The Long-Range Transmission Plan
2016 – 2026

Transmission Planning Department
Consolidated Edison Company of New York, Inc.

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1.0 EXECUTIVE SUMMARY

The Long-Range Transmission Plan ("Plan") is focused on achieving the objective of reliably serving forecasted loads over a 10-year planning horizon under certain conservative assumptions on the interconnection of new generating projects. The Plan meets this objective and adheres to Con Edison's Transmission Planning Criteria. The Plan meets the requirements set by FERC through the NYISO tariff that Transmission Owners (TOs) must design their systems in a transparent and open manner. In terms of the NYISO tariff the Plan is Con Edison's Local Transmission Plan or LTP. The Plan may change over time in order to adapt to changing future conditions which include: variations in load forecast, variations in load distribution across the service area, evolving new generation development projects, generation retirements and mothball announcements, transmission projects, demand side management programs, evolution in the regulatory (including Reforming the Energy Vision or REV, and Public Policy provisions approved by FERC) and/or power market rules, and advancements in transmission technology.

Major new assumptions incorporated with the 2016 plan include:

1. Revised configurations utilizing the 2016 (year 1), 2021 (year 5) and 2026 (year 10) FERC Form 715 models from the NYISO, updated with more recent forecasts of Con Edison loads anticipated for 2016, 2021, and 2026.
2. The PJM / Con Edison Wheel to be discontinued for the year 2017 and beyond, based on Con Edison's stated intent[1] to discontinue the Wheel in April, 2017.

The Con Edison's Transmission Planning Criteria contain deterministic requirements and are distinguished from NYISO's resource requirement probabilistic Loss of Load Expectation (LOLE) criteria. Con Edison does not enforce LOLE requirements through its Criteria.

[1] See letter of intent submitted by Con Edison to the New York State Department of Public Service in re: Case 12-E-0503 - Notice of Non-renewal of PJM Transmission Service, which can be found at this site: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b2E6C8F70-5077-4E7C-896A-74086011913B%7d

The Transmission Load Areas[2] (TLAs) evaluated in the development of the Plan were: New York City - 345 kV, West 49th Street - 345 kV, New York City - 138 kV, Astoria - 138 kV, Greenwood / Staten Island - 138 kV, East 13th Street - 138 kV, Corona / Jamaica - 138 kV, Bronx - 138 kV, Astoria East / Corona - 138 kV, Astoria West / Queensbridge - 138 kV, Vernon - 138 kV, Staten Island 138 kV - 138 kV, East River - 138 kV, Eastview - 138 kV, Dunwoodie North / Sherman Creek- 138 kV , Dunwoodie South- 138 kV, and Millwood / Buchanan - 138 kV.

The 2016 Long Range Plan identified no new deficiencies with the defined TLAs. However, the 2016 Plan did reaffirm deficiencies in two load areas that were previously identified in the 2014 Long Range Plan. These are: Greenwood / Staten Island, Astoria East / Corona – 138 kV, as having a deficiency condition relative to planning criteria over the planning horizon. The Plan continued to support the previously recommended solution for the deficiency in Astoria East / Corona, specifically the establishment of a phase angle regulated transmission feeder connecting Rainey and Corona substations. The Plans continued to support the previously recommended solution for the Greenwood / Staten Island area, specifically the establishment of an additional breaker at Greenwood to mitigate the impact of the worst contingency. These solutions are on track for completion and have been incorporated into the base cases for the 2016 Long Range Plan.

The Plan also discusses the prospects for new transmission and generation in the Con Edison system over the study period based on an analysis of the overall capacity of projects in the NYISO Interconnection Queue. The uncertainty of proposed developer projects reaching commercial operation would make planning the future system topology a challenging and evolving task. For this reason, there were no projects within the NYISO Interconnection Process that were considered in the development of the Plan. . In any case, as future projects come to fruition, each will be required to adhere to reliability provisions in the NYISO tariff, including Con Edison's Transmission Planning Criteria.

The Governor's Energy Highway initiative resulted in a Blueprint with at least two specific New York PSC initiatives that have a bearing on reliability in New York City.

[2] Transmission Load Areas are specified portions of the transmission system designated for convenience in studying the reliability of the system.

The first was entitled: *Proceeding on Indian Point Contingency Plan* and *Proceeding to Examine Alternating Current Transmission Upgrades,* which resulted in several transmission projects that have been implemented under the category of "Transmission Owners Transmission Solutions (TOTS). The PSC's second initiative is called "AC Transmission Upgrades"[3] is ongoing, and will address the persistent transmission congestion that exists at the UPNY/SENY interface under the category of a "Public Policy Transmission Need".

The NYISO 2016 Reliability Needs Assessment (RNA) study has not identified any system adequacy deficiencies for the state in its 10-year planning horizon studies, or any specific transmission security deficiencies in the Con Edison System.

With the discontinuation of the PJM / Con Edison Wheel, the base case power flows for the inter-utility tie lines associated with the Con Edison / PJM Wheel have been set to zero for all studies performed for the years 2017 and beyond. In addition, all studies have been performed such that the post-contingency power flows on the transmission tie lines A2253, B3402 and C3403 along with the 230 kV phase angle regulators at Waldwick are adjusted to zero as part of the overall response following any N-1 or N-1-1 contingency event.

[3] The New York Public Service Commission Website: www.dps.ny.gov/ACTransmission/ provides the background and description of this initiative.

2.0 OVERVIEW

This document lays out Con Edison's plan ("the Plan") for the transmission system over a 10-year planning horizon[4]. Recognizing future uncertainties, the Plan should be viewed as a robust yet flexible framework or roadmap for direction rather than a well-defined series of projects to be implemented on a set schedule. Decisions on the implementation of specific projects are made based on reliability needs that are affected by numerous factors, including the economy, customer usage behavior, Distributed System Implementation Plan (DSIP) initiatives and developer projects. As factors change so must the Plan.

This is the eighth edition of the Plan to be published on the Con Edison web site (www.coned.com) and presented at the NYISO TPAS. Previous editions have been published as follows:

Edition	Publication Date
First	09/22/2009
Second	08/27/2010
Third	09/15/2011
Third Edition Update[5]	02/17/2012
Fourth	10/3/2013
Fifth	09/23/2013
Sixth	09/15/2014
Seventh	10/15/2015

[4] The posting and discussion of this document satisfies the requirements of Order 890 for openness and transparency in local transmission planning. The document itself constitutes the Local Transmission Plan (LTP) referred to the in the NYISO tariff.

[5] A special update to the third edition was published in response to a major change in the system, the notice of mothballing of generators at Astoria and Gowanus.

2.1. Factors Affecting the Long-Range Transmission Plan

Factors that affect the Plan include:

i. Changes in reliability requirements;

ii. Changes in econometric load forecasts;

iii. Impact from directives of the New York State "Reforming the Energy Vision" (REV) plan and Con Edison's developing initiatives under the umbrella of the DSIP;

iv. Impacts from the State's Energy Efficiency Portfolio Standard (EEPS) and Renewable Portfolio Standard (RPS) programs;

v. Other state and national policy programs such as the Regional Greenhouse Gas Initiative (RGGI) and Public Policy planning provisions under FERC;

vi. New merchant generation and transmission;

vii. Decisions under the New York Independent System Operator's (NYISO's) Comprehensive Reliability Planning Process (CRPP) as well as FERC Orders 890 and 1000;

viii. Potential new legislation on the interconnection-wide planning process; and

ix. Potential changes in the NYISO's Locational Capacity Requirement for New York City (NYISO Zone J).

Of particular importance is Con Edison's DSIP program. Components of this program have been embedded in the Company's Ten-Year Load Forecast that was used for this study as follows:

Category	Amount (MW)
Energy Efficiency (EE)	111
Demand Response (DR)	197
Demand Management Program (DMP)	19
Integration of Distributed Generation (DG)	153
Photovoltaics (PV)	80
Electric Vehicle Load	-46
Steam AC to Electric Load Conversion	-48
Total	466

At sufficient magnitudes, the components of Con Edison's DSIP program can result in the deferral of significant transmission investments. Elements of the DSIP program contributed to the deferral of new or upgraded transmission substations within the 10 year planning period (See Chapter 7).

The studies that support the Plan reflect current assumptions regarding these factors. Conversely, the Plan needs to be updated periodically to capture, among other issues, updated assumptions. One example of this would be the New York PSC Orders providing new sources of funding for the state's nuclear fleet as well as the Clean Energy Standard (CES) designed to meet the Governor's "30 x 50" goal of generating 50% of the state's energy needs with renewables by 2030.

2.2. Con Edison's Distribution System Implementation Plan (DSIP)

Con Edison's DSIP initiative represents the Company's overall response to New York State's "Reforming the Energy Vision" (REV) initiative. Although these initiatives exist at levels below that of the Transmission System, their overall impact can reach Transmission levels. For that reason, a short description of the program and some examples are provided in the following pages.

On February 26, 2015, the New York State Public Service Commission issued its Order Adopting Regulatory Policy Framework and Implementation Plan (Track One Order)[6] in its Reforming the Energy Vision (REV) initiative which details the regulatory framework and implementation plan for REV. This Initial DSIP filing is a thorough self-assessment of the Company's system and describes immediate opportunities that will further contribute to REV policies and goals. The DSIP will serve as a source of public information regarding the Company's DSP plans and objectives and the template for an integrated approach to planning, investment, and operations. The DSIP documents the Company's plans over a five-year period and will be updated every two years. Per the Commission's April 20, 2016 Order Adopting the DSIP Guidance (DSIP Order)[7], the

[6] Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (REV Proceeding), Order Adopting Regulatory Policy Framework and Implementation Plan (issued February 26, 2015) (Track One Order).

[7] REV Proceeding, April 20, 2016 Order Adopting Distributed System Implementation Plan Guidance (DSIP Order). In the same proceeding, on October 15, 2015, the Staff Proposal Distributed System Implementation Plan Guidance (Staff DSIP Guidance) was issued and was followed by stakeholder comments, including those of the Joint Utilities (Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., New

Company will jointly file a Supplemental DSIP on November 1, 2016 with the Joint Utilities (JU)[8], to outline the joint plan for the tools, processes, and protocols required and a coordinated approach for deployment. These topics include probabilistic planning, system data sharing standards, further development of hosting capacity, and details of stakeholder engagement.

