The Long-Range Transmission Plan
2011 – 2020

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

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1.0 EXECUTIVE SUMMARY

The Long-Range Transmission 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 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, transmission projects, demand side management programs, evolution in the regulatory and/or power market rules, and advancements in transmission technology.

Compared to the Plan issued in 2010, the major changes or items of note are[1]:

1. Revised forecasts for 2011, 2015 and 2020 were derived from the NYISO 2010 FERC Form 715 cases for 2010, 2014 and 2019.
2. The establishment of Astoria Energy II at the new Astoria Annex station in June of 2011.
3. The establishment of 345 kV Feeder M29 and the Academy 345 kV Transmission Station in the year 2011, removing the Bronx Transmission Load Area deficiency identified in the previous Long Range Plan.
4. The establishment of cooling for feeders 45 and 46 in the year 2011, removing the West 49th Street Transmission Load Area deficiency identified in the previous Long Range Plan.
5. The anticipated establishment of the Gowanus 345 KV Station as a single ring bus with a tie to the Bayonne Energy Corporation (BEC) Generator in the year 2012.
6. The anticipated establishment of the Hudson Transmission Path (HTP) 345 KV tie feeder from Ridgefield Substation in New Jersey to West 49th Street Substation in Manhattan in the year 2013.

[1] The Appendix reproduces a table that lists all units currently in the NYISO Interconnection Queue that plan to interconnect to a Con Edison substation. The in-service dates in the NYISO queue Table are frequently those originally submitted and have not been updated by Developers. The dates stated in this Plan represent Con Edison's expectations of the in-service dates.

7. The establishment of Goethals 345 KV Station as a single ring bus, assumed to be completed in the year 2014.
8. The removal of the chapter in the Long Range Transmission Plan regarding the Joint LIPA / Con Edison Offshore Wind Project, as the project has been removed from the NYISO queue of proposed generation.

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. Of the 17 Transmission Load Areas evaluated in this report, the Plan identifies two load areas, Greenwood / Staten Island - 138 kV and Jamaica / Corona - 138 kV, that have a deficiency condition relative to planning criteria over the planning horizon. The Plan identifies recommended solutions to these deficiencies. Over the ten-year study period, no other deficiencies have been identified in the remaining transmission load areas.

The Gowanus 345 kV Transmission Station will be expanded in the year 2020 to serve one or more proposed area stations in the year 2021 in order to support projected load growth. No other new transmission stations are identified to support load growth and serve new area stations within the ten-year horizon.

The Plan also discusses the prospects for new generation in the Con Edison system over the study period based on an analysis of the overall capacity of projects in the NYISO generation queue. The uncertainty of developer projects going into commercial operation makes planning the future system topology a challenging and evolving task. For this reason, only certain projects currently under construction were considered in the development of the Plan.

The potential shutdown of the Indian Point nuclear units 2 and 3 is currently a subject of much discussion, even in the media. Potential solutions to an eventual Indian

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

Point plant shutdown must be regional in nature and fall outside of the scope of this Plan. Therefore, the Plan considers that these units remain in service for the entire period of analysis.

2.0 OVERVIEW

This document lays out Con Edison's plan ("the Plan") for the transmission system over a 10-year planning horizon[3]. 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 which are affected by numerous factors, including the economy, customer usage behavior, demand side management efforts and developer projects. As factors change so must the Plan.

This is the third edition of the Plan. The first edition was published on the Con Edison Web Site (www.coned.com) on September 22, 2009, and presented at the NYISO TPAS meeting on October 14, 2009 for stakeholder review and comments. The second edition of the plan was submitted to the NYISO and published on the Con Edison Web Site on August 27, 2010.

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 of demand side management programs (DSM);
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);
vi. New merchant generation and transmission;
vii. Decisions under the New York Independent System Operator's (NYISO's) Comprehensive Reliability Planning Process (CRPP)and FERC Order 890;
viii. Potential new legislation on the interconnection-wide planning process; and

[3] 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.

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

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.

Of particular importance are Con Edison's on-going and proposed DSM programs. These programs have been embedded in the Plan and in particularly in the load forecast and load projections for Transmission Load Areas. Con Edison's proposed DSM program results in the deferral of significant transmission investments. For this reason, this Plan contains no recommendations for new transmission substations.

2.2. 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[4]. 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. The latest version of EP-7100 is publicly available and posted on the Con Edison website.[5]

All system expansions, whether by Con Edison or by other parties, must be made in accordance and in compliance with NERC Standards, NPCC Criteria, NYSRC rules and NYISO procedures. As a member of the Northeast Power Coordinating Council (NPCC), Con Edison's planning process adheres to NPCC Criteria. The NPCC Criteria documents are designated as Type "A" or "Directories" and describe the minimum criteria applicable to NPCC members functioning as part of the coordinated interconnected network. Given their importance, the Criteria and Directory documents require the approval of two thirds of the NPCC membership. NPCC Guideline documents designated as Type "B" serve as the guide through which implementation of

[4] The Con Edison Transmission Planning Criteria; EP-7100 dated December 2009 was adhered to in developing this Plan.
[5] http://www.coned.com/documents/Transmission Planning Criteria.pdf

the criteria and acceptable system performance is achieved. As a member of the New York State Reliability Council (NYSRC), Con Edison must also adhere to the "NYSRC Reliability Rules for Planning and Operating the New York State Power System". NYSRC reliability rules may be more specific or stringent than NERC Standards and NPCC Criteria. Given the importance of NYSRC reliability rules, adoption or modification requires an affirmative vote of at least 9 out of the 13 members of NYSCR's Executive Committee.

