Resource Adequacy Deliverability for Distributed Generation

2013 Study Results Report

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1 Introduction

On September 18, 2012 the ISO filed its proposed tariff amendment to implement a streamlined process for providing resource adequacy deliverability status to distributed generation ("DG") resources[1] from transmission capacity identified in the ISO's annual transmission plan. One part of this proposed process involves the ISO annually performing a DG Deliverability study to determine MW amounts of Potential DG Deliverability ("Potential DGD") that can be used to assign deliverability status to DG resources connected below various network nodes on the ISO grid, without requiring additional network upgrades and without adversely affecting the deliverability status of existing generation or proposed generation in the interconnection queue. The proposal anticipated that the ISO would begin the first annual DG Deliverability in December 2012 and complete it in the first quarter of 2013. The proposal also specified that the ISO would publish the DG Deliverability study results, specifically the nodal amounts of Potential DGD, following completion of the study.

On November 16 FERC issued its order on the DG Deliverability proposal. The November 16 order did not modify the design of the annual DG Deliverability study that the ISO would perform to determine nodal amounts of Potential DGD. As a result, the ISO began the annual DG Deliverability study in December, completed it in March, and is publishing the results in this paper.

Section 2 of this paper provides a high level summary of the study results by participating transmission owner (PTO) service territory. The study methodology used by the ISO in conducting the annual DG Deliverability study is described in section 3. Section 4 provides information intended to help make the detailed results easier to understand.

[1] For purposes of this study, DG resources are generation resources connected to utility distribution systems. The ISO recognizes that, in some contexts, some parties use the term "distributed generation" to mean resources of certain technology types or below certain size thresholds, and may even include such categories of resources when they are connected to the transmission system. For purposes of this study, however, the term "distributed generation" encompasses all generation resources connected to utility distribution systems, without regard to size or resource type, and only such resources.

The detailed results are contained in worksheets attached to this report. For each PTO service territory, two worksheets could be produced. One is a "Potential DGD worksheet" which includes those nodes at which Potential DGD is available for assignment of deliverability status to DG resources connected below those nodes. The second possible worksheet is a "No Potential DGD worksheet" which lists those nodes at which no Potential DGD is available for assignment due to deliverability constraints. For the SCE and PG&E service territories, both worksheets were produced. For the SDG&E service territory only the "No Potential DGD worksheet" was produced.

2 Study results summary

The annual DG Deliverability study completed in 2013 determined that a total of 1,196.59 megawatts of Potential DGD is available at nodes on the ISO grid for assignment of deliverability status to DG resources connected below those nodes. The available Potential DGD is entirely in the SCE and PG&E service territories; none is available in the SDG&E territory. The total Potential DGD for each PTO service territory is summarized in the following table. Of these total quantities, some amounts of Potential DGD at specific nodes will be available to municipal utility distribution companies (UDC) for assignment of deliverability status to DG resources on their distribution systems.

PTO service territory	Total MW of Potential DGD
SCE	744.60
SDG&E	0.00
PG&E	451.99
Total	1,196.59

The detailed nodal amounts of Potential DGD within each PTO service territory are provided in worksheets attached to this report. The following provides a summary of the results for each PTO service territory.

2.1 SCE service territory

There were 57 nodes studied for Potential DGD in the SCE service territory.[2] The study determined that a total of 744.60 megawatts of Potential DGD is available at 23 of the 57 nodes. There is none available at the remaining 34 nodes, either because there was no DG designated at these nodes in the base portfolio used in the 2012-2013 Transmission Planning Process (12 nodes) or because of deliverability constraints (22 nodes).

In the SCE service territory, there are three ISO grid nodes where both SCE and municipal utility load is served off of their respective distribution systems.[3] These three nodes are VISTA (SCE, Riverside and Colton) with 81.0 MW of Potential DGD, MIRA LOMA (SCE and Corona) with 5.99 MW of Potential DGD, and LAGUBELL (SCE and Vernon) with 4.46 MW of Potential DGD. At such nodes, both SCE and the municipal utility could assign deliverability status to DG resources interconnected to their respective distribution systems. There is one additional ISO grid node—LEWIS—where only municipal load is served (Anaheim) with 19.0 MW of Potential DGD.

