid-summer of the following year.

The remainder of this paper is organized as follows. Section 2 lays out a timetable for the rest of this initiative, with dates for key stakeholder activities leading up to presentation of the final proposal to the ISO Board of Governors at the May 2012 meeting. Section 3 defines the scope of the initiative including the initiative's objectives. Section 4 illustrates the proposed timeline for the determination and allocation of DG deliverability. Section 5 provides background on the ISO's deliverability assessment methodology. Section 6 is the heart of the proposal and describes the two main elements of the proposed process: (1) the study methodology the ISO intends to use in determining the MW amounts of deliverability available for DG resources at specific network nodes on the ISO grid without requiring additional network upgrades; and, (2) the process for allocating DG deliverability determined by the studies to load serving entities ("LSEs") through their local regulatory authorities ("LRAs"). Section 7 provides background information comparing the process steps in the allocation of RA import capacity to that in the allocation of DG deliverability. Lastly, Section 8 provides a detailed example illustrating that deliverability of a DG resource is not determined by the flow direction at the transmission-distribution interface.

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count towards RA requirements. This proposal is intended to apply only to the second category of Rule 21 resources.

7 The process is streamlined in the sense that it may provide RA deliverability status to DG resources sooner than they would otherwise receive through the WDAT interconnection process. The ISO understands that Rule 21 may not offer a means for determining deliverability and may instead rely on the process being proposed here.

2. Stakeholder process and schedule

ISO management intends to take this initiative to its Board of Governors for approval at their May 2012 meeting. Accordingly, the ISO proposes the following dates for the remaining steps of the stakeholder process.

February 28	ISO posts revised straw proposal
March 6	Stakeholder conference call to discuss revised straw proposal
March 13	Stakeholder written comments due
March 29	ISO posts draft final proposal
April 5	Stakeholder conference call to discuss draft final proposal
April 12	Stakeholder written comments due
May 16-17	ISO Board of Governors meeting

Stakeholders should submit their written comments to DeliverDG@caiso.com.

Additional information in this initiative can be found at:
http://www.caiso.com/informed/Pages/StakeholderProcesses/DeliverabilityforDistributedGeneration.aspx .

3. Scope of this initiative

3.1.1. Objectives of this initiative

This initiative is intended to develop an approach to successfully achieve the following objectives:

1. Support California's strategy for increasing the share of renewable resource production in the state's annual consumption of electricity;
2. Support the increasing role of distributed generation, as an element of that strategy[8], by providing a means for LSEs to count capacity of DG resources towards their annual RA requirements without requiring the completion of each resource's WDAT study process;

8 For example, to support the state's RPS targets, California Governor Jerry Brown's Clean Energy Jobs Plan called for adding target amounts of localized renewable generation (i.e., DG) close to consumer loads and transmission and distribution lines.

3. Determine the amount of DG that will be fully deliverable without any additional delivery network upgrades, without needing any further deliverability assessment, and without degrading the deliverability of existing resources or generation projects in the ISO's interconnection queue;
4. Enable both WDAT and non-NEM Rule 21 interconnecting resources to utilize the deliverability made available through the new approach;
5. Ensure consistency of the new approach with the outcome of the ISO's TPP-GIP Integration initiative; and,
6. Inform DG developers, LRA/LSE resource planning and procurement processes, and other interested stakeholders, in a timely manner of locations where sufficient deliverability capacity exists to accommodate additional DG resources.

3.1.2. Definition of DG resources as used in this proposal

For purposes of this initiative, the terms "distributed generation" and "DG" will refer to generating facilities connected to the distribution system of a utility distribution company, irrespective of the size of the facility or the resource type. The ISO recognizes that the term is used slightly differently in other contexts, however, and therefore provides clarification in this proposal where needed to reconcile different usages.

It is not the ISO's intent to exclude non-renewable DG resources from this proposal. The ISO assumes that the decision whether to allocate DG deliverability to non-renewable DG resources is a decision more appropriately left to the LRAs that oversee procurement by LSEs iwthin the ISO. Moreover, for purposes of this proposal, the ISO is not placing a size limit on DG resources, but instead is defining it as any generation connected at the distribution level.

3.1.3. Proposal does not substitute for interconnection processes

The process described in this proposal is not an interconnection process and, thus, is not intended to substitute for the GIP, WDAT or Rule 21 interconnection processes. Rather, the proposed process is a means of determining available deliverability for DG resources pursuing distribution-level interconnection at specific nodes below the ISO grid, either under Rule 21 or WDAT, without requiring additional network upgrades. The proposed process may therefore provide an earlier determination of deliverability for such resources, but would not supersede any other requirements of the Rule 21 or WDAT processes. DG projects awarded deliverability through the process outlined in this proposal may still be responsible for reliability network upgrades or distribution system upgrades. Lastly, this streamlined process is not applicable to projects requesting interconnection through the ISO's GIP.

This proposal is not intended to provide deliverability status to those projects seeking interconnection through the ISO's generation interconnection procedures (GIP). However, as mentioned above, it is intended to apply to projects seeking interconnection through either Rule

21[9] or WDAT. For such projects, this proposal is intended to provide an earlier determination of deliverability than would otherwise occur through the interconnection process. The generation projects awarded or assigned deliverability as a result of this process will be treated as already deliverable for the amount of deliverability determined and awarded in the subsequent deliverability assessment performed as part of the ISO GIP cluster studies.

It is important to emphasize that the process proposed here is solely a means of providing an earlier determination of deliverability status to DG resources and is not a substitute for the interconnection process (either Rule 21 or WDAT). That is, each resource considered eligible for the deliverability allocation proposed here must still apply to and complete its interconnection process under Rule 21 or the WDAT.

4. Proposed timeline for determination and allocation of DG deliverability

The diagram on the following page provides for illustration purposes the proposed timeline of the process for providing RA deliverability status to DG resources. As examples, the timeline depicts what the ISO expects would be the first (2013-14) and second (2014-15) cycles of the proposed process. The process whereby LRAs assign or award[10] DG deliverability to specific projects is external to the ISO process and is not shown. However, it is critical for the ISO to have accurate and timely information on the resulting awards to specific DG projects, and it is expected that such information will be provided to the ISO before the start of a subsequent DG deliverability study cycle (i.e., prior to November). For comparison purposes, the diagram also includes the major GIP milestones that interact with the DG deliverability process in terms of modeling assumptions.

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9 Non-NEM resources in the Rule 21 queue.

10 The terms “assign” and “award” are used interchangeably throughout this proposal.

Timeline for determination and allocation of DG deliverability

	2012-Q1	2012-Q2	2012-Q3	2012-Q4	2013-Q1	2013-Q2	2013-Q3	2013-Q4	2014-Q1	2014-Q2	2014-Q3	2014-Q4	2015-Q1
TPP	2012/13 TPP – plans transmission to support deliverability for generation portfolios identified during 2012-Q1				2013/14 TPP – plans transmission to support deliverability for generation portfolios identified during 2013-Q1				2014/15 TPP – plans transmission to support deliverability for generation portfolios identified during 2014-Q1				
	Mar 2012 2011/12 Final Plan				Mar 2013 2012/13 Final Plan				Mar 2014 2013/14 Final Plan				
C3/4	Enter GIP Phase 2	April-November GIP Phase 2 study		GIA negotiation									
C5	March - Open window	April-December GIP Phase 1 study			Option (A) or (B) chosen	April-November GIP Phase 2 study			TPD allocation & GIA negotiation				
DGD1				November – February DG deliverability study		Allocation of DG deliverability							
C6					April - Open window	May-December GIP Phase 1 study			Option (A) or (B) chosen	April-November GIP Phase 2 study			TPD allocation & GIA negotiation
DGD2								November – February DG deliverability study		Allocation of DG deliverability			
C7									April – Open window	May-December GIP Phase 1 study			Option (A) or (B) chosen

<u>Notes/explanations:</u>

"DGD1" represents the first anticipated cycle (2012-13) of the ISO's proposed process for providing RA deliverability status to DG resources without any additional delivery network upgrades.

"DGD2" represents the second anticipated cycle (2013-14) of the ISO's proposed process for providing RA deliverability status to DG resources without any additional delivery network upgrades.

"TPD" is a shorthand reference to "TP deliverability" which is intended to reflect the MW amount of deliverability for new generation projects in the ISO interconnection queue that is provided by the existing transmission system, as expanded by approved projects up to and including the latest approved comprehensive transmission plan.

5. Background on ISO's deliverability assessment methodology

The ISO's deliverability assessment methodology is part of the GIP study process.[11] The GIP study process consists of a reliability assessment and a deliverability assessment. The reliability assessment, among other things, consists of a short circuit analysis, a stability analysis to the extent the ISO and applicable Participating Transmission Owners (PTO) reasonably expect transient or voltage stability concerns, and a power flow analysis, including off-peak analysis. The purpose of the reliability assessment is to identify reliability network upgrades necessary to reliably interconnect the generation to the grid. The reliability assessment for distribution connected generation is performed by the distribution company according to their procedures.