2.3. Relationship with FERC Orders 1000, 890 and 2003

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 Loss of Load Expectation (LOLE) greater than 0.1 over a 10-year period. The Comprehensive Reliability Plan issued by the NYISO then identifies regulated backstop solutions to be developed by the appropriate Transmission Owners (TOs) that would be triggered by the NYISO if the market does 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 Transmission Owners. The posting of this document and its discussion with interested parties are intended to satisfy these requirements. The NYISO sets a schedule[6] for meeting these requirements in advance of the Load and Capacity Data Report (aka Gold Book) used at the start of next RNA cycle.

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

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[6] For 2009 the NYISO required local TOs to post their local plans in September and make presentations to interested parties in October.

must consider this. Further, TOs are required to meet load for a given year[7] with generic generation placed at feasible locations. Recently the NYISO has adopted a deliverability requirement, embedded in Attachments X of the NYISO OATT, in addition to the prior minimum interconnection standard. As a result of the application of this tariff, new generation may require changes and additions to the transmission system that must be also be reflected in all studies performed.

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 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 establish some new ones:

- All transmission providers must have a regional transmission planning process in place that meets the nine Planning Principles in Order 890. This Long-Range Transmission Plan, when presented in an open NYISO planning forum will be fully compliant with all the appropriate Principles.
- One aspect that is new in Order 1000 is that local and regional planning processes must consider transmission needs driven by public policy requirements established by state or federal laws or regulations.
- Final Rule eliminates the right-of-first refusal tariff provisions for incumbent transmission providers with respect to building proposed facilities that are included in a regional transmission plan, which the NYISO tariff did not have any. However, several exceptions are granted for local facility upgrades in existing right-of-ways.

Although the effective date of the Order is within 60 days of official issuance, the Order requires compliance tariff filings on the part of the NYISO within 12 months thereafter. Once FERC approves that tariff, the new Order 1000 regulations will apply to new transmission facilities.

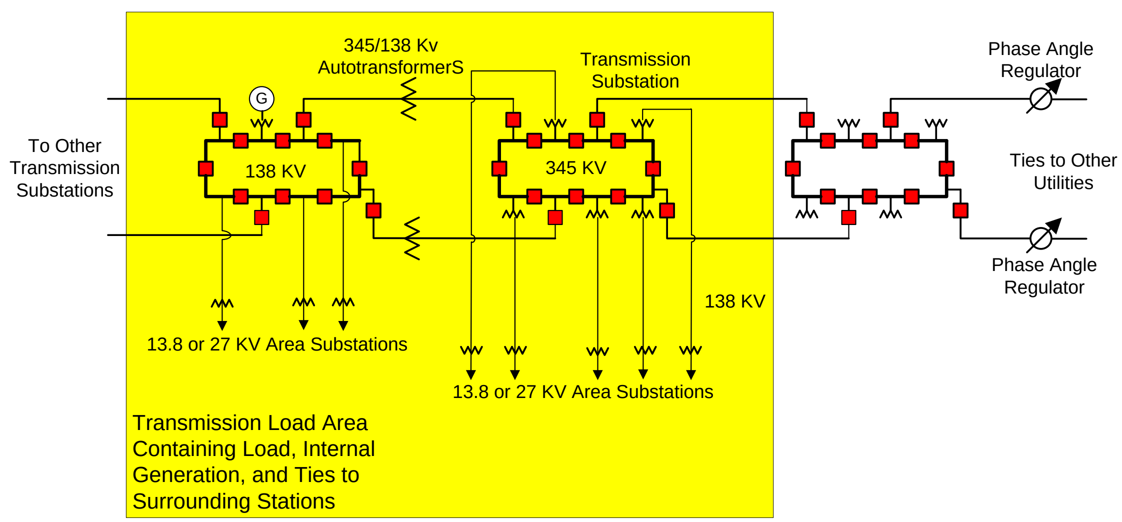
[7] Attachment S of the NYISO OATT includes the concept of Class Year in which Generator Owners can place themselves so that the reliability of the system can be studied with the collective presence of all generators in the Class Year.

2.4. 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[8].

2.4.1. Objective 1: Transmission Load Area (TLA) Assessment

Planning for the Con Edison transmission system includes the detailed evaluation of Transmission Load Areas over a ten-year period. Transmission Load Areas are specified portions of the transmission system designated for convenience in 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

[8] Con Edison, together with all other TOs in the State is participating in a separate planning program called STARS. Information on this initiative can be found on the NYISO website at http://www.nyiso.com/public/services/planning/stars.jsp

with reliability criteria. There are a number of possible actions that can address Transmission Load Area reliability criteria deficiencies:

1. Additional transmission expansion into the Transmission Load Area, which may require other transmission support farther out from the Transmission Load Area;
2. Demand side management programs targeting load within the Transmission Load Area;
3. Increasing the capacity of existing transmission components;
4. Transferring load from one Transmission Load Area to another Transmission Load Area by transferring a portion of one network within the load area to a network in another load area that has spare capacity;
5. New generation within the Transmission Load Area; and
6. 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 Transmission Load Area into compliance with reliability criteria. Chapter 6 presents the current status of the Con Edison system Transmission Load Area assessment.

2.4.2. Objective 2: Transmission Substation Assessment

As load grows within a Transmission Load Area, more feeders are required to reliably supply network load. At some point, an area station may reach its expansion limit due to transformer capacity, subtransmission feeder capacity, bus current capacity, circuit breaker interrupting capability, or other reasons. In these situations, a new area station may be needed and internal 138 kV transmission expansions also may be needed to supply the new area station. As the 138 kV system expands, new 345 kV transmission stations may be required for the reliable integration of area stations into the bulk power system. There are some exceptions where 345 kV transmission stations supply area station load directly but this is not the general case. Chapter 7 is reserved for discussing the need for new transmission stations. None were found to be required for the 10-year period studied in this Plan.

