

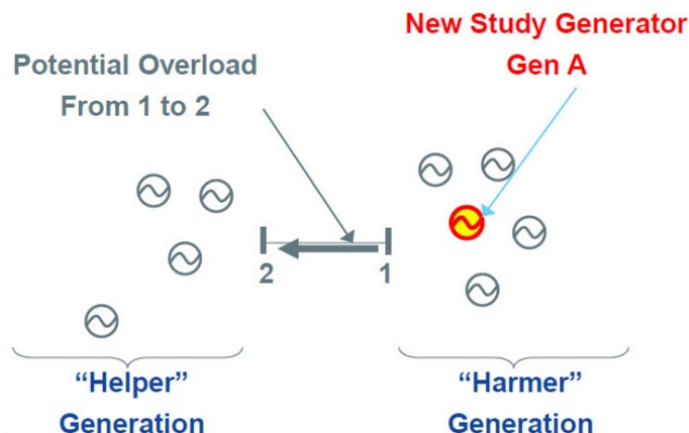
Capacity Capability Interconnection Standard (CCIS) Study Methodology

The CCIS analysis is performed by following the steps described below, in accordance with Section 3 of PP5-6. It relies on linear power flow (DC) solutions to efficiently process several system stress conditions, where final results are verified through AC power flow solutions. This summary applies to the CCIS analysis performed for Cluster Studies, and specifically for the Transitional Cluster Study (TCS), but is fundamentally the same methodology used in past deliverability analyses to support Forward Capacity Auctions.

Step 1 – Initial Stress – Starting with the initial base case, developed consistent with Section 2.3 of Schedules 22 and 23, system stress cases are developed by stressing flows across key interfaces (North-South, West-East, NY-NE, etc.). Each stress case is N-1 secured.

Step 2 – Flowgate Screen – Using the secured case(s) and ancillary files, monitored elements and contingency pairs (flowgates) are identified, which have the potential to reach significant loading under stressed conditions. This flowgate screening process is achieved in the form of a transfer analysis. For each flowgate, the screening sorts all generators, including the TCS projects, from highest to lowest DFAX on the flowgate with respect to the New England system load. Generators with a positive DFAX value are referred to as “harmers,” meaning those for which increasing output increases loading on the monitored element for the given contingency. Generators with a negative DFAX are referred to as “helpers,” meaning those for which increasing output reduces flow on the monitored element for the given contingency. A transfer is performed from the worst harmers to the best helpers until the flowgate reaches specified screening thresholds (e.g., a loading of 80% of its applicable rating). This list of flowgates is saved to a flowgate file for use in the subsequent steps.

Figure 1 - Harmers and Helpers Illustration



Step 3 – Reference Dispatch – The next step in the analysis is performed by stressing flowgates for which the TCS Project(s) under study is a (are) significant harmer(s). To determine the applicable stress flowgates, the TCS Project(s) under study must either have a DFAX of at least 3% with respect to New England system load or an impact of at least 3% on the flowgate as a percent of its applicable rating. A pre-project dispatch (also referred to as the reference dispatch) is created by completing a transfer from harmer generation¹ with a DFAX of 3% or greater to generators with a DFAX less than 3% on the stress flowgate with respect to New England system load. Each harmer is dispatched (even if initially offline) up to its full output,² one at a time, in descending DFAX order (highest to lowest). The set of generators with DFAX less than 3% are turned down proportionally based on their output before the dispatch. The pre-project dispatch stops when one of the flowgates, for which the TCS Project(s) under study is a (are) significant harmer(s) is binding (*i.e.*, reaches 100% of its applicable rating), or when a voltage/stability-limited interface is binding, or when there are no additional harmers with DFAX 3% or greater available to dispatch. A subset of flowgates (monitored flowgates), for which the TCS project(s) under study is a (are) significant harmer(s) that have a potential for being overloaded are identified at this time. A TCS Project is considered a “TCS Project under study” if:

- with respect to the stress flowgate, it has a DFAX greater than or equal to 3% with respect to the New England system load; and
- with respect to the monitored flowgates, it would meet the criteria to be considered impactful for the applicable Load Zone (*i.e.*, it meets the 3% Load Zone DFAX criteria as listed in Section 3.1.1 of PP5-6).