The deliverability assessment consists of an on-peak deliverability assessment, as applicable, in accordance with ISO tariff section 6.5.2 in Appendix Y or GIP Business Practice Manual (BPM) section 6.1.4.3.[12] The purpose of the deliverability assessment is to identify delivery network upgrades required to provide the requesting generation project with full or partial[13] capacity deliverability status for purposes of providing RA capacity to an LSE. A fundamental objective of the RA program is that energy produced by the generation facility must meet a simultaneous deliverability requirement when dispatched with other resource adequacy capacity under peak load conditions. Because the ISO's deliverability assessment is performed in advance of, and as a pre-condition for, the demonstration by LSEs of the resources they have procured to meet their RA requirements, the deliverability assessment must verify that all generating capacity determined to be deliverable (and therefore acceptable for meeting RA requirements) within an electrical study area of the ISO grid can be dispatched to the full amount of its deliverability status under peak load conditions without overloading any ISO grid facilities. To meet RA requirements, LSEs must procure capacity that has been demonstrated to be deliverable through the ISO's deliverability assessment process.

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11 The ISO conducts deliverability assessments both for generation projects that participate in the ISO interconnection queue to connect directly to the ISO grid and on behalf of PTOs for resources in the Wholesale Distribution Access Tariff (WDAT) interconnection queue and for non-net energy metering ("non-NEM") resources under Rule 21. Resources are studied for deliverability as part of the cluster queue in which they were submitted.

12 A more detailed description of the deliverability assessment methodologies is available on the ISO website, http://www.caiso.com/Documents/Deliverability%20assessment%20methodologies

13 On January 30, 2012 FERC conditionally approved the ISO's GIP-2 tariff revisions. The GIP now allows projects to request partial deliverability in their initial interconnection request applications or switch from FC to partial deliverability after receiving the Phase 1 study report. For purposes of the present initiative, the ISO would allow an LRA to assign to a particular DG resource an amount of partial deliverability that is less than its full qualifying capacity.

The ISO's deliverability assessment is described in tariff section 40.4.6.1, *Deliverability Within the CAISO Balancing Authority Area*, and in the BPM for Reliability Requirements section 5.1.3.4, *Deliverability to Aggregate of Load*. These provisions specify the process for establishing deliverability annually for internal supply resources. Once the deliverability of a resource is established through an ISO deliverability assessment, the relevant network upgrades assumed in the study are in-service and the generating facility is in-service, LSEs are able to count all or part of that deliverable capacity toward their respective year-ahead and month-ahead RA requirements.

The deliverability assessment is only one of the elements of the GIP. Interconnection Study Responsibility Allocation, Attachment A to Appendix Y,[14] provides a complete list of requirements for interconnection customers. The deliverability assessment requirements are shown as line items 6 and 9 of Attachment A.

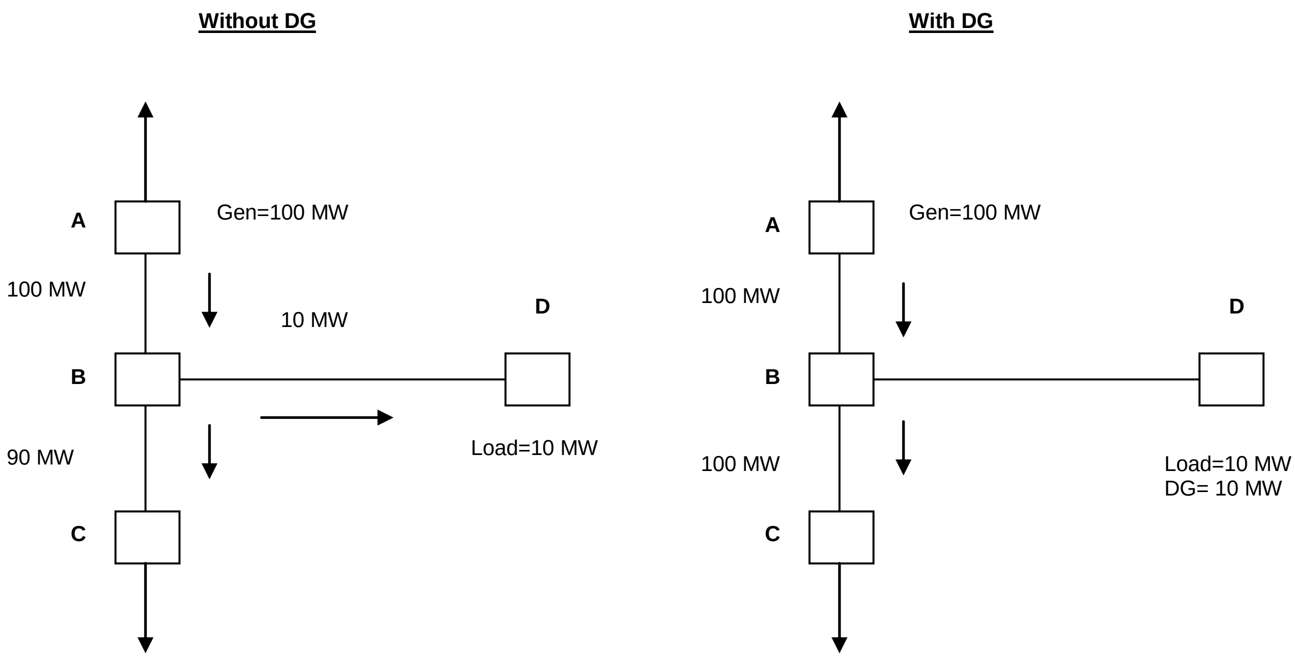
5.1.1. "No Backflow" is not sufficient to determine deliverability for DG

Many stakeholders participating in this initiative and in related proceedings at the CPUC have asserted that DG resources connected to a utility distribution system below (downstream from) any particular ISO network node should be considered deliverable as long as the total output of those DG resources does not exceed the total load below the same node. They rationalize this assertion by saying that, if there is no "back flow" of produced energy from the distribution system onto the ISO grid, then the output of those DG resources is fully absorbed by the local load and does not impact the ISO grid. The ISO has explained that this argument is based on a misunderstanding of the deliverability study methodology, which is designed to verify the fundamental principle of what it means for a group of resources – including both ISO grid-connected and distribution-connected – to be, collectively, fully deliverable. In particular, a finding of deliverability for a group of resources depends on the modeled pattern of load that would be served by the resources. When DG resources reduce the load in the area, the collective deliverability of the resources in the area could be adversely affected, irrespective of whether there is any back flow. The following simple example illustrates why demonstration of "no back flow" is not sufficient to establish deliverability for DG resources.

Referring to the leftmost diagram in the figure on the next page (i.e., "Without DG"), consider a network 230 kV line A-B-C that is part of the ISO grid. Assume that at B is a 230/69 kV transformer and that the 69 kV side of the transformer not part of the ISO grid. Downstream from the low side of the transformer at B is 69 kV bus D with 10 MW of load and no generation. Assume no losses. There is a 100 MW generator connected at A and the power flow from A to B is 100 MW and the power flow from B to C is 90 MW (i.e., 10 MW leaves line A-B-C at B and flows downstream through the 230/69 kV transformer at B to serve the 10 MW load at D).

14 Appendix Y, Interconnection Requests, Generator Interconnection Procedures (GIP), http://www.caiso.com/Documents/AppendixY-FifthReplacementCAISOTariff.pdf

Assume the binding constraint in this example is the 90 MW rating of B-C (for simplicity assume no outages). Assume further that the 100 MW generator at A is fully deliverable, based on modeling 10 MW of load at D and 90 MW of flow on B-C.



Now, turning to the rightmost diagram in the figure above (i.e., “With DG”), assume that 10 MW of DG connects at D. The result will be that the 10 MW DG project fully serves the 10 MW of load at D. There is no backflow on B-D (in fact, there is no power flow at all on B-D), nor is there any back flow onto A-B across the substation at B. The power flow on A-B is still 100 MW, but now the power flow on B-C is also 100 MW which violates the 90 MW rating of B-C. Therefore the 10 MW DG resource at D is not deliverable, even though it did not create back flow. If the 10 MW DG resource at D were deemed deliverable, the 100 MW generator at A would no longer be fully deliverable, because it could not be dispatched to its full capacity level without overloading line B-C. Thus the absence of back flow is not sufficient to demonstrate deliverability of resources connected on the distribution system.

This example should not be misinterpreted to mean that the deliverability of more distant existing generation is valued over new DG generation located closer to load. Rather, DG resources awarded deliverability, whether through the earlier determination of deliverability proposed in this draft final proposal or through normal interconnection processes, will have its deliverability preserved in subsequent GIP studies.

This same concept is demonstrated by a less simplified and more realistic example (constructed from actual deliverability studies) found in Appendix Section 8.

6. Draft Final Proposal

6.1. Comparison between this proposal and the prior one

Based on discussions of the ISO's February 28, 2012 revised straw proposal during the March 6 stakeholder conference call, as well as the written comments submitted by stakeholders on March 13, the ISO has made a number of clarifications and modifications that are reflected in the draft final proposal.