Lastly, it is worth noting that there are several nodes at which the Potential DGD (i.e., the amount in Column C of the accompanying worksheets that is available for assigning deliverability status to DG resources) is substantially less than the amounts that the ISO modeled (Column G) and found deliverable (Column H). Example nodes include VICTOR, ANTELOPE, MIRA LOMA, and LAGUBELL, among others. At such nodes, the amount of DG designated in the Transmission Planning Process base portfolio establishes the cap on the amount that can be utilized for assigning deliverability status to DG resources in accordance with the FERC-approved tariff provisions, even though this amount is less than the amount studied and found deliverable in the study. The ISO is providing this information to give developers, load-serving entities, regulatory authorities, and other stakeholders with additional information on the potential for developing additional deliverable DG resources. This information may also be useful in the consideration of revised DG target amounts in future Transmission Planning Process renewable portfolios.

2.2 SDG&E service territory

There were 73 nodes studied for Potential DGD in the SDG&E service territory (see footnote 2). There is no Potential DGD available at any of these nodes. This is because every node in SDG&E contributes to the Path 43 (North of SONGS) deliverability constraint that has been identified in generation interconnection studies. In accordance with the ISO's June 8, 2012 technical bulletin[4],

[2] These are the nodes at which DG is designated in any of the resource portfolios used in the ISO's 2012-2013 Transmission Planning Process. This is a subset of the total nodes represented in the power flow model in the SCE service territory. This same situation also applies in the case of PG&E and SDG&E.
[3] The load represented is based on the CEC's 2013 coincident peak demand forecast.
[4] The Revised Technical Bulletin: Deliverability Requirements for Queue Clusters 1-4 and Determination of Net Qualifying Capacity can be found at the following link: http://www.caiso.com/Documents/RevisedTechnicalBulletin-DeliverabilityRequirements-QueueClusters1-4_Determination-NetQualifyingCapacity.pdf.

upgrades to relieve the constraint have been removed from Queue Cluster 1&2 Phase II studies and Queue Cluster 3&4 Phase II studies and therefore, pursuant to the FERC-approved methodology for the DG Deliverability study, the available Potential DGD at nodes that impact that constraint is zero.

2.3 PG&E service territory

There were 497 nodes studied for Potential DGD in the PG&E service territory (see footnote 2). A total of 451.99 megawatts of Potential DGD is available for assignment of deliverability status to DG resources at 68 of the 497 nodes. There is none available at the remaining 429 nodes, either because there was none designated at these nodes in the base portfolio (146 nodes) or because of deliverability constraints (283 nodes).

In the PG&E service territory, there are 13 ISO grid nodes where only municipal utility load is served. These 13 nodes consist of PLO ALTO (Northern California Power Agency is the UDC) with 24.30 MW of Potential DGD and 12 others where Silicon Valley Power load is served (Homestea, Kenneth, KRS, LAF T2, Mission, Northwes, Palm, DVRPP 1M, Serra, Uranium, Walsh, and Zeno) and where Potential DGD is available for assignment (0.77, 0.28, 1.12, 2.17, 2.10, 1.82, 0.56, 1.82, 1.12, 2.24, 2.24 and 0.70, respectively). There were no ISO grid nodes with identified Potential DGD at which both PG&E and municipal utility load is served.

