

## **Reactive Power Deficiency Analysis in Cluster Phase II Study**

A reactive power deficiency analysis will be performed in the cluster Phase II study to determine:

- Whether the asynchronous facilities proposed by the interconnection projects are required to provide 0.95 leading/lagging power factor at the Point of Interconnection (POI)

The analysis will be done in two steps.

First, the study will be conducted assuming unity power factor at the Point of Interconnection for the asynchronous facilities of the new interconnection projects in the cluster being studied. Four base cases are developed:

- Case 1: Peak pre-cluster base case
- Case 2: Peak post-cluster base case with the unity power factor modeled for the cluster projects being studied
- Case 3: Off-peak pre-cluster base case
- Case 4: Off-peak post-cluster base case with the unity power factor modeled for the cluster projects being studied

CAISO Category “B” and “C” contingencies will be analyzed. The study results will determine

- Whether the addition of cluster projects causes normal condition voltages out of the allowable normal min/max range.
- Whether the addition of cluster projects causes post-contingency voltages out of the allowable post-transient min/max range.
- Whether the addition of cluster projects causes excessive voltage deviation from the pre-contingency level.

Critical contingencies that result in excessive voltage deviation will be further analyzed using the post-transient power flow. In particular, a Q-V analysis will be performed to determine the post-transient voltage stability. If significant amount of power transfer occurs, the pre-contingency power transfer can be increased by 5% for Category B and 2.5% for Category C contingencies. The post transient voltage stability analysis will determine

- Whether the system has sufficient reactive margin according to the planning standards

If the study does not identify any reactive power deficiency, the study is complete for the study group. The asynchronous generators in the study group are not required to provide 0.95 leading/lagging power factor at POI.

If the study results indicate reactive power deficiency, the second step of the study will be performed with the modified reactive power capability assumptions:

- All asynchronous-machine generation projects in the cluster are modeled to provide 0.95 leading/lagging power factors at the Point of Interconnection (POI) to CAISO Controlled Grid.

The same contingency analysis and post-transient voltage stability analysis are conducted in the second step. The study results should demonstrate that the reactive power deficiency problems are fully or partially mitigated by the asynchronous generators providing reactive power capability.