The following areas are clarified in the draft final proposal:

1. Stakeholders requested additional clarity on the study model used in the DG deliverability studies. In response, the ISO has created several new subsections in the draft final proposal and has included additional material in an effort to provide an improved explanation of the study model. These clarifications are included in both Section 6.2 and Section 6.3 (and its subsections).
2. Stakeholders commented that reducing the target DG amounts in the study to achieve feasibility while maintaining the dispatch levels of existing generation and projects in the queue somehow under-values DG. The ISO clarifies that under current rules and procedures, absent the present proposal, DG resources may request deliverability through the WDAT, and the ISO will study these requests within the GIP as part of the GIP cluster corresponding to the date the WDAT request was submitted. Within the GIP study process the WDAT resources have no less priority than any other resources in the same cluster in the same study area, but they may as a result be responsible for some delivery network upgrades to the ISO grid if their deliverability requires such upgrades. The present proposal does not remove or diminish this option for DG resources. Rather, it provides an alternative route to obtaining a deliverability designation that is faster, because it does not require the two-phase GIP study process to be finished, and potentially less costly, because it bases deliverability for DG on available transmission capacity without triggering additional network upgrades. For non-NEM Rule 21 interconnection requests, the present proposal offers an even more dramatic benefit because currently there is no way for Rule 21 resources to obtain deliverability. Thus, the study approach described in this proposal offers significant benefits to facilitate DG development, without compromising the objectives and effectiveness of the RA program, and without undermining the open access principles behind the ISO's cluster-based GIP. This is discussed more fully in Section 6.2 ("Overview).
3. Stakeholders requested clarification concerning the base resource portfolio used as an input in the DG deliverability study and the extent to which the portfolios include the DG

plans of publicly owned utilities. The ISO agrees that the base resource portfolio used to determine DG deliverability as proposed in this paper should adequately reflect the DG target amounts of all LRAs that oversee procurement by LSEs within the ISO. However, the ISO believes that this consideration is properly within the scope of Phase 1 of each annual TPP wherein the development of the resource portfolios takes place, and not within the scope of the present proposal. For the current 2012-2013 TPP cycle the ISO has requested information from the non-CPUC LRAs with which to supplement the DG representation in the TPP base portfolio and the TPP high DG portfolio. The ISO expects to receive this information in the near future and that these portfolios will reflect the existing and anticipated DG procurement of LSEs overseen by non-CPUC LRAs. This will ensure that when the present initiative is first implemented at the end of 2012 it will effectively address the DG procurement needs of these LRAs.

4. Stakeholders requested clarifications relative to the timeline diagram. In response, the ISO has revamped the timeline diagram to make it easier to follow.
5. In response to the ISO's explanation about "backflow" several stakeholders pointed out that reductions in load due to any number of reasons (including, for example, energy efficiency and departing load besides just the addition of DG) may degrade deliverability and asked how these are addressed today. The ISO clarifies that the impact of load pattern changes due to, for example, weather and economic trends, energy conservation programs, and energy efficiency programs, is today reflected in the annual NQC determination per ISO Tariff Section 40.4.6.1. This proposal makes no changes in this regard.
6. Stakeholders requested additional clarification regarding how existing DG is addressed in the proposed process. The study process will take into account actual DG development defined as the amount currently in the WDAT queue and non-NEM resources in the Rule 21 queue. The DG resources already in operation are modeled in the study as part of the existing system, and as such are not included in the target quantities to be assessed in the study. In response to stakeholder concerns that including all projects in the WDAT and Rule 21 queues may reduce the amount of DG deliverability made available through this process, the ISO clarifies here that although it will model all WDAT and non-NEM Rule 21 projects, the study will preserve deliverability only for WDAT projects requesting full capacity deliverability status. The remainder is available for allocation.
7. Stakeholders expressed interest in the ISO performing the DG deliverability studies using TPP resource portfolios that model higher amounts of DG than in the base resources portfolio. The ISO clarifies that although it could study these higher amounts for informational purposes, the ISO would only make available for allocation the target amounts of DG modeled in the base portfolio. Study results based on higher amounts of DG could be used to inform portfolio development for the next TPP cycle. For example, if state policy goals indicate that a greater amount of system-wide DG should be specified in the TPP base portfolio, then the nodal information from the study could suggest how to distribute the increased DG quantity to specific network nodes. The one caveat the ISO makes is that this approach provides no certainty that the larger amounts of deliverability identified in one year's study would still be available a year later, as other

factors affecting DG deliverability could change from one year to the next; however, this information could still serve as a useful indicator.

8. Stakeholders asked whether DG resources awarded deliverability through this process will be subject to NQC determinations. The ISO clarifies that DG resources awarded deliverability through this project will be subject to annual NQC determination, as specified in ISO Tariff Section 40.4.6.1, as are all generators that obtain deliverability through the interconnection process. The NQC for a generator may be reduced below the level of its full capacity deliverability status in any given year, depending on system conditions, such as transmission system configuration and load levels. Such a reduction would apply for the upcoming RA compliance year only, and would be reassessed the following year for the next RA compliance year.

In addition to the clarifications made, the draft final proposal makes the following modifications to enhance the proposal:

9. Stakeholders expressed concerns about the possibility that an LRA may not obtain its full load share of DG deliverability at nodes where multiple LSEs serve load and suggested that allocation of DG deliverability at any node should be based on nodal load ratio shares and not based on total system load ratio shares. The ISO agrees and has made this modification. However, because the ISO believes that this alone may not be enough to mitigate this concern, the ISO has made several additional modifications for stakeholder consideration. This is discussed in more detail in Section 6.4.1 ("Sequence of the allocation process").
10. Stakeholders objected to the previous proposal's prohibition against the "carry over" of unused or unassigned DG deliverability to subsequent cycles of this process (i.e., a "use it or lose it" approach). In response, the ISO now proposes that if any portion of the deliverable MW in a given year goes unassigned by LRAs to specific projects in that year, the LRA will be allowed to carry over the unused deliverability to subsequent cycles of this process. This is discussed in more detail in Section 6.4.3 ("Unused or unassigned DG deliverability").
11. Stakeholders suggested a few modifications to the objectives of this initiative; specifically, that the objectives reference California's DG goals, and that an objective should be to inform resource planning and procurement processes in a timely manner. The ISO has revised objectives 2 and 6 in response to these suggestions.
12. ISO proposes to remove (i.e., zero-out MW values for) those nodes that are in study areas for which the most recently completed Phase 1 or Phase 2 study has identified a need for delivery network upgrades (the previous proposal only applied this approach to Phase 1 results). Similarly, the ISO will also zero out the DG MW values for those nodes that are in the study areas for which the most recent cluster Phase 2 study identified and then removed certain delivery network upgrades to support deliverability for MW amounts in the interconnection queues. The ISO will only add transmission in the study model that has received ISO approval and delivery network upgrades that are either funded or permitted. The intention here is to lessen the risk of DG deliverability being dependent on network upgrades that may not ultimately get built.

6.2. Overview

The ISO proposes to conduct an annual process consisting of two parts to provide RA deliverability status to DG resources. In the first part of the process, the ISO will determine MW amounts of deliverability available for DG resources at specific network nodes on the ISO grid without requiring additional network upgrades. In the second part of the process, the ISO will allocate the use of such deliverability to LRAs that oversee procurement by their regulated LSEs. The intent of this streamlined process is to enable LSEs to procure deliverable DG resources up to these MW amounts without requiring further assessment to establish deliverability in the interconnection processes. (DG resources are still required to apply to and complete the appropriate Rule 21 or WDAT interconnection process, however.) The timeline for this annual process would run from the fourth quarter of one year to mid-summer of the following year.

For the first part of the process, the ISO will perform special DG deliverability studies during the fourth quarter of each year (during the course of the annual TPP) and would publish the results – a list of available network nodes on the ISO grid with associated MW quantities of deliverability for DG resources – by February 15 of the following year. For this study the ISO will model the existing transmission system plus new additions and upgrades that have been approved in prior GIP and TPP cycles, plus certain new generation in the ISO interconnection queue and associated upgrades, as described below. Onto this model the ISO will then add target DG quantities at each network node and determine how much of each nodal target quantity is deliverable without requiring additional upgrades on the ISO grid and without adversely affecting the deliverability of other modeled resources.[15] The nodal target quantities will be at least as large as, and may exceed, the nodal DG quantities specified in the base case resource portfolio[16] used in the current TPP cycle for identifying public policy-driven transmission upgrades.

The study process will take into account actual DG development defined as the amount currently in the WDAT queue and non-NEM resources in the Rule 21 queue. The DG resources already in operation are modeled in the study as part of the existing system, and as such are not included in the target quantities to be assessed in the study. In response to stakeholder concerns that including all projects in the WDAT and Rule 21 queues may reduce the amount of

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15 The ISO will perform the proposed deliverability study in accordance with its normal procedure for such studies. A detailed description of the deliverability assessment methodologies is available on the ISO website at: http://www.caiso.com/Documents/Deliverability%20assessment%20methodologies

16 Although the proposed study may assess deliverability for a nodal target quantity that exceeds the corresponding nodal DG quantity in the TPP base case resource portfolio, the ISO will not allocate any more DG deliverability in the current cycle than the TPP portfolio amount. The use of larger nodal quantities in the proposed study would be for informational purposes only.

DG deliverability made available through this process, the ISO clarifies here that although it will model all WDAT and non-NEM Rule 21 projects, the study will preserve deliverability only for WDAT projects requesting full capacity deliverability status. The remainder is available for allocation. For example, suppose that the DG target amount at node N is 150 MW, and this is the same as the nodal DG amount in the TPP base case resource portfolio Suppose further that there are 200 MW of DG in the WDAT queue at this node, of which 80 MW has requested full capacity deliverability status and 120 MW is energy only. Suppose the study finds that the 150 MW target amount is fully deliverable. Then the amount available for allocation would be 70 MW (i.e., 150 MW - 80 MW).

If actual DG development at any node (WDAT and non-NEM Rule 21 projects currently in queue) already exceeds the target levels of DG in the TPP base resource portfolio, then the target level at that node will be raised to accommodate the actual DG development at that node for study purposes. As noted above, however, in step 2 of the current cycle the ISO will allocate no more than the TPP portfolio amount.

