
	<p align="center">TRANSMISSION PLANNING CRITERIA</p>	<p>Document Number: NYT-TPC-0001</p>
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**TRANSMISSION PLANNING
CRITERIA
NYT-TPC-0001
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1.0 Purpose

This document summarizes the New York Transco (NY Transco) Transmission Planning Criteria for assessing the reliability performance of the NY Transco transmission system throughout the operating and planning horizon. These Criteria shall be utilized in the design of the NY Transco transmission system and shall guide future expansion of the system. Application of these Criteria will ensure that the NY Transco transmission system is planned to maintain a consistent level of reliability. NY Transco is not a Load Serving Entity and any customers/ independent developers that will potentially be a load on the system will also need to coordinate with the electric utility in whose franchise area their facility exists for any additional requirements they may be required to comply with to receive delivery service.


The NY Transco Transmission System is planned in accordance with the following Transmission Planning Criteria, which are applicable to all new projects proposed by NY Transco and independent developers. Any requests to the exception of these Criteria must be evaluated from a technical perspective, and if deemed to be not a detriment to the reliability of the transmission system, it shall be memorialized and approved in writing by the VP Capital Investments and the Chief Engineer. Please note that NY Transco has previously made and may continue to make investments in Transmission Projects that have been / are proposed by other Connecting Transmission Owners, and the planning criteria utilized for those projects have met / or will meet those in effect for those Connecting Transmission Owners.

2.0 Transmission Planning Tools

NY Transco and/or their engineers utilize various types of power system simulation software tools for power system analysis. These software tools allow Transmission Planning Engineers to conduct steady state power flow studies (thermal and voltage), dynamic stability studies, short circuit studies, as well as various transmission system security and reliability studies. While there are several software tools utilized, the primary software tools utilized to assess the reliability of the Transmission System are:

2.1 PSS/E

Power System Simulator for Engineering (PSS/E) is a Siemens program utilized for electric transmission system analysis and planning. Typical PSS/E analyses consist of steady state power flow (thermal and voltage) and dynamic stability analyses. The

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principal uses are to identify thermal, voltage and stability constraints and to assess solutions to these issues.

2.2 PowerGEM TARA

PowerGEM Transmission Adequacy & Reliability Assessment (TARA) is a software tool used to assess thermal transfer limits and to assess steady state thermal and voltage performance of the power system under N-1 and N-1-1 contingency conditions.

2.3 ASPEN OneLiner

ASPEN OneLiner is a software tool that allows Transmission Planning Engineers to perform Transmission System short circuit studies and to assess the adequacy of transmission circuit breaker interrupting ratings.

2.4 Other Analysis Programs


NY Transco utilizes other analysis programs, as needed, to assess interconnection of generation and transmission facilities and transmission lines to evaluate the potential for sub-synchronous resonance (SSR), subsynchronous torsional interaction (SSTI), electromagnetic transient (EMT) impacts, and control system interactions.

3.0 Transmission System Overview

The transmission system consists of Bulk Electric System (BES) facilities (as defined by NERC), Bulk Power System (BPS) facilities (as defined by NPCC), NYS Bulk Power System (as defined by NYSRC), and Local Transmission facilities.

3.1 Bulk Electric System (BES)

The Bulk Electric System (BES) definition was revised by NERC and became effective July 1, 2014. The BES definition includes bright line criteria with various enumerated inclusions and exclusions. Application of the BES definition has resulted in the NY Transco transmission systems being classified as BES. This includes transmission lines, transformers, phase angle regulators (PARs), and static and dynamic reactive power devices.

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All BES elements shall be designed to meet the performance requirements specified in the applicable NERC Transmission Planning Reliability Standard (Transmission System Planning Performance Requirements; TPL-001-5.1).

3.2 Bulk Power System (BPS)

The NPCC, which the NYISO is part of, defines the Bulk Power System as:


“The interconnected electrical systems within northeastern North America comprising generation and transmission facilities on which faults or disturbances can have a significant adverse impact outside of the local area. In this context, local areas are determined by Council members.” NPCC BPS facilities are identified based on the application of NPCC’s Document A-10 “Classification of Bulk Power System Elements.” This criterion is based on a performance-based test for significant adverse impact.

The present NYS Bulk Power System (NYS BPS) definition is as follows: “The portion of the New York Transmission System identified as the NYS Bulk Power System (NYS BPS) pursuant to the NPCC Document A10, Classification of Bulk Power System Elements.” All applicable BPS elements that are identified per NPCC A-10 shall comply with the NYSRC rules.

4.0 Design Principles

The NY Transco Transmission System is planned in accordance with the fundamental design principles outlined in the NY Transco Guidelines for Third Party Interconnections, which are applicable to all new projects proposed by the Company and by independent developers of generator, and/or transmission projects.

