GUIDELINES FOR
THIRD PARTY INTERCONNECTIONS
NYT-IG-0001

11/15/2024

Contents

1.0 Background

NY Transco applies facility interconnection requirements using the processes and procedures as provided in the most recent NYISO Tariff. It should be noted that NY Transco is a transmission-only Company and does not provide retail service which would need to be coordinated with the electric utility who serves the end-user's location and which many have additional requirements beyond those of NY Transco.

2.0 Information Sharing

NY Transco will provide the seasonal thermal ratings of its equipment at the Point of Interconnection (POI) during the Scoping Meeting and once the NYISO has approved an Interconnection Request. In many cases, NY Transco may only own a portion of the transmission facilities to which entities are looking to interconnect and, in some cases, does not own the entire line or the terminal substations. Therefore, the ratings of NY Transco equipment may or may not be the limiting elements used to set the line ratings.

3.0 NY Transco Interconnection Requirements and Requirements of Affected Transmission Owners

The NY Transco Transmission System is planned in accordance with the fundamental design principles outlined in this document. These principles are applicable to all new projects proposed by the Company and by independent developers of generator, and/or transmission projects. Any requests to the exception of these principles 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. For entities looking to interconnect to NY Transco facilities, they should be aware that NY Transco's assets reside in a highly integrated system that in many cases includes transmission lines and substations owned by other transmission owners. As such, additional interconnection requirements beyond those of NY Transco may be applicable to the interconnection project. The interconnection requirements of all the New York State Transmission Owners can be

located in the FERC Form715 Filing/Planning Reliability Criteria folder on the NYISO's website at: https://www.nyiso.com/ny-power-system-information-outlook.

4.0 Coordination of Studies and Notification to Affected Systems

Interconnection studies are coordinated by NYISO per the Tariff provisions applicable to the type of interconnecting facility. Affected systems are identified in this process and Affected Transmission Owners and owners of other affected systems are notified by NYISO. NY Transco will coordinate with NYISO to confirm that all facilities connecting to the NY Transco transmission system are within the metered boundaries of the NYISO Balancing Authority Area.

All generation and transmission projects must be designed to conform with and adhere to all applicable NERC, NPCC, NYSRC Reliability Rules including NYSRC Local Reliability Rules, as well as applicable NY Transco specifications, procedures and guidelines.

In addition to interconnection studies coordinated by NYISO, new generation and transmission facilities proposing to interconnect to an existing NY Transco transmission line or substation may be required to be evaluated for sub-synchronous resonance (SSR), subsynchronous torsional interaction (SSTI), electromagnetic transient (EMT) impacts, and control system interactions.

5.0 Engineering, Design and Construction of Interconnection Facilities

NY Transco will appoint a Project Manager and use contractors for work related to installation of any interconnection facilities that are required to be performed by NY Transco. Given the physical and electrical layout of the NY Transco facilities with the Affected Transmission Owner(s), the Project Manager will engage with any Affected Transmission Owner(s) as part the NY Transco interconnection requirements.

6.0 Property Rights

NY Transco requires physical ownership of the property on which any POI substation that is connected to its transmission system is situated. Layout of the POI station will be designed to meet NY Transco requirements. Additionally, it is NY Transco's strong preference to have our own access road to the POI substation.

NY Transco requires separate secured fenced areas for all NY Transco substation facilities including all SUF and CTOAF assets. The secured fenced area must facilitate access for all operations and maintenance activities including the ability to perform security patrols around the entire perimeter.

7.0 Startup Testing and Commissioning

NY Transco's Project Manager will coordinate startup testing and commissioning of the interconnection facilities with the interconnecting customer, the NYISO and any Affected Transmission Owner.

8.0 Project Closeout

Upon notification by NY Transco's Project Manager that all project related documents (e.g., drawings, warranties, inspection reports, etc.) are in NY Transco's files and that all contractor bills have been paid, a final reconciliation of actual project cost to total monies collected will occur.

9.0 Interconnection Technical Requirements

The following design criteria are required for interconnection to NY Transco. These criteria serve to ensure safety and power quality on the NY Transco transmission system.