Consolidated Edison Company of New York, Inc. (the Company or Con Edison) is excited to be among the utilities at the forefront of the changing energy landscape, and to be committed to dramatically changing the way energy is produced and consumed in New York. It is with these goals in mind that Con Edison presents its Initial Distributed System Implementation Plan (DSIP)[9]. This five-year, self-assessment and strategic roadmap responds to the Order Adopting the DSIP Guidance[10] , and strives to take a larger look at the efforts the Company is undertaking to give customers more choice, control, and convenience and to remake the day-to-day planning and operation of the electric system. This DSIP outlines Con Edison's plan to efficiently integrate Distributed Energy Resources (DER) and promote the Company's goals of customer engagement, reliability, and operational excellence. The DSIP also includes a plan for encouraging technological innovation and promoting a robust marketplace for DER. In addition, key planning information, including the electric demand and energy forecast, and capital budget, will be updated and shared with stakeholders in an effort to provide timely and actionable information with regard to potential market opportunities. The highlights of the DSIP include:

I. Five-year roadmap to have integrated approximately 800 MW of DER by 2020
    a. Builds on the robust growth of solar energy
    b. Enables the steady growth of combined heat and power which enhances resiliency

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York State Electric and Gas Corporation, Niagara Mohawk d/b/a National Grid, Orange and Rockland Utilities, Inc., and Rochester Gas & Electric Corporation. In view of the timing of the Staff DSIP Guidance and DSIP Order, and the need to initiate preparation of the DSIP well before its due date, there may be non-material discrepancies between the DSIP and the DSIP Order.

[8] See note 3 above for the listing of the Joint Utilities.

[9] Con Edison submitted their Initial DSIP to the NY Public Service Commission on June 30th, 2016. This can be found at: http://documents.dps.ny.gov/public/MatterManagement/MatterFilingItem.aspx?FilingSeq=163160&MatterSeq=44991

[10] Case 14-M-0101 Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (REV Proceeding), Order Adopting Distributed System Implementation Plan Guidance (April 20, 2016).

c. Provides greater opportunity to benefit from the Company's successful Energy Efficiency and Demand Response programs

II. Grid modernization investment plans in support of DER

a. Builds adaptability and increases grid edge monitoring so the grid benefits from increasing amounts of DER

b. Implements Advanced Metering Infrastructure (AMI) to provide the cyber secure backbone and metering information that will be critical to developing the new market place envisioned by the Commission

c. Seeks strategic transmission investments to enable large scale renewables (LSR)

III. Multi-pronged plan to stimulate DER growth

a. Outlines opportunities, in the capital investment plan, for Non Wires Alternatives (NWA) including the ongoing Brooklyn Queens Demand Management (BQDM) project which targets 52 MW of NWA. A significant portion of that total will be achieved with a new and innovative Demand Response Auction, which is described below.

b. Presents several new candidates for NWA solutions, potentially including Glendale (which is a 60 MW load transfer and installation of a substation transformer) and several projects at the distribution level.

2.2.1 BQDM Demand Response Auction

Con Edison has filed with the NY Public Service Commission requesting approval to allow the use of a BQDM DR auction as the sole mechanism for procuring "peak shaving" DR resources so aggregators and customers seeking to provide such DR resources in the BQDM area for 2017 and 2018 are able to do so via the auction, instead of through the more conventional Commercial System Relief Program (CSRP). By reducing the need for power in these areas through DR, Con Edison will defer the construction of a $1.2 billion substation.

The auction was held in late July, 2016. Companies serving as "demand response providers" submitted bids indicating how much money they wanted for reducing reliance on energy from the grid at peak times.

The auction started with ceiling prices for roughly a dozen bidders, who then offered lower prices. Con Edison accepted offers from 10 of those providers and will pay prices ranging from $215 per kilowatt per year to $988 per kilowatt per year.

As a result, Con Edison expects energy usage to drop by 22 megawatts by 2018 on afternoons and evenings when the company asks participating customers to cut back on their consumption of energy from the grid.

2.3. Con Edison Transmission Planning Criteria

System expansion and the incorporation of new facilities must follow the established and published Con Edison Transmission Planning Criteria, EP-7100[11]. The criteria document describes Con Edison's Transmission Planning Criteria for assessing the adequacy of its transmission system to withstand design contingency conditions while providing reliable supply to all its customers throughout the planning horizon. The document includes a description of the Company's transmission system design principles, performance criteria, and voltage, thermal and stability assessments and is updated when there are changes to existing criteria or when new criteria items are added. This year's edition of the Long Range Plan was based on version 13 of TP-7100, which is publicly available and posted on the Con Edison website.[12]

All system expansions, whether by Con Edison or by other parties, must be made in accordance and in compliance with NERC Standards[13], NPCC Criteria[14], NYSRC Reliability Rules[15], NYISO Procedures[16], and the Con Edison Transmission Planning Criteria. As of July 1, 2016 Con Edison assumed responsibilities as a Transmission Planner (TP) under NERC.

2.4. Relationship with FERC Orders 2003, 890 and 1000

FERC Order 2003 *Standardization of Generator Interconnection Agreements and Procedures* established rules and procedures that govern large generation

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[11] The Con Edison Transmission Planning Criteria; EP-7100 dated March 29, 2016, was adhered to in developing this Plan.
[12] http://www.coned.com/documents/EP-7100-13.pdf
[13] NERC Standards can be found at the website:
[14] NPCC Directories can be found at the website: https://www.npcc.org/Standards/Directories/Forms/Public%20List.aspx
[15] NYSRC Reliability Rules can be found at the website: http://www.nysrc.org/NYSRCReliabilityRulesComplianceMonitoring.html
[16] NYISO Procedures, manuals and guides can be found at the website: http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp

interconnections. In New York, parts of Order 2003 are addressed by tariff provisions in the NYISO OATT, Attachment X. Merchant generation can follow a defined process to interconnect at the location of its choice, and the TO's Long-Range Transmission Plan must consider this. Further, TOs are required to meet load for a given year[17] with generic generation placed at feasible locations. The NYISO has also adopted a deliverability requirement, embedded in Attachments X of the NYISO OATT, in addition to the prior minimum interconnection standard for those generation resources that wish to sell capacity in addition to energy. As a result of the application of this tariff, new generation may require changes and additions to the transmission system that address any reliability criteria violations that may result from that project. This year, the NYISO added similar expedited tariff provisions for new transmission interconnections under its new Transmission Interconnection Process (TIP).

FERC Order 890 "*Preventing Undue Discrimination and Preference in Transmission Service*" requires reliability and economic processes for new transmission. In New York, the reliability planning process is the first step of the Comprehensive System Planning Process under the NYISO OATT, which places primary emphasis on implementing new market-based merchant resources to meet a reliability need if there is a system capacity LOLE greater than 0.1, or one load disconnection event over a 10-year period. The Comprehensive Reliability Plan issued by the NYISO then identifies regulated backstop solutions to be developed by the appropriate TOs that would be triggered by the NYISO if the market does not produce a merchant solution in a timely manner.

Further, Order 890 contains certain principles to achieve the non-discriminatory, open and transparent goals of the planning process that must be followed by both the NYISO and the local TOs. The posting of this document and its discussion with interested parties are intended to satisfy some of these requirements. The NYISO sets a schedule for meeting these requirements in advance of its Load and Capacity Data Report (aka "Gold Book") used at the start of next RNA cycle.

Since there are many reasons that may affect decisions on future generation, DSM and transmission, it is necessary to make reasonable assumptions on such changes in

[17] Attachment S of the NYISO OATT includes the concept of Class Year in which Generator Owners can place themselves so that the reliability of the system can be studied with the collective presence of all generators in the Class Year.

the development of the Plan. However, in all circumstances, the driver for the local Long-Range Transmission Term is maintaining reliability.

On July 21, 2011, FERC issued Order 1000 on Transmission Planning and Cost Allocation, which affirms certain Order 890 requirements and establishes some new ones. Order No. 1000's transmission planning reforms require that each public utility transmission provider: (1) participate in a regional transmission planning process that produces a regional transmission plan and (2) amend its OATT to describe procedures for the consideration of transmission needs driven by public policy requirements established by local, state, or federal laws or regulations in the local and regional transmission planning processes.

To comply with the interregional transmission coordination and cost allocation requirements of Order 1000, ISO-NE, NYISO and PJM amended an existing Northeastern ISO RTO planning coordination agreement, which was originally adopted in 2004. The stated goal of the amended Northeastern Protocol is to contribute to the ongoing reliability and enhanced operational and economic performance of the three regions through coordinated planning.

On February 19, 2015 FERC directed the NYISO to file tariff revisions to establish rates, terms and conditions for "Reliability-Must-Run" (RMR) service under which generating units that announce their intention to shut down, but are needed to ensure transmission system reliability and the efficient operation of the NYISO markets, remain in service. RMR contracts should be limited in duration. On October 19, 2015 the NYISO complied with FERC's RMR directive and included cost allocation approaches that would apply to RMR contracts and to long-term solutions to identified reliability deficiencies.

FERC directed the NYISO to submit its RMR compliance filing, which the NYISO did on September 19, 2016. NYISO's filing provides for TOs to provide updates to their LTP that may address reliability criteria violations upon generation deactivation.

