Draft Technical Bulletin

Generation Interconnection Procedures

Revision to Cluster 4, Phase 1 Study Methodology

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Executive Summary

An alternative methodology to the phase 1 analysis of the network upgrades for interconnection queue Cluster 4 will be used to assess an interconnection customer's cost responsibility ceiling and posting requirements for Cluster 4 generation. This alternative methodology was developed out of a concern that the unprecedented volume of generation requests received in Cluster 4 will result in unrealistic results if the current methodology is applied.

This alternative methodology considers studying a more realistic amount of generation in each study area, based on the greater of the generation amounts studied in Cluster 3, phase 1, or the highest amount of generation forecast in any of the CPUC (Long Term Procurement Plan) LTPP renewable generation portfolios. The network upgrade cost results associated with these more realistic generation amounts ($/MW) will then be extrapolated across all the Cluster 4 generation that has applied for interconnection in the study area. Individual generation interconnection facilities (i.e., the upgrades/modifications needed to reliably attach the generation project to the grid) will continue to be studied on a generator-specific basis.

This alternative method is expected to provide more realistic results for phase 1 purposes that anticipate the inevitable withdrawal of a portion of the generation in the clusters; no change in methodology is expected for phase 2 analysis and all generation that continues to advance from Cluster 3 and Cluster 4 phase 1 will be studied together in the Cluster 3 and 4 phase 2 process. The alternative methodology therefore does not impose a limit on the amount of generation that actually proceeds through phase 2, and the network upgrades assessed in phase 2 will be based on the generation projects that elect to continue forward to phase 2.

Background

The purpose of cluster studies is to identify the interconnection facilities and network upgrades that would be necessary to integrate the generation seeking interconnection to the transmission system, to estimate the costs of those upgrades and to establish the maximum cost responsibility of each of the generation projects in the cluster.

The cluster study approach has proved an effective way to manage a large number of simultaneous interconnection requests. The study methodology used to assess network upgrades necessary to support each cluster of generation layers the new cluster of generation upon all existing generation and all previous interconnection requests that remain active, as well as the network upgrades associated with the active previous interconnection requests or approved through the ISO's transmission planning process.

The unprecedented volume of generation in Cluster 4 has raised particular concerns that under the existing approach the resulting transmission plans for network upgrades will not produce realistic and meaningful results for the phase 1 analysis, and that there be little, if any, corresponding relationship between the methods of service set forth in the phase 1 study results and those in the phase 2 study results.. Cluster 4 alone has added 35 GW of renewable generation to bring the total renewable generation in the queue to 68 GW, in a market with a peak load of 50 GW and in which the expected need for new renewable generation is about 20 GW. Stakeholders and others have commented that a comparison of potential supply sources to system historic size and anticipated near term needs compels the conclusion that a substantial number of proposed projects will not be completed.

The ISO has therefore developed an alternative methodology for conducting the individual study components set out in GIP Section 6.4 for phase 1 interconnection studies. The alternative methodology relies on the methodology principles employed previously but includes adaptations to produce more reasonable and useful results while still accommodating the needs of interconnecting parties. The representative MW number for each study area will be incorporated into the phase I study as a study assumption.[1] The ISO will apply this methodology to the phase 1 study process.

With respect to the combined Cluster 3 and Cluster 4 phase 2 interconnection study, any ISO decision regarding the possible employment any methodology other than the current methodology for phase 2 studies would be based on the responses of the cluster 3 and 4 generation developers' to their phase 1 costs (i.e. the number of projects and MW generating capacity that would post the initial financial security posting, thus electing to progress to phase 2). As of the date of this technical bulletin, the ISO does not anticipate that any changes will be made to the phase 2 interconnection study analysis process

This technical bulletin sets out the background and issues that led the ISO to the conclusion that methodology changes are required for phase 1 of Cluster 4, an alternative methodology, and the issues associated with implementation of the alternative. The primary concepts characterizing the alternative are to

(1) limit the amount of new generation to be studied in the Cluster 4 phase 1 study to a more reasonable and realistic quantity in each study area, based on a combination of the resource portfolios developed by the CPUC and anticipated to be adopted by the ISO for the 2011/2012 transmission planning cycle and the Cluster 3 phase 1 results; and

(2) establish phase 1 cost caps for the Cluster 4 generation projects by extrapolating the cost results.

