New York ISO
Independent System Operator

Transmission Security Assessments

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Agenda

- Purpose and Background
- Transmission Security Assessments – Current Practices
- Capacity Market Process
- Near-Term Action Plan and Next Steps

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Purpose

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Transmission Security Assessments

- As part of the stakeholder review of the Transmission Security Limit (TSL) and TSL Floor implementation, stakeholders have observed that different treatments of supplier availability are applied in the Capacity Market procurement process compared to the Reliability Planning Process, and some stakeholders have recommended the consideration of supplier [un]availability should be removed from the floor calculation.
- The NYISO has considered the feedback and reviewed the transmission security assessments in the Reliability Planning Process and Capacity Market procurement process.
- The presentation provides background, a high-level overview of current practices, and proposed next steps.

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Background

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Reliability of the New York Power System

- **The main aspects of reliability are rooted in resource adequacy and transmission security requirements, defined by the NYSRC.**
  - Resource adequacy is the ability of the electric system to supply the aggregate electrical demand and energy requirements of the customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.
    - Resource adequacy is assessed through a probabilistic analysis of the system's loss of load expectation (LOLE) of disconnecting firm load due to resource deficiencies, not to exceed 1 day in 10 years allowing for emergency transfer criteria.
  - Transmission security is the ability of the electric system to withstand disturbances such as electric short circuits or unanticipated loss of system elements.
    - Transmission security is a deterministic analysis of credible combinations of system conditions which stress the system. The system is assessed for its ability to withstand the loss of specified, representative and reasonably foreseeable design criteria contingencies (N-1, N-1-1, N-1-1-0) at projected customer demand and anticipated transfer levels. Design criteria are applied according to normal transfer criteria.

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Short History of NYISO Capacity Market

- **The primary objectives of today's NYISO Capacity Market is to maintain sufficient capacity to satisfy both statewide resource adequacy and ICAP locality requirements respecting transmission security, by providing revenue adequacy for supply resources.**
- **Prior to 2017, the Capacity Market established the IRM and LCRs developed using the Tan 45 process.**
  - Tan 45 process
    - Starts with the as found system
    - Balances use of existing generation and transmission assets
    - Historically resulted in sufficient capacity to meet both resource adequacy and transmission security requirements for the NYC and Long Island localities

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Introduction of the Capacity Optimizer

- In 2017, the NYISO introduced the concept of the Capacity Optimizer as a way to minimize costs while still maintaining sufficient capacity to meet reliability.
- The Transmission Security Limit (TSL) was introduced into the optimizer as a floor to maintain sufficient resources in the ICAP localities to meet transmission security criteria.

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Transmission Security Limit

- **Determined each year though a study that is reviewed by stakeholders.**
  - Developed for N-1-1 transmission contingencies into the G-K and K localities.
  - For the J locality, TSL is determined assuming the second transmission contingency has occurred and the system is returned to normal ratings (N-1-1-0).
    - Based on NYSRC Local Reliability Rule G.1-R1.
    - Consistent with the NYISO Operating Objective to operate in the "normal" operating state following the worst first contingency.
      - Rules allow Operations to go into Emergency Transfer Criteria (ETC) to avoid load shedding.
- **The most recent TSL report is posted at the following link**
  - https://www.nyiso.com/documents/20142/17462310/Summer2021-N-1-1-Analysis.pdf/ed9b287a-a484-4460-37c8-a923be6354e1

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Transmission Security – Current Practices

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Reliability Planning Process

- **Main objectives of the Reliability Planning Process:**
  - Identify Reliability Needs pursuant to applicable reliability criteria;
  - Identify, through the development of appropriate scenarios, factors and issues that might adversely impact the reliability of the bulk system;
  - Provide a process whereby solutions to identified needs are proposed, evaluated on a comparable basis, selected (as applicable), and implemented in a timely manner to ensure the reliability of the system;
  - Provide an opportunity first for the implementation of market-based solutions while providing for the reliability of the bulk system;
  - Coordinate the NYISO's reliability assessments with neighboring control areas.
- **Also as part of the Reliability Planning Process, the Market Monitoring Unit reviews the primary reliability studies and considers whether market rules changes are necessary to address an identified failure, if any, in one of the ISO's competitive markets.**

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Transmission Security Assessments