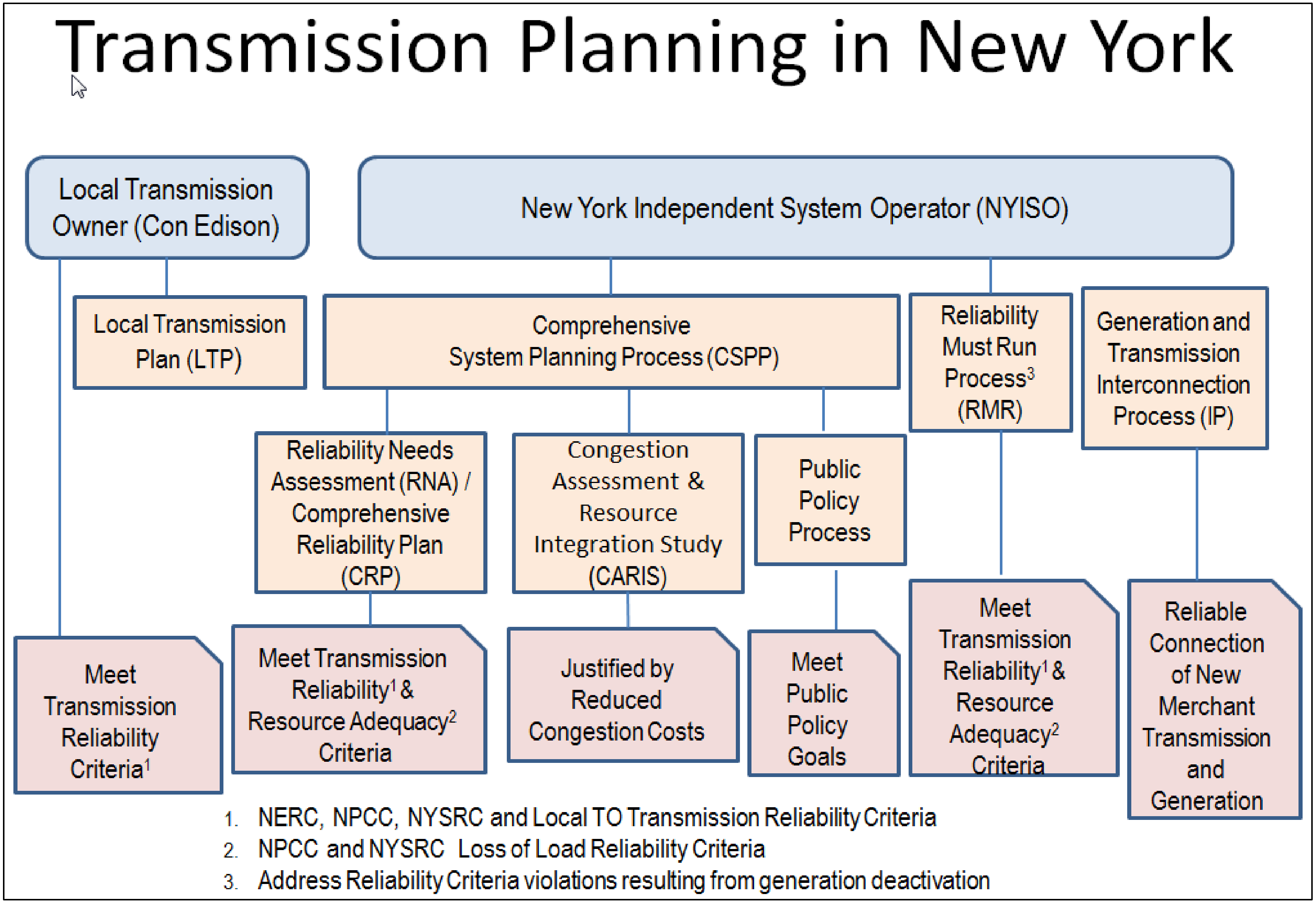
2.5. Transmission Planning in New York

An overview of the transmission planning process in New York is graphically represented on the following page. It shows that there are a number of programs embedded in the NYISO tariff that may result in new transmission added to the New York transmission system:

- The Local Transmission Plan (LTP) program of Transmission Owners. Con Edison's Long-Range Transmission Plan is its LTP.
- The NYISO's Comprehensive System Planning Process (CSPP) that has three separate programs:
  - Reliability Needs Assessment (RNA) followed by the Comprehensive Reliability Plan (CRP),
  - Congestion Assessment & Resource Integration Study (CARIS), and,
  - Public Policy program
- The Reliability Must Run (RMR) program (described in the prior section), and,
- The generation and transmission interconnection program (described in Chapter 8 of this Plan.

To date, only program that has resulted in new transmission has been the early version of the Public Policy program added three transmission projects and the actual program that is now pursuing two sets of new transmission, one in western New York and the so-called "AC Transmission Upgrades"[18] that will add transfer capability into South eastern New York.

[18] The New York Public Service Commission Website: www.dps.ny.gov/ACTransmission/ provides the background and description of this initiative.

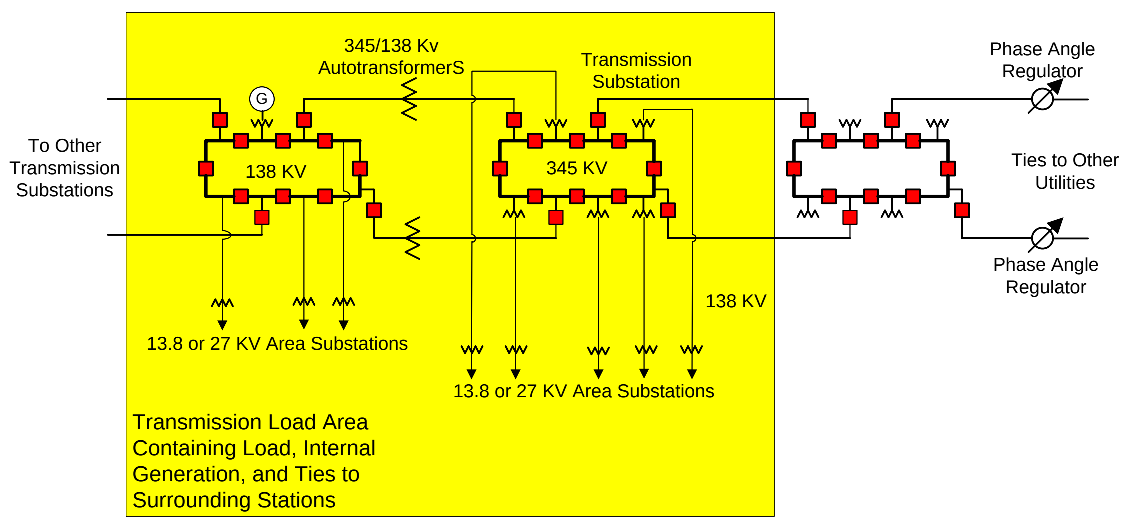

Transmission Planning in New York
Local Transmission Owner (Con Edison)
New York Independent System Operator (NYISO)
Local Transmission Plan (LTP)
Comprehensive System Planning Process (CSPP)
Reliability Must Run Process3 (RMR)
Generation and Transmission Interconnection Process (IP)
Reliability Needs Assessment (RNA) / Comprehensive Reliability Plan (CRP)
Congestion Assessment & Resource Integration Study (CARIS)
Public Policy Process
Meet Transmission Reliability Criteria1
Meet Transmission Reliability1 & Resource Adequacy2 Criteria
Justified by Reduced Congestion Costs
Meet Public Policy Goals
Meet Transmission Reliability1 & Resource Adequacy2 Criteria
Reliable Connection of New Merchant Transmission and Generation
1. NERC, NPCC, NYSRC and Local TO Transmission Reliability Criteria
2. NPCC and NYSRC Loss of Load Reliability Criteria
3. Address Reliability Criteria violations resulting from generation deactivation

2.6. Objectives

The driver of the Long-Range Transmission Plan is maintaining reliability. Con Edison has developed a set of objectives for the development of its Long-Range Transmission Plan in accordance with all applicable reliability criteria. The ability of the transmission system to perform in accordance with the Transmission Planning Criteria is periodically assessed as new load forecast information becomes available. This assessment can result in recommendations for specific upgrades, as discussed in more detail in Chapter 6 of this Plan.

2.5.1 Objective 1: Transmission Load Area (TLA) Assessment

Planning for the Con Edison transmission system includes the detailed evaluation of various TLAs over a ten-year period. The TLAs are specified portions of the transmission system for studying the reliability of the system. The following diagram is a generic representation of a TLA:



As load forecasts are considered, it is possible that projections indicate that one or more reliability criteria would not be met at some date in the future. In such cases, remedial actions are developed and planned to assure the system continues to comply with reliability criteria. There are a number of possible actions that can address TLA reliability criteria deficiencies:

- Additional transmission expansion into the TLA, which may require other transmission support situated further out from the TLA;
- DSIP initiatives, including Energy Efficiency, Demand Response and others targeting load within the TLA;
- Increasing the capacity of existing transmission components;
- Transferring load from one TLA to another TLA by transferring a portion of one network within the load area to a network in another load area that has spare capacity;
- New generation within the TLA; and
- Combinations of the above.

Analysis is performed on a case-by-case basis to determine the most cost-effective remedial action. All are designed to bring the TLA into compliance with reliability criteria. Chapter 6 presents the current status of the Con Edison system TLA assessment

2.5.2 Objective 2: Transmission Substation Assessment

As load grows within a TLA, more feeders are required to reliably supply network load. At some point, an area station may reach its expansion limit due to transformer capacity, sub-transmission feeder capacity, bus current capacity, circuit breaker interrupting capability, or other reasons. In these situations, a new area station may be needed with support from an existing Transmission station with sufficient capacity. As the Transmission station's capacity is reached, a new transmission station, along with appropriate connections to the surrounding transmission system, may be required to for the reliable integration of a new area station and its load. All of this may have an impact on the defining characteristics of the associated TLA. Chapter 7 is reserved for discussing the need for new transmission stations. No new Transmission Stations were found to be required for the 10-year period studied in this Plan. However, the Gowanus Transmission station will be expanded to support two new area stations in the year 2026.

2.5.3 Objective 3: Interconnection of New Generation Resources

Reliability criteria can be met in some cases by the interconnection of new generation resources within the system or by interconnections to new or existing generation resources outside the system. New generation resources are not only a source of additional real power but are also a source of reactive power, all of which help to meet reliability criteria. Other considerations include the provision of black start capabilities by units directly on the Con Edison system as well as well as the provision of dual fuel capability, both of which contribute to maintaining reliability. At some point, the interconnection of new generation resources may be needed to meet reliability and supply requirements.

New transmission may be needed to integrate new internal or external resources. The current outlook of interconnection projects in the Con Edison system is discussed in Chapter 8.

2.7. Organization of the Report

Chapter 3 presents the analysis tools and methodologies followed in developing the Plan to meet its three main objectives. Chapter 4 contains the information posted on the Con Edison website regarding the origin of the base cases and major assumptions used in developing the Plan. The methodologies used in the development of the Plan are discussed in Chapter 5. In turn, Chapter 6 presents the results of studies performed on all 17 TLAs. Chapter 7 is reserved for studies regarding the need for new transmission stations. The prospects for new generation or transmission during the study period are discussed in Chapter 8.