As stated above, no methodology changes are anticipated for phase 2 analysis of Cluster 4. The generation studied in Cluster 4 phase 2 (which will be combined with e Cluster 3 analysis) will be based on all generation projects that elected to move forward through the ISO's interconnection process, and the amount studied in each area will not be limited by the generation amounts assumed in the Cluster 4 phase 1 analysis.

It is important to note that the alternative methodology referenced in this technical bulletin applies only to the Cluster 4 phase I analysis of customer delivery network upgrades ,and NOT to analysis of the PTO's interconnection facilities or reliability network upgrades Interconnection facilities and reliability network upgrades will continue be examined individually

Objectives of the Phase 1 Cluster Study

To be useful and effective, the Phase 1 cluster study efforts should accomplish the following objectives.

1. *Identify transmission facility components*. Provide a realistic initial assessment of the additional network upgrades needed to fulfill the interconnection requests of projects in the cluster that anticipate the inevitable withdrawal of a portion of the generation in the clusters, given the current status of projects earlier in the ISO queue and the network upgrades identified for those earlier projects or approved in the TPP;

[1] In this regard, GIP Section 6.4 provides that "The Phase I Interconnection Study will state for each Group Study or Interconnection Request studied individually (i) *the assumptions upon which it is based,* (ii) the results of the analyses, and (iii) the requirements or potential impediments to providing the requested Interconnection Service to all Interconnection Requests in a Group Study or to the Interconnection Request studied individually." (emphasis added..)

2. *Estimate Costs*. Result in reasonable cost estimates for the identified network upgrades based on anticipation of the inevitable withdrawal of a portion of the generation in the clusters, so as to establish a cost cap for each generation project in the cluster that reflects, with reasonable accuracy, the maximum dollar amount the project sponsor will be required to up-front fund for its share of the needed network upgrades.

As explained below, the GW volume of projects in Cluster 4 makes it unlikely that the current methodology can meet these objectives. The problem is that the GW volume may be so large as to produce results well beyond the realm of plausibility the identification of network upgrades that would be produced for the first objective.

GIP Section 6.4 describes the "bundle" of studies which comprise a phase 1 interconnection study. These consist of

- A short circuit analysis,
- a stability analysis to the extent the CAISO and applicable Participating TO(s) reasonably expect transient or voltage stability concerns,
- a power flow analysis, including off-peak analysis, and
- an On-Peak and Off-Peak Deliverability Assessment(s), as applicable, in accordance with GIP Section 6.5.2.

The GIP does not mandate a specific methodology under which the ISO and applicable Participating TO perform the on-peak and Off-Peak Deliverability Assessments. Rather sections 6.5.2.1 and 6.5.2.2 state that the ISO shall utilize a methodology that it posts to the CAISO Website or include in a BPM. This technical bulletin describes the alternate (i.e. revised) methodology by which the ISO will perform the deliverability assessments for Cluster 4.

Current methodology:

Under the cluster study approach, the ISO first groups the interconnection requests into study areas. The ISO defines the study areas based on geography and network topology.. The defined study areas are intended to group together generation projects that will impact the same transfer paths on the grid and therefore will be responsible for shares of the same network upgrades.

The current cluster study approach next calls for the ISO to do the following for each study area, focusing on one study area at a time:

- **Within the study area:**
- Model all existing generation, generation remaining active from prior serial or cluster processes, and the related transmission from those projects,
- Layer on all of the Cluster 4 generation in that area,
- Model a dispatch of the Cluster 4 generation in the study area as follows:
    - Initially dispatch at 80% of each generator's capacity;
    - Next, increase generation in the study area up to a maximum of 1500 MW additional output by "ramping up" as many as 20 of these Cluster 4 generating facilities. Under the model protocol, those generators identified for adjustment (i.e., ramping up) are the ones with the most significant impact on *the transmission system limitation* being studied.

- **Outside of the study area**
- Next, the generation in other areas outside of the study area are dispatched down to create sufficient demand to balance the generation in the study area to the load/demand in the subject area.
- The network upgrades necessary to meet the requirements of the new generation are then determined and allocated among all of the generation having a *material impact* (i.e., at least a 5% shift factor) on the transfer path the network upgrades are reinforcing.

