Scope of Study for System Impact Studies Under the Minimum Interconnection Standard and Enhanced Interconnection

Background

In response to FERC order, the Regional Transmission Planning Committee (RTPC) adopted the following "Minimum Integration Standard" on November 10, 1998. The standard was subsequently included in the Thirty-Ninth Agreement amending the New England Power Pool Agreement and filed with FERC.

> A generating unit will meet the Minimum Interconnection Standard (as defined in Section 49 of the NEPOOL Tariff) if studies demonstrate that (with any required upgrades):
>
> (1) the unit does not cause a reduction in transfer capability across any transmission line or interface; and
>
> (2) Sections 3.1, 3.2, 4 and 5 of the NEPOOL Reliability Standards are met on a regional (i.e., NEPOOL Control Area) and sub-regional basis; and
>
> (3) in the reasonable judgment of the System Operator, the generating unit does not create a significant adverse effect on the System Operator's ability to reliably operate and maintain the system.
>
> It is recognized that, in the context of defining a revised Congestion Management System, the definition of Minimum Interconnection Standard may change.

The Minimum Interconnection Standard describes the basic characteristics of a Minimum Interconnection, but does not describe how to define the scope and associated study assumptions of the System Impact Studies. The Thirty-Ninth Agreement amending the New England Power Pool Agreement also provided for Enhanced Interconnections, but likewise did not describe how to define the scope and associated study assumptions of the Enhanced Studies. The objective of this document is to supplement the Minimum Interconnection Standard and the Enhanced Interconnection by providing guidance which can be consistently applied in defining the scope and study assumptions when performing System Impact Studies. It is anticipated that this Scope of Study will eventually be incorporated into the NEPOOL Reliability Standards and the associated CRS 39. In the interim, this scope of study should be treated as an addendum and, where applicable, supersede certain CRS39 procedures.

It is anticipated that studies which follow the guidance provided by this document will typically satisfy the expectations of the Regional Transmission Planning Committee (RTPC), but does not preclude the possibility that some results may suggest the need for additional studies.

Minimum Interconnection Standard Scope of Study

A minimum interconnection study is performed in response to the request for interconnection.

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 Power Pool" ("Reliability Standards") on a regional (i.e. NEPOOL 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[1] to meet NEPOOL Reliability Standards, does not exceed the capacity of the new resource, as measured by its intended high limit.

(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[2] and does not diminish the reliability or operating characteristics of the New England bulk power 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 bulk power system and its component systems.

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

2. Conduct the following analyses:

- Steady state
- Short circuit

[1] Dispatch or redispatch in this document refer to generation modeling and associated changes relative to planning assumptions not actual operations.

[2] "reasonably stressed conditions" refers to conditions described by "Conditions for Analyses"

- 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. On a pre-contingency basis, except for the proposed new resource, it is permissible to redispatch any or all resources[3] which contribute to a transmission constraint, subject to the following items:
   a) Except that resources required for system reliability[4] cannot be redispatched
   b) Provided that the redispatched resources and the new resource can be 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.
5. Load levels and resource capability to be evaluated
   a) Peak load: Load should be at 100% of the projected peak NEPOOL 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 peak NEPOOL 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 peak NEPOOL 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 NEPOOL 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.

[3] A resource may be a generator or an import from another Control Area; redispatch of imports refers to rescheduling.
[4] "required for reliability" generally refers to resources which still are "must run", typically for local area reliability.

2. All units should be in service.

C. Stability

1. Power Flows across applicable transmission lines or interfaces should be at or above the most limiting of the existing stability or thermal transfer limits. (Note: The transfer may be greater because all of the units should be modeled at their full output which due to lumpiness may result in total transfers greater than the existing transfer limit).
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 peak NEPOOL 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) Peak load: Load should be at 100% of the projected peak NEPOOL 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[5] with approved 18.4 applications which 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 System Operator, 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 System Operator. Examples of studies which 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.

[5] "planned transmission facilities" in this case is referring to upgrades or additions unrelated to any proposed generating interconnections. These upgrades or additions may be related to improving reliability, operating flexibility, or congestion.

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.

Enhanced Interconnection Scope of Study

An Enhanced Interconnection Study is performed in response to a request to evaluate upgrades that may increase transfer capability or reduce congestion. ISO-New England based on the Study Queue will determine the order in which Minimum and Enhanced studies are performed. However, those studies, which were underway prior to October 29, 1998, and are beyond the minimum standard level may, at the discretion of the applicant, be continued to completion without delay.

The scope for the Enhanced Interconnection Study will define planning conditions that the applicant wants to consider as feasible for purposes of identifying Elective Transmission Enhancements.

Elective Transmission Enhancements

After identifying possible upgrades and their associated cost based on a System Impact Study level of analysis, the applicant will select what, if any, system upgrades the applicant is willing to support consistent with their rights and responsibilities under the NEPOOL Agreement. Pursuant to their election of upgrades, additional studies will be performed, as necessary, to demonstrate compliance with the NEPOOL Reliability Standards. Such studies may lead to 18.4 Application(s) for new or upgraded transmission facilities.

Analyses ultimately may be required to quantify the benefit of the upgrades relative to changes in transfer capabilities in the system. These analyses will need to be consistent with the Congestion Management System and any other applicable portion of the NEPOOL Agreement.

Elective Transmission Enhancements are not operating or competitive market studies. Therefore they can not be used to evaluate possible competitive operating conditions or to estimate the probability or

frequency of operating under such conditions. Should a Transmission Provider undertake an operating or competitive market analysis study, such study can not delay the start of any study or the completion of any study being performed by the Transmission Provider pursuant to the NEPOOL Open Access Transmission Tariff or the NEPOOL Agreement. The results of such studies, if performed by a Transmission Provider, may become public information when they are completed.