9.1 Primary Interconnection Facilities

NY Transco will determine the viability and feasibility of the proposed interconnection and method of interconnection with the system.

Interconnection plans for new generation facilities and transmission lines shall be designed to ensure system reliability and, as such, shall comply with basic substation reliability design. For example, interconnection plans will avoid overhead crossings of lines and associated substation bus sections; provide adequate separation and, when necessary, independent routing of underground lines; and provide separation of control and relay protection wiring.

9.1.1 Interconnections to a NY Transco Substation

New generation facilities and transmission lines proposing to interconnect to an existing transmission substation shall do so in a manner consistent with the design basis established by NY Transco for that substation; e.g., ring bus, double ring bus, or breaker-and-a-half.

The new interconnection shall not compromise the basic design concepts inherent in these configurations. For example, transmission lines or generation shall not be connected to the syn buses of a breaker-and-a-half configuration. Additionally, a new project shall not interfere with the ultimate design basis of the substation being achieved.

The interconnection of new generation facilities and transmission lines shall satisfy the need for adequate substation diversity recognizing that an acceptable configuration may require the relocation of existing facilities. For example, this design principle requires alternating supply and load lines in substation design.

The interconnection of new generation facilities and transmission lines shall ensure that a single event (e.g., breaker failure) will not result in the outage of multiple supply sources (generation or transmission) into a transmission load area.

The interconnection of new generation facilities and transmission lines shall ensure that a loss of any single facility will not result in the outage of multiple bus sections.

9.1.2 Interconnections to a NY Transco Transmission Line

New generation facilities and transmission lines proposing to interconnect to an existing transmission line shall require the construction of a new substation with the appropriate breaker configuration at the POI to maintain system reliability.

The typical minimum interconnection configuration required for all generation proposing to interconnect to the NY Transco transmission system shall be a three-breaker ring bus, unless an exception is granted as noted below. Additional circuit breakers and alternate substation configurations may be required when interconnecting to multiple transmission lines or interconnecting multiple generating units.

In cases where the interconnection is to an existing transmission line that is operated in parallel with one or more transmission lines with common terminals, then all such transmission lines shall be incorporated into the design of the new substation to prevent the interconnection from causing an imbalance in the distribution of power on the parallel lines.

These provisions may be waived for generators 20 MVA and under in aggregate and connecting to the NY Transco transmission system at voltage levels below 200 kV. Under such circumstances, an exception may be granted, such as a half-breaker configuration. Under no circumstances will NY Transco allow a configuration that adds a terminal to an existing transmission by directly tapping the transmission line. The acceptance of non-standard interconnections is at the sole discretion of NY Transco. Exceptions shall be evaluated on a case-by-case basis and shall be granted only when the following conditions are met:

- Transmission line and interconnection facilities can be protected adequately, while ensuring that transmission system protective relay coordination and relay sensitivity can be maintained.

- Transmission reliability is not adversely impacted as determined through application of the NY Transco Transmission Planning Criteria and any other applicable reliability criteria.
- When deemed necessary, provisions acceptable to NY Transco are made to accommodate the future expansion of the interconnection to, at least, a three-breaker ring bus.

9.2 Protection

This section outlines the protection requirements for interconnection to the NY Transco transmission system. These protection requirements define the minimum requirements to maintain reliability of the NY Transco transmission system. These requirements do not address adequacy of protection of the Interconnection Customer's equipment, which is the sole responsibility of the Interconnection Customer.

9.2.1 Redundancy (Primary and Backup System)

The Interconnection Customer shall design their interconnection protection systems to the same level of safety and reliability to which NY Transco designs its transmission system protection. The Interconnection Customer's protection system shall be designed to sense any type of fault or system abnormality and isolate the Interconnection Customer's facilities from the NY Transco transmission system, even when any component of the Interconnection Customers' protection system fails.

This design requirement is achieved by utilizing redundant protection and control systems; that is, by duplicating all protective relays and associated communication systems, primary voltage and current sensing devices, and DC control circuitry from the protection system trip output through and including the trip coils of circuit breakers or other interrupting devices. This includes providing separately fused primary and backup protection and control systems, overlapping zones of protection to avoid "blind spots" where faults may be undetected by the protection systems, ensuring that all trip paths are not

dependent upon correct operation of a single device, and maintaining no common auxiliary devices (auxiliary relays, lockout relays, programmable controllers, etc.) between the two systems.