The ISO recognizes that there may be TPP resource portfolios modeling higher DG amounts than those in the base resource portfolio that the ISO proposes to use for these studies. For example, suppose the base resource portfolio in a given year models 2,500 MW of DG but a "high DG" resource portfolio has 5,000 MW of DG. Also suppose that the target DG amount at node N is 150 MW in the base resource portfolio and 225 MW in the "high DG" resource portfolio. The ISO could study these higher amounts for informational purposes, but would only make available for allocation at most 2,500 MW (150 MW at node N) in the current cycle. An informational study such as this could reveal, for example, that 3,700 MW (of the 5,000 MW target amount) of DG is deliverable system wide and 190 MW (of the 225 MW modeled) is deliverable at node N. These study results could then be used to inform portfolio development for the next TPP cycle. For example, if state policy goals indicate that a system-wide DG amount greater than 2,500 MW should be specified in the TPP base portfolio, then the nodal information from the study could suggest how to distribute the increased DG quantity to specific network nodes. The one caveat the ISO makes is that this approach provides no certainty that the larger amounts of deliverability identified in one year's study would still be available a year later, as other factors affecting DG deliverability could change from one year to the next; however, this information could still serve as a useful indicator.

In performing the proposed deliverability study, in grid areas where all resources modeled including the target DG amounts cannot be simultaneously dispatched to the output level corresponding to their full or partial deliverability status without overloading ISO grid facilities, the ISO will reduce the modeled DG amounts as needed to achieve a feasible dispatch. For each network node where the modeled DG amount must be reduced from the target level to achieve feasibility, the ISO will determine the amount of reduction needed to achieve feasibility, leaving the unreduced nodal MW amount of DG that would be deliverable. This approach is necessary and appropriate to preserve the resource adequacy value of the resources the LSEs may procure to meet their RA requirements. If the ISO were to reduce the dispatch of existing resources in a given study area before reducing the target DG amounts, then either the RA eligibility of those existing resources would need to be reduced commensurately, which could have adverse impacts on the financial status of such resources, or the LSEs could be procuring RA capacity in that area that cannot be fully utilized, which would be costly for ratepayers and would potentially jeopardize grid reliability by providing less available RA capacity than the procurement numbers indicate. Alternatively, if the ISO were to reduce the dispatch of full capacity generation projects already in the ISO interconnection queue or in a Participating Transmission Owner's (PTO) WDAT queue, this would allow "queue jumping" by the DG resources in violation of open access generator interconnection requirements as provided through the queue cluster system in the ISO tariff.

Some stakeholders have commented that reducing the target DG amounts in the study to achieve feasibility while maintaining the dispatch levels of existing generation and projects in the queue somehow under-values DG. The ISO believes that this view reflects a misunderstanding of both the intent and the benefits of the present proposal. Under current rules and procedures, absent the present proposal, DG resources may request deliverability through the WDAT, and the ISO will study these requests within the GIP as part of the GIP cluster corresponding to the date the WDAT request was submitted. Within the GIP study process the WDAT resources have no less priority than any other resources in the same cluster in the same study area, but they may as a result be responsible for some delivery network upgrades to the ISO grid if their deliverability requires such upgrades. The present proposal does not remove or diminish this option for DG resources. Rather, it provides an alternative route to obtaining a deliverability designation that is faster, because it does not require the two-phase GIP study process to be finished, and potentially less costly, because it bases deliverability for DG on available transmission capacity without triggering additional network upgrades. For non-NEM Rule 21 interconnection requests, the present proposal offers an even more dramatic benefit because currently there is no way for Rule 21 resources to obtain deliverability. Thus, the study approach described in this proposal offers significant benefits to facilitate DG development, without compromising the objectives and effectiveness of the RA program, and without undermining the open access principles behind the ISO's cluster-based GIP.

When the study is completed the ISO will provide a list of the network nodes modeled in the study, the corresponding MW amounts of deliverable DG, and the nodal deliverability MW available for allocation to DG resources. The resulting MW amount for allocation at each node will be less than or equal to the target MW amount that was modeled in the deliverability study. For ISO network node locations where the ISO has modeled and found to be deliverable a larger MW amount than was specified in the TPP base portfolio, the ISO will publish this information.[17] The TPP base portfolio amount represents the maximum possible available for allocation in the current cycle. Further details on the deliverability study process are described in Section 6.3 (Deliverability Study Methodology).

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17 This will be provided for information purposes only and will not be used for allocation purposes.

For the second part of the proposed process, the ISO will allocate DG deliverability to local regulatory authorities (LRAs)[18] for use in procurement by the LSEs they regulate. The allocation process can begin soon after the publication of the available nodal deliverability amounts. The proposed allocation process will be similar to the existing annual process for allocating import capacity to LSEs for procurement of resource adequacy capacity, as provided in ISO tariff section 40.4.6.2. The proposed allocation step is described below in Section 6.4 (Allocation of Deliverability to Local Regulatory Authorities).

DG resources awarded deliverability through this process are subject to annual NQC determination, as specified in ISO Tariff Section 40.4.6.1, as are all generators that obtain deliverability through the interconnection process. The NQC for a generator may be reduced below the level of its full capacity deliverability status in any given year, depending on system conditions, such as transmission system configuration and load levels. Such a reduction would apply for the upcoming RA compliance year only, and would be reassessed the following year for the next RA compliance year.

In some grid areas the resource portfolios used in the TPP may include some quantities of resources directly connected to the ISO grid that are considered “DG resources” based on their size or other characteristics. The ISO will not include these DG amounts in the proposed assessment because the purpose of the methodology is to assess deliverability available for distribution-connected resources. Any ISO interconnection requests that are considered “DG resources” under other definitions of that term, must participate in the ISO’s GIP in the normal manner to receive their desired deliverability status. As such, for purposes of the deliverability study proposed here the ISO will model them in a manner consistent with the described treatment of the current interconnection queue.

6.2.1. Resource portfolios

Although the subject of development of the resource portfolios for the TPP is not the subject of this paper, some stakeholders have commented in this initiative that the resource portfolios used in the DG deliverability assessment should consider the DG-related input of all LRAs (i.e., the CPUC and LRAs other than the CPUC). The ISO agrees. The base resource portfolio used to determine DG deliverability as proposed in this paper should adequately reflect the DG target amounts of all LRAs that oversee procurement by LSEs within the ISO.

The ISO believes that this consideration is properly within the scope of Phase 1 of each annual TPP wherein the development of the resource portfolios takes place, and not within the scope of the present proposal. For the current 2012-2013 TPP cycle the ISO has requested information from the non-CPUC LRAs with which to supplement the DG representation in the TPP base portfolio and the TPP high DG portfolio. The ISO expects to receive this information in the near future and that these portfolios will reflect the existing and anticipated DG procurement of LSEs

[18] Those LRAs that oversee procurement by LSEs within the ISO.

overseen by non-CPUC LRAs. This will ensure that when the present initiative is first implemented at the end of 2012 it will effectively address the DG procurement needs of these LRAs.

6.3. Deliverability Methodology

During the course of the annual TPP, the ISO will perform a special DG deliverability study to determine MW amounts of deliverability available for DG resources at each of a specified set of network nodes on the ISO grid. The ISO will use the DG component of the 33 percent renewable base portfolio developed for the current TPP cycle to specify the set of network nodes and initial MW targets of DG for the MW deliverability amounts at each node. For study purposes the ISO may actually use larger MW target amounts at specific nodes as a way to provide additional information about deliverability in specific grid areas of interest,[19] but the annual allocation process described in section 6.4 will allocate no more than the MW amounts specified in the base TPP resource portfolio for that planning cycle. The development of the resource portfolio, including consideration of non-CPUC jurisdictional LRA DG plans and targets, will occur during the first phase of each annual TPP cycle. The ISO's deliverability assessment will then determine how much of the target DG amount at each node can be deliverable without any additional delivery network upgrades.[20]

It is important to understand that the study described here cannot determine the maximum amount of DG that can be connected with full deliverability at any particular network node or for the system as a whole. The proposed study will determine whether the nodal target MW amounts of DG are fully deliverable and, if not, what portion of the target is deliverable at each node. Thus if the nodal target amount is found to be fully deliverable, it may be possible that a greater amount would also be deliverable, but the proposed study would not be able to determine that.

The study results at each node will indicate:

1. DG MW amount specified in the 33 percent TPP base portfolio;
2. DG MW target amount assessed in the study, which will be at least as large as item 1;

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19 For example, it has been suggested in some stakeholder comments that the ISO should assess deliverability for the "High DG" TPP resource portfolio, which could be done by expanding the nodal MW quantities specified in the base portfolio to the values specified in the High DG portfolio, even including any additional network nodes that may be in the High DG portfolio.

20 The finding that a particular MW amount of DG is deliverable at a specific network node does not obviate the need to perform the transmission reliability impact assessment normally performed in conjunction with WDAT interconnection requests. Thus it is possible that some reliability network upgrades or other mitigation may be required in conjunction with the deliverable DG resources.

3. DG MW amount determined to be deliverable, which will be a value between zero and item 2; and
4. DG MW amount available for allocation, which will be the minimum of item 1 and item 3.

Another important feature of the proposed study is the protection of the deliverability of existing deliverable resources and full or partial capacity resources that are in good standing in the ISO interconnection queue. The deliverability of existing resources or generation projects in the ISO interconnection queue is based, in part, on the particular load pattern assumed in the associated deliverability studies (i.e., the amount of load modeled at each node). A different load pattern will affect transmission flows and may result in a different set of deliverability amounts. The impact of changes in the load pattern due to, for example, weather and economic trends, energy conservation programs, and energy efficiency programs, is reflected in the annual NQC determination per ISO Tariff Section 40.