2.4.3. 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 bring the system into compliance with reliability criteria. Resources closer to load will provide greater reactive support than those further away. 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 is 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.

2.5. 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 during the study period are discussed in Chapter 8.

3.0 LONG-RANGE TRANSMISSION PLAN ANALYSIS TOOLS AND METHODOLOGIES

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[9]. This is done for present and planned configurations at present and future load levels, respectively. The simulations are validated using real-time measurements made under normal and contingency conditions whenever possible. Assessments are made in the following areas, using standardized software packages to study the system's performance:

- Thermal;
- Voltage;
- Short Circuit;
- Stability;
- Critical Clearing Time;
- Underfrequency Load Shedding;
- Transient Switching Surge and Lightning Withstand Capabilities; and
- Extreme Contingencies.

3.1. Thermal

Load flow studies are the primary method used by Transmission Planning to assess the performance of the transmission system under normal and contingency conditions. 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 transmission system load flow studies.

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 operation, long-time emergency operation (LTE), and short-time emergency operation (STE).

[9] 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

Load flow studies are conducted to simulate normal operation under peak forecast loads, followed by various contingency conditions defined in the New York State Reliability Council (NYSRC) and the Northeast Power Coordinating Council (NPCC) rules. In these simulations, the transmission system must exhibit the capability to be returned to operation within normal thermal limits following the worst case contingencies within the time frame specified in the rules.

3.1.1. FERC Form 715

While 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 for optimum power flows. A battery of load flow base cases are developed for the FERC 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.

Load flow base cases developed for the FERC 715 filing are used for annual reviews of Installed Reserve Margin (IRM), a NYSRC requirement. Transfer limits for the local area are calculated by Transmission Planning using load flow studies, and these are used as inputs in Multi Area Reliability Simulations (MARS) conducted by Con Edison's Energy Management organization.

Load flow base cases developed for the FERC 715 filing are also used in the NYISO's Comprehensive Reliability Planning Process (CRPP) which is conducted annually looking out over a ten-year horizon, one year at a time. The first task in the CRPP is to conduct a Reliability Needs Assessment (RNA). If a reliability need or needs are identified in any or all of the ten years studied, a Comprehensive Reliability Plan (CRP) must be formulated to meet that need or those needs.

3.2. 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[10].

3.3. Short Circuit

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

3.4. Stability

Stability studies are performed 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 Document A-2, “Basic Criteria for Design and Operation of Interconnected Power Systems.” Document A-2 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.

NPCC Document B-4, “Guidelines 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

[10] Voltages must remain within a prescribed range of 0.95 to 1.05 per unit through all contingencies studied under the NYSRC rules.

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.

3.5. Critical Clearing Time

Critical clearing time studies, like stability studies, are performed using the dynamic simulation capability of the PSS/E software. These are subsets of stability studies done with the intent of determining the allowable time intervals for protective relays and circuit breakers to sense and isolate faults without causing generator instability or unstable oscillations (power swings) on the system. Worst case fault clearing scenarios are investigated, including, among other things, stuck breaker conditions. The results of critical clearing time studies are often used to set the time delays on breaker failure relaying schemes to determine if existing settings are adequate.

Critical clearing time studies are by their very nature voluminous given the number of combinations and permutations to be considered in a typical complex transmission system. New studies are undertaken for significant planned changes to the system.

3.6. Underfrequency Load Shedding

The adequacy of the underfrequency load shedding program is also assessed using the dynamic simulation capability of the PSS/E software. Simulations for the Con Edison service territory are conducted. In addition, the Company participates in NPCC Study Group SS-38, which conducts simulations that encompass all areas in the NPCC region. Underfrequency load shedding has been implemented throughout the NPCC to address imbalances between generation and load when electrical islands are formed due to major disturbances. Adequacy is affected by the extent of the imbalances, as well as by the dynamic response of the generators. The nature of the load modeling can also impact the study results.

While the NPCC keeps a close eye on the adequacy of its underfrequency load shedding program through its SS-38 Study Group, there is no prescribed interval for periodic studies. Studies are undertaken when engineering judgment dictates that system conditions have changed sufficiently to warrant a review of the existing program.

3.7. 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 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.

3.8. Extreme Contingencies

Extreme contingency scenarios that stress the transmission system beyond its design criteria are assessed in accordance with NPCC Document B-4, “Guidelines for NPCC Area Transmission Reviews”.. Document B-4 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 periodically 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 eighteen months to carry out and review. The studies are based on assumptions that were posted in the Con Edison website.[11]

4.1. Long-Range Transmission Plan Assumptions

Study Year	***Assumptions[12]***
2011	• *Con Edis*on Load (Coincident Peak) = 13,300 MW • 576 MW Generator (Astoria Energy 2) connected at Astoria Annex 345 kV Station to Feeders Q35L&M
2015	• Con Edison Load (Coincident Peak) = 14,060 MW • 576 MW Generator (Astoria Energy 2) connected at Astoria Annex 345 kV Station to Feeders Q35L&M[13] • 500 MW Generator (Bayonne Energy Center) connected at Gowanus configured as 345 kV Ring Bus[14] • 660 MW (320 MW Firm) Transmission Tie connecting Ridgefield, NJ to the West 49th Street 345 kV Transmission station[15]
2020	• Con Edison Load (Coincident Peak) = 15,138 MW • 576 MW Generator (Astoria Energy 2) connected at Astoria Annex 345 kV Station to Feeders Q35L&M[13] • 500 MW Generator (Bayonne Energy Center) connected at Gowanus configured as 345 kV Ring Bus[14] • 660 MW (320 MW Firm)Transmission Tie connecting Ridgefield, NJ to the West 49th Street 345 kV Transmission station[15]

[11] The revised Long-Range Transmission Plan Assumptions were posted on July 11, 2011, on the Con Edison website http://www.coned.com/tp/transmission_planning_process.asp in accordance with the requirements of Order 890

[12] These assumptions supplement or replace the comparable assumptions in the FERC 715 Annual Transmission Planning and Evaluation Report filed by the NYISO in April, 2011. Also, the load quantities quoted are net of transmission system losses.