Redundant interrupting devices are not required at the POI; however, interconnection breaker(s) require breaker failure protection and direct transfer trip (DTT) to transmit trip signals to adjacent NY Transco and other Transmission Owner substations to disconnect the Interconnection Customer in the event of failure of an interrupting device at the POI.

For facilities that are determined to be NERC BES facilities by application of the NERC BES definition, redundant station DC supplies will be required if it is determined during the interconnection study that redundant DC supplies are necessary to achieve acceptable system performance for a NERC category P5 planning event.

9.2.2 Fault Detection on the NY Transco Transmission System

The Interconnection Customer's protection system shall be designed to detect all abnormal conditions on both the Interconnection Customer’s facilities and the NY Transco transmission system. This includes faults and open phase conditions. The Interconnection Customer's generator and all associated equipment shall be automatically disconnected for these conditions.

Note that it is the Interconnection Customer’s responsibility to ensure that the Interconnection Customer’s equipment is protected against damage caused by faults and abnormal conditions on both the Interconnection Customer's facilities and on the NY Transco transmission system.

It is the Interconnection Customer's responsibility to review the protection of their generator and associated devices. NY Transco is primarily concerned with the protection of NY Transco-owned equipment, and will not review the protection of the Interconnection Customer's equipment except to ensure coordination.

9.3 Monitoring and Control

NY Transco reserves the right to determine all telemetering and supervisory control and data acquisition (SCADA) requirements to allow reliable operation of the electric system and for the proper administration of all contracts.

NY Transco will select the equipment and will provide the Interconnection Customer with acceptable communications media to be used. All equipment costs are the responsibility of the Interconnection Customer as is the cost of the communication medium from the Interconnection Customer's site to a Control Center to be designated by NY Transco. The Interconnection Customer shall also be responsible for the recurring communication costs associated with monitoring and control.

Monitoring the Interconnection Customer's facility requires the communication of real-time telemetering and device status information from the site to a Control Center to be designated by NY Transco. All monitored data shall be remotely accessible through DNP3 protocol by NY Transco's SCADA systems. All analog quantities shall be metered at the POI between the Interconnection Customer's facility and the NY Transco transmission system.

The minimum required data values are as follows:

- Voltage and current on each phase
- Power factor
- Three-phase energy (MWh) at the end of each hour
- Three-phase active (MW) and reactive (MVAr) power
- Device status for motor operated disconnects and circuits breakers at the POI between the Interconnection Customer's facility and the NY Transco transmission system.

Additional monitoring points may be required based on review by NY Transco.

Additional monitoring and control also may be required if the Interconnection Customer participates in NYISO markets.

9.4 Power Quality

9.4.1 Harmonic Limits

The Interconnection Customer shall provide generator controls to maintain proper voltage, frequency, and line current balance and permit synchronizing with the NY Transco transmission system. The Interconnection Customer's electrical output shall meet the performance requirements of the latest IEEE Standard 519 and ANSI C84.1 at the time it goes into service.

9.4.2 Limitation of DC Injection

NY Transco limits the level of DC current injection into the transmission system as it may lead to transformer saturation and other equipment failure. The Interconnection Customer's facilities, including all interconnection equipment, shall not inject DC current greater than 0.5 percent of the full rated output current at the POI.

9.5 Performance/Design

9.5.1 Substation Equipment

All equipment, including but not limited to circuit breakers, bus work, disconnect switches, and structural supports, shall withstand the mechanical forces associated with postulated fault currents and at a minimum the station design basis.

9.5.2 Generator Step-up (GSU) Transformers

GSU transformer connections and winding configurations shall be reviewed and approved by NY Transco before procurement by the Interconnection Customer. Acceptable equipment parameters are often dependent on the location of the POI on the electrical system.

The winding arrangement shall be such that NY Transco's transmission system remains effectively grounded.

GSU transformer and auxiliary transformers shall have no-load tap settings and impedances coordinated with power system voltage control requirements and unit capabilities.

