

Comments by the Northeast Power Coordinating Council FERC Reactive Power Technical Conference

Introduction

The Northeast Power Coordinating Council¹ (NPCC) is an international electric regional reliability council formed shortly after the 1965 Northeast Blackout to promote the reliability and efficiency of the interconnected power systems within its geographic area.

The geographic area covered by NPCC includes New York state, the six New England states, and Ontario, Quebec, and the Maritime Provinces in Canada. The total population served is approximately 54 million. The area covered is approximately 1 million square miles.

NPCC is one of ten Regional Reliability Councils throughout the United States, Canada and portions of Mexico that form the North American Electric Reliability Council (NERC).

NPCC is a voluntary, non-profit organization. Its current membership represents Transmission Providers and Transmission Customers serving the northeastern United States and central and eastern Canada. The NPCC *Membership Agreement* allows for non voting membership to be extended to regulatory agencies with jurisdiction over participants in the electricity market in Northeastern North America. It also extends membership to public-interest organizations expressing interest in the reliability of electric service in Northeastern North America.

Role of NPCC

NPCC establishes the processes that assure the reliable and efficient operation of the international, interconnected bulk power systems in Northeastern North America through development and enforcement of regionally-specific criteria that are not inconsistent with NERC broad-based continent-wide reliability standards. NPCC coordinates system planning, design and operations, assesses reliability, and monitors and enforces mandatory compliance with regional reliability criteria. NPCC, to the extent possible, facilitates attainment of fair, effective and efficient competitive electric markets.

Development of Regional-specific Criteria

NPCC's regionally-specific reliability criteria clearly establish design-based reliability objectives and accommodate market mechanisms, as appropriate, as a means of achieving reliable operations. The objective of NPCC's Document A-2,² "Basic Criteria for Design and Operation of Interconnected Bulk Power Systems" is to ensure that the bulk power system is designed and operated to a level of reliability such that the loss of a major portion of the system, or unintentional separation of a major portion of the system, will not result from any design contingencies. In NPCC the technique for assuring the reliability of the bulk power system is to require that it be designed and operated to withstand representative, specified contingencies. Analyses of simulations of these contingencies include assessment of the potential for widespread cascading outages due to overloads, instability or voltage collapse. Loss of small portions of a system (such as

¹ See: http://www.npcc.org/about_npcc.asp

² See: <http://www.npcc.org/PublicFiles/Reliability/CriteriaGuidesProcedures/A-02.pdf>

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radial portions) may be tolerated provided these do not jeopardize the reliability of the remaining bulk power system.

The criteria described in the NPCC Basic Criteria are used in the design and operation of the bulk power system. These criteria meet or exceed the North American Electric Reliability Council (NERC) standards. These criteria are applicable to all entities which are part of or make use of the bulk power system.

The NPCC member whose system is used to connect a non-member system to the bulk power system assures that, whenever it enters into arrangements or contractual agreements with non-members whose system could have a significant adverse impact on service reliability on the interconnected bulk power system in Northeastern North America, the terms of such arrangements or contractual agreements are consistent with criteria established by NPCC, NERC, or the Regional Reliability Councils established in areas in which the facilities used for such arrangements are located. Lessons learned from the 2003 Blackout are an essential part of the ongoing comprehensive reviews of regional reliability criteria, with due regard to risks and costs.

Coordination of Planning and Operations

NPCC conducts regional and interregional reliability analyses and facilitates broader regional planning efforts. NPCC has proposed modifications to its underfrequency load shedding program and is evaluating applicability of increased utilization of under-voltage load shedding. NPCC's coordination of line protection, load shedding, and generation protection systems have been expanded to include consideration of islanding survivability. NPCC's operational reliability assurance activities provide normal, pre emergency and emergency communications and coordination. Region-wide operational security and Area resource and transmission adequacy are assessed in order to maintain reliability.