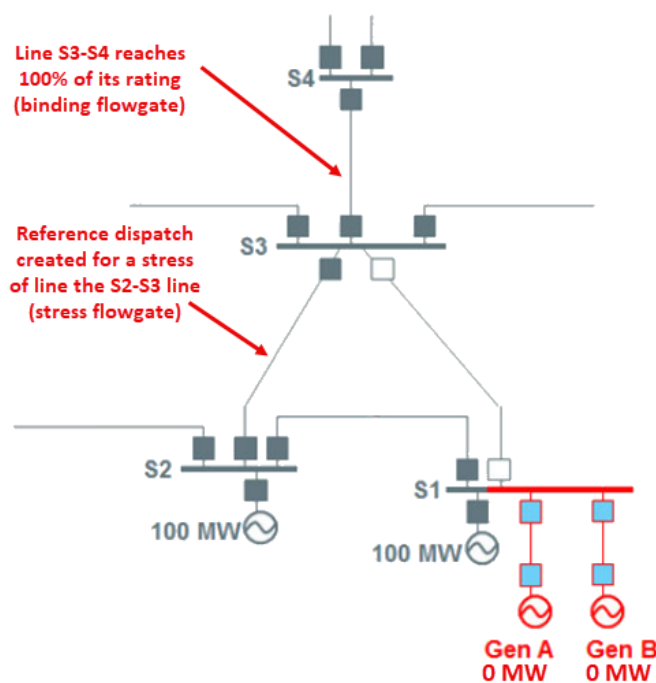
Notes:

- i. TCS Project(s) under study is (are) not dispatched in the reference dispatch
- ii. Certain harmers or helpers may not be dispatched if doing so causes a violation of a voltage/stability-limited interface.
- iii. Thermal-limited interfaces are monitored only if they form the boundary of the Load Zone for the TCS project(s) under study.
- iv. The stress flowgate and binding flowgate may be different in a given dispatch.

¹ May include TCS projects provided they are not considered a TCS Project under study for that dispatch.

² Summer CNRC

Figure 2 - Reference Dispatch Illustration

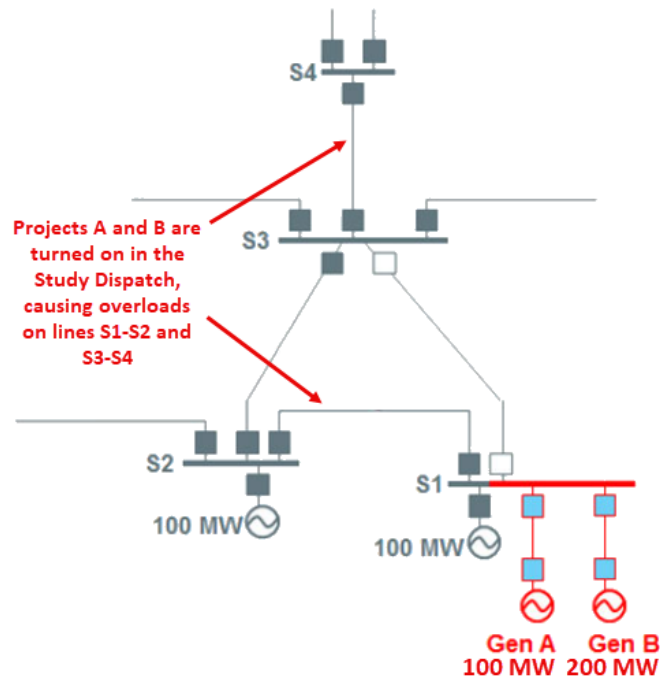


Step 4 – Study Dispatch – A post-project dispatch (also referred to as study dispatch) is created by fully dispatching the TCS Project(s) under study and completing a transfer from the TCS Project(s) under study to generators with DFAX below 3% on the stress flowgate with respect to the New England system load. Each individual dispatch is reviewed to ensure that no key interface limits are exceeded for interfaces that form the boundary with the Load Zone under consideration, or voltage or stability limited interfaces that are completely outside of the Load Zone under consideration. Violations observed in this dispatch, for which the TCS Project(s) under study has a DFAX greater than 3% on the overloaded flowgate with respect to the Load Zone load (*i.e.*, meet the DFAX criteria in PP5-6 Section 3.1.1), are recorded for further review.

Notes:

- i. Ultimately, the TCS Project(s) under study included in the post-project dispatch must have:
 - a. DFAX greater than or equal to 3% on the stress flowgate with respect to the New England system load; and
 - b. DFAX greater than, or equal to, 3% with respect to its Load Zone load on a monitored flowgate (*i.e.*, meets the DFAX criteria in PP5-6 Section 3.1.1).
- ii. A violation may be associated with a monitored flowgate, or a stability- or voltage-limited interface within the Load Zone under consideration.
- iii. Steps 3 and 4 use DFAX values calculated with Load Zone load as the reference subsystem only to determine which TCS project(s) is (are) associated with an observed overload and the DFAX values to use in cost allocation calculations.

Figure 3 - Study Dispatch Illustration



Step 5 – Recorded violations from Step 4 are verified in an AC power flow solution and used as the basis for any identified upgrades if they meet the overload criteria as noted in Section 3.1.1 of PP5-6 (i.e., the overloads recorded in the final TCS Report are AC verified values). All power flows performed in the previous steps use a DC power flow solution.