Consolidated Edison Long-Range Transmission Plan 2017 – 2027

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Presentation to ESPWG / TPAS

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Long-Range Transmission Plan

- Driver of the Plan is to maintain local reliability
- 10-year planning horizon extending through the year 2027
- Order 890 compliance
  - Assumptions
  - Criteria
  - Analysis Tools
  - 2017 Long Range Plan

  Can all be accessed from this page:

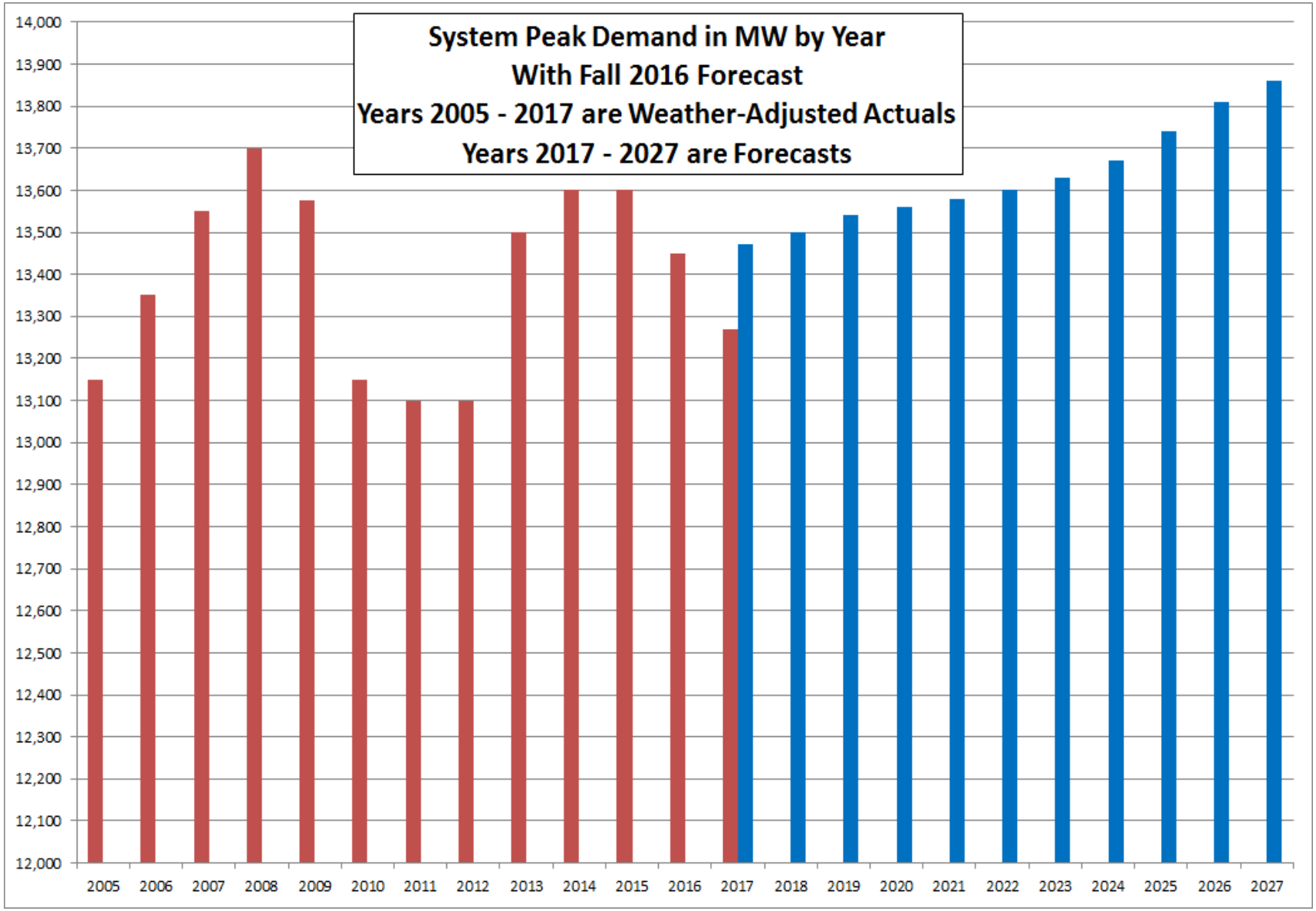
  https://www.coned.com/en/business-partners/transmission-planning

Assessments

- System Performance
- Transmission Load Area (TLA)
- Transmission Substation
- Interconnection of New Generation / Transmission Resources