[13] A new generator, Astoria Energy Unit 2, with a capability of 576 MW, will be connected to the same 345 kV interconnection point as the Poletti plant, which was retired in January, 2010 This generator in the 2020 model is the same resource cited for 2015 and does not represent an additional 576 MW over the one assumed for 2015.

[14] A new generator, Bayonne Energy Center, with a capability of 500 MW, will be connected to the Gowanus 345 kV Transmission Station. The Gowanus Station will be reconfigured as a Ring Bus to accommodate the interconnection.

[15] A new tie line, "HTP", with a capacity of 660 MW, will be connected from the Ridgefield 345 Transmission Station in New Jersey to the West 49th Street 345 kV Transmission Station in Manhattan, to be completed in the year 2013.

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 in 18 months from beginning to end.

The process timeline is now designed 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 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"[16], 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 "a" through "g", per Table A of the NYSRC Reliability Rules". 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.

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

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:

A. The most severe of design criteria contingencies of type “a” through “g”, per Table A of the NYSRC Reliability Rules.
B. The most severe combination of two non-simultaneous design criteria contingencies of type “a” and “d”, per Table A 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 18-month cycle, the Long-Range Transmission Plan process begins after the issuance of the NYISO’s Gold Book describing the summer conditions for the year prior to the first study year of this Plan:

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 on their load forecast develops a summer model for the entire New York system. This provides the model for areas outside the Con Edison system for the studies reported in the Plan. To define the internal portions of the model, the first step is to take the independent peaks for each Transmission Load Area (TLA) which are available after the summer and perform a spreadsheet tabulation evaluation to identify possible deficiencies as an early signal of potential problem areas. In the fourth quarter, after the coincident load forecast for each area station is available, the load flow base cases for the three timeframes of the study are developed. Starting in the first quarter of the study year load flow analysis for 17 different TLAs for each of the three timeframes is conducted. Short circuit analysis is also performed in areas where there have been significant model or generation changes. The second quarter of the study year is devoted to the evaluation of the results of these analyses and the development and verification of potential solutions. Finally during the summer period the Plan is thoroughly reviewed and the report is drafted.

Special note should be taken that the model for the first year of evaluation (2011 for the current Plan) contains the NYISO's forecasted loads for the summer of the previous year (2010) for the non-Con Edison portions and the summer forecasted loads for the first year of the study (2011) for the Con Edison system. This is necessary for the timely completion of the analysis because the NYISO forecasted loads for the first year of evaluation are not ready until just prior to the summer of that year.

These steps are described in detail below:

1. Con Edison Model to NYISO for years 0, 4 and 9 (2010, 2014, 2019)

   Con Edison works collaboratively with the NYISO to build an accurate representation of the Con Edison transmission system and its load as a component of the NYISO load model;

2. NYISO Model to Con Edison for Years 0, 4 and 9 (2010, 2014, 2019)

   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 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 being under construction;

3. Obtain Independent Peaks by Station for Years 1, 5 and 10 (2011, 2015, 2020)

   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;

4. Evaluation of Tabulations for 17 TLAs for Years 1, 5 and 10 (2011, 2015, 2020)

   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. These results are generally optimistic by design.

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;

5. Obtain Coincident Peaks for Years 1, 5 and 10 (2011, 2015, 2020)

   Following the determination of the independent peaks for each TLA, the coincident peaks to be used in the load model are determined in the fourth quarter. This data will be incorporated into the Con Edison portion of the NYISO load flow models;

6. Define the Con Edison Portion of the Models for Years 1, 5 and 10 (2011, 2015, 2020)

   Each Con Edison area station is updated with the latest load data, and 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 peak loads;

7. Load Flow Studies for 17 TLAs for Each of the 3 Snapshot Years

   During the first quarter of year 1 of the study, the load models are evaluated for each of the 3 years in question. Each TLA is categorized according to a first or second contingency level of reliability;

8. 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 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;

9. Solutions Proposed and Evaluated

For all thermal overloads and voltage violations that cannot be corrected using actions permissible within the 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;

10. Report and Presentation

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

11. FERC Order 890 Presentations and Responses

    In accordance with the requirements set forth in FERC Order 890, 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

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 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 Short Term Emergency rating of that path, and bus voltages do not violate their 0.95 – 1.05 per unit limits; and

b. The utilization of Phase Angle Regulators (PAR's) must be sufficient to reduce the overload(s) to a level below the Long Term Emergency rating. Once that is achieved, 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 flow on the all paths may not exceed the normal rating of that path, 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.

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:

1. Criteria corrective actions for first contingencies in a “first contingency design” configuration or the second contingency in a “second contingency design” configuration include:
   a. Adjustment of power flow using Phase Angle Regulators and Transformers;
   b. Adjustment of generation power output up to their maximum reserve amounts;
   c. Adjustment of generation voltage and reactive power;
   d. Initiation of any and all Gas Turbines; and
   e. Switching of shunt devices.
2. Criteria corrective actions for the first contingency in a “second contingency design” configuration include:
   a. Adjustment of power flow using Phase Angle Regulators;
   b. Adjustment of generation power output up to 10 minute reserve amounts; and
   c. Initiation of Gas Turbines with Quick Start capabilities.