There are several nodes at which the available Potential DGD (i.e., the amount in Column C available for assigning DS to DG resources) is less than the amounts that the ISO modeled (Column G) and found deliverable (Column H). However, the magnitude of the difference at some of these nodes in the PG&E service is not as significant as some of these instances in the SCE service territory. Example nodes include LAKEVIEW, DUMBARTN, GRANT, JARVIS, among others. At such nodes, the amount of DG designated in the Transmission Planning Process base portfolio establishes the cap on the amount that can be utilized for assigning deliverability status to DG resources in accordance with the FERC-approved tariff provisions, even though this amount is less than the amount studied and found deliverable in the study. The ISO is providing this information to give developers, load-serving entities, regulatory authorities, and other stakeholders with additional information on the potential for developing additional deliverable DG resources. This information may also be useful in the consideration of revised DG target amounts in future Transmission Planning Process renewable portfolios.

3 Study methodology

This section steps through the study methodology used by the ISO in conducting the annual DG Deliverability study. At the end of this section a flowchart is provided illustrating the steps described here. Throughout this description references are made to columns of the detailed worksheets attached to this report. A further explanation of the column headings in these worksheets is provided in section 4.

The study results are organized into either one or two worksheets for each PTO service territory depending on whether non-zero amounts of Potential DGD is available for assignment or whether it is known that certain nodes contribute to deliverability constraints. If Potential DGD is available for assignment at one or more nodes in a PTO service territory, a "Potential DGD worksheet" is produced identifying the nodes with non-zero amounts. If DG at a node contributes to deliverability constraints that require upgrades in generation interconnection studies or for which upgrades have been removed in Queue Cluster 1 (QC1) through Queue Cluster 4 (QC4) Phase II studies (for example, see earlier discussion in section 2.2 and footnote 4), then there is no Potential DGD at the node and this result is reported in a "No Potential DGD worksheet" for that PTO service territory. Thus, for the SCE and PG&E service territories, both the "Potential DGD worksheet" and "No Potential DGD worksheet" were produced. For the SDG&E service territory only the "No Potential DGD worksheet" was produced. These five worksheets are attached to this report.

In conducting the annual DG Deliverability study, the ISO models the existing transmission system and new additions and upgrades that have been approved in prior Transmission Planning Process ("TPP") cycles, plus existing generation and certain new generation in the ISO queue and associated upgrades[5]. For each network node (Columns A and B) the ISO then determines the target DG quantities. The target DG quantity at a node is specified in the 2012/2013 ISO Transmission Planning Process renewable base portfolio (Column C). However, this target DG quantity is set to zero if the node contributes to the deliverability constraints that require network upgrades in the generation interconnection studies or for which the network upgrades have been identified and then removed in the QC1 to QC4 Phase II interconnection studies. Such nodes are listed in the "No Potential DGD worksheet" for each PTO service territory with Potential DGD (Column L) set to zero and information on the deliverability constraint provided (Column P).

The remainder of this discussion pertains only to those nodes for which the DG modeled does not contribute to deliverability constraints that require network upgrades in the generation interconnection studies or for which the network upgrades have been identified and then removed in the QC1 to QC4 Phase II interconnection studies.

For the remaining nodes, the ISO starts with the greater of the base portfolio DG amount (Column C) and the WDAT/Rule 21 non-NEM amount (Column D) and adds the amount of existing non-NEM DG (Column E). At its discretion, the ISO then increases the DG amounts to the highest level among all of the renewable portfolios, which becomes the DG modeled (Column G)[6]. It is on the resulting

[5] The network upgrades associated with the new generator projects in the queue are modeled if the upgrade is under construction or has received regulatory approval.

[6] Consistent with the ISO's proposed tariff amendment, the study may assess deliverability for even larger nodal target quantities, to give developers, load-serving entities, regulatory authorities, and other stakeholders with additional information on the potential for developing additional deliverable DG resources. However, the Potential DGD (i.e., that available for assignment) will not exceed the sum of the DG in the base portfolio (Column C) and the existing energy-

amount at each node then that the ISO performs the deliverability assessment to determine the megawatts of deliverable DG at each of these nodes (Column H). The deliverability of WDAT projects requesting full capacity deliverability status (Column J) and prior commitment (Column K)[7] is preserved.