Adding DG resources on distribution systems has the equivalent effect of changing the load pattern from a modeling perspective. Specifically, adding a DG resource to a distribution system reduces the load in that distribution system which, in turn, reduces the flow from the transmission grid to that distribution system. The ISO's proposed methodology recognizes this and attempts to determine how much DG can be added at each node (up to the target amounts modeled in the study) without degrading the deliverability of existing resources or generation projects in the ISO queue and the PTOs' WDAT queues. There is a common misconception that a DG resource (connected to a distribution system) should be deliverable as long as its generation output does not "backflow" onto the transmission grid (i.e., as long as its generation output is less than the load served on the same distribution system). This is not correct, as explained above in section 5. Regardless of whether the flow at the interface between the transmission system and distribution system reverses direction, the flow pattern on the transmission system will change due to the addition of the DG resource, which could result in overloads on the transmission grid where no overloads existed prior to the addition of the DG resource. This is why it is essential to assess DG deliverability through the type of study the ISO is proposing, rather than rely on the simple and intuitively-appealing – but incorrect – "no backflow" criterion.

In performing the proposed assessment the ISO will protect the deliverability of all generation in the ISO's generation interconnection queue and the PTOs' WDAT queues by ensuring that queue generation is sufficiently represented in the base case used in performing the deliverability assessment. This should not be misconstrued as a policy choice to give lower priority to DG resources relative to projects in the interconnection queue (which may, by the way, include DG resources); rather, this is a recognition that projects abiding by the established rules of the interconnection process should not be adversely impacted by the allocation of "as available" transmission to DG resources through this streamlined process.

6.3.1. Building the study model

To develop the base case for the study the ISO will start with the most recent GIP cluster Phase 2 deliverability power flow base case, and then add the generation projects that have obtained deliverability using the annual full capacity deliverability option, as well as any transmission additions and upgrades approved in the final comprehensive transmission plan for the most recent TPP cycle. Next, the ISO will add in any generation projects in the most recent GIP Phase 1 study that have been found to be fully deliverable without any delivery network upgrades (i.e., projects that were not assigned any delivery network upgrade costs in the Phase 1 study). The following table summarizes the core modeling assumptions for the DG deliverability assessment.

Generation Assumptions	**Transmission Assumptions**
• Existing generators • Generation projects requesting full capacity or partial deliverability status queued earlier or in the cluster that most recently completed Phase 2 interconnection • Generation projects that obtained full capacity or partial deliverability through the annual full capacity option • DG resources assigned deliverability in previous DG deliverability study cycle • Generation projects without delivery network upgrades identified in the most recently completed Phase 1 interconnection study	• Existing transmission system • Approved transmission upgrades • Funded or permitted network upgrades for generation completed interconnection studies

The ISO will then examine the DG network nodes specified in the 33 percent renewable TPP base portfolio and will remove (i.e., zero-out the MW values for) those nodes that are in study areas for which the most recently completed Phase 1 or Phase 2 study has identified a need for delivery network upgrades. The logic here is that if the Phase 1 or Phase 2 study found a need for delivery network upgrades in a study area, then there would be no capacity available at nodes within that study area to provide deliverability for DG, without such DG adversely impacting the generation projects in the queue. Similarly, the ISO will also zero out the DG MW values for those nodes that are in the study areas for which the most recent cluster Phase 2 study identified and then removed certain delivery network upgrades to support deliverability for MW amounts in the interconnection queues.

Finally, for the remaining DG network nodes, the ISO will add the MW amounts in the 33 percent base portfolio – or larger target MW amounts as may be of interest for study purposes – to the base case model for the DG deliverability assessment. As mentioned earlier, consideration of non-CPUC jurisdictional LRA DG plans and targets will occur during the development of the resource portfolio in the first phase of each annual TPP cycle, so this information will already be included in the 33 percent base portfolio.

6.3.2. Performing the studies

In performing the deliverability assessment using the base case as described above, the ISO will identify deliverability constraints by increasing dispatch of resources with 5 percent or more flow impact on a transmission facility including any target DG quantities, up to levels consistent with their deliverability status. If overloads of any transmission facilities are observed as a result of the dispatches, the ISO will reduce the DG quantities at effective nodes (i.e., nodes that have at least 5 percent flow factor on an overloaded transmission facility) from their target levels in a manner that balances efficiency and equity. To balance efficiency and equity the ISO will use a weighted least squares algorithm to determine the nodal DG reduction amounts.[21] Such an algorithm distributes the reduction amounts across multiple effective nodes in an equitable manner, so as to avoid applying very dramatic DG reductions at the one or two most effective nodes. As explained in section 6.2, applying such reductions to the nodal DG amounts is necessary and appropriate to maintain the effectiveness of resource adequacy capacity procurement and to protect the deliverability of existing resources and resources in the ISO generation interconnection queue and the PTOs' WDAT queues.

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[21] The ISO has considered two analytical methods that can be applied to determine the amount of deliverable DG generation at each node given the transmission configuration in any particular year. One is the approach of maximizing deliverable MWs which tends to allocate the deliverability to nodes in the order of shift factors and can create the situation where one network node may be fully reduced to zero deliverability while a nearby node may not be reduced at all, even though the shift factors on the binding deliverability constraint between the two nodes are only slightly different. The advantage of this approach is that it maximizes the system-wide amount of deliverability that is available for DG and gives more network nodes full deliverability rather than partial deliverability. A second approach is to apply a weighted least squares (WLS) formulation. The WLS approach will result in somewhat less total deliverability available system-wide by distributing needed reductions over a larger group of network nodes that have flow impacts on the constraining network facilities. In this manner the WLS approach produces a more equitable deliverability allocation; i.e., available deliverability is allocated to a greater number of nodes, rather than imposing potentially drastic reductions on only one or a small number of nodes. The ISO is proposing to use the WLS approach. For example, assume there are two DG nodes in a given area. Node 1 has 45 MW DG modeled in the study and a shift factor of 0.5 on the binding deliverability constraint. Node 2 has 25 MW DG modeled in the study and a shift factor of 0.15 on the same binding deliverability constraint. If the available deliverability is 10 MW, then under the maximizing deliverable MW approach, DG deliverability is 12.5 MW at Node 1 and 25 MW at Node 2 for a total of 37.5 MW between them. In contrast, under the WLS approach, Node 1 receives 14 MW of deliverability and Node 2 receives 20 MW of deliverability for a total of 34 MW between them.

6.3.3. Publishing the study results

At the end of the assessment, the ISO will provide the results in the form of a table listing all of the network nodes with non-zero MW amounts of deliverability for DG, the corresponding nodal MW amounts of DG determined to be deliverable, and the corresponding nodal MW amounts available for allocation to LRAs. As discussed earlier, if the study targeted and found to be deliverable a DG amount greater than the amount in the TPP base portfolio, the ISO will report both the amount found to be deliverable and the amount available for allocation, where the latter will not exceed the TPP base portfolio amount.

The deliverable amounts will be the MW amounts of DG that will be fully deliverable without any additional delivery network upgrades, without needing any further deliverability assessment, and without degrading the deliverability of existing resources or generation projects in the ISO's interconnection queue.

Finally, it is important to understand that the deliverable MW amount corresponds to an actual resource production level appropriate to the qualifying capacity determination method for each resource type specified in the deliverability assessment methodology. As such the deliverable MW amount may be less than the installed or nameplate capacity of the modeled resources. The conversion between the deliverable MW amount and the installed capacity varies depending on the mix of resources contributing to the deliverability constraints and the location of the resources. For example, a deliverable amount of 64 MW might be used for 64 MW of installed capacity of solar PV resources or 100 MW of installed capacity of wind resources, or other combinations of different resource types.

6.3.4. Initial application of the methodology

The first time that the ISO will perform the proposed DG deliverability assessment is in the 2012/2013 transmission planning cycle. This means that the ISO will provide the first results in February 2013 which the LSEs could utilize for their procurement for the 2014 RA compliance year. The following discussion illustrates how the study process would work for this first DG deliverability assessment cycle.

1. Develop the base case

    a. The base case development starts with the Cluster 3 and Cluster 4 Phase 2 deliverability assessment base case, and then adds any additional transmission additions and upgrades identified in the 2012/2013 transmission planning cycle.

    b. Next, add to the model those Cluster 5 generation projects that were found in the Phase 1 study process to be fully deliverable without requiring any additional delivery network upgrades (i.e., projects that were not allocated any delivery network upgrade costs in the Phase 1 study).

    c. Next, determine the target MW amount of DG at each network node as the maximum among the following:

i. MW amount of DG in the TPP base portfolio

ii. MW amount of DG in the TPP portfolio with the highest overall DG amounts (i.e., the “High DG” portfolio)

iii. MW amount of active WDAT and non-NEM Rule 21 resources

d. Finally, model MW amounts of DG at each network node as determined in the previous step, but then set the DG amounts to zero for (i) those network nodes located in study areas where the Cluster 5 Phase 1 studies indicated a need for additional delivery network upgrades or (ii) those network nodes located in study areas where Cluster 3 and 4 Phase 2 studies indicated a need for additional delivery network upgrades or where problematic delivery network upgrades are removed from the Cluster 3 and 4 Phase 2 study results.