In addition to transmission planning criteria enumerated in this document, all new projects, whether generation or transmission, must be designed to conform with and adhere to all applicable NERC, NPCC, and NYSRC Standards, Criteria, and Reliability Rules, including NYSRC Local Reliability Rules, as well as applicable NY Transco specifications, procedures and guidelines.

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5.0 Performance Principles

5.1 Performance Criteria

The performance criteria of the NY Transco Transmission System require the evaluation of voltage, thermal, stability, transient, and short circuit performance of the system with all facilities in service, as well as under the contingency conditions described in the following sections.


While transfer limits across the transmission interfaces defined by the NYISO are not, by themselves, measures of reliability, there is potential for adverse reliability impacts to occur if transfer limits are degraded from their existing levels as the result of the addition of a new generator or transmission facility. The NYSRC Reliability Rules do not require that transfer limits be maintained at specific levels. However, in its processes to review the impacts of any proposed transmission or generation project, the NYISO should give due consideration to the possible reliability impacts that may result if the proposed project results in diminished transfer capability, per NPCC criteria.

Accordingly, the transfer limits assessment is the responsibility of the New York Independent System Operator (NYISO), and it is performed as a critical part of the NYISO process to ensure transmission system reliability, with the participation of all New York Control Area (NYCA) market participants, including NY Transco.

5.2 System Design

Under Normal System conditions normal state thermal or voltage limits shall not be exceeded (N-0).

NY Transco transmission assets are designed to First contingency design which means that the NY Transco Transmission System is planned to withstand, at peak design demand, the more severe of independent Scenarios A, B or C, as described below:

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Scenario A

The most severe of design criteria contingencies of Category P1, P2, P4, P5, and P7 in accordance with Table 1 of the NERC Standard TPL-001 Transmission System Planning Performance Requirements (N-1). NY Transco evaluates these contingencies in the time immediately following a contingency event, in which only dynamic devices (generators, STATCOMS, SVCs, etc.) have had time to respond to the new system conditions. Operator actions or automatic equipment operations that occur after a time delay are not considered.

For Scenario A testing, applicable post-contingency thermal, voltage and stability limits shall not be exceeded (N-1).


Scenario B

The most severe of design criteria contingencies of Category I Single Event, Contingency events 1 through 9, in accordance with Table B-1 of the NYSRC Reliability Rules (N-1/-0).

For Scenario B testing, applicable post-contingency thermal, voltage and stability limits shall not be exceeded. In addition, the system must be able to be returned to within its normal state limits using all available operating reserves and system controls (N-1/-0).

Scenario C

The most severe of design criteria contingencies of Category P3 and P6 in accordance with Table 1 of the NERC Standard TPL-001 Transmission System Planning Performance Requirements (N-1-1). NY Transco evaluates these contingencies allowing all system adjustments following the first contingency and allowing only dynamic devices to respond following the second contingency. Following the first contingency, system redispatch is applied in accordance with subsystem and monitored element files provided by NYISO to secure those facilities defined by NYISO. Where overloads on other facilities could be resolved by securing the system, redispatch between the first and second contingencies may be considered in accordance with the NYISO Manual 15 (Emergency Operations).

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For Scenario C testing, applicable post-contingency thermal, voltage and stability limits shall not be exceeded.

5.3 Voltage Assessment


The following voltage limits are established by NY Transco in its role as a Transmission Owner, in accordance with Section 2.3.1 of the NYISO Methodology for Creating System Operating Limits for the Operations Horizon. NY Transco, in its role as a Transmission Planner, applies these voltage limits in its planning assessments of the near-term transmission planning horizon.

Each NY Transco bus has an associated voltage limit. Voltages at NY Transco buses must satisfy both steady-state pre-contingency and post-contingency limits in the following table, unless modified by an exception below. These voltage limits respect voltage-based facility ratings.

Bus Voltage	Pre-contingency		Post-contingency	
	Low Limit	High Limit	Low Limit ^{2,4}	High Limit ^{1,3}
345	338 kV (0.98 pu)	362 kV (1.05 pu)	328 kV (0.95 pu)	362 kV (1.05 pu)
230	219 kV (0.95 pu)	242 kV (1.05 pu)	219 kV (0.95 pu)	242 kV (1.05 pu)
138	131 kV (0.95 pu)	145 kV (1.05 pu)	131 kV (0.95 pu) ²	145 kV (1.05 pu)
115	109 kV (0.95 pu)	121 kV (1.05 pu)	109 kV (0.95 pu) ²	121 kV (1.05 pu)

Exceptions:

1. NY Transco determines voltage limits for buses listed in Table A-2 of NYISO Emergency Operations Manual to coordinate with limits on adjacent buses and within equipment capabilities. The post-contingency high limits for the Knickerbocker, Van Wagner, Fraser South, and Dover 345 kV buses are 380 kV (1.10 pu).
2. The minimum allowable system voltage limit is 0.95 pu for buses 200 kV and above. Voltages on systems below 200kV may be allowed to have a limit of

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0.90 pu post contingency following operation of dynamic devices (e.g., generators, STATCOMS, SVCs) and prior to automatic equipment operations (e.g., LTCs and automatic switching of shunt compensation).