9.5.3 Voltage and Reactive Power

NY Transco will not be obligated to supply or absorb reactive power for Interconnection Customer's new or modified interconnections with NY Transco's transmission system. Such entities shall supply the additional reactive power requirements attributable to such interconnection to ensure reactive power neutrality at the POI to the NY Transco transmission system. This requirement is applicable under normal system conditions (i.e., when all design facilities are in service), as well as steady-state conditions occurring after design criteria contingencies described in the New York State Reliability Council (NYSRC) Reliability Rules & Compliance Manual for Planning and Operating the New York State Power System.

Generation facilities shall be designed to meet 0.85 lagging power factor at 0.95 pu voltage, and 0.95 leading power at 1.05 pu voltage, for N-0 and N-1 conditions.

Projects utilizing synchronous and doubly fed asynchronous machines are required to have excitation systems capable of automatic terminal voltage control. In general, long-term operation with constant excitation (manual mode) is not acceptable. If power factor control is available, it must be automatically disabled following a system disturbance to ensure sustained reactive support after an event. Power factor control and automatic voltage control schemes shall be mutually agreed to between the Interconnection Customer and NY Transco.

Projects utilizing induction machines will be required to utilize switched shunt compensation within their facility to minimize system voltage impacts over the full range of the facility's output.

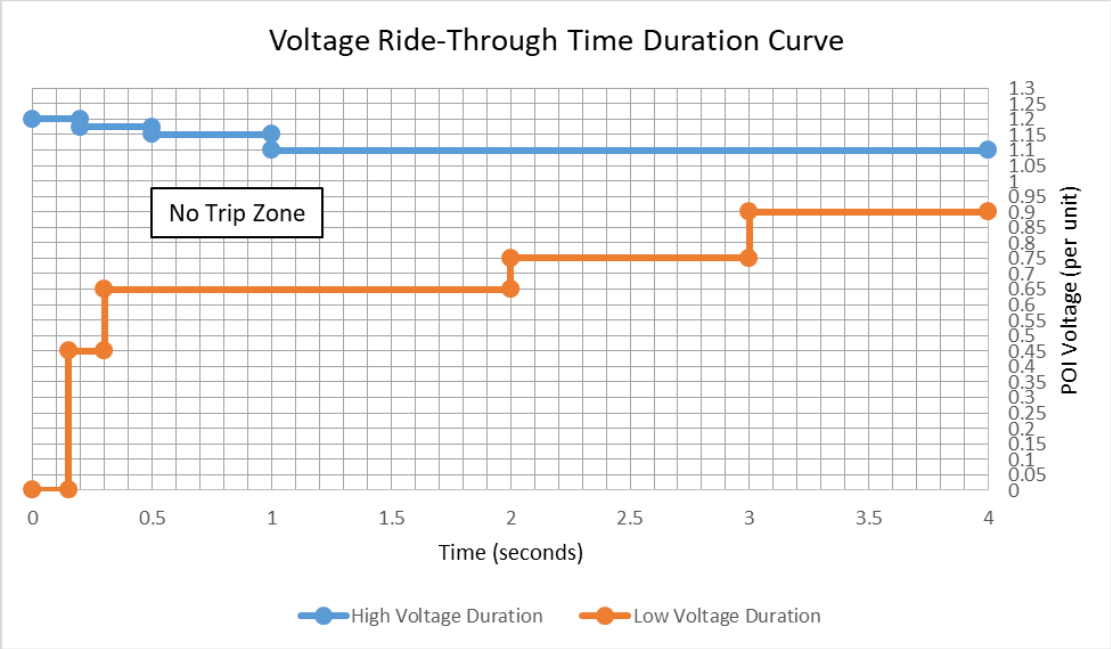
9.5.4 Special Protection Systems (SPS) / Remedial Action Schemes (RAS)

The use of an SPS or RAS on any portion of NY Transco's system, generally, is not allowed. An SPS and RAS would be considered only as a temporary mitigation measure and only while facilities are being constructed for the long-term correction of any adverse system condition(s).

