ISO NEW ENGLAND PLANNING PROCEDURE NO. 5-6

SCOPE OF STUDY FOR SYSTEM IMPACT STUDIES UNDER THE GENERATION INTERCONNECTION PROCEDURES

EFFECTIVE DATE: July 7, 2009

REFERENCES: ISO New England Transmission, Markets and Services Tariff (the "Tariff")

ISO New England Planning Procedure 5-1 (PP5-1): Procedure for Review of Governance Participant's Proposed Plans

ISO New England Planning Procedure 5-3 (PP5-3): Guidelines For Conducting And Evaluating Proposed Plan Application Analyses

ISO New England Planning Procedure 10 (PP10): Planning Procedure to Support the Forward Capacity Market

Scope of Study for System Impact Studies
Under the
Generator Interconnection Procedures

Background

The objective of this document is to provide guidance which ensures that the Network Capability Interconnection Standard ("NCIS") is consistently applied in defining the scope and study assumptions for System Impact Studies.

NCIS describes the minimum characteristics required to 1) interconnect a proposed new Resource[1] in the New England Control Area or 2) materially change and increase the capacity of an existing Resource. Additional information on procedures is found in Planning Procedures PP5-1 and PP5-3.

NCIS is defined in Schedules 22 (LGIP and 23 (SGIP) of Section II of the ISO New England Transmission, Markets and Services Tariff (the "Tariff") and "shall mean the minimum criteria required to permit the Interconnection Customer to interconnect in a manner that avoids any significant adverse effect on the reliability, stability, and operability of the New England Transmission System, including protecting against the degradation of transfer capability for interfaces affected by the Generating Facility."

The objective of this document is also to provide guidance which ensures that the scope and study assumptions for preliminary analyses under the Capacity Capability Interconnection Standard ("CCIS") are consistently applied.

System Impact Studies that follow the guidance provided by this document will typically satisfy the expectations of the Reliability Committee and the ISO; however, that does not preclude the possibility that some results may suggest the need for additional studies.

Network Capability Interconnection Standard Scope of Study

1. Identify the minimum required upgrades to meet all of the following requirements:

(a) Satisfy Sections 3.1, 3.2, 4, and 5 of the "Reliability Standards for the New England Area Bulk Power Supply System" (the "Reliability Standards") on a regional (i.e. New England Control Area) and sub-regional basis, subject to the conditions analyzed.

(b) As a result of the addition of the proposed new Resource, the maximum collective change in the amount by which other Resources must be redispatched to meet the Reliability Standards, does not exceed the capacity of the new Resource, as

[1] For the purposes of this document, a Resource may be a generator or an import from another Control Area; redispatch of imports refers to rescheduling.

measured by its intended high limit. If the request for interconnection involves multiple generating units at a plant and the applicant for interconnection controls all the existing generating units at that plant, the applicant for interconnection shall specify the desired maximum output for the plant and the design of the interconnection shall be based on this specified maximum output.

(c) The proposed new Resource does not diminish the transfer capability across any transmission line or relevant interface below the level of achievable transfers during reasonably stressed conditions and does not diminish the reliability or operating characteristics of the New England Area bulk power supply system and its component systems. For a proposed new Resource in an exporting area, an increase in the transfer capability out of the exporting area is not required to meet this interconnection standard.

(d) The proposed new Resource does not diminish the transfer capability across any transmission line or relevant interface below the level of possible imports during reasonably stressed conditions and does not diminish the reliability or operating characteristics of the New England Area bulk power supply system and its component systems.

(e) The addition of the proposed new Resource does not create a significant adverse effect on the ISO's ability to reliably operate and maintain the system.