3.0 LONG-RANGE TRANSMISSION PLAN ANALYSIS TOOLS AND METHODOLOGIES

Con Edison's Con Edison's transmission system is assessed using a variety of system modeling and simulation tools to measure the transmission system's capabilities against design criteria[19]. This is done for present and planned configurations at present and future load levels, respectively. Assessments are performed as needed in the following areas using standardized software packages to study the system's performance:

- Thermal;
- Voltage;
- Short Circuit;
- Stability;
- Transient Switching Surge and Lightning Withstand Capabilities, and;
- Extreme Contingencies.

3.1. FERC Form 715

Load flow studies are conducted year-round by Transmission Planning for a wide variety of analyses, including planned expansions and real-time contingencies, overall system-wide assessments are required once a year to support the NYISO's requirement to file FERC Form 715, the Annual Transmission Planning and Evaluation Report. This is a comprehensive effort that includes updating the system model in terms of configuration and impedances, and adjusting the transmission system. A battery of load flow base cases are developed for the FERC Form 715 filing that include present summer and winter seasonal cases, as well as five and ten year look-ahead cases. The future cases incorporate all planned changes such as additions, expansions, and retirements according to the scheduled timelines for these changes.

The software used for these studies is provided by Power Technologies International, a division of Siemens AG, and is referred to as PSS/e, the acronym for Power System Simulator / Engineering. This is the leading software package for bulk

[19] In accordance with the requirements of Order 890, the contents of this chapter were posted on the Con Edison website in December, 2009. The latest version can be found at: http://www.coned.com/tp/Long Range Plan Analysis Tools and Methodology.pdf

transmission system load flow studies. The PSS/e application is the primary method used by Transmission Planning to assess the performance of the transmission system under normal and contingency conditions.

3.2. Thermal

The load flow levels established by the studies are measured against the thermal ratings of transmission facilities. Con Edison's Central Engineering Department assigns facilities thermal ratings for normal, long-time emergency (LTE), and short-time emergency (STE) conditions.

Load flow studies are conducted to simulate normal operation under peak forecast loads, followed by various contingency conditions defined by NERC (North American Electric Reliability Corporation), the Northeast Power Coordinating Council (NPCC), the New York State Reliability Council (NYSRC), and Con Edison Transmission Planning Criteria. In order to comply with the more stringent Con Edison Transmission Planning Criteria, the transmission system must exhibit the capability to be returned to operation within normal thermal limits following the worst case contingencies.

3.3. Voltage

Voltages throughout the transmission system are checked using the same load flow studies that are used to make the thermal assessments described in the section above. The focus, however, shifts from the delivery of real power, measured in MW, to voltage support and control provided by reactive power, measured in Mvar[20] .

3.4. Short Circuit

Short circuit studies are conducted using the ASPEN One-Liner program. These are done to assess the ability of the transmission system, specifically circuit breakers, to withstand and interrupt fault currents. The NYISO conducts semi-annual updates of its short circuit base case models. Significant data for these studies include system configuration, i.e., network topology, impedances of all connected equipment, and

[20] Voltages must remain within a prescribed range of 0.95 to 1.05 per unit throughout all contingencies.

circuit breaker interrupting ratings. All short circuit base cases use all available generation to ensure that the maximum possible current levels are simulated.

3.5. Stability

Stability studies are performed as needed, using the dynamic simulation capability of the PSS/E software. The studies encompass the full range of stability considerations on the power system, namely, steady-state stability, transient stability, and dynamic stability. These studies are very dependent on the detailed modeling of generator characteristics including excitation systems, control systems, inertia, and governor response.

Stability is assessed in accordance with NPCC Regional Reliability Reference Directory #1 "Design and Operation of the Bulk Power System". Directory #1 specifies a variety of faults and other contingencies, including stuck breaker conditions, through which the power system must remain stable. Provision is included for automatic reclosing which can be very effective in maintaining system stability following transient faults such as those induced by lightning.

Within NPCC Directory #1, Appendix B – "Guidelines and Procedures for NPCC Area Transmission Reviews" states that stability assessment is to be part of the Comprehensive Review conducted once every five years in each of the NPCC Areas. The NYISO conducts the Comprehensive Review for the New York Control Area. Beyond this requirement, Con Edison undertakes stability studies when planned system changes have potential stability implications. In some cases, the studies are quite specific, targeted on a particular vicinity of the system. In other cases, the studies are broad in nature, encompassing a widespread territory. Transmission planners must use their experience and engineering judgment in determining the boundaries for such studies. Otherwise the studies become unwieldy and the results can be difficult to interpret.

3.6. Transient Switching Surge and Lightning Withstand Capabilities

The ability of the transmission system to withstand transient switching surges and surges due to lightning is assessed as needed using the Electromagnetic Transients Program, known throughout the industry as EMTP. These types of studies, while not explicitly required by any of the various industry oversight entities, are conducted by electric utilities to ensure that planned expansions are designed in a manner that will not impose transient stresses beyond the capability of equipment on their system, either existing or new. Scenarios studied include energizing and de-energizing, fault clearing under normal and stuck breaker conditions, backfeed conditions, and potential resonance conditions. Occasionally, studies are conducted to address unusual or unexpected electrical phenomena observed on the transmission system in real time operation. From a technical perspective, these are very sophisticated studies that require detailed modeling of system parameters and even the specific electrical characteristics of equipment.

EMTP studies can identify a need for surge arrestors, and determine the required capability thereof. They can also identify a need for shunt reactors to mitigate transient overvoltages, even in cases where they would not be required for normal voltage control.

3.7. Extreme Contingencies

Extreme contingency scenarios that stress the transmission system beyond its design criteria are assessed in accordance with NPCC Directory #1, Appendix B – "Guidelines and Procedures for NPCC Area Transmission Reviews". Appendix B states that extreme contingency assessment, similar to stability assessment, is to be part of the Comprehensive Review conducted once every five years in each of the NPCC areas. The NYISO conducts the Comprehensive Review for the New York Control Area. Beyond this requirement, Con Edison also conducts extreme contingency assessments for its own transmission system. The intent is to gauge the extent of customer and overall system impact that could be incurred under selected worst case scenarios involving multiple contingencies, and to identify potential mitigating actions that could be taken to minimize the adverse impact.

4.0 ORIGIN OF BASE CASES AND MAJOR ASSUMPTIONS

The analysis presented in this document is performed on a yearly cycle and takes close to six months to carry out and review. The studies are based on assumptions that were posted in the Con Edison website.[21]

4.1. Long-Range Transmission Plan Assumptions

Study Year	***Assumptions***[22]

2016	• Con Edison Load (Coincident Peak) = 13,650 MW
	• Under peak load conditions, Transmission Feeder 32077 is operated radially from Farragut to supply Water Street Load through Transformer #4
	• New breaker at E 13th Street 345 kV, separating B47/37378 from Q35L/44371
	• 2017
	  ○ PJM – Con Edison Wheel is discontinued. Available firm power equals zero
	  ○ New breaker at E 13th Street 345 kV, separating 46/37372 from M55/37373
	• 2018
	  ○ Transfer of 60 MW of load from Brownsville (served from Farragut) to Glendale (served from Vernon).
	  ○ New breaker at E 13th Street 345 kV, separating 45/37374 from M54/37375
	  ○ New Breaker 3N at Greenwood separating 42232 from 42G13 and shunt reactor
	• 2019
	  ○ Rainey-Corona Feeder Established
	  ○ New breaker at E 13th Street 345 kV, separating Q35M/37376 from 48/37377

2021	• Con Edison Load (Coincident Peak) = 14,350 MW
2026	• Con Edison Load (Coincident Peak) = 13,900 MW

Several Area Stations within the Con Edison service area have been designated for programs in DSM and Demand Response. The load relief values are categorized as either Customer Sided Solutions (CSS), or Utility-Sided Solutions (USS).

For purposes of the Long Range Plan, the load relief numbers have been incorporated as part of the load forecast, and are a component within the coincident peak load values for these stations prior to performing all reliability assessments.

[21] The revised Long-Range Transmission Plan Assumptions were posted on June 26, 2016, on the Con Edison website http://www.coned.com/tp/transmission_planning_process.asp in accordance with the requirements of Order 890

[22] These assumptions supplement or replace the comparable assumptions in the FERC Form 715 Annual Transmission Planning and Evaluation Report filed by the NYISO in April, 2016. Also, the load quantities quoted are net of transmission system losses.

5.0 DEVELOPMENT OF THE LONG-RANGE TRANSMISSION PLAN

This chapter presents the requirements, procedures, and scheduling that are necessary for the development of the Long-Range Transmission Plan. The process is designed to be completed on an annual basis, and to dovetail with the scheduling requirements of FERC Order 890, which requires a local transmission plan to be posted for public review in the September - October timeframe, in sufficient time for meaningful review and comments prior to the inputs that need to be provided for the NYISO's Comprehensive System Planning Process (CSPP).

5.1. General Description of the Contingency Evaluation Process

Con Edison is required by NERC, NPCC and NYSRC rules to maintain its transmission system so that the worst contingency during the highest load period will not result in equipment loading that exceeds the designated emergency rating of that equipment, will not result in the loss of any customer service, and following "criteria corrective action"[23], will not result in equipment loading that exceeds the designated normal rating of that equipment.

Single contingency design is defined in the Con Edison Criteria as "the most severe of design criteria contingencies of type 1 through 9, per Table B-1 of the NYSRC Reliability Rules and Compliance Manual". The definition includes the loss of associated infrastructure that would also be lost as a result of the contingency. Generally, this may be the loss of a single transmission line or generator. Sometimes the failure of a circuit breaker, switch, or "common mode" failures such as transmission tower, double circuit configuration, or relay may also cause the outage of multiple transmission lines and or generators.

Con Edison also considers some load areas to be designed for second contingency, which is defined in the Criteria as the more severe of independent Scenarios A and B, as described below:

[23] The term "criteria corrective action" is used to signify actions permissible under the Con Edison Transmission Planning Criteria, EP-7100.