2. Perform the analysis using the deliverability assessment methodology described in the ISO document identified in Section 4 above. To the extent the study reveals that the network cannot provide full deliverability to all the generation projects and DG per the modeling approach described above, the ISO will reduce the amounts of DG at each node as necessary to achieve full deliverability, using the five percent flow factor threshold and weighted least squares algorithm described above.

3. Summarize and publish the deliverable MW quantity of DG at each network node, and the amount of DG deliverability at each node that is available for allocation to LRAs. Although the deliverable MW amount at a network node may be greater than the amount in the TPP base portfolio, the MW quantity available for allocation will be less than or equal to the amount that was specified in the TPP base portfolio. As noted earlier, this information would be available in the first quarter of each year.

6.4. Allocation of Deliverability to Local Regulatory Authorities

Following the annual determination of how much deliverability is available for DG without triggering additional delivery network upgrades, as described in the previous section, the ISO will conduct a process for allocating the available DG deliverability to LSEs through their local regulatory authorities (LRAs)[22]. The ISO anticipates that the allocation process would commence in March of each year, shortly after the publication of the MW amounts of DG deliverability at each network node in February.

The ISO proposes to follow a process similar, but not identical to that used for the allocation of Maximum Import Capability (MIC) for imported RA resources per tariff section 40.4.6.2. Under the proposed approach, the ISO would allocate the available deliverability amounts at each

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[22] Those LRAs that oversee procurement by LSEs that serve load within the ISO.

node on the grid to the LRAs based on the MW amount each entity requests or nominates at each node, provided such requests are shown by the requesting LRA to correspond to specific DG resources to which they or their LSEs intend to attribute deliverability status.

Although the process is conceptually similar to the MIC allocation, it is not a precise match due to some important differences between how LSEs will utilize DG resources for RA purposes and how they utilize imports. A table comparing the process for allocating MIC for imported RA resources to the present proposal can be found in Appendix Section 7. As the reader will note, the first step in the table describes the determination of the MW amounts of deliverable DG. In the context of this proposal this determination is conducted during the study process described in Section 6.3, so that the allocation process for the present proposal actually begins with step five in the table. The pertinent steps in the allocation process are described immediately below in Section 6.4.1.

6.4.1. Sequence of the allocation process

The sequential steps in the allocation process are as follows:

Determine each LRA's share. The ISO will determine (1) each LRA's share of the total system MW of DG deliverability available for allocation, and (2) each LSE's initial or provisional share[23] of nodal MW of available DG deliverability for nodes at which LSEs for more than one LRA serve load. Item (1) for the LRA will be based on the share of system peak load forecast attributable to those LSEs subject to that LRA's jurisdiction, using the load forecast for the upcoming RA compliance year (the same forecast that the ISO uses for the MIC allocation for the same RA year). This quantity will be a share of total system MW of DG deliverability, without reference to any particular nodes or locations. The ISO will determine item (2) for each relevant node and each affected LRA based on that node's share of the system peak load forecast, multiplied by the share of the nodal load attributable to the LSEs subject to each LRA's jurisdiction. The ISO will perform this step in March of each year.

Notify each LRA of its shares. By the end of March, the ISO will notify each LRA of the results of the previous step.

Transfer of shares. The proposed process allows an LRA to transfer a portion of its system-wide MW share or its nodal MW to another LRA. Both LRAs participating in a transfer will notify the ISO of the transfer. The ISO proposes to allow such transfers for each current cycle of this process at any time up to the third and final round of LRA nominations, as described further below.

[23] Nodal shares for these nodes are considered provisional at this point because they may need to be adjusted in a later step of the process, as described further below.

<u>LRAs submit nominations.</u> Each LRA will submit nominations or requests to the ISO to assign portions of its share of the total system MW of DG deliverability to specific network nodes. The proposed process allows for three rounds of nominations. In any given round, each LRA's total nominations cannot exceed its share of the total system MW of DG deliverability, and its nodal nomination at any node where LSEs subject to more than one LRA serve load cannot exceed its nodal share of the DG deliverability. The first round of nominations will be due to the ISO by the end of April, and in this round the LRA may only specify nodes at which its jurisdiction LSEs serve load. (Nominations at nodes at which an LRA has no load, as well as at load-free nodes, are allowed in the second nomination round, discussed later.) Following the submission of nominations, the ISO will validate that all nominations comply with the limitations just described, and will notify the submitting LRA of any invalid nominations and allow a reasonable opportunity for the LRA to make adjustments and resubmit.

<u>ISO allocates DG deliverability based on LRA nominations.</u> Except for nodes where the LSEs of more than one LRA serve load, the ISO will approve all first round nominations that comply with the validation rules above. For nodes where the LSEs of more than one LRA serve load, some additional considerations are required to ensure that small LRAs whose LSEs serve load at only one or two ISO network nodes are not unduly disadvantaged in their ability to utilize their full system-wide shares of DG deliverability. Although the initial provisional nodal load shares described above will be good starting points for first round LRA nominations, simply enforcing those shares may be insufficient and in some instances may actually prevent a small LRA from realizing its full system-wide share. The most obvious case is where an LRA has load at only one node, and its load-ratio share at that node provides fewer MW of DG deliverability than its system-wide share. This would occur when the ISO study indicates very limited capacity to support DG deliverability at that node. For an LRA that has a reasonably large number of nodes at which it serves load, being unable to utilize some of those nodes may have little or no adverse impact. But for an LRA that has load at only one node and wants to develop DG at its load location, providing it only its nodal load-ratio share will be insufficient.

An example will be useful to illustrate the problem and explain the ISO's proposed approach to address it. Consider the following scenario. Suppose there is a node N with 40 MW of DG deliverability, at which two LSEs subject to two different LRAs serve load. Assume that LSE #1 is a small publicly owned utility whose entire load is located at node N, whereas LSE #2 is a CPUC-jurisdictional investor owned utility with a substantial retail service territory consisting of dozens of nodes or more. Suppose for a given annual cycle that the total system MW of DG deliverability is 3,000 MW. Suppose that LSE #1 has a load ratio share of the total system MW of 2 percent or 60 MW and that LSE #2 has a load ratio share of 25 percent or 750 MW. Suppose that each of these two LSEs has a 50 percent share of the load at Node N. Applying each LRA's node N load-ratio share would result in LSE #1 obtaining only 20 MW of DG deliverability, which is 40 MW less than its 60 MW load-ratio share of the total system MW of DG deliverability. In such instances the ISO believes that the simple nodal load-share approach should be modified to help ensure that each LSE is able to obtain its load ratio share of total system MW of DG deliverability and to be able to locate its DG where its load is located. The ISO believes this is consistent with the concern the ISO identified in the previous proposal – i.e., the need to prevent a situation where a simple nodal load ratio share rule might impede the ability of an LRA for a smaller LSE to procure deliverable DG close to its load.

To address the above type of situation, the ISO proposes that the following formula be applied at nodes where LSEs under multiple LRAs have load, and where the geographic distribution of an affected LSE's retail load territory combined with the simple nodal load-ratio share rule would limit its ability to utilize its system-wide share of available DG deliverability. In such a case the nodal DG deliverability available to the small LSE would be determined by the following formula (the abbreviation DGD stands for DG deliverability):

> Max{(nodal load share * nodal DGD available), Min[(nodal DGD available),(system load share * system DGD available)]}

Applying this modified approach to LSE #1 (the small publicly owned utility) in this same example would have the following result:

> Max{(50% * 40 MW),Min[(40 MW),(2%*3000 MW)]} = Max{(20 MW),Min[(40 MW),(60 MW)]} = 40 MW

With this approach, LSE #1 gains an additional 20 MW of DG deliverability at node N while LSE #2 obtains 20 MW less (as compared to the simple nodal load-ratio share approach). The ISO believes that this modified approach is justified for use at nodes where LSEs under multiple LRAs have load because, as in this example, the small publicly owned utility may have few nodes, or even just a single node, at which it has load to try and obtain its share of the total system MW of DG deliverability, whereas the large investor owned utility will have many nodes available at which to obtain its share of the total system MW share of DG deliverability.

One point to understand regarding the above allocation rule is that the need to use it can be minimized by formulating the DG representation in the TPP base resource portfolio to adequately reflect the DG resources and procurement plans of the small LRAs. The need to apply the above rule could arise either because (1) the DG resources and procurement plans of small LRAs were under-represented in the TPP base portfolio, which led to small MW DG quantities being available at key small LRA nodes; or (2) their DG plans were represented adequately, but the study revealed that the grid could not support deliverability for the portfolio quantities at the small LRA nodes. The ISO believes that at least factor (1) can be eliminated by proper modeling of small LRA DG, and as noted in section 6.2.1 the ISO is pursuing this.

<u>Notify LRAs of outcomes of first round nominations. .</u> The ISO, by the end of May, will notify LRAs of the outcome of their first round nominations (i.e., those approved, adjusted or denied), and will post any remaining nodal DG deliverability that has not been assigned.