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: Economical, fast, may support other organizational goals

   Disadvantages: May limit future growth in other areas, may interfere with other organizational goals.

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, more expensive than load transfers.

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 queue that can have an impact within the Con Edison service territory.

Advantages: Permanent improvement in capacity and voltage support

Disadvantages: Merchant generation not under the control of Con Edison, long period from concept to operation and 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 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

Disadvantages: Expense, long lead time

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

7. Reactive Power Compensation (Capacitors or Shunt Reactors)

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

Overhead transmission lines need to 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.

Advantages: Permanent improvement in 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 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 higher impedance devices such as series reactors or phase angle regulators can be added to the system.

Advantages: Allows for more interconnections between stations, more economical than other alternatives such as DC back-to-back links

Disadvantages: Absorb reactive power, reduces voltages

10. Demand Side Management (DSM)

Permanent DSM 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="6">Planned Changes In Load Area</td><td>2011</td><td colspan="3">Establish 576 MW generator Astoria Energy II at Astoria Annex</td></tr>
<tr><td>2011</td><td colspan="3">Installation of cooling infrastructure for feeders 45 and 46 improves Normal Rating by an additional 100MW each.</td></tr>
<tr><td>2011</td><td colspan="3">Transfer 20 MW from E 179th St Area Station to Central Bronx Area Station</td></tr>
<tr><td>2013</td><td colspan="3">Establish HTP (PSNJ to W 49th St) 320 MW Firm, 660 MW Emergency</td></tr>
<tr><td>2018</td><td colspan="3">Pick up 165 MW (P/O Lenox Hill at E 75th Street) to new York Area Station</td></tr>
<tr><td>2020</td><td colspan="3">Pick up Hunter Network from East 63rd St #1 to East 75th Street</td></tr>
<tr><td rowspan="6">Assessment</td><td rowspan="2">2011</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">2015</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">2020</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>2011</td><td colspan="3">None required</td></tr>
<tr><td>2015</td><td colspan="3">None required</td></tr>
<tr><td>2020</td><td colspan="3">None required</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">Planning Solution</td><td>2011</td><td colspan="3">None required</td></tr>
<tr><td>2015</td><td colspan="3">None required</td></tr>
<tr><td>2020</td><td colspan="3">None required</td></tr>
<tr><td>Short Circuit Considerations</td><td colspan="4">None</td></tr>
</table>

6.2. West 49th Street - 345 kV

Geographic Coverage	Midtown and Lower Manhattan.			
Design Criteria	Second Contingency.			
Planned Changes In Load Area	2011	Establish 576 MW generator Astoria Energy II at Astoria Annex		
	2011	Installation of cooling infrastructure for feeders 45 and 46 improves Normal Rating by an additional 100MW each.		
	2011	Transfer 25 MW from Cherry St. (E 13th St. S/S) to Seaport #1 (Farragut S/S)		
	2013	Establish HTP (PSNJ to W 49th St) 320 MW Firm, 660 MW Emergency		
Assessment	2011	First Contingency	Loss of M51	No deficit
		Second Contingency	Loss of M51 followed by the loss of M52	No deficit**
	2015	First Contingency	Loss of M51	No deficit
		Second Contingency	Loss of M51 followed by the loss of M52	No deficit
	2020	First Contingency	Loss of M51	No deficit
		Second Contingency	Loss of M51 followed by the loss of M52.	No deficit
Operational Remediation	2011	**See note below on Short Circuit Issues.		
	2015	None required.		
	2020	None required.		
Planning Solution	2011	None required.		
	2015	None required.		
	2020	None required		
Short Circuit Considerations	Until upgrades of the short circuit capability at Vernon switching station are performed (scheduled for 2013), at least one element from a list of connections at Vernon East will need to be out of service before line 38M72 is placed in service. 38M72 acts as a supply from Vernon to West 49th St. and is needed to meet second contingency criteria for the load area.			