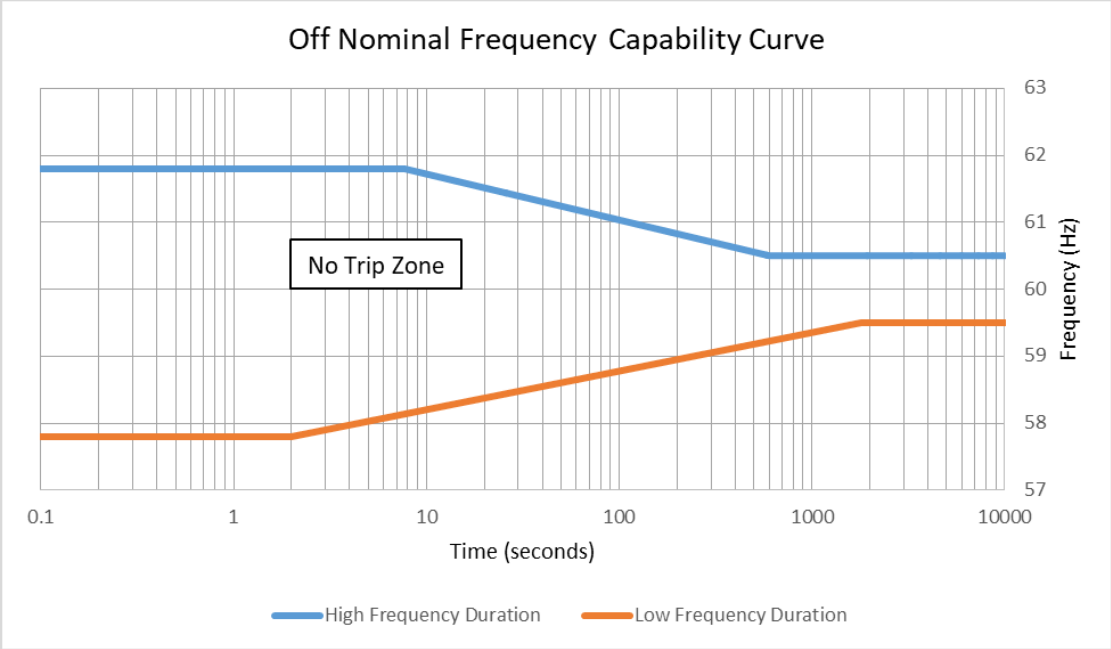
9.6 Additional Requirements for Inverter-Based Resources

Inverter-based generation resources which are interconnected to NY Transco's transmission system shall continue to inject current at the POI inside the "No Trip" zone of the frequency and voltage ride through curves of NERC Standard PRC-024 Attachment 1 and NPCC Regional Standard PRC-006-NPCC Figure 2. (For an illustration of the "No Trip Zone" as presented in the NERC Std. PRC-024 in effect at time of writing of this Planning Criteria document, please see Graph 1 and Graph 2 below. For an illustration of the NPCC Thresholds for Setting Underfrequency Trip Protection for Generators, please see Graph 3 below. Please note that any future interconnection proposals will need to comply with the then current version of NERC Standards, including PRC-024, as may be amended by NERC from time to time and NPCC Standards and Criteria, including PRC-006-NPCC, as may be amended by NPCC from time to time.)