- **Transmission security analysis conducted in all planning studies complies with criteria established by the NERC, NPCC and NYSRC.**
  - Compliance documented in annual Area Transmission Review (link to 2020 ATR)
  - Reliability Needs and solutions are addressed in Short Term Assessments of Reliability (STARs), Reliability Need Assessments (RNAs), and Comprehensive Reliability Plans (CRPs)
  - Assumptions reviewed regularly with stakeholders and the NYSRC
- **Transmission security analysis conducted for, and incorporated into, the Capacity Market and Locational ICAP Requirements is consistent with stakeholder discussions and representations made during the development of the Alternative LCR Optimization mechanism and the applicable tariff filings (see MST 5.11.4(c)) and is aligned with the Capacity Market resource procurements and Operational expectations.**

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Design Criteria (All NYCA)

- **N-0, N-1: This represents the system condition before any event actually occurs (i.e., N elements in-service).**
  - System dispatched such that all facilities are (1) within normal (24-hour) ratings pre-contingency (N-0) and (2) secured to applicable normal transfer criteria post-contingency ratings (typically LTE 4-hour ratings) for preparation of the next design criteria event (without that event actually occurring: N-1).
  - Events: loss of transmission, transformer, shunt, generator, or bus section, and loss of multiple elements due to a common tower or stuck breaker.
- **N-1-0, N-1-1: Starting from the secured system condition (N-0, N-1), a single element design event has actually occurred (loss of a transmission line, transformer, shunt, or generator).**
  - With that outage, system is redispatched with adjustments that are possible within 30 minutes of the first event such that all facilities are (1) within normal ratings pre-contingency, and (2) secured to applicable normal transfer criteria post-contingency ratings.

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Design Criteria (NYC only)

- **N-1-1-0: Starting from the secured system condition following one outage and system adjustments (N-1-1), the second contingency event has actually occurred (loss of transmission, transformer, shunt, generator, or bus section, and loss of multiple elements due to a common tower or stuck breaker)**
  - With that outage, system is redispatched with adjustments that are possible within 30 minutes of the second event such that all facilities are within normal ratings pre-contingency.

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Identification of Reliability Needs

- Power flow simulations are performed to calculate the balance of resources, and identify resource and transmission deficiencies in any given portion of the bulk system
- Load = Generation + Imports – Losses
- When there is insufficient generation or transmission capability to meet load and losses, a Reliability Need would be identified.
  - In transmission security analysis, this typically takes the form of an overloaded transmission circuit due to insufficient local generation to serve projected load.

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Reliability Planning Process
Transmission Security Assumptions

- **See 2020 RNA and Q1-2021 STAR for details of most recent assumptions**
- **Load assumption: all load levels considered, peak load typically most stressed system condition**
- **Key resource assumptions:**
  - Generation removed if there is a known forced outage during the study period or if it has a completed deactivation notice
  - Generation removed if part of N-1-1 or N-1-1-0 outage events (represents forced outages)
  - Fossil-fueled: maximum output = Dependable Maximum Net Capability (DMNC)
    - Assumes fuel availability at peak hour
  - Land-based wind: zero output
    - Represents low certainty that wind will be blowing at peak hour
  - Solar (utility-scale and behind-the-meter): de-rated level coincident with peak load period
  - Special Case Resources (SCRs): zero under normal transfer criteria, full contribution under emergency transfer criteria

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Capacity Market Differences Compared to Planning

- **Generation unavailability**
  - The Capacity Market procurement focuses on transfer limitations driven by transmission contingencies, without accounting for forced outages represented by generation contingencies. Rather, the Capacity Market procurement incorporates a 5-year derating factor measuring resource unavailability and satisfies procurement targets based upon resources UCAP contributions. This derating factor is accounted for after the calculation of the transmission security limits.
- **Resource contributions**
  - The Capacity Market procurement allows wind resources and SCRs to meet ICAP locality transmission security requirements.

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Capacity Market Process

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Accounting for Supplier [Un]availability

- **Consideration of supplier [un]availability in the ICAP Market:**
  - Allows for all capacity market suppliers capable of meeting transmission security needs to be represented on a comparable basis (e.g., UCAP)
  - Allows for a direct comparison of transmission security needs relative to resource adequacy needs because both requirements can be expressed in either ICAP or UCAP terms.
- **Consideration of supplier [un]availability results in ICAP locality requirements more consistently aligned with historical tan 45 values.**
- **Consideration of supplier [un]availability is consistent with historical operational experience and historical generation availability.**
- **At this time, the NYISO does not support a change to the current accounting of supplier [un]availability, but NYISO proposes a further assessment of transmission security practices.**

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Near-Term Action Plan

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Assessment of Best Practices

- **NYISO appreciates the interest in the topic and the research into the practices that have occurred as a result.**
- **NYISO has identified two areas of focus:**
  - Lack of alignment between the Planning and Market practices.
    - Different treatment in the application of contingencies, generation unavailability, and resource mix may result in inconsistent identification of desired resources.
  - Historical practices regarding generator unavailability may not be sufficient to maintain reliability going forward as the fleet transitions to intermittent resources.
    - Historical reliability needs have been driven by summer afternoon high temperature peak loads and have been met by conventional, fossil fuel resources with non-coincident failure modes.