6.3. New York City - 138 kV

Geographic Coverage	Bronx, Brooklyn, Queens and Manhattan.			
Design Criteria	Second Contingency			
Planned Changes In Load Area	2011	Establish 345 kV Feeder M29 - Capability depends on the capacity of feeders 15031/15032 and Sherman Creek Load		
	2012	Install third 20MVAR capacitor bank at Parkchester No. 2 (Parkchester) for area station load relief.		
Assessment	2011	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East, followed by NYPA CC1/CC2 500 MW plant at Astoria West.	No Deficit
	2015	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East, followed by NYPA CC1/CC2 500 MW plant at Astoria West.	No deficit
	2020	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East, followed by NYPA CC1/CC2 500 MW plant at Astoria West.	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	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	2011	Establish 345 kV Feeder M29 - Capability depends on the capacity of feeders 15031/15032 and Sherman Creek Load		
	2012	Install third 20 MVAR capacitor bank at Parkchester No. 2 (Parkchester S/S) for area station load relief.		
Assessment	2011	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East, followed by NYPA CC1/CC2 500 MW plant at Astoria West.	No deficit
	2015	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East, followed by NYPA CC1/CC2 500 MW plant at Astoria West.	No deficit
	2020	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East, followed by NYPA CC1/CC2 500 MW plant at Astoria West.	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	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	2011	Establish 576 MW generator Astoria Energy II at Astoria Annex		
	2011	Installation of cooling infrastructure for feeders 45 and 46, for an additional 100MW on each.		
	2011	Transfer 25 MW (P/O City Hall) from Cherry Street to Seaport No.1.		
	2019	Transfer 15 MW (P/O Chelsea) from West 19th Street to East 29th Street.		
Assessment	2010	First Contingency	Loss of Feeder B47: Q35L, #37378, #44371 L/M, Transformer #16 & 17 at E13th	No deficit
		Second Contingency	Followed by loss of Feeder 48: Q35M, #37378, #37376, #37377, Transformer #16, #10 & #11 at E13th Street	No deficit
	2014	First Contingency	Loss of Feeder B47: Q35L, #37378, #44371 L/M, Transformer #16 & 17 at E13th	No deficit
		Second Contingency	Followed by loss of Feeder 48: Q35M, #37378, #37376, #37377, Transformer #16, #10 & #11 at E13th Street	No deficit
	2019	First Contingency	Loss of Feeder B47: Q35L, #37378, #44371 L/M, Transformer #16 & 17 at E13th	No deficit
		Second Contingency	Followed by loss of Feeder 48: Q35M, #37378, #37376, #37377, Transformer #16, #10 & #11 at E13th Street	No deficit
Operational Remediation	2010	None required		
	2014	None required		
	2019	None required		
Planning Solution	2010	None required		
	2014	None required		
	2019	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	2017	Swap Tie Feeders at Jamaica (18001 with 702 and 18002 with 701)		
	2019	Upgrade capacity of 6 feeders between Astoria East and Corona		
Assessment	2011	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East followed by U.S. PowerGen Astoria 4 at Astoria East.	No deficit
	2015	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East followed by U.S. PowerGen Astoria 4 at Astoria East.	No deficit
	2020	First Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East.	No deficit
		Second Contingency	Loss of Astoria Energy I 500 MW Plant at Astoria East followed by U.S. PowerGen Astoria 4 at Astoria East.	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	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	2020	Transfer Hunter (85 MW) to East 75th Street		
		Transfer 30 MW (P/O Roosevelt Island) from East 63rd Street No.2 to East 63rd Street No.1		
Assessment	2011	First Contingency	Failed Breaker 6S resulting in Loss of NYPA CC1/CC2 500 MW Plant at Astoria West, 24051, 38X15 and 38X11	No deficit
		Second Contingency	Loss of NYPA CC1/CC2 500 MW at Astoria West followed by 31281	No deficit
	2015	First Contingency	Failed Breaker 6S resulting in Loss of NYPA CC1/CC2 500 MW Plant at Astoria West, 24051, 38X15 and 38X11	No deficit
		Second Contingency	Loss of NYPA CC1/CC2 500 MW at Astoria West followed by 31281	No deficit
	2020	First Contingency	Failed Breaker 6S resulting in Loss of NYPA CC1/CC2 500 MW Plant at Astoria West, 24051, 38X15 and 38X11	No deficit
		Second Contingency	Loss of NYPA CC1/CC2 500 MW at Astoria West followed by 31281	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		
Other Planning Solutions	2011	None required		
	2015	None required		
	2020	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	None			
Assessment	2011	First Contingency	Loss of Ravenswood 1	No deficit
		Second Contingency	Followed by loss of Ravenswood 2	No deficit
	2015	First Contingency	Loss of Ravenswood 1	No deficit
		Second Contingency	Followed by loss of Ravenswood 2	No deficit
	2020	First Contingency	Loss of Ravenswood 1	No deficit
		Second Contingency	Followed by loss of Ravenswood 2	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		
Other Planning Solutions	2011	None required		
	2015	None required		
	2020	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	2011	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 Transformer 17	No deficit
	2015	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 Transformer 17	No deficit
	2020	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 Transformer 17	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		
Other Planning Solutions	2011	None required		
	2015	None required		
	2020	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	2019: Transfer 26 MW (radial load) from Bensonhurst No.2 to Bensonhurst No.1			
Assessment	2011	First Contingency	Bus Fault with Stuck Breaker #4N results in loss of Gowanus GTs 1&3, Narrows GT2, Feeder 42232.	No Deficit
	2015	First Contingency	Bus Fault with Stuck Breaker #4N results in loss of Gowanus GTs 1&3, Narrows GT2, Feeder 42232.	No Deficit
	2018	First Contingency	Bus Fault with Stuck Breaker #4N results in loss of Gowanus GTs 1&3, Narrows GT2, Feeder 42232.	Total 11 MVA deficit See Planning Solution
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2018	Establish a new bus section and breaker at the Greenwood 138kV Substation (3N between 2N & 4N) and separate the feeders 42G13 and 42232, to reduce the impact of bus fault contingency with stuck breaker.		
	2020	No additional actions required		
Other Planning Solutions	2011	None required		
	2015	None required		
	2020	None required		

6.11. Corona / Jamaica - 138 kV

Geographic Coverage	Queens			
Design Criteria	First Contingency			
Planned Changes In Load Area				
Assessment	2011	First Contingency	Failed breakers 1, 2, 9, or 18 resulting in the loss of feeder 901, 702 and transformer bank 4 at Jamaica 138 kV	None required.
	2015 - 2017	First Contingency	Failed breakers 1, 2, 9, or 18 resulting in the loss of feeder 901, 702 and transformer bank 4 at Jamaica 138 kV	Deficit Forecast for 2017. See Planning Solution
	2018 - 2020	First Contingency	Failed breakers 1, 2, 9, or 18 resulting in the loss of feeder 901, 702 and transformer bank 4 at Jamaica 138 kV	None required.
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2017	Upgrade feeder capability or transfer load out of TLA. Feeder upgrade options include cooling, conductor replacement or additions.		
	2020	No Further Actions Required		
Short Circuit Considerations	None			