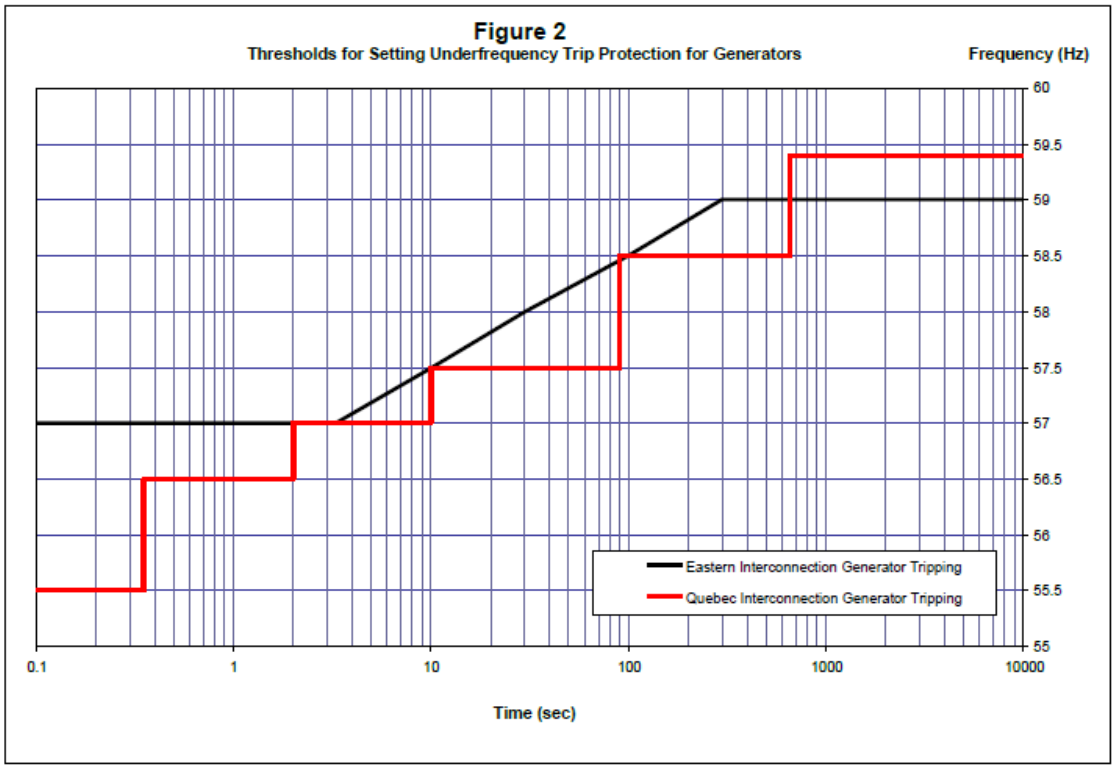
Graph 1: NERC Standard PRC-024 Voltage Ride-Through Requirements



Graph 2: NERC Standard PRC-024 Frequency Ride-Through Requirements



Graph 3: NPCC Standard PRC-006-NPCC Underfrequency Trip Protection for Generators



Inverter-Based generation resources shall support voltage regulation and voltage stability at the POI and as such shall have the capability to operate in automatic voltage control at all times. The automatic voltage control shall be continuously acting to control reactive power injection across all expected planning conditions. Inverter-based generation resources shall follow NYISO's Default Generator Voltage Schedule.

Inverter-based generation resources shall be designed to meet 0.85 lagging power factor at 0.95 pu voltage and 0.95 leading power at 1.05 pu voltage, for N-0 and N-1 conditions at all active power outputs down to 0 MW at the POI.

Inverter-based resources shall not utilize momentary cessation unless it is identified in an interconnection study as being necessary by the NYISO or other Affected Transmission Owners as being necessary to maintain acceptable system performance. If momentary cessation is deemed necessary, NY Transco will approve acceptable settings on a case-by-case basis.

Inverter-based generation resources shall provide primary frequency response (active power-frequency control), implemented at either the inverter-level or at the plant-level, and deliver that primary frequency response to the grid when in an operating condition that would allow for a response. The control shall have an adjustable proportional droop characteristic with a default value of 5 percent. If a deadband is used, it shall be a non-step deadband not to exceed +/- 0.036 Hz. If hysteresis is used in the deadband, it shall not exceed +/- 0.005 Hz on either side of the deadband. Hysteresis shall not be used if frequency measurement resolution is not sufficient to accurately measure this frequency.

9.7 Additional Requirements for Storage Facilities

Storage Facilities, such as Battery Energy Storage Systems (BESS), Advanced Compressed Air Energy Storage (A-CAES), and Pumped Storage facilities shall be considered as a generator rather than a load. However, when evaluating system impacts these types of facilities will be evaluated for impacts caused while acting as both a generator and a load.

Contact information:

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

REVISION HISTORY

REV #	DATE	Revision(s)	Preparer	Approver
0	03-07-21	Original Issue comment		NH
1	03-10-21	Modifications to address FAC-001, asset changes	PT	PH
2	11-15-24	General Revision – Incorporated design principles from the NY Transco Transmission Planning Criteria.	PT	PH