System Performance

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


System Peak Demand in MW by Year
With Fall 2016 Forecast
Years 2005 - 2017 are Weather-Adjusted Actuals
Years 2017 - 2027 are Forecasts
14,000
13,900
13,800
13,700
13,600
13,500
13,400
13,300
13,200
13,100
13,000
12,900
12,800
12,700
12,600
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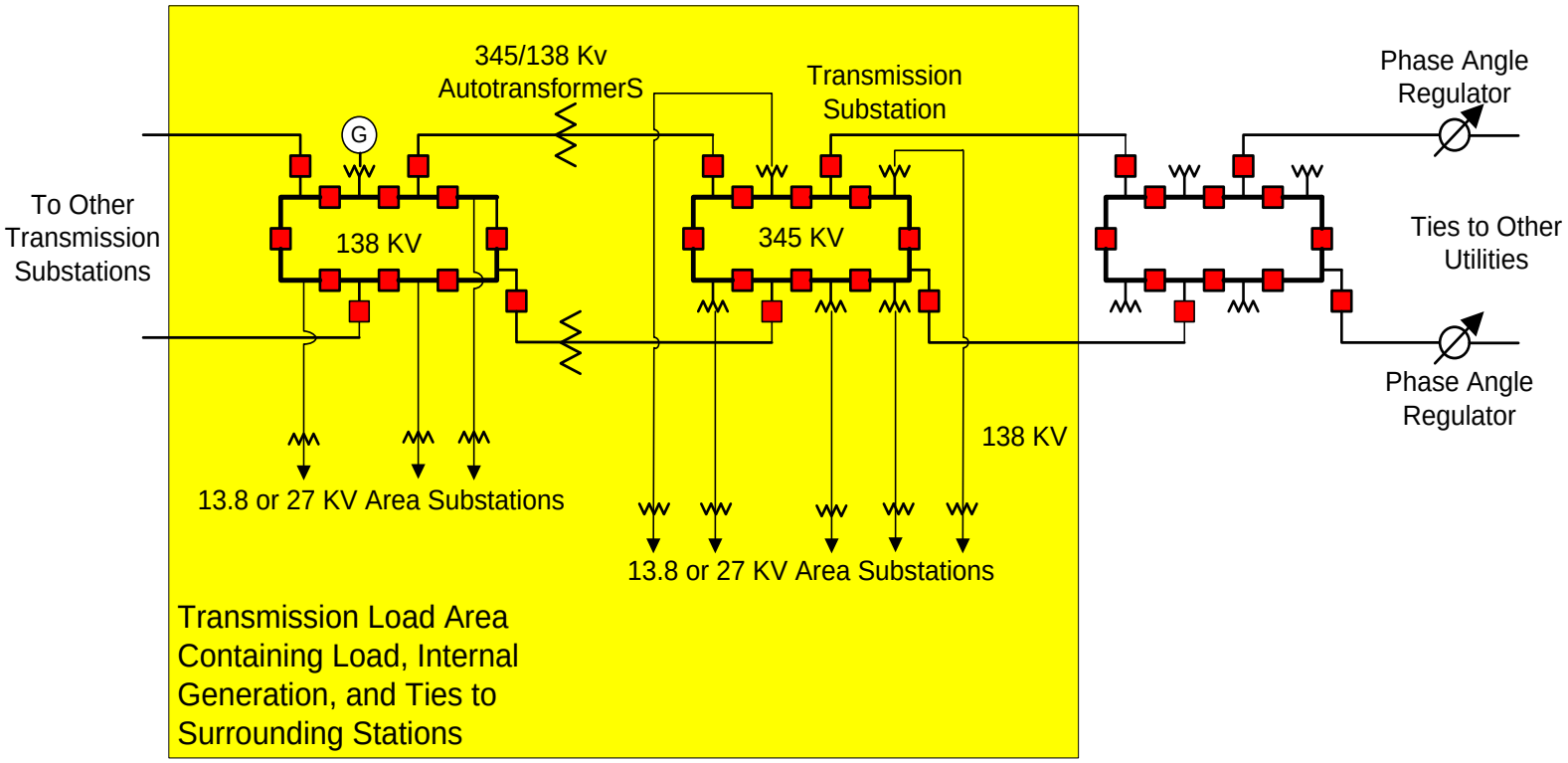
2026
2027

Transmission Load Area (Generic)



Transmission Load Areas (TLA) are specified portions of the transmission system designated to facilitate the analysis in studying the reliability of the system.

17 Actual Transmission Load Areas

	Transmission Load Areas	Contingency Level
1	New York City - 345 kV / 138 kV	2
2	West 49th Street - 345 kV	2
3	East 13th Street - 138 kV	2
4	Astoria East / Corona - 138 kV	2
5	Astoria West / Queensbridge - 138 kV	2
6	Vernon / Queensbridge - 69 kV	2
7	East River (Non BES) - 138 kV	2
8	Eastern Queens	1
9	Brooklyn / Queens	1
10	Corona / Jamaica - 138 kV	1
11	Greenwood / Staten Island- 138 kV	1
12	Staten Island - 138 kV	1
13	Bronx – 138 kV	1
14	Dunwoodie North / Sherman Creek - 138 kV	1
15	Dunwoodie South – 138 kV	1
16	Eastview (Non BES) – 138 kV	1
17	Millwood / Buchanan - 138 kV	1

TLA Assessments

- Thermal
  - Power, in terms of MVA, on a transmission path must not exceed its applicable emergency rating (LTE or STE, as applicable) and be able to be returned to normal levels for that path post contingency
  - First and second (if TLA is designated second contingency)
- Voltage
  - Bus voltages must not exceed their limits either above or below their nominal ratings
- Short-Circuit
  - 3 phase, 2 phase to ground or single phase to ground faults create a short-circuit flow on a transmission path that should not exceed the appropriate short-circuit rating of any of the breakers that are necessary for the isolation of that transmission path

2017 Long Range Plan Assumptions