A. 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 and Compliance Manual.

B. The most severe combination of two non-simultaneous design criteria contingencies of Category I Single Event, Contingency events 1 and 2, in accordance with Table B-1 of the NYSRC Reliability Rules.

In this definition, a common mode failure (such as a tower) or breaker failure is not included. Criteria corrective actions following first or second contingency events are different in scope and extent. Any area which has been designated as second contingency must also satisfy first contingency requirements. The worst first contingency may be different from the first of the worst second contingency pair.

5.2. Long-Range Transmission Plan Process Milestones and Schedule

For every annual cycle, the Long-Range Transmission Plan process begins with the development of the annual FERC Form 715 load flow models, describing the summer conditions for the following snapshot years:

1. Summer peak load period for year 1 of the study;
2. Summer peak load for year 5 of the study; and
3. Summer peak load for year 10 of the study.

The NYISO, with input from the TOs on changes to their transmission system and their load forecasts, develops a summer model for each of the 3 snapshot years for the entire New York system. These models are finalized by April 1st of each year. In order to complete the long range studies in a timely manner, the earlier versions of the load models are adjusted to accurately represent the internal Con Edison coincident loads that are determined and made available by the Company's Area Station Planning group in the first quarter of the year. Once these internal loads are incorporated into the model, appropriate voltages, interface flows, and generation dispatch are established for the three cases. At this point, all appropriate contingencies are evaluated, with a focus on 17 different TLAs associated with the Con Edison transmission system. Short circuit analysis is also performed. Any areas in which deficiencies have been identified undergo further evaluation for the development and verification of potential solutions.

The potential solutions are reviewed and vetted with engineering and operating organizations, up to their executive levels. After the solution strategies have been selected, the overall plan is thoroughly reviewed and the report is drafted.

These steps are described in detail below:

1. Obtain Independent Peaks by Station for Years 1, 5 and 10 (2016, 2021, 2026)

   Con Edison determines area station load forecasts after the summer of each year, based on the most current summer load information for each area station. The independent peaks to be used in the TLA tabulations are available by the start of the fourth quarter;

2. Evaluation of Tabulations for 17 TLAs for Years 1, 5 and 10 (2016, 2021, 2026)

   The TLA tabulations utilize independent area station peaks combined with a diversity factor in order to provide a rough estimate of the MW margin or deficiency within each TLA. An indication of a TLA with marginal or deficit conditions would signal the need for a more accurate study in the subsequent load flow evaluations;

3. NYISO cases provided to Con Edison for Years 1, 5 and 10 (2016, 2021, 2026)

   The NYISO collects all of the component models of each contributing Transmission Owner and generation entity within the state and surrounding areas, and combines them into a single model (FERC Form 715) which is then distributed to all utilities. Generators that are in the NYISO Interconnection Process for future establishment are not included in the model unless they meet certain NYISO criteria, including initiation of construction;

4. Obtain the latest coincident peaks for Years 1, 5 and 10 (2016, 2021, 2026)

   The latest forecasts of coincident peaks for all area stations are obtained from the Company's Area Station Planning group, and incorporated into the Con Edison portion of the NYISO load flow models. The models are adjusted so that the load stations are regulated to the appropriate voltage level. Generation is re-dispatched, and tie line flows are modified as necessary.

   In some cases, a TLA experiences its peak load at a significantly different time than the system. Potential impacts from contingencies may not be observed because the coincident peak loads are smaller than independent peak loads for these stations. For these cases, additional load models would be created and evaluated, in which the localized area station load values are modified to reflect independent localized TLA peak loads;

5. Load flow studies for each of the 3 snapshot years

   The entire Con Edison Transmission System is evaluated for each of the 3 years in question. Additional focus for each TLA is made according to their first or second contingency level of reliability.

   If significant changes in the transmission system are scheduled between two snapshot years, then additional studies will be performed to identify the impact.

6. Problems Identified

   Thermal overloads and voltage violations may require pre-contingency adjustments to the system (such as pre-loading transmission lines, generator re-dispatch, or reactive compensation, etc.) in order to resolve post-contingency violations.

   Thermal overloads and voltage violations that cannot be corrected using acceptable methods will be identified according to the year of appearance, extent of violation, growth of the problem over time, and potential of remediation through scheduled or anticipated infrastructure improvements;

7. Solutions Proposed and Evaluated

   For all thermal overloads and voltage violations that cannot be corrected using actions permissible within the Con Edison Transmission Planning Criteria, the impact of various system enhancements are evaluated according to their feasibility, timely establishment, extent of impact, and cost, and the one that most optimally satisfies the reliability, economic and operational requirements of the Transmission System is selected. Temporary operational remedial measures are identified to satisfy the TLA deficit until such time as the permanent solution is in place;

8. Report and Presentation

   The results of the analysis performed for each TLA are included in the annual Long-Range Transmission Plan; and

9. FERC Orders 890 and 1000 - Presentations and Responses

In accordance with the requirements set forth in FERC Order 890 and Order 1000, the Plan is posted and presented to interested parties. The intent is to provide information on the local transmission plan early in the planning cycle so as to provide a meaningful opportunity for comments.

5.3. Design Criteria Requirements

1. Thermal Overloads and Voltage Violations

Thermal overloads occur when the complex power, or MVA, on a transmission path exceed the normal rating of that path. These overloads can be caused by excessive real power flow, reactive power flow, or a combination of both. Voltage violations occur when bus voltages exceed their limits either above or below their nominal ratings.

For Overhead lines and inter-utility ties, Con Edison transmission planning design criteria for every “loss of transmission path” contingency is evaluated such that:

a. Immediately following the contingency and prior to any criteria corrective action, the flow on any path does not exceed the Long Term Emergency rating of that path, and bus voltages do not violate their 0.95 to 1.05 per unit limits ; and
b. Following criteria corrective action (steady state), the flow on the path may not exceed the normal rating of that path.

For underground lines, Con Edison transmission planning design criteria is evaluated such that:

a. Immediately following the contingency and prior to any criteria corrective action, the flow on any path does not exceed the Short Term Emergency rating of that path, and bus voltages do not violate their 0.95 – 1.05 per unit limits; and
b. For the Loss of Generation - provided ten (10) minute operating reserve and/or phase angle regulation is available to reduce the loading to its

LTE rating within fifteen (15) minutes and not cause any other facility to be loaded beyond its LTE rating.

c. For the loss of Transmission Facilities - provided phase angle regulation is available to reduce the loading to its LTE rating within fifteen (15) minutes and not cause any other facility to be loaded beyond its LTE rating.

d. Once the overload(s) are reduced to a level below the Long Term Emergency ratings, generation redispatch, within prescribed limits and additional PAR action may be used to reduce the overload(s) to a level below normal rating. Following criteria corrective action (steady state), the flows on all paths may not exceed their normal ratings, and bus voltages may not exceed their steady-state operating limits.

If criteria corrective actions are sufficient to meet design criteria requirements, the analysis will conclude that there are no reliability deficits.

2. Short-Circuit Violations

Short-Circuit Violations occur when a 3 phase, 2 phase to ground or single line to ground faults create a short-circuit flow on a transmission path which exceeds the appropriate short-circuit rating of any of the breakers that are necessary for the isolation of that transmission path. In addition, all equipment on the transmission system, including but not limited to circuit breakers, bus work, disconnect switches, and structural supports, shall be evaluated for their ability to withstand the mechanical forces associated with fault currents.

5.4. Corrective Actions within the Modeling Environment

The sets of corrective actions allowed by criteria are different according to the stage and type of contingency encountered. In the results of the analysis of TLAs presented in Chapter 5 a finding of “no deficit” after a first or second contingency already may assume that the following acceptable corrective actions have been taken:

Criteria corrective actions include:

a. Adjustment of power flow using Phase Angle Regulators and Transformers;
b. Adjustment of generation power output up to their maximum capability;
c. Adjustment of generation voltage and reactive power;
d. Initiation of any and all Gas Turbines; and
e. Switching of shunt devices.

5.5. Methods for Deficit Resolution through System Enhancements

When criteria corrective actions are deemed insufficient or inappropriate for resolving post-contingency problems, strategies for the resolution of deficits through system enhancements are identified. Various solutions are modeled and evaluated for every problem, based on extent of impact, reliability improvement, scheduling, and cost. The following solution concepts are considered:

1. Load Transfers

Area Station load transfers that reduce load within a TLA may be sufficient to reduce or eliminate deficits found within a TLA.

Advantages: More economical than new transmission and substations, faster implementation.

Disadvantages: May limit future growth for impacted area stations, No increase in capacity, and may require extensive distribution system re-configuration.

2. Upgrades to Infrastructure

Enhancements to transmission lines, circuit breakers, transformers, or phase angle regulators can increase the ability to import power into a TLA. Upgrades include increased circulation for underground circuits, cooling, re-conductoring, or replacement of equipment.

Advantages: Permanent improvement in capacity, more economical than building new infrastructure.

Disadvantages: May require significant outage time, improvement may be limited by upstream or downstream facilities.

3. New Generation or Upgrades

The timely establishment of new generation or the upgrade of existing generation within a TLA can have a major impact on reducing TLA deficits. Generally, anticipated generation is not considered unless construction has begun. Con Edison closely tracks the status of all generation projects in the NYISO Interconnection Queue that can have an impact within the Con Edison service territory.

Advantages: Permanent improvement in capacity and voltage support.

Disadvantages: Merchant generation is not under the control of Con Edison, unpredictable schedule, with long period from concept to operation, may need short circuit mitigation.

4. New or Reconfigured Transmission Lines

New transmission lines increase the ability to import power into a TLA by providing an alternative path for support following a contingency. Sometimes, it can be sufficient to reconfigure a line to improve reliability, either by upgrading the operating voltage level, relocating a termination point to another station, or by relocating the termination point within a station. Consideration must be taken for any increase in short-circuit magnitudes.

Advantages: Permanent improvement in capacity, reliability.

Disadvantages: Cost, long lead times, may need short-circuit mitigation.

5. New Transmission Stations with New or Reconfigured Transmission Lines

Transmission stations can be established according to the need for load relief in support of area stations that have reached their capacity. In most cases, these new transmission stations will also provide new transmission line connections or pathways that improve capacity and deliverability.

Advantages: Permanent improvement in capacity, future flexibility.

Disadvantages: High Cost, long lead time, up to 3 years, may need short-circuit mitigation.