NPCC Guideline B-3³ "Guidelines for Inter-Area Voltage Control" provides general principles and guidance for effective inter-Area voltage control, consistent with the NPCC Basic Criteria. Specific methods to implement these guidelines may vary among Areas, depending on local requirements. Coordinated inter-Area voltage control is necessary to regulate voltages to protect equipment from damage and prevent voltage collapse. Coordinated voltage regulation reduces electrical losses on the network and lessens equipment wear and tear. Local control actions are generally most effective for voltage regulation. Occasions arise when adjacent Areas can assist each other to compensate for deficiencies or excesses of reactive power and improve voltage profiles and system security.

Each Area develops, and operates in accordance with, its own voltage control requirements and procedures. Area requirements procedures are be consistent with NPCC Criteria. Adjacent Areas are familiar with each others procedures. Areas mutually agree upon procedures for inter-Area voltage control.

³ See: <http://www.npcc.org/PublicFiles/Reliability/CriteriaGuidesProcedures/B-03.pdf>

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Assessment of Reliability

NPCC reviews the reliability of the Areas' planned bulk power systems for conformance with its operating, planning and design criteria. The overall NPCC regional reliability and interregional security of the planned bulk power systems is assessed.

NPCC Document C-4,⁴ "Monitoring Procedures for Guidelines for Inter-Area Voltage Control" establishes the monitoring procedures and performance review relative to the Inter-Area Voltage Control Guidelines.

Enforcement of Compliance

The NPCC *Membership Agreement* obligates each member to plan, design and operate its bulk power system in compliance with its regionally specific reliability criteria and broad-based continent-wide NERC standards. To assess and monitor compliance with NPCC and NERC reliability standards, NPCC has in place the Reliability Compliance and Enforcement Program. Initially adopted in 2000, it establishes a mechanism to impose non-monetary sanctions for non-compliance to a specified set of reliability requirements.

Role of Regional Reliability Councils

The *U.S.-Canada Power System Outage Task Force Final Report on the 2003 Blackout* in its Recommendation #3 addressed the need to strengthen the institutional framework for reliability management in North America. The Regional Managers Committee in its examination of the Role of the Regional Reliability Councils⁵ identified essential reliability functions and services and required organizational principles for reliability assurance management entities.

It should be noted that RTOs alone cannot accomplish the task of assuring the reliability of the entire market due to the international character of the marketplace and to the desire for some parts of the country to refrain from implementing formal markets. An inclusive reliability structure is needed in order to permit Canadian and other entities to interact seamlessly with each other. Regional Reliability Councils, separate but complementary to the operating entities within its footprint, are most able to accomplish this objective.

Regional Reliability Councils (RRC) provide a significant means by which State and Provincial regulators can fulfill their political mandate to oversee the reliability of the electric system.

States, in the absence of enactment of U.S. reliability legislation, and Provincial authorities could strengthen existing regulatory backstop for the enforcement of mandatory compliance with NERC standards and regional reliability council criteria for their jurisdictional electric utilities. NPCC supports the recent NARUC Resolution⁶

⁴ See: <http://www.npcc.org/publicFiles/reliability/criteriaGuidesProcedures/c-04.pdf>

⁵ See: <http://www.npcc.org/roleOfRegions.asp>

⁶ Sponsored by the Committee on Electricity and Energy Resources and Environment Adopted by the NARUC Board of Directors February 16, 2005; see: <http://www.naruc.org/displaycommon.cfm?an=1&subarticlenbr=394>.

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regarding the development of the model orders and legislation that could be considered by individual states to make NERC reliability standards and RRC criteria mandatory.

NPCC criteria establish the regionally specific reliability requirements necessary to maintain the security and adequacy of its interconnected bulk power supply system. These criteria define the minimum requirements for both the design and operation of the Northeastern North American electric power system. While they are consistent with and meet NERC standards, they are more stringent.

More stringent criteria and rules make for a more robust system, especially when operation outside of normal system conditions is encountered. These requirements provide for extra margin that adds flexibility when extraordinary events occur and reduces the likelihood of the need for load shedding in response to such system disturbances.