<u>LRAs submit second round nominations.</u> LRAs may submit second round nominations to the ISO to the extent that they have not yet received their full shares of the total system MW of DG deliverability. These will be due to the ISO by mid-June. In the example above, even with the modified allocation rule LSE #1 is still 20 MW short of obtaining its load share of the total system MW of DG deliverability, and LSE #2 may be short if it had requested its provisional amount of

DG deliverability at node N and was denied. This step in the allocation process would provide LRAs the opportunity to submit a second round nomination. The ISO proposes that in this second round the LRAs would be allowed to submit nominations at nodes where their LSEs have no load and even at load-free nodes. As it does with the first round submissions, the ISO will validate the second round submissions to ensure that each LRA's nominations plus its first round allocations do not exceed its system-wide MW share. Any amounts allocated in the second round would count towards each LRA's share of the total system MW of DG deliverability. If multiple LRAs nominate DG deliverability at the same load-free node and the total of these nominations exceeds the MW amount of available DG deliverability at the node, then each LRA will get an amount proportional to its share of total system MW of DG deliverability.

Notify LRAs of outcome of second round nominations. The ISO, by the end of June, will notify LRAs of the outcome of their second round nominations and will post any remaining nodal DG deliverability that has not been assigned.

LRAs submit third round nominations. If any nodal DG deliverability remains unassigned after the previous step, then the ISO will provide one last opportunity for LRAs to submit nominations if they have not yet met their full system-wide allocation amounts. Any transfers of allocated shares between LRAs must be completed and reported to the ISO by the deadline for these submissions in order to be considered in the current cycle. These nominations and any transfer reports will be due to the ISO by mid-July. The ISO will notify LRAs of the outcome by the end of July.

The following table provides a brief summary of the steps described above and the tentative timeframe in which they may occur.

Sequential steps in the allocation process	**Tentative timeframe**
ISO will determine LRA shares of the total system MW of DG deliverability determined as well as nodal LRA shares at nodes where LSEs of more than one LRA serve load.	March
ISO will notify each LRA of its available shares of DG deliverability.	End of March
LRAs will notify the ISO of any transfers of deliverability made to other LRAs. LRAs may engage in and report such transfers to the ISO up to the deadline for submitting third round nominations.	By mid-July

Sequential steps in the allocation process	Tentative timeframe
Each LRA will submit first round nominations to the ISO for allocation of nodal quantities of DG deliverability, up to its system-wide share and subject to any applicable nodal limits.	Nominations due by end of April
ISO will notify LRAs of the outcome of their first round nominations (i.e., those approved, adjusted or denied), and posts any remaining nodal DG deliverability that has not yet been allocated.	By end of May
LRAs may submit second round nominations to the ISO if they have not yet been allocated their full share of the total system MW of DG deliverability.	Nominations due by mid-June
ISO notifies LRAs of the outcome of their second round nominations and will post any remaining nodal DG deliverability that has not been allocated.	By end of June
If any nodal DG deliverability remains unallocated, the ISO will provide a third nomination round as one last opportunity in the current cycle for LRAs to submit nominations to be allocated any remaining amounts of their shares.	Nominations due by mid-July ISO will notify LRAs of outcome by end of July

6.4.2. DG deliverability as an attribute of a DG resource

Before the start of the next ISO DG deliverability study for the next annual cycle (i.e., by approximately October 15 of the year for the current allocation cycle), LRAs will report to the ISO on the assignment or attribution of deliverability by their LSEs to specific DG projects. Once such assignment is done and reported to the ISO, the RA deliverability status for the assigned MW amount becomes an attribute of the DG project[24] and is not transferable by the LRA or LSE

24 An allocation to a DG resource does not allow that DG resource to avoid milestones, security deposits, and other requirements needed to maintain good standing in either Rule 21 or WDAT.

to another DG project. This would mean, for example, that when a DG resource's contract with a particular LSE expires, the DG resource will be eligible to provide RA capacity to another LSE. This is consistent with how RA deliverability status is treated today for ISO grid-connected resources.

The ISO will look to the responsible LRA to ensure that each DG project that was assigned deliverability is making satisfactory progress toward commercial operation and that the DG project continues to meet LRA-specified retention criteria in order to retain the RA deliverability status. In the event that a DG project fails to meet the LRA-specified retention criteria, the ISO will allow the LRA to revoke the project's deliverability status and assign it to another DG project, as long as the new project is connected to distribution circuits below the same ISO grid node and utilizes no more deliverability MW than the original project. The LRA must report any such revocations and reassignments to the ISO.

6.4.3. Unused or unassigned DG deliverability

The ISO will preserve the allocated deliverability at each node in subsequent GIP studies, even if the amount of deliverability allocated at any given node was not fully assigned by LRAs to specific DG projects. This is a change from the ISO's previous proposal, which stated that DG deliverability must be assigned to specific DG projects within the same cycle, or else the associated transmission capacity would be made available to other resources in the subsequent GIP studies (i.e., the "use it or lose it" provision). Many stakeholders expressed concern that the previous proposal provided insufficient time for LSEs to make procurement decisions within a single DG deliverability allocation cycle that fully utilize their allocations. The ISO now proposes that if any portion of the deliverable MW allocated to LRAs in a given year goes unassigned by those LRAs to specific projects in that year, the ISO will preserve the allocated deliverability in subsequent studies for use by the same LRAs in subsequent cycles of this process.

At the same time, the ISO does not believe such unassigned DG deliverability should be preserved or protected indefinitely. In particular, it may turn out that specific locations that were thought at one time to be favorable for DG development ultimately attract much less commercial interest than expected. In such cases it would be inefficient to protect unassigned deliverability in these areas indefinitely. The ISO believes that the place to address such situations is in the TPP portfolio development process. If allocated DG deliverability goes unassigned for two or more cycles, then the ISO would consult with the LRAs to consider modifying the DG component of the TPP base portfolio to reduce the amounts of DG in such areas. This would enable the TPP base portfolio to be adjusted in subsequent years if the actual pattern of DG development departs from what was expected in previous DG deliverability cycles. Of course, any such adjustments to the TPP base portfolio would not adversely affect any DG resources to which deliverability had already been assigned.

6.4.4. Relationship of the present proposal to the annual Section 8.2 full capacity deliverability option

Both the DG deliverability process and the ISO's annual full capacity option for energy only resources (Section 8.2 of ISO tariff appendix Y) are intended to provide available deliverability to generation projects without additional network upgrades. The relative priority between the two processes is a result of the timing of the studies. In a given year, the annual Section 8.2 option study completes around the same time as the GIP Phase 2 study and before the DG deliverability study. Deliverability assigned to projects under Section 8.2 is preserved in the DG deliverability study. Awarded DG deliverability is then preserved in the next cycle of GIP Phase 2 study and annual Section 8.2 study.

7. Appendix A – Comparison of RA Import Capacity (MIC) Allocation versus Proposed DG Deliverability Allocation

The following table shows how the MIC allocation methodology compares to the process for allocating DG deliverability to LRAs.[25] One fundamental difference is that the ISO allocates MIC directly to LSEs, but proposes to allocate DG deliverability to LRAs who will in turn manage the allocation to the LSEs whose procurement they oversee.

Comparison of RA Import Capacity Allocation v. Proposed DG Deliverability Allocation		
Step	**Existing RA Import Allocation Process (Tariff section 40.4.6.2)**	**Proposed DG Deliverability Allocation Process**
Step 1	Determine Maximum Import Capability (MIC)	The ISO will determine the MW amounts of deliverable DG at each network node and post those values on the ISO website. This is described in Section 6.3.
Step 2	Available Import Capability: Total Import Capability to be shared after removing ETC transmission capacity	N/A
Step 3	Existing Contract Import Capability (ETC inside loads)	N/A
Step 4	Total Pre-RA Import Commitments & ETC. Remaining Import Capability is determined in Step 4	N/A
Step 5	Allocate remaining Import Capability by Load Share Ratio	The ISO will determine LRA shares of the total system MW of DG deliverability determined in Step 1 above, as well as nodal LRA shares at nodes where LSEs of more than one LRA serve load.
Step 6	ISO posts assigned and unassigned capability per Steps 1-5	N/A
Step 7	ISO notifies scheduling coordinators (SC) of LSE assignments	ISO will notify each LRA of its available shares of DG deliverability.
Step 8	Transfer [trading] of import capability among LSEs or market participants.	LRAs will notify the ISO of any transfers of deliverability made to other LRAs. LRAs may engage in and report such transfers to the ISO up to the deadline for submitting third round nominations in step 13, below.
Step 9	Initial SC request to ISO to assign remaining import capability by intertie.	Each LRA will submit first round nominations to the ISO for allocation of nodal quantities of DG deliverability, up to its system-wide share

25 In applying the MIC approach to DG deliverability, steps 2-4 and step 6 of the 13-step process are not applicable. These steps are required for the MIC allocation to account for existing transmission contract capacity and pre-RA energy import commitments, which are not relevant here.

Comparison of RA Import Capacity Allocation v. Proposed DG Deliverability Allocation		
		and subject to any applicable nodal limits.
Step 10	ISO notifies SCs of LSE assignments & posts unassigned available import capability	ISO will notify LRAs of the outcome of their first round nominations (i.e., those approved, adjusted or denied), and posts any remaining nodal DG deliverability that has not yet been allocated.
Step 11	Secondary SC request to ISO to assign remaining import capability by intertie.	LRAs may submit second round nominations to the ISO if they have not yet been allocated their full share of the total system MW of DG deliverability.
Step 12	ISO notifies SCs of LSE assignments & posts unassigned available import capability	ISO notifies LRAs of the outcome of their second round nominations and will post any remaining nodal DG deliverability that has not been allocated.
Step 13	SCs may submit requests for balance of year unassigned available import capability	If any nodal DG deliverability remains unallocated after Step 12, the ISO will provide a third nomination round as one last opportunity in the current cycle for LRAs to submit nominations to be allocated any remaining amounts of their shares.