Application of current methodology to Cluster 4:

While this methodology has generally produced realistic and therefore useful results in cluster studies up through Cluster 2, applying the same methodology for Cluster 3 has raised concerns that unrealistic generation development scenarios resulted, which then dictate unrealistic transmission plans being produced, due to a large number and aggregate GW generating capacity of generators seeking to interconnect in areas where there is general recognition that only a portion of generators will ultimately be sited. Because the current methodology accommodates *the total MW quantity of all generation that has submitted an interconnection request within the queue*, the resulting transmission plan can appear overly unrealistic.

This situation is exacerbated in Cluster 4 analysis, as Cluster 4 includes close to 35 GW of renewable capacity alone (with the peak load in the ISO's entire footprint reaching only 50 GW) and bringing the total amount of renewable generation in the ISO queue to over 68 GW. In contrast, the ISO's footprint requires less than 20 GW of new renewable capacity to reach the 33% RPS goals by 2020.

In reviewing the California Public Utility Commission (CPUC) generation portfolios that the ISO is planning to use in the 2011/2012 transmission planning cycle, it is observed that, in a number of areas, the generation included in Cluster 3 and earlier processes already surpasses the amount of generation expected in those areas under any scenario in the CPUC portfolios. The addition of Cluster 4 generation obviously increases this oversubscription.

Methodology for Cluster 4 Phase 1 Study

In response to the concerns expressed by interested parties with the application of the current methodology to the Cluster 4 phase 1 generation interconnection queue, the ISO has developed an alternative focusing on the following design principles:

- Reasonable and Useful: provide meaningful estimated costs and useful transmission development plans.
- Efficient: make best use of past technical analysis and study efforts.

The results of this methodology, to be employed only in phase 1 analysis, will be used for all purposes the results of the current methodology are used for, including setting the ceiling for network upgrade costs for the generators in cluster 4.

The stages in the revised methodology are:

Step 1 – Assess whether a methodology change is appropriate for each specific study area:

- Assess the maximum amount of generation forecast in each area by 2020 in any of the identified CPUC portfolios (to be referred to as the CPUC study area ceiling).

- For study areas in which the total generation, including Cluster 4 applications, is *less than* the maximum identified in any of the CPUC's generation portfolios, no changes will be made to the methodology (i.e. the current methodology, which incorporates all Cluster 4 MW into the study area, will be utilized).

- For study areas where the Cluster 3 and highest PUC portfolio amounts do not provide a representative price signal for the addition of new generation, then the ISO will apply the current methodology for that study area or otherwise make the necessary adjustment. Examples of these circumstances include:

    - Applying the current methodology may be necessary if there were no material generation in Cluster 3 or the CPUC portfolios, but considerable Cluster 4 applications.
    - Applying an adjustment to the price signal from Cluster 3 may be necessary if the price signal was based on interconnections to one voltage level in the system, but applications in Cluster 4 are seeking interconnections to a lower voltage, necessitating further upgrades.

Step 2 - Determining delivery network upgrades and costs:

- For each study area where Cluster 3 results are already based on *more generation* than was identified in any of the CPUC portfolios for that area, the Cluster 3 delivery network upgrades and costs will be carried forward to the Cluster 4 cost allocation stage.

- For each study area where Cluster 3 results are based on *less generation* than the highest CPUC portfolio area result, delivery network upgrades will be identified and costs will be estimated that would support the ceiling established in the CPUC portfolios. The incremental network upgrades and costs will be added to the upgrades and costs to support Cluster 3 generation, so that the total upgrades and costs will reflect all of Cluster 3 and the portion of Cluster 4 generation necessary to reach the CPUC ceiling for the study area.

Step 3 – Allocation of delivery network upgrade costs to Cluster 4 generation:

- Determine for the study area the $/MW network upgrade cost by dividing the network upgrade costs identified in Step 2 by the incremental generation in that area. The incremental generation is the Cluster 3 generation plus the Cluster 4 generation added to the study area (if any) to reach the CPUC ceiling for that study area.
- Apply the $/MW value to each project in the study area to the capacity of that project, to determine the network upgrade cost responsibility for that project.

Step 4 – Determining interconnection and reliability network upgrades and costs:

- The alternative methodology does not extend to these elements. Accordingly, each generation project will be assessed individually or in a group to develop conceptual interconnection and reliability network upgrades and to estimate their costs.