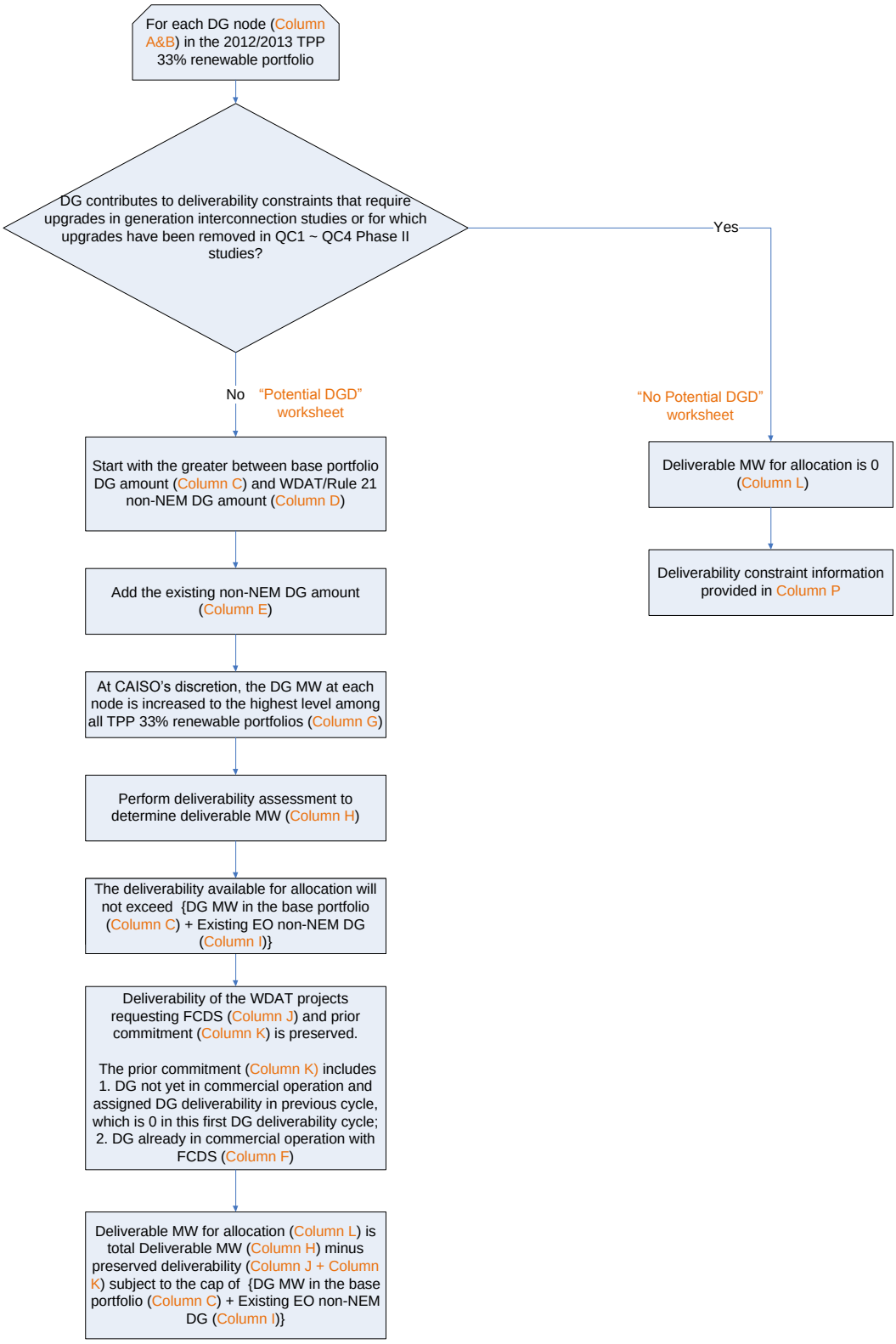
The Potential DGD that results at each node is represented by the values listed in Column L. The Potential DGD (Column L) is calculated as the total deliverable DG (Column H) minus the preserved deliverability (the sum of Columns J and K as previously noted in footnote 3), subject to the cap represented by the sum of the DG in the base portfolio (Column C) and the existing energy-only non-NEM DG (Column I) as previously noted in footnote 4.