8. Appendix B – Example illustrating that deliverability of a DG resource is not determined by the flow direction at the transmission-distribution interface

The following is an example extracted from an actual deliverability study, but with the names and other identifying information changed or removed to maintain confidentiality.

The following notations are used in the example:

Bus A, B, E, L, V, W: 230 kV bus of the substation that serves load from the 66 kV distribution system. The 230kV buses are part of the transmission system. The 230/66 kV transformer banks and the 66kV buses belong to the distribution system.

Line L-A, A-B, B-E, B-V, B-W, W-V: 230 kV transmission lines that are part of the transmission system.

Generator with ID “E”: Existing generator at Bus A and W

Generators with ID “D”: DG resources on the distribution systems, represented at Bus A, B and V for illustration purpose.

Before the DG resources are added to Bus A, B and V, all the existing generators are deliverable. Figure 1 shows the worse potential deliverability constraint. Under the single outage of Line B-E, Line A-L is loaded to just below 100% of the emergency rating.

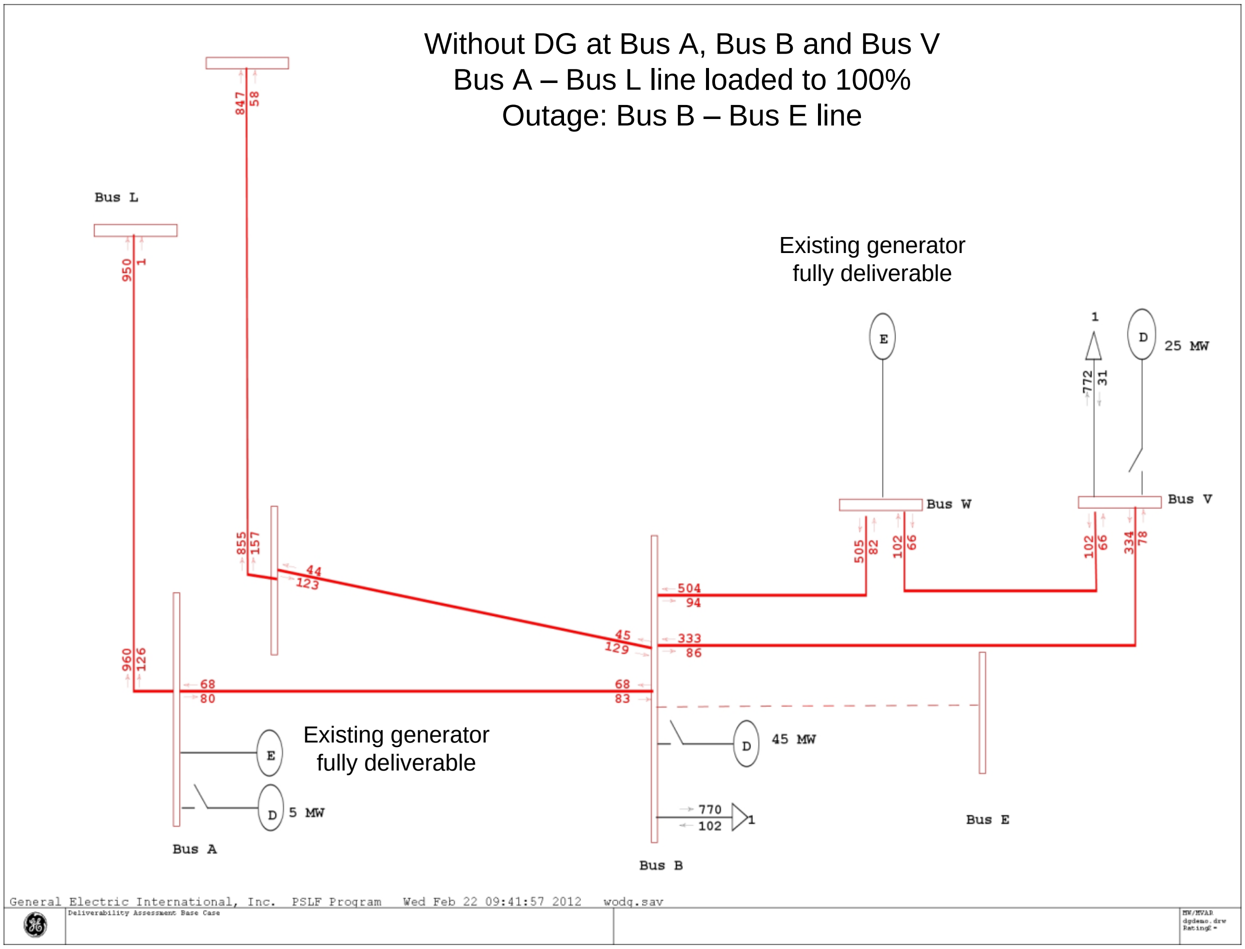

Figure 1: Existing generators deliverable before adding DG

Then the following DG resources are added to Bus A, B and V. The table below shows the load and maximum DG output at each bus.

Bus	DG Pmax (MW)	Load (MW)
A	5	0
B	45	770
V	25	772

The DG resources added are only a small fraction of the load served from Bus B and V. To balance load and generation, generation in the CAISO Controlled Grid are scaled down by about 75 MW. All other conditions remain exactly the same as the previous scenario without DG. Due to less flow into the distribution feeders at B and V, Line A-L is overloaded under the single outage of Line B-E. Figure 2 shows the overload.

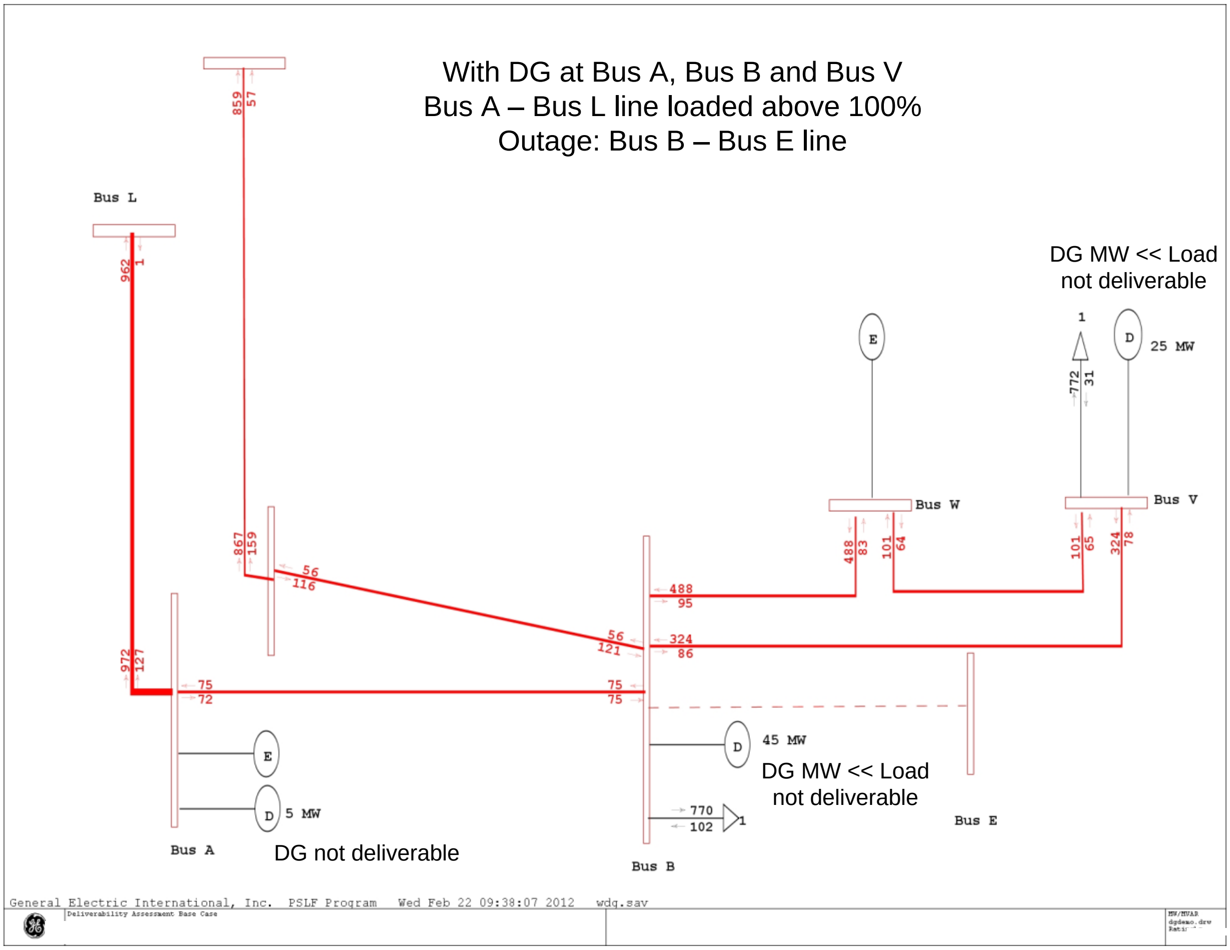

Figure 2: DG resources not fully deliverable

The deliverability of a DG resource is not determined by the flow direction at the transmission/distribution interface. Rather it depends on its contribution to the delivery constraints as defined by the flow shift factor in the deliverability assessment methodology.

If the DG resources were deemed deliverable in the example, the existing generators at Bus A and Bus W would be subject to total NQC reduction ranging from 25 MW to 95 MW.