6. Transmission Station Configuration Upgrades

Transmission stations can be reconfigured or expanded to provide reliability improvements. Isolated bus configurations can be effectively upgraded to ring bus or breaker-and-a-half configurations. Consideration must be taken for any increase in short-circuit magnitudes.

Advantages: Permanent improvement in capacity, reliability, cost.

Disadvantages: Cost, long lead times, may need short-circuit mitigation, size of property may be limiting. Most transmission stations are at their physical size and utilization limits.

7. Reactive Power Compensation (Capacitors or Shunt Reactors)

The need for reactive power compensation varies according to the location, structure and function of various transmission and sub-transmission components.

Overhead transmission lines usually carry a large volume of power and may be limited by low voltage constraints. The most efficient and economical support for deliverability is the installation of shunt capacitor banks to provide reactive compensation for the transmission path, and maintain high voltage along the transmission corridor.

Underground cables have significant capacitive reactance, providing reactive support for the system that can be essential during peak load periods but may be detrimental at light load periods. The most efficient and economical resolution is the utilization of switched shunt reactors at the terminal points of these lines to absorb the reactive component flow at light load periods.

Area Stations use switched Capacitors for reactive compensation of reactive loads and losses.

Advantages: Permanent (although relatively small) improvement through reactive compensation, lower cost, short lead time.

Disadvantages: Shunt devices are subject to fluctuation as a function of voltage. Capacitor banks must be evaluated for contribution to transients during switching.

8. Power Flow Control (Phase Angle Regulators, Variable Frequency Transformers)

Phase angle regulators (PAR's) and Variable Frequency Transformers (VFT's) are used when control of the real power flow on a transmission path needs to be regulated.

Advantages: Permanent improvement in operational reliability.

Disadvantages: Cost, long lead time, relatively large equipment.

9. Short Circuit Remediation

As generators are added to the system and as new transmission ties create more connections between stations, the overall level of short-circuit current magnitudes will increase. To reduce short-circuit currents, DC converters or higher impedance devices such as series reactors, or phase angle regulators can be added to the system.

Advantages: More economical than alternative transmission upgrades.

Disadvantages: DC converters are costly, absorb reactive power, and may require additional voltage support.

10. DSIP Initiatives, including Energy Efficiency, Demand Response, and/or Demand Response

Advantages: Large Customer population to choose from

Disadvantages: Customers may not wish to participate. Participation must be evaluated and renewed annually. Requires massive customer participation to achieve impact at the transmission level.

Energy Efficiency

Advantages: Permanent reduction in load, most cost-effective strategy.

Disadvantages: Requires massive customer participation to achieve impact at the transmission level.

Distributed Generation

Advantages: Significant and focused local impact

Disadvantages: May not be cost effective for customer, depending on fuel and maintenance costs.

All of these strategies, when allocated appropriately, can delay or replace the costly implementation of alternative infrastructure improvements.

6.0 TRANSMISSION LOAD AREA ASSESSMENT

The following table lists all 17 Transmission Load Areas in the Con Edison system. This is followed by individual tables for each TLA containing the results of first contingency or second contingency analysis together with other analysis and considerations.

	Transmission Load Area	Design Contingency
1	New York City - 345 kV	Second
2	West 49th Street - 345 kV	Second
3	New York City - 138 kV	Second
4	Astoria - 138 kV	Second
5	East 13th Street - 138 kV	Second
6	Astoria East / Corona - 138 kV	Second
7	Astoria West / Queensbridge - 138 kV	Second
8	Vernon - 138 kV	Second
9	East River - 138 kV	Second
10	Greenwood / Staten Island - 138 kV	First
11	Corona / Jamaica - 138 kV	First
12	Bronx- 138 kV	First
13	Eastview - 138 kV	First
14	Staten Island - 138 kV	First
15	Dunwoodie North / Sherman Creek - 138 kV	First
16	Dunwoodie South - 138 kV	First
17	Millwood / Buchanan - 138 kV	First

6.1. New York City - 345 kV

<table>
<tr><td>Geographic Coverage</td><td colspan="4">Manhattan, Bronx, Brooklyn, Queens and Staten Island.</td></tr>
<tr><td>Design Criteria</td><td colspan="4">Second Contingency.</td></tr>
<tr><td rowspan="2">Planned Changes In Load Area</td><td>2019</td><td colspan="3">Transfer 60 MW from Brownsville #1 to Glendale</td></tr>
<tr><td>2019</td><td colspan="3">Establish new 138 kV transmission line with transformer and Phase Angle Regulator connecting Rainey and Corona Substations</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="6">Assessment</td><td rowspan="2">2016</td><td>First Contingency</td><td>Loss of feeder 71 or feeder 72</td><td>No deficit</td></tr>
<tr><td>Second Contingency</td><td>Loss of feeder 71 or feeder 72 followed by the loss of Ravenswood 3</td><td>No deficit</td></tr>
<tr><td rowspan="2">2021</td><td>First Contingency</td><td>Loss of feeder 71 or feeder 72</td><td>No deficit</td></tr>
<tr><td>Second Contingency</td><td>Loss of feeder 71 or feeder 72 followed by the loss of Ravenswood 3</td><td>No deficit</td></tr>
<tr><td rowspan="2">2026</td><td>First Contingency</td><td>Loss of feeder 71 or feeder 72</td><td>No deficit</td></tr>
<tr><td>Second Contingency</td><td>Loss of feeder 71 or feeder 72 followed by the loss of Ravenswood 3</td><td>No deficit</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">Operational Remediation</td><td>2016</td><td colspan="3">None required</td></tr>
<tr><td>2021</td><td colspan="3">None required</td></tr>
<tr><td>2026</td><td colspan="3">None required</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">Planning Solution</td><td>2016</td><td colspan="3">None required</td></tr>
<tr><td>2021</td><td colspan="3">None required</td></tr>
<tr><td>2026</td><td colspan="3">None required</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>Short Circuit Considerations</td><td colspan="4">None</td></tr>
</table>

6.2. West 49th Street - 345 kV

<table>
<tr><td>Geographic Coverage</td><td colspan="4">Midtown and Lower Manhattan.</td></tr>
<tr><td>Design Criteria</td><td colspan="4">Second Contingency.</td></tr>
<tr><td>Planned Changes In Load Area</td><td colspan="4">None</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="6">Assessment</td><td rowspan="2">2016</td><td>First Contingency</td><td>Loss of M51</td><td>No deficit</td></tr>
<tr><td>Second Contingency</td><td>Loss of M51 followed by the loss of M52</td><td>No deficit</td></tr>
<tr><td rowspan="2">2021</td><td>First Contingency</td><td>Loss of M51</td><td>No deficit</td></tr>
<tr><td>Second Contingency</td><td>Loss of M51 followed by the loss of M52</td><td>No deficit</td></tr>
<tr><td rowspan="2">2026</td><td>First Contingency</td><td>Loss of M51</td><td>No deficit</td></tr>
<tr><td>Second Contingency</td><td>Loss of M51 followed by the loss of M52.</td><td>No deficit</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">Operational Remediation</td><td>2016</td><td colspan="3">None required.</td></tr>
<tr><td>2021</td><td colspan="3">None required.</td></tr>
<tr><td>2026</td><td colspan="3">None required.</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">Planning Solution</td><td>2016</td><td colspan="3">None required.</td></tr>
<tr><td>2021</td><td colspan="3">None required.</td></tr>
<tr><td>2026</td><td colspan="3">None required.</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>Short Circuit Considerations</td><td colspan="4">None</td></tr>
</table>

6.3. New York City - 138 kV

Geographic Coverage	Bronx, Brooklyn, Queens and Manhattan.			
Design Criteria	Second Contingency			
Planned Changes In Load Area	2019	Transfer 60 MW from Brownsville #1 to Glendale		
Assessment	2016	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by NYPA CC1/CC2	No deficit
	2021	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by NYPA CC1/CC2	No deficit
	2026	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by NYPA CC1/CC2	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
6666				
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.4. Astoria – 138 kV

Geographic Coverage	Bronx, Queens and Manhattan			
Design Criteria	Second Contingency			
Planned Changes In Load Area	2019	Establish new 138 kV transmission line with transformer and Phase Angle Regulator connecting Rainey and Corona Substations		
Assessment	2016	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by NYPA CC1/CC2	No deficit
	2021	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by NYPA CC1/CC2	No deficit
	2026	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by NYPA CC1/CC2	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.5. East 13th Street - 138 kV

Geographic Coverage	Midtown and lower Manhattan			
Design Criteria	Second Contingency			
Planned Changes In Load Area	2019	Establish 4 Breakers that isolate the 345 kV Feeders at East 13th Street		
Assessment	2016	First Contingency	Loss of Feeders B47, Q35L, 37378, 44371 L/M, Transformers 16 & 17 at E13th Street. Switch to restore Q35L, 44371 & Transformer 17.	No deficit
		Second Contingency	Followed by loss of Feeder 48, Q35M, 37376, 37377, Transformers 10 & 11 at E13th Street.	No deficit
	2021	First Contingency	Loss of Feeders 46, 37372 and Transformer 12 at E13th Street.	No deficit
		Second Contingency	Followed by loss of Feeders Q35M, 37376, and Transformer 10 at E13th Street.	No deficit
	2026	First Contingency	Loss of Feeders 46, 37372 and Transformer 12 at E13th Street.	No deficit
		Second Contingency	Followed by loss of Feeders Q35M, 37376, and Transformer 10 at E13th Street.	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.6. Astoria East / Corona - 138 kV

Geographic Coverage	Queens			
Design Criteria	Second Contingency			
Planned Changes In Load Area	2019	Establish new 138 kV transmission line with transformer and Phase Angle Regulator connecting Rainey and Corona Substations		
Assessment	2016	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by loss of feeder 34091 and Astoria Unit 2	No deficit
	2021	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by loss of feeder 34091 and Astoria Unit 2	No deficit
	2026	First Contingency	Loss of Astoria Energy I	No deficit
		Second Contingency	Loss of Astoria Energy I, followed by loss of feeder 34091 and Astoria Unit 2	No deficit
Operational Remediation	2016	Utilize 300 hour ratings for feeders 34051/52 and 701/702 until new transmission line established in 2019		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required – See Operational Remediation		
	2021	None required – See Planned Changes in Load Area		
	2026	None required		
Short Circuit Considerations	None			