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Assessment of Best Practices

- **NYISO believes it is necessary to undertake an assessment of the current transmission security practices:**
  - Objective(s) of the assessment:
    - Challenge current assumptions and practices and determine if they are sufficient to sustain reliability expectations while accounting for the changing characteristics of the power system and resource fleet.
    - Provide recommendations to evolve transmission security assessment practices.
    - Provide alignment between Planning and Market practices with Operational needs.

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Assessment of Best Practices

- **Key Elements of the Assessment:**
  - Review current transmission security analysis assumptions and practices and provide recommendations to enhance outcomes. Sample items to be considered include:
    - Representation of generator unavailability
    - Representation of generator capabilities
    - Load forecast level to be secured for
    - Application of emergency transfer criteria vs. normal transfer criteria
    - Post contingency operating conditions and expectations
    - Post contingency reserve availability
    - Representation of transmission limitation durations
    - Representation of duration-limited resources
    - Representation of weather dependent resources
    - Representation of BTM solar resources
  - Review industry practices for transmission security assessment
  - Evaluate impact of recommendations on resource adequacy methodologies

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2021-2030 Comprehensive Reliability Plan

- One of the main objectives of the Reliability Planning Process is to identify factors and issues that might adversely impact the reliability of the New York grid, and provide that information to aid system planning, market design, and policymaking.
- The 2021-2030 CRP, to be completed by the end of 2021, will include assessments of "tipping points" that will identify the impact of plausible changes in assumptions that may impact reliability in the future.
  - This can address all areas of transmission security assumptions
  - Will review potential future resource mixes
  - Will include impact of additional forced outages on transmission security beyond N-1-1 and N-1-1-0
- For more information, see May 20, 2021 ESPWG presentation
- Results and draft findings will be reviewed at ESPWG July through September

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Near-term Actions for 2022 TSL Floor Determination Process

- **Exploration of the treatment of the 901/903 PAR controlled ConEd-LIPA lines**
  - The current transmission security assessment practices (both Reliability Planning and Capacity Procurement) maintain a scheduled power flow into Con Edison, per normal operating practices.
  - The current Resource Adequacy Assessment practices allow for the power flow adjustment of 901/903 PAR controlled lines into the Long Island area under emergency operating conditions.
  - Emergency operations procedures would be expected to allow for the power flow adjustment of 901/903 PAR controlled lines area to address transmission security emergencies under the assumption of historical supplier [un]availability.
- **Action Plan:**
  - Determine applicable modeling treatment for 901/903 PAR controlled ConEd-LIPA lines (August)
  - Incorporate treatment into TSL Calculation Process (October)
  - Incorporate into TSL Floor Determination Process (December)

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Next Steps

- Commence action plan for 2022 TSL Floor determination process.
- Please provide any feedback on the proposed process assessment.
  - Please send feedback to DEckels@nyiso.com
- Brief NYSRC on NYISO recommended course of action.
- Consider feedback and return to ICAPWG/ESPWG in September with scope and timeline for further next steps.

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Questions?

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Appendix

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2010-2020 IRM and LCR Values

Capability Year (May - April)	Base Case IRM (%)	EC Approved IRM (%)	NYCA Equivalent UCAP Requirement (%)	NYISO Approved NYC LCR (%)	NYISO Approved LI LCR (%)	NYISO Approved G-J LCR (%)
2010	17.9	18.0	6.12	80.0	104.5	
2011	15.5	15.5	6.03	81.0	101.5	
2012	16.1	16.0	5.35	83.0	99.0	
2013	17.1	17.0	6.58	86.0	105.0	
2014	17.0	17.0	6.38	85.0	107.0	88.0
2015	17.3	17.0	7.01	83.5	103.5	90.5
2016	17.4	17.5	6.21	80.5	102.5	90.0
2017	18.1	18.0	7.04	81.5	103.5	91.5
2018	18.2	18.2	8.08	80.5	103.5	94.5
2019	16.8	17.0	6.72	82.8	104.1	92.3
2020	18.9	18.9	9.03	86.6	103.4	90.0

http://nysrc.org/PDF/Reports/2021%20IRM%20Study%20Appendices%2012_4_20%20(1).pdf

The LCRs in 2021 are 102.9% in Zone K, 80.3% in Zone J and 87.6% in Zones G-J to meet transmission security requirements

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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