6.12. Bronx - 138KV

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	2011	Establish 345 kV Feeder M29 from Sprain Brook to Academy - Capability depends on the capacity of feeders 15031/15032 and Sherman Creek Load		
	2011	Transfer 20 MW from E 179th St Area Station to Central Bronx Area Station		
Assessment	2011	First Contingency	Loss of X28	No Deficit
		Second Contingency	Loss of M29	No Deficit.
	2015	First Contingency	Loss of X28	No Deficit
		Second Contingency	Loss of M29	No Deficit.
	2020	First Contingency	Loss of X28	No Deficit
		Second Contingency	Loss of M29	No Deficit.
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		

6.13. Eastview - 138 kV

Geographic Coverage	Westchester			
Design Criteria	First Contingency			
Planned Changes In Load Area	No Changes			
Assessment	2011	First Contingency	Loss of 1 Common Tower – 1S & 1N Transformers at Eastview, W78, W85, W64 and W99	No deficit
	2015	First Contingency	Loss of 1 Common Tower – 1S & 1N Transformers at Eastview, W78, W85, W64 and W99	No deficit
	2020	First Contingency	Loss of 1 Common Tower – 1S & 1N Transformers at Eastview, W78, W85, W64 and W99	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	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	2013	Transfer 12 MW from Fresh Kills 33kV to Woodrow		
	2017	Transfer 12 MW from Fresh Kills 33kV to Woodrow		
	2018	Transfer 6 MW from Wainwright to Woodrow		
Assessment	2011	First Contingency	Loss of Arthur Kill 2	No deficit
	2015	First Contingency	Loss of Arthur Kill 2	No deficit
	2020	First Contingency	Loss of Arthur Kill 2	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		
Other Planning Solutions	2011	None required		
	2015	None required		
	2020	None required		

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	2011	Establish 345 kV Feeder M29 from Sprain Brook to Academy - Capability depends on the capacity of feeders 15031/15032 and Sherman Creek Load		
Assessment	2011	First Contingency	Loss of M29	No Deficit
		Second Contingency	Loss of W74	No Deficit
	2015	First Contingency	Loss of M29	No Deficit
		Second Contingency	Loss of W74	No Deficit
	2020	First Contingency	Loss of M29	No Deficit
		Second Contingency	Loss of W74	No Deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	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	No Changes			
Assessment	2011	First Contingency	Loss of W73	No deficit
	2015	First Contingency	Loss of W73	No deficit
	2020	First Contingency	Loss of W73	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		
Short Circuit Considerations	None			

6.17. Millwood / Buchanan - 138 kV

Geographic Coverage	Westchester			
Design Criteria	First Contingency			
Planned Changes In Load Area	2011	Transfer 4MW from Ossining West to Elmsford No.2		
	2013	Transfer 7MW from Ossining West to Elmsford No.2		
Assessment	2011	First Contingency	Loss of Transformer TA-2 at Millwood	No deficit
	2015	First Contingency	Loss of Transformer TA-2 at Millwood	No deficit
	2020	First Contingency	Loss of Transformer TA-2 at Millwood	No deficit
Operational Remediation	2011	None required		
	2015	None required		
	2020	None required		
Planning Solution	2011	None required		
	2015	None required		
	2020	None required		
Short Circuit Considerations	None			

7.0 LOAD GROWTH SUPPORT: NEW TRANSMISSION STATIONS

Gowanus 345 kV Transmission Station will be expanded in the year 2020 to support one or more area stations scheduled to support load growth in the year 2021.

There are no other new transmission stations required for the period 2011-2020.

8.0 INTERCONNECTION PROCESS AND OUTLOOK

Con Edison has issued a Developer Welcome Kit (posted on the Con Edison website[17]) 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 NYISO 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. Additionally once the NYISO issues the tariff sheets for "Deliverability," developer projects in Class Years 2008 and beyond will also need to comply with that requirement. 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 performance of these studies is 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

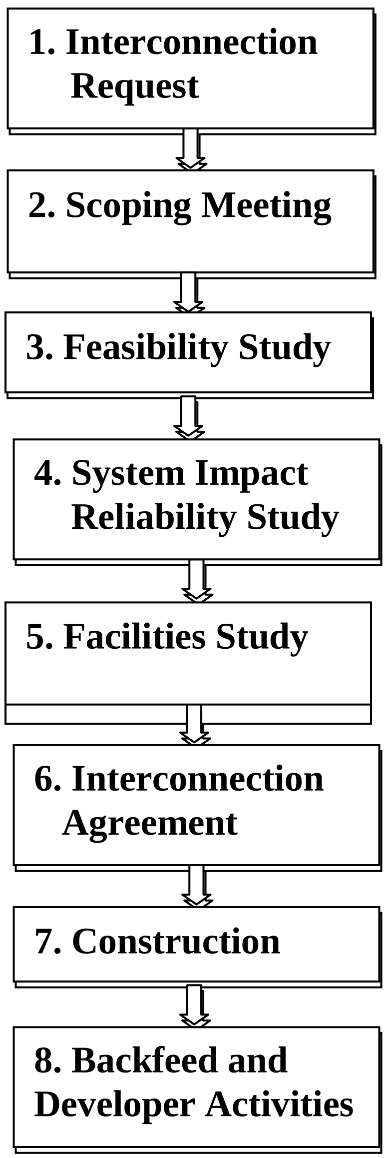
Developers must also adhere to the local TO planning criteria and practices to assure a reliable interconnection. In general, new generating facilities must not contribute to a deterioration of system reliability such as by burdening it with excessive

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

flows under normal and contingency conditions, providing excessive fault currents or by not supplying the reactive power required by their interconnection agreement.

8.3. The NYISO Interconnection Process

Below is 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.