6.7. Astoria West / Queensbridge - 138 kV

Geographic Coverage	Queens and Manhattan			
Design Criteria	Second Contingency			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of NYPA CC1/CC2	No deficit
		Second Contingency	Loss of NYPA CC1/CC2 followed by loss of Astoria Unit 5	No deficit
	2021	First Contingency	Loss of NYPA CC1/CC2	No deficit
		Second Contingency	Loss of NYPA CC1/CC2 followed by loss of Astoria Unit 5	No deficit
	2026	First Contingency	Loss of NYPA CC1/CC2	No deficit
		Second Contingency	Loss of NYPA CC1/CC2 followed by loss of Astoria Unit 5	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.8. Vernon - 138 kV

Geographic Coverage	Queens and Manhattan			
Design Criteria	Second Contingency			
Planned Changes In Load Area	2019	Transfer 60 MW from Brownsville #1 to Glendale		
Assessment	2016	First Contingency	Loss of Ravenswood 1	No deficit
		Second Contingency	Loss of Ravenswood 1, followed by loss of Ravenswood 2	No deficit
	2021	First Contingency	Loss of Ravenswood 1	No deficit
		Second Contingency	Loss of Ravenswood 1, followed by loss of Ravenswood 2	No deficit
	2026	First Contingency	Loss of Ravenswood 1	No deficit
		Second Contingency	Loss of Ravenswood 1, followed by loss of Ravenswood 2	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.9. East River - 138 kV

Geographic Coverage	Manhattan			
Design Criteria	Second Contingency			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Failed Breaker BT 6-7 resulting in Loss of ER6 & ER7 at East River	No deficit
		Second Contingency	Loss of ER 7 at East River followed by ER2 or Transformer 17	No deficit
	2021	First Contingency	Failed Breaker BT 6-7 resulting in Loss of ER6 & ER7 at East River	No deficit
		Second Contingency	Loss of ER 7 at East River followed by ER2 or Transformer 17	No deficit
	2026	First Contingency	Failed Breaker BT 6-7 resulting in Loss of ER6 & ER7 at East River	No deficit
		Second Contingency	Loss of ER2 at East River followed by ER2 or Transformer 17	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.10. Greenwood / Staten Island 138 kV

Geographic Coverage	Brooklyn and Staten Island			
Design Criteria	First Contingency			
Planned Changes In Load Area	2018	Establish Breaker 3N, to separate feeder 42232 from feeder 42G13 (GTs 1&3)		
Assessment	2016	First Contingency	Bus Fault with Stuck Breaker #4N results in loss of Gowanus GTs 1&3, Narrows GT2, Feeder 42232.	No deficit
	2021	First Contingency	Bus Fault with Stuck Breaker #4S results in loss of Gowanus GTs 2&4, NYPA GTs, Feeder 42231.	No deficit
	2026	First Contingency	Bus Fault with Stuck Breaker #4S results in loss of Gowanus GTs 2&4, NYPA GTs, Feeder 42231.	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.11. Corona / Jamaica - 138KV

Geographic Coverage	Queens			
Design Criteria	First Contingency			
Planned Changes In Load Area	2019	Establish new 138 kV transmission line with transformer and Phase Angle Regulator connecting Rainey and Corona Substations		
Assessment	2016	First Contingency	Bus fault resulting in the loss of feeder 901, 702 and transformer bank 4 at Jamaica 138 kV	No Deficit
	2021	First Contingency	Bus fault resulting in the loss of feeder 901, 702 and transformer bank 4 at Jamaica 138 kV	No Deficit
	2026	First Contingency	Bus fault resulting in the loss of feeder 901, 702 and transformer bank 4 at Jamaica 138 kV	No Deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.12. Bronx - 138 kV

Geographic Coverage	The Bronx and Manhattan			
Design Criteria	This 138 kV load area has a first contingency design serving load in the Bronx and supports second contingency load in Manhattan supplied by Sherman Creek.			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of X28 or M29	No Deficit
	2021	First Contingency	Loss of X28 or M29	No Deficit
	2026	First Contingency	Loss of X28 or M29	No Deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.13. Eastview - 138 kV

Geographic Coverage	Westchester			
Design Criteria	First Contingency			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of Common Tower - Transformers 1S & 1N at Eastview, and feeders W78, W85, W64 and W99	No deficit
	2021	First Contingency	Loss of Common Tower - Transformers 1S & 1N at Eastview, and feeders W78, W85, W64 and W99	No deficit
	2026	First Contingency	Loss of Common Tower - Transformers 1S & 1N at Eastview, and feeders W78, W85, W64 and W99	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None.			

6.14. Staten Island - 138 kV

Geographic Coverage	Staten Island			
Design Criteria	First Contingency			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of Arthur Kill 2	No deficit
	2021	First Contingency	Loss of Arthur Kill 2	No deficit
	2026	First Contingency	Loss of Arthur Kill 2	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.15. Dunwoodie North / Sherman Creek - 138 kV

Geographic Coverage	Westchester, the Bronx and Manhattan			
Design Criteria	First Contingency design, supporting second contingency load in Manhattan			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of M29	No Deficit
	2021	First Contingency	Loss of M29	No Deficit
	2026	First Contingency	Loss of M29	No Deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.16. Dunwoodie South - 138 kV

Geographic Coverage	Westchester and the Bronx			
Design Criteria	First Contingency			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of W73	No deficit
	2021	First Contingency	Loss of W73	No deficit
	2026	First Contingency	Loss of W73	No deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

6.17. Millwood / Buchanan - 138 kV

Geographic Coverage	Westchester and the Bronx			
Design Criteria	First Contingency			
Planned Changes In Load Area	None			
Assessment	2016	First Contingency	Loss of Transformer TA-2 at Millwood	No Deficit
	2021	First Contingency	Loss of Transformer TA-2 at Millwood	No Deficit
	2026	First Contingency	Loss of Transformer TA-2 at Millwood	No Deficit
Operational Remediation	2016	None required		
	2021	None required		
	2026	None required		
Planning Solution	2016	None required		
	2021	None required		
	2026	None required		
Short Circuit Considerations	None			

7.0 LOAD GROWTH SUPPORT: NEW TRANSMISSION STATIONS

There are no new Transmission Stations that are planned within the next 10 years.

8.0 INTERCONNECTION PROCESS AND OUTLOOK

Con Edison has issued a Developer Welcome Kit (posted on the Con Edison website[24]) with the intent to provide developers of merchant generator or merchant transmission projects with general guidelines for connecting proposed facilities to Con Edison's electric transmission and distribution systems. This Welcome Kit contains a general schedule and technical requirement to guide developers in their project development process.

8.1. Regulations Governing the Interconnection Process

As Con Edison is a member of the New York Independent System Operator (NYISO), all proposed connections to the transmission system are governed by the NYI Open Access Transmission Tariff (OATT) – Attachment X – Large Generator Interconnection Procedure. Connection of proposed developer projects to the Con Edison electric transmission system must meet established reliability, environmental and safety standards. Attachment X to the NYISO OATT prescribes a number of technical system studies. These system studies are performed to ensure that the proposed project does not have an adverse impact on the performance of the New York State Transmission System. The coordination and performance of these studies are the responsibility of the NYISO. Studies performed for previous projects can be obtained from the NYISO website. While Attachment X of the OATT outlines the general requirements of each study, a detailed scope must be presented to and approved by the NYISO's Operating Committee.

8.2. Con Edison Transmission Planning Criteria Process

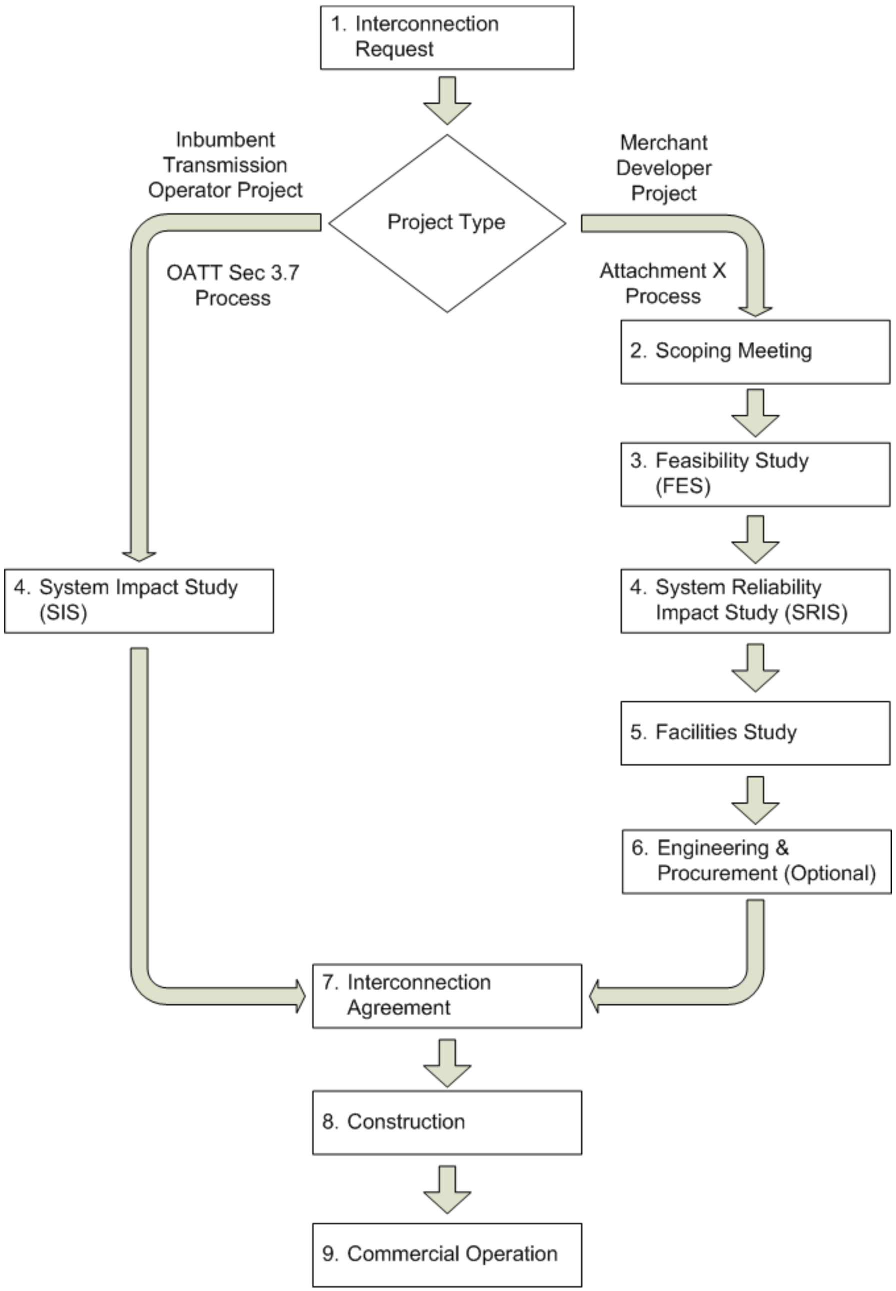
Developers must also adhere to the local TO planning criteria and practices to assure a reliable interconnection. In general, new generating facilities must not

[24] See http://www.coned.com/tp/developer_welcome_kit.asp

contribute to a deterioration of system reliability such as by burdening it with flows that exceed criteria under normal and contingency conditions, fault currents that exceed criteria, or by not supplying the reactive power required by their interconnection agreement.