2. Conduct the following analyses:

- Steady state
- Short circuit
- Stability

3. Conditions for Analyses

A. Steady State

1. Steady State analyses will demonstrate compliance with applicable voltage and thermal loading criteria.
2. These studies should consider a Resource dispatch such that it stresses power flows across applicable transmission lines or interfaces. A stressed line or interface should, to the extent reasonable, be at or near their ratings or transfer limits. A reasonable condition when power flows may not be at or near their transfer limits would exist when the maximum number of fully loaded Resources that may reasonably be expected to be in service for the expected system conditions does not result in stressed power flows.
3. When studying a new Resource, any other Resource may be redispatched subject to the following:
   a) Resources that continue to be required for system reliability cannot be redispatched,

b) Redispatched Resources and the new Resource can be practicably monitored and observed for purposes of system operation and unit commitment, and

c) If the most limiting transmission constraints occur on sub-transmission or lower voltage (less than 100 kV) facilities, then generation redispatch is not acceptable.

4. No Resource(s) can be assumed as Must Run as a condition for acceptable operation of the new Resource. If an existing Resource is considered Must Run prior to placing the new Resource in service, the existing Resource may continue to be modeled as Must Run, but the Must Run requirement of this Resource should not be increased. Studies must examine relevant stressed existing Resource outage conditions in addition to outages or reductions that have been considered as part of Resource redispatch.
5. No Resource(s) can be manually tripped to relieve any first contingency facility loading in excess of the more limiting of either the Short Term Emergency Ratings or any other applicable Transmission Owner-specific emergency ratings. Manually ramping down Resources to relieve first contingency overloads, can only be applied to the Resource(s) under study, provided that the Resource reduction is acceptable to the ISO.
6. Load levels and Resource capability to be evaluated
   a) Peak load: Load should be at 100% of the projected (90/10 forecast) peak New England Control Area load for the year the Resource is projected to be in service and the Resource is at full capability.
   b) Intermediate Load: Load should be at 75% of the projected (50/50 forecast) peak New England Control Area load for the year the Resource is projected to be in service and the Resource is at full capability.
   c) Light Load: Unless the proposed unit can reach minimum load within 2 hours, a light load analysis should be performed at 45% of the projected (50/50 forecast) peak New England Control Area load for the year the Resource is projected to be in service and the Resource is at minimum load. Other Resources that may be dispatched at 75% of the projected peak New England Control Area load should also be assumed to be running, but may also be at minimum load except for units which can reach minimum load within 2 hours. Units that can start up and reach minimum load within 2 hours may be off in the 45% case. Careful consideration of realistic operating conditions needs to be provided when simulating nuclear and hydro (run of river or ponding) facilities.

B. Short Circuit
   1. Short Circuit analyses will demonstrate that short circuit duties will not exceed equipment capability.
   2. All Resources that can physically and concurrently be in service, including deactivated reserve, should be modeled in service.

C. Stability
   1. Power Flows across applicable transmission lines or interfaces should be at the most limiting of the existing stability or thermal transfer limits. In cases where the

transfers are not stability limited, the transfers should be modeled at levels recommended by the Stability Task Force. (Note: All units modeled as in service for a particular stability case should be modeled at its full output which may result in total transfers greater than the existing transfer limit. More detail on modeling is available in Planning Procedure 5-3 (PP5-3): Guidelines For Conducting And Evaluating Proposed Plan Application Analyses).

2. Consider reasonable combinations of all Resources and devices that would be expected to have significant interactions.
3. Load levels to be evaluated at full capability of the new Resource
   a) Light Load: Load should be at 45% of the projected (50/50 forecast) peak New England Control Area load for the year the Resource is projected to be in service. (Note: The focus of the stability analyses should be performed at this load level. A number of combinations of Resources should be studied to ensure that stability is maintained for all reasonable conditions.)
   b) Intermediate Load: Load should be at 75% of the projected (50/50 forecast) peak New England Control Area load for the year the Resource is projected to be in service. (Note: Testing at 75% load level should be performed for line out conditions as required by the Stability Task Force. The line out conditions may be referred to as N-2 testing because it represents a condition where all but two facilities are in service. The Stability Task Force may require line out testing at higher load levels if higher transfers can be achieved across critical interfaces.)
   c) Peak load: Load should be at 100% of the projected (90/10 forecast) peak New England Control Area load for the year the Resource is projected to be in service. (Note: The emphasis of the stability analyses performed at this load level is to confirm that the response has not significantly changed with the load level. It may also be used to assess changes in damping if the possibility of an oscillatory response is recognized in the light load analyses. If all Resources can not be dispatched behind the limiting lines or interface, a reasonable number of combinations may need to be studied.)