- Developer submits Interconnection Request to NYISO

- Discuss Project particulars with NYISO and connecting Transmission Owner
- The Developer must submit a one-line diagram of the proposed Interconnection Point within 5 days of the Scoping Meeting

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

- Evaluates thermal, stability, short circuit and transfer limit impacts

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

- 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 table below lists the merchant generation and transmission projects that currently propose to interconnect to Con Edison. This information was extracted from the NYISO's interconnection queue listing, dated 7-1-2011, 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 existing projects.

The list of proposed developer projects that seek interconnection to the Con Edison transmission system reveals that 4,703 MW of new generation projects and 6,025 MW of new transmission projects.

There are three projects that have been included in the Long Range Plan: The Astoria Energy Unit 2 generator, with a capability of 576 MW, has been completed as of June, 2011. The Bayonne Energy Center Project, with a capability of 500 MW, is under construction and anticipated to be completed by May 2012, along with the reconfiguration of the Gowanus 345 kV transmission station. The Hudson Transmission Project, a 345 kV transmission line connecting New Jersey with the West 49th Street transmission station, has begun construction and is anticipated to be completed by May 2013.

The remaining projects in the queue have not been included in the Long Range Plan, because their actual construction may be delayed or cancelled due to a variety of factors that impact a developer's decision to proceed or exit from the project. These include:

- Future load growth and existing available capacity;
- Development of DSM 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.

There is no accurate means to determine the speed at which a prospective developer will move through the NYISO's interconnection process, or to then actually interconnect. This is evidenced by the current NYISO interconnection queue reflecting that some developers have been in the study mode for 10 years, while others have started the NYISO study process and completed construction within 3 years.

Appendix: NYISO Queue Entries for the Con Edison Service Territory

Pos.	Owner/ Developer	Project Name	G / T	Date of IR	(MW)	Zone	Inter-connect Point	Availability of Studies	Interconnect Request	Scoping Meeting	Feasibility Study	System Reliability Impact Study	Facilities Study	Original In-Svc Date	Current In-Svc Date
106	TransGas Energy, LLC	TransGas Energy	G	10/5/01	1100	J	E13St, Rainey, or Farragut-345kV	SRIS	x	x	GF	x	x, a*	2007	2012/Q3
201	NRG Energy	Berrians GT	G	8/17/05	200	J	Astoria West Substation 138kV	SRIS, FS	x	x	x	x		2008/02	2013/06
206	Hudson Transmission Partners	Hudson Transmission	T	12/14/05	660	J	West 49th Street 345kV	FES, SRIS, FS	x	x	x	x	x, b*	2009/Q2	2011/Q4
224	NRG Energy, Inc.	Berrians GT II	G	8/23/06	50	J	Astoria West Substation 138kV	FES	x	x	x			2010/06	2013/06
232	Bayonne Energy Center, LLC	Bayonne Energy Center	G	11/27/06	500	J	Gowanus Substation 345kV	FES, SRIS	x	x	x	x	x, d*	2008/11	2011/06
261	Astoria Generating Company	South Pier Improvement	G	10/2/07	105	J	Gowanus 138kV	FES, SRIS	x	x	x	x	x, c*	2010/06	2012/05
266	NRG Energy, Inc.	Berrians GT III	G	11/28/07	744	J	Astoria 345kV	FES, SRIS	x	x	x	x	x, c*	2010/06	2012/06
267	Winergy Power, LLC	Winergy NYC Wind Farm	G	11/30/07	601	J	Gowanus Substation 345kV	FES	x	x				2015/01	2017/01
295	CCH Holdings Group, LLC	Cross Hudson II	T	5/6/08	800	J	West 49th St. Substation 345kV	None	x	x				2011/06	2012/Q2
305	Transmission Developers Inc.	Transmission Developers NYC	T	7/18/08	1000	J	Gowanus Substation 345kV	SRIS	x	x	x	x		2014/Q1	2015/03
306	Transmission Developers Inc.	Clay HVDC	T	7/18/08	1000	C, J	Clay 345kV - Sherman Creek 138 kV	None	x	x				2014/Q1	2014/Q1
307	New York Wire, LLC	New York Wire-Phase 1	T	7/29/08	550	J	Gowanus Substation 345kV	FES	x	x				2013/07	2013/12
310	Cricket Valley Energy Center, LLC	AP Dutchess	G	9/23/08	1002	G	Tie Line 398 via new substation	SRIS	x	x	x	x		2014/12	2014/12
351	Linden VFT, LLC	Linden VFT Uprate	T	3/2/10	15	J	Goethals 345kV	SRIS	x	x		x		2010/11	2010/11
357	NRG Energy	NY Power Pathway	T	9/10/10	1000	F, G or H	New Scotland - Roseton or Buchanan 345kV	None	x	x				2016/07	2016/07
358	Anabaric Northeast	West Point Transmission	T	9/13/10	1000	F, H	Leeds - Buchanan North	None	x	x				2015/05 - 2016/05	2015/05 - 2016/05
361	US PowerGen Co.	Luyster Creek Energy	G	2/15/11	401	J	Astoria Substation	None	x	x				2014/06	2014/06

Total Generation - MW's	4,703
Total Transmission - MW's	6,025
Total Proposed Project MW's that have a completed Facility Study and have accepted Cost Responsibility	660
At the time of publication, the Class Year 2009/10 Facilities Study has not yet been finalized	

Notes:
a* = Has completed Facility Study but rejected its cost responsibility
b* = Has completed Facility Study and accepted cost responsibility
c* = Has completed Facility Study, rejected cost responsibility in first round
d* = Accepted 2009 Class Year Cost Allocation in the first round, awaiting finalization of Class Year Study
G = Generation Project
T = Transmission Project
GF = Grandfathered projected that did not undergo a Feasibility Evaluation
FES = Feasibility Study
SRIS = System Reliability Impact Study
FS = Facilities Study