8.3. The NYISO Interconnection Process

The diagram on the following page shows a simplified flow chart of the Interconnection Process. This is only to serve as a general guide to the Interconnection Process with notes that pertain to Con Edison. Developer should adhere to the most updated NYISO Open Access Transmission Tariff.



1. Developer submits Interconnection Request to NYISO

2. Discuss Project particulars with NYISO and connecting Transmission Owner and other affected Transmission Operators (TOs)
   The Developer must submit a one-line diagram of the proposed Interconnection Point within 5 days of the Scoping Meeting

3. Preliminary assessment of the physical constructability of the proposed project and location proposed by the Developer

4. For either SIS or SRIS: evaluate thermal, stability, short circuit and transfer limit impacts to the extent required by the tariff / process

5. Two part study conducted by NYISO to determine the necessary system upgrade facilities and cost allocation among a Class Year of developers based on minimum interconnection and deliverability standards

6. Developer can opt to execute an Engineering and Procurement (E&P) agreement with the TO (subject to the TO's consent) to proceed with the Engineering work and procurement of equipment

7, Culmination of the Interconnection Process and study evaluations
Includes terms and conditions agreed by involved parties

Developer Projects Proposing to Interconnect to Con Edison

The two tables in the appendix provide lists of the merchant generation and transmission projects that are currently proposed to interconnect with Con Edison. This information was extracted from the latest version of the NYISO's interconnection queue listing, dated September 30, 2016, and is subject to periodic revision by the NYISO to reflect the status updates of the various *projects currently in the queue, as well as the addition of new or deletion of known propo*sed projects. Some of the projects are relatively new, and their anticipated MW capabilities are listed as TBD (To Be Determined), because these values have not yet been defined by the developers.

The list of proposed developer projects that seek interconnection to the Con Edison transmission system has identified 4882 MW of new generation projects, as well as 4675 MW of new transmission projects (although capabilities for many of the transmission projects have not been provided).

No anticipated generation projects in the queue have been included in the Long Range Plan, because their actual construction (and in-service) dates were sufficiently far into the future, or subject to delay or cancellation due to a variety of factors (such as having not completed the Class Year process) that impact a developer's decision to proceed or exit from the project. These include:

- Future load growth and existing available capacity;
- Development of Demand Response, DSM and REV programs;
- Fuel diversity of the load area served to access a competitive advantage;
- Local reliability rules that would prescribe a specific need not met by existing facilities;
- Capacity market pricing;
- Retirements of existing generation;
- Financing costs and calculated payback period for the technology utilized; and
- Forecasted needs for resources as communicated by the NYISO through the Comprehensive System Planning Process.

Appendix: NYISO interconnection Queue Entries for the Con Edison Service Territory

Based on NYISO Interconnection Queue as of September 30, 2016

Merchant Generation Projects in the NYISO Interconnection Queue that are Currently Proposed to Interconnect with Con Edison

Queue	Generation Owner / Developer	Generation Project Name	Date of IR	MW	Zone	Interconnection Point	Availability of Studies	Interconnect Request	Scoping Mtg	Feasibility Study	System Reliability Impact Study	Facilities Study	SGIA Tender	Current In-Svc Date	Original In Svc Date
251	CPV Valley, LLC	CPV Valley Energy Center	7/5/2007	678	G	Coopers – Rock Tavern 345kV	FES, SRIS, FS							7/31/16	2017/06
361	US PowerGen Co.	Luyster Creek Energy	2/15/2011	401	J	Astoria West Substation 138kV	FES, SRIS	X	X	X	X			1/31/15	2017/06
382	Astoria Generating Co.	South Pier Improvement	5/30/2012	91	J	Gowanus Substation 138kV	SRIS	X	X	X	X			4/30/16	2018/06
383	NRG Energy, Inc.	Bowline Gen. Station Unit #3	5/30/2012	775	G	Ladentown Subsation 345kV	SRIS	X	X	X	X			6/30/16	2022/01
393	NRG Energy, Inc.	Berrians East Repower	10/16/2012	102	J	Astoria East Substation 138kV	FES	X	X	X	X			3/31/14	2018/06
444	Cricket Valley Energy Center, LLC	Cricket Valley Energy Center II	6/18/2014	1020	G	Pleasant Valley - Long Mt. 345kV	SRIS	X	X	X	X			2/29/16	2017/12
510	Bayonne Energy Center	Bayonne Energy Center II	8/3/2015	120	J	Gowanus Substation 345kV	SRIS	X	X	X	X			7/31/16	2017/06
515	N Bergen Liberty Energy Center LLC	Liberty Generation	10/7/2015	1000	J	W49th St 345kV	None	X	X	X				10/31/15	2019/06
516	East Coast Power LLC	Linden Cogen Uprate	10/12/2015	230	J	Linden Cogen 345kV	None	X	X	X	X			1/31/15	2019/Q2
522	NYC Energy LLC	NYC Energy	12/16/2015	80	J	Hudson Avenue East 138kV	None	X	X	X				5/31/16	2017/10
561	Astoria Generating Co. LP	Astoria Generating Unit 4	7/18/2016	385	J	Astoria 138 kV	None	X	X					7/31/16	2018/05
			Total:	4882											

FES= Feasibility Study
SRIS = System Reliability Impact Study
FS = Facility Study
NA = Not Applicable
W = Waived

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Based on NYISO Interconnection Queue as of September 30, 2016

Transmission Projects in the NYISO Interconnection Queue that are Currently Proposed to Interconnect with Con Edison

Queue	Transmission Owner / Developer	Transmission Project Name	Date of IR	MW	Zone	Interconnection Point	Availability of Studies	Interconnect Request	Scoping Mtg	Feasibility Study	System Reliability Impact Study	Facilities Study	SGIA Tender	Current In-Svc Date	Original In Svc Date
305	TDI-USA Holdings Corporation	Champlain Hudson Power Express	7/18/2008	1000	J	Astoria Annex Substation 345kV	FES, SRIS	X	X	X	X			5/31/15	2019/Q1
358	West Point Partners, LLC	West Point Transmission	9/13/2010	1000	F, H	Leeds - Buchanan North 345kV	FES, SRIS	X	X	W	X			1/31/15	2017/07
396A	New York State Electric & Gas	Wood Street Transformer	12/14/2012	N/A	G	Wood St. 345/115kV	SIS	X			X			5/31/16	2021/12
414	North America Transmission, LLC	New Scotland-Leeds-PV 345	9/5/2013	N/A	F, G	New Scotland - P. Valley 345kV	FES	X	X	X	X			5/31/16	2019
424	Boundless Energy NE, LLC	Leeds Path West	11/26/2013	N/A	G-J	Leeds - Millwood 345kV	FES	X	X	X	X			10/31/15	2017/06
429	Orange & Rockland	North Rockland Station	2/12/2014	N/A	G	Line Y88 345kV	SIS	X	X		X			5/31/16	2018/06
458	TDI-USA Holdings, Inc.	NS Interconnection	10/24/2014	1000	F, J	Marcy-New Scotland-Astoria 345kV	FES	X	X					7/31/16	2019/Q1
465	Hudson Transmssion Partners	Hudson Transmission NY to PJM	12/15/2014	675	J	W49th St 345kV - Bergen 230kV	SRIS	X	X	W	X			7/31/16	2017/06
506	Empire State Connector Corp.	Empire State Connector	6/10/2015	1000	C, J	Clay - Gowanus 345kV	None	X	X	X				10/31/15	2021/10
518	PPL Electric Utilities	Compass	10/27/2015	N/A	G	Lackawanna - Ramapo 345kV	None	X	X					5/31/16	2023/12
537	NextEra Energy New York	Segment A	4/25/2016	N/A	E, F	Edic - New Scotland 345kV	None	X	X					5/31/16	2018/11
538	NextEra Energy New York	Segment B	4/25/2016	N/A	F, G	Greenbush - PV 345kV	None	X	X					5/31/16	2018/11
539	NextEra Energy New York	Segment B Alt	4/25/2016	N/A	F, G	Greenbush - PV 345kV	None	X	X					5/31/16	2018/11
540	AVANGRID	Connect NY Edic - PV	4/28/2016	N/A	E, G	Edic - PV 345kV	None	X	X					5/31/16	2020/12
541	AVANGRID	Connect NY Edic - Ramapo	4/28/2016	N/A	E, G	Edic - Ramapo 345kV	None	X	X					5/31/16	2020/12
542	National Grid	Segment A Edic-New Scotland	5/4/2016	N/A	E, F	Edic - New Scotland 345kV	None	X	X					6/30/16	2021/12
543	National Grid	Segment B Knickerbocker-PV	5/4/2016	N/A	F, G	Greenbush - PV 345kV	None	X	X					6/30/16	2021/12
			Total:	4675											

FES= Feasibility Study
SRIS = System Reliability Impact Study
FS = Facility Study
NA = Not Applicable
W = Waived