In closing, NPCC would like to offer the following comments on the Transmission Reliability and Engineering questions posed by the Staff Report:

Q: Should there be interconnection standards with respect to merchant transmission?

NPCC proposed that the scope of the Generation Interconnection rulemaking should be broadened to include transmission interconnections between entities in different Control Areas and should treat them on an equal footing with generation projects to ensure that inter-Area reliability effects are properly addressed and coordinated.⁷

“The Commission should consider broadening the scope of its rulemaking when the NOPR in this proceeding is issued to include inter-area transmission projects in the standardized interconnection procedures. NPCC recognizes the Commission’s desire to confine the Standardized Interconnection Agreement and Procedures to generators alone. However, inter-Area transmission projects could have as significant an effect on the coordinated planning and operation of the interconnected transmission system as generators. Moreover, simply accounting for transmission projects in the interconnection study base cases, as stated in section 2.3 of the Consensus IP, fails to guarantee the needed level of study coordination between proposed inter-area transmission projects and proposed generation interconnection projects that is needed to maintain a reliable system. Inter-Area transmission projects pose a great potential for Wide-Area impact. RRCs are uniquely situated to provide the study oversight needed to evaluate the Wide-Area effects such projects may have. In fact, NPCC has been a part of the review process of inter-Area transmission projects in the past¹⁹ and is presently involved in reviewing several

⁷ NPCC submitted its comments on the Commission’s Advance Notice of Proposed Rulemaking on Standardizing Generator Interconnection Agreements and Procedures Docket No. RM02-1-000.

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proposed projects.²⁰ Therefore, the Commission should encourage RRC participation in interconnection coordination.”

¹⁹ For instance, the Hydro-Quebec Phase II HVDC Interconnection between Quebec and New England.

²⁰ Examples include the Cross Sound Cable interconnection between Long Island, New York and Connecticut, and the proposed Neptune Project.

Q: Can thermal/non-thermal transmission constraints be relieved by supplying or consuming reactive power? If so, how and to what extent?

Yes. As an example, NPCC submits the results of a study conducted by the NPCC Regional Planning Forum⁸ (RPF). The RPF’s objective was to explore innovative approaches to enhance the capabilities of the transmission grid from a Wide-Area, trans-Regional outlook. The RPF investigated ways to increase the size of the largest single contingency (currently approximately 1,500 MW) that NPCC can reliably withstand as well as ways of reliably increasing the New York 7040 line import limit from Hydro-Québec above 1,500 MW.

The study reaffirmed that, for both today’s system and the future (2006) system analyzed, (under conditions of high simultaneous transfers in MAAC and NPCC) the size of the largest NPCC single contingency the interconnection can reliably withstand is limited under 2,000 MW, due primarily to lack of dynamic voltage (Var) support in response to the contingency on the New York system around its southern border with Pennsylvania.

The RPF screening analysis suggested that improvement of New York post-contingency voltage response could allow for up to 800 MW of additional transfer capability from the existing Hydro-Québec to NPCC interconnections. Simulations of various levels of dynamic reactive compensation⁹ at either the Oakdale, New Scotland, or Marcy New York buses were shown to support these additional transfers without violating system post contingency voltage criteria.

The RPF analysis represented a starting point and was not meant to represent a detailed planning analysis, proposal or NPCC endorsement for any particular project. Detailed cost-benefit analyses were not conducted, nor were extensive system or environmental studies undertaken.

However, the RPF results did illustrate opportunities (from a Wide-Area, Trans-Regional outlook) to increase the existing transfer capability of today’s system that are also applicable for the future (2006 time period) system. Increasing transfer capacity at the time of system need enhances the overall reliability of the system.

⁸ See: <http://www.npcc.org/regionalPlanningForum.asp>

⁹ FACTS devices such as SVCs and STACOMs enhance the transfer of electricity by providing dynamic reactive support. These devices have been shown to increase transfer capability in a cost-effective manner when compared with other methods (see www.epri.com).