A flowchart illustrating the study methodology logic discussed above is provided on the following page.

only non-NEM DG (Column I). This limitation is crucial to ensure that the results are aligned with the Transmission Planning Process.

[7] The prior commitment (Column K) includes: (1) DG not yet in commercial operation and assigned DGD in previous cycle and (2) DG already in commercial operation with full capacity deliverability status.

Study Methodology Flowchart



4 Detailed study results

For each PTO area, two worksheets could be produced. One is a "Potential DGD worksheet" which includes those nodes at which Potential DGD (i.e., non-zero amounts) is available for assignment of deliverability status to DG resources (see Column L). This worksheet may include zero Potential DGD at some nodes because the Transmission Planning Process base portfolio designates zero DG at the node. The second possible worksheet is a "No Potential DGD worksheet" which lists those nodes at which no Potential DGD is available for assignment to DG resources due to deliverability constraints. For the SCE and PG&E service territories, both worksheets were produced. For the SDG&E service territory only the "No Potential DGD worksheet" was produced.

To help the reader understand the results presented in the "Potential DGD worksheet" an explanation of the column headings is provided below in section 4.1. Section 4.2 provides the same information for the "No Potential DGD worksheet." The worksheets for each PTO service territory are attached to this report. There are five worksheets in total.

4.1 "Potential DGD worksheet" column headings

The following is a listing of the column headings used in the "Potential DGD worksheet" along with a brief explanation of each.

A. **DG Node—Substation Name**. Name of the substation representing the DG node.
B. **DG Node—Transmission Level kV**. The transmission level voltage at the transmission/distribution interface.
C. **DG in Base Portfolio**. The megawatts of DG at the node in the ISO Transmission Planning Process renewable base portfolio.
D. **WDAT/Rule 21 non-NEM DG**. The total megawatts of non-NEM DG at the node in the WDAT or Rule 21 queue.
E. **Existing non-NEM DG**. The total megawatts of non-NEM DG at the node already in commercial operation (either with Full Capacity Deliverability Status or with Energy Only Deliverability Status).
F. **Existing FCDS non-NEM DG**. The total megawatts of non-NEM DG at the node already in commercial operation with Full Capacity Deliverability Status.
G. **DG Modeled**. The total megawatts of DG modeled in the DGD study at the node. DG Modeled is greater than or equal to the sum of Column E and the maximum of Columns C and D.
H. **DG Deliverable**. The total megawatts of DG determined to be deliverable at the node.
I. **Existing EO non-NEM DG**. The total megawatts of non-NEM DG already in commercial operation with Energy Only Deliverability Status.

J. **WDAT FC Request (not assigned FCDS in DGD process)**. The total megawatts of non-NEM DG at the node in the WDAT queue that have requested Full Capacity Deliverability Status and not assigned Full Capacity Deliverability Service in previous DGD cycle.
K. **Prior Commitment**. This includes (1) DG not yet in commercial operation and assigned Full Capacity Deliverability Status in previous DGD cycle and (2) DG in commercial operation with Full Capacity Deliverability Status.
L. **Potential DGD**. The total megawatt amount of Potential DGD at the node available for assignment of deliverability status to DG resources. Potential DGD is calculated as the minimum of (Column C + I) and (Column H – J – K).

4.2 "No DGD worksheet" column headings

The following is a listing of the column headings used in the "No DGD worksheet" along with a brief explanation of each.

A. **DG Node—Substation Name**. Name of the substation representing the DG node.
B. **DG Node—Transmission Load**. The transmission level voltage at the transmission/distribution interface.
C. **DG in Base Portfolio**. The megawatts of DG at the node in the ISO transmission planning process renewable base portfolio.
L. **Potential DGD**. The value for all nodes is zero in this worksheet.
P. **Notes**. Additional information provided regarding constraints.