



# **NSTAR Electric Transmission Planning Criteria**

**NSTAR System Planning  
Updated October 2008**

## **System Characteristics**

NSTAR Electric (“NSTAR”) is an investor owned utility that provides electric service to Boston, Cambridge and surrounding cities and towns in northeastern Massachusetts and in New Bedford, Plymouth, Cape Cod and surrounding cities and towns in southeastern Massachusetts. The NSTAR Electric bulk power system serves a diverse region which ranges from dense urban, heavy to moderate suburban, to rural. NSTAR Electric’s summer geographic load distribution is roughly 80% in the northern portion of its service territory, which consists of communities in and around the metropolitan Boston area. The remaining 20% is in the southern portion of its service territory, comprising the areas of New Bedford, Plymouth, and Cape Cod.

The NSTAR Electric transmission system is comprised of 345kV, 230kV and 115kV overhead and underground transmission circuits.

NSTAR is a member of the New England Power Pool (“NEPOOL”), an association of independent utilities, generators, merchants, municipalities, load serving entities and others. ISO-New England Inc. (ISO-NE), the independent system operator of New England, serves as the designated agent for the control and operation of all NEPOOL members’ generation and transmission assets. NSTAR is also a member of the Northeast Power Coordinating Council (NPCC) and is registered as a Transmission Planner (TP) with the North American Electric Reliability Corporation (NERC), the FERC certified “electric reliability organization” for the United States. In evaluating the adequacy of the transmission system, NSTAR uses this internal planning criteria as well as ISO-NE, NPCC and NERC planning criteria and standards.

## **Existing ISO-NE, NPCC and NERC Standards**

The NSTAR Electric transmission system is designed to be in conformance with at least the minimum criteria described in the following documents:

These documents are currently on file at the designated web site.

1. NPCC Document A-2, "Basic Criteria for Design and Operation of Interconnected Power Systems", revised May 6, 2004.  
<http://www.npcc.org/>
2. North American Electric Reliability Corporation Transmission Planning Standards  
TPL-001-0, effective date April 1, 2005  
TPL-002-0, effective date April 1, 2005  
TPL-003-0, effective date April 1, 2005  
TPL-004-0, effective date April 1, 2005

TPL-005-0, effective date April 1, 2005  
TPL-006-0, effective date April 1, 2005  
<http://www.nerc.com/>

3. "Scope of Study for System Impact Studies Under the Minimum Interconnection Standards" (ISO New England Planning Procedure No. 5-6), revised February 1, 2005.  
<http://www.iso-ne.com/>
4. "Reliability Standards for the New England Area Bulk Power System" (ISO New England Planning Procedure No. 3), revised October 13, 2006.  
<http://www.iso-ne.com/>

### **Expected System Performance**

The NSTAR transmission system is designed for a high level of reliability such that the loss of a major portion of the system, or unintentional separation of any portion of the system, will not result from reasonably foreseeable contingencies. The system is required to be designed to meet representative contingencies as defined in the ISO-NE, NPCC, and NERC reliability standards. Simulations of foreseeable contingencies are not expected to result in the potential for widespread cascading outages due to overloads, instability, or voltage collapse. The loss of small portions of the system may be tolerated provided the reliability of the overall system is not jeopardized.

### **Steady State Assessment**

NSTAR Electric's transmission system shall be designed with sufficient transmission capacity to serve local customer load under outage conditions. Design studies should assume power flow conditions with due allowance for generator maintenance and forced outages, which reasonably stress the system. Voltages, line loadings, and equipment loadings shall be within normal limits for pre-disturbance conditions, and within applicable emergency limits for the system conditions that exist following the contingencies.

After removal of the typical megawatts of generator maintenance and forced outages, three individual contingency pairs are specified for testing:

1. Loss of two major generating units, or
2. Loss of one major generating unit and one autotransformer, or
3. Loss of one major generating unit and one transmission line

Following the equipment loss specified by contingency conditions, the system shall be designed such that all equipment loading levels must be maintained within the

appropriate emergency rating of the elements and voltage levels must be maintained within  $\pm 5\%$  of normal scheduled levels as defined by the current standards.

For operational and reserve requirement considerations, the following additional contingencies are tested:

4. Loss of two transmission elements (lines or autotransformers)

### **Stability Assessment**

NSTAR Electric's transmission system shall remain stable during and following the most severe of the contingencies stated in the Steady State Assessment section above with due regard for reclosing facilities (where applicable), and before making any manual system adjustments.

### **Transfer Capability**

NSTAR Electric's transmission system shall be designed with adequate transmission transfer capability to minimize system reserve requirements, facilitate transfers, provide emergency back-up of supply resources, permit economic interchange of power, and to assure that the conditions specified in the Steady State Assessment and the Stability Assessment sections above can be maintained without adversely affecting the NSTAR system or other New England transmission systems. Anticipated transfers of power from and to the NSTAR transmission system, as well as within the NSTAR system, should be considered in the design of transmission facilities. Therefore, design studies would assume applicable transfers and the most severe load and resource conditions that can be reasonably expected and/or forecasted.

### **Short Circuit Assessment**

The NSTAR transmission system is designed such that any proposed addition or modification to the design or operation of the transmission system must not result in any system equipment (e.g. circuit breakers, disconnect switches, etc.) exceeding their short circuit current interrupting capability or short circuit withstand capability.

## **Regional System Planning Results**

NSTAR Electric is a participant in ISO New England's regional system planning process and assists with the development of the ISO-NE Regional System Plan (RSP) for its portion of the New England bulk power system. The RSP examines the comprehensive needs of the bulk power system (BPS) throughout New England and documents the resource and Pool Transmission Facility (PTF) upgrade requirements to meet those needs. The electric system characteristics and expected performance are fully addressed in the RSP report.

The ISO-NE RSP is currently on file at the following web site:

<http://www.iso-ne.com/trans/rsp>

## **Local System Planning Results**

Planning needs and results for NSTAR facilities that are non-PTF and therefore not part of the ISO-NE RSP are detailed in NSTAR's Local System Plan (LSP). For a listing of the local non-PTF system upgrades of the NSTAR transmission system, refer to the following website:

[http://www.nstar.com/business/rates\\_tariffs/open\\_access/local\\_transmission\\_planning/](http://www.nstar.com/business/rates_tariffs/open_access/local_transmission_planning/)