3. Under emergency conditions, such as island formation in an underfrequency load shedding (UFLS) study, NY Transco allows post-contingency voltage up to 1.10 pu.
4. For Geomagnetic Disturbance (GMD) Vulnerability Assessments performed pursuant to NERC Reliability Standard TPL-007, NY Transco allows voltage of 0.90 to 1.05 pu at the following buses evaluated by NYISO to assess the potential for voltage collapse:
 - buses operated at 200 kV or greater that are not listed in the NYISO Emergency Operations Manual, Table A-2; and
 - NPCC BPS buses operated at voltage below 200 kV.

The change in voltage (“delta V”) following a contingency must be less than 0.05 per unit for facilities operated at 200 kV and above and must be less than 0.10 per unit for facilities operated below 200 kV.


NY Transco does not own any undervoltage load shedding (UVLS) systems or programs. If NY Transco implements an UVLS system or program, these limits will be modified, if necessary, to ensure that voltage limits are greater than or equal to in- service BES relay settings for UVLS system or program.

5.4 Thermal Assessment

5.4.1 The NY Transco thermal planning criteria, expressed in ampere carrying capacity, consider three thermal categories. These are:

- Normal (continuous) rating
- Long-Term Emergency (LTE) rating
- Short-Term Emergency (STE) rating

Thermal ratings are established by NY Transco, in its role as a Transmission Owner, in accordance with its FAC-008 facility ratings methodology. NY

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Transco submits these ratings to the NYISO in accordance with the NYISO Reliability Analysis Data Manual.

NY Transco, in its role as a Transmission Planner, uses facility ratings in its planning assessments of the near-term transmission planning horizon in accordance with Section 3.2 of the NYISO Methodology for Creating System Operating Limits for the Operations Horizon.

5.4.2 The post-contingency loading of any facility, including overhead transmission lines and inter-utility ties must not exceed its LTE rating.

5.4.3 In observance of NYSRC Reliability Rules, the post-contingency loading of any underground cable can exceed its LTE rating, but not its STE rating, following:

- Loss of generation – provided that ten (10) minute operating reserve and/or phase angle regulation is available to reduce the loading to its LTE rating and not cause any other facility to be loaded beyond its LTE rating; and
- Loss of transmission – provided that phase angle regulation is available to reduce the loading to its LTE rating and not cause any other facility to be loaded beyond its LTE rating.


5.5 Stability Assessment

NY Transco, in its role as a Transmission Planner, uses stability criteria in its planning assessments of the near-term transmission planning horizon in accordance with Section 4.3 of the NYISO Methodology for Creating System Operating Limits for the Operations Horizon.

NY Transco’s transient voltage recovery (TVR) criterion requires voltage to recover above 0.9 per unit within five seconds after a fault has cleared.

5.6 Transient Assessment

As changes occur in the topography of the NY Transco transmission infrastructure, appropriate analysis shall be conducted to ensure that electrical equipment (e.g., circuit breakers, transformers, series and shunt compensation

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devices) are protected against transient overvoltage and harmful resonance conditions caused by switching operations and/or potential contingency events.


5.7 Short Circuit Assessment

The NY Transco Transmission System shall be planned such that, when all generation and all transmission lines are in service, fault duty levels do not exceed the rated interrupting capability of breakers at the substations. Determination of fault duty levels shall be made with due regard to fault current limiting series reactor operating protocols.

5.8 Extreme Contingency Assessment

Extreme contingency assessment recognizes that the Transmission System can be subjected to events that exceed, in severity, the normal planning criteria. This assessment is conducted to determine the nature and potential extent of widespread system disturbances from such events and to identify measures that will be utilized, where appropriate, to reduce the frequency of occurrence of such events, or to mitigate the consequences that are indicated as a result of testing for such contingencies.

Analytical studies shall be performed to determine the effect of the Extreme Contingency.

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Contact information:

Paul Haering
 VP Capital Investments
 New York Transco LLC
paul.haering@nytransco.com
 office 518-444-4880

REVISION HISTORY

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A	4-17-20	First DRAFT issued for comment	JPB	
0	8-21-20	Original Issue	JPB	PH
1	3-11-21	Format updates, inverter requirements	JPB	PH
2	3-15-23	Format updates; voltage criteria additions	PJT	PH
3	03-26-24	Update thermal and voltage criteria sections	PJT	PH
4	11-15-24	Moved most of Section 4 -Design Principles into the Guidelines for Third Party Interconnections	DJD	PH