4. **System Configuration** - Analyses and sensitivities should be performed with the existing system facilities and topology and with all Resources and their associated upgrades in the study queue ahead of the Resource under study and for planned transmission facilities with approved Proposed Plan Applications that may influence the results of System Impact Study for the Resource under study.

5. **Operational Considerations** - Assess the operating constraints of the proposed transmission and generation system. Determine the estimated magnitude of required redispatch of generation under typical and reasonably stressed conditions. Do not identify the upgrades necessary to reduce the operating constraints. If requested by the ISO, limited operating studies may be required to demonstrate viable operability of the proposed Resources and provide some indication of the system conditions for which the Resource's operation may be restricted. The conditions to be considered in these studies will be coordinated through the ISO. Examples of studies that may be expected include:
    a) Describe a methodology of determining and implementing the dispatch of Resources in any constrained area in a day-to-day operating environment.
    b) Demonstrate that the proposed new Resource is able to operate through a load cycle without causing an increased likelihood of causing another Resource to be committed or increased in output if already committed, or require equipment switching which may compromise the reliability of the system.
    c) Demonstrate that generation can be redispatched or other system adjustments can be made within 30 minutes following a first contingency to accommodate a second contingency.

    (Note: Extensive operating studies, separate from the interconnection studies, may be necessary prior to actual operation.)

6. **Identification of Related Upgrades** - Any aggregate study should identify the upgrades associated with each proposed Resource.

Preliminary Analyses of Overlapping Interconnection Impacts under the Capacity Network Resource Interconnection Standard: Scope of Study

The preliminary analysis will use the same criteria and assumptions that are prescribed in the analysis of overlapping interconnection impacts in Planning Procedure 10 – Planning Procedure to Support the Forward Capacity Market (PP10). The starting point for the base case to be used in the preliminary analysis will be the latest developed base case that has been prepared, pursuant to PP10, for the analysis of New Generating Capacity Resources seeking to participate in a Forward Capacity Auction (FCA).

An Interconnection Customer with a Capacity Network Resource Interconnection Service Request may request that the Feasibility Study or System Impact Study include a preliminary, non-binding, analysis to identify potential upgrades that may be necessary for the Interconnection Customer's Generating Facility to qualify for participation in an FCA under Section III.13 of the Tariff, based on a limited set of assumptions to be specified by the Interconnection Customer.

The set of additional assumptions that may be specified by the Interconnection Customer are limited to additional transmission projects and/or generation projects with active Interconnection Requests under the L/SGIP that the Interconnection Customer requests to be added to the base case.

To the extent the Interconnection Customer requests a preliminary analysis of Overlapping Interconnection Impacts under the Capacity Network Resource Interconnection Standard, a report will contain the results of the requested preliminary analysis, along with an identification of potential upgrades that may be necessary for the Interconnection Customer's Generating Facility to qualify for participation in a FCA pursuant to Section III.13 of the Tariff.

Document History[2]

Rev. 0 App.: RTPC – 4/13/99
Rev. 1 Rec.: RC – 2/13/01; App.: PC 3/2/01
Rev. 2 Eff.: 2/1/05
Rev. 3 App.: RC 5/19/09; NPC 6/5/09; ISO-NE 7/7/09

[2] This Document History documents action taken on the equivalent NEPOOL Procedure prior to the RTO Operations Date as well as revisions to the ISO New England Procedure subsequent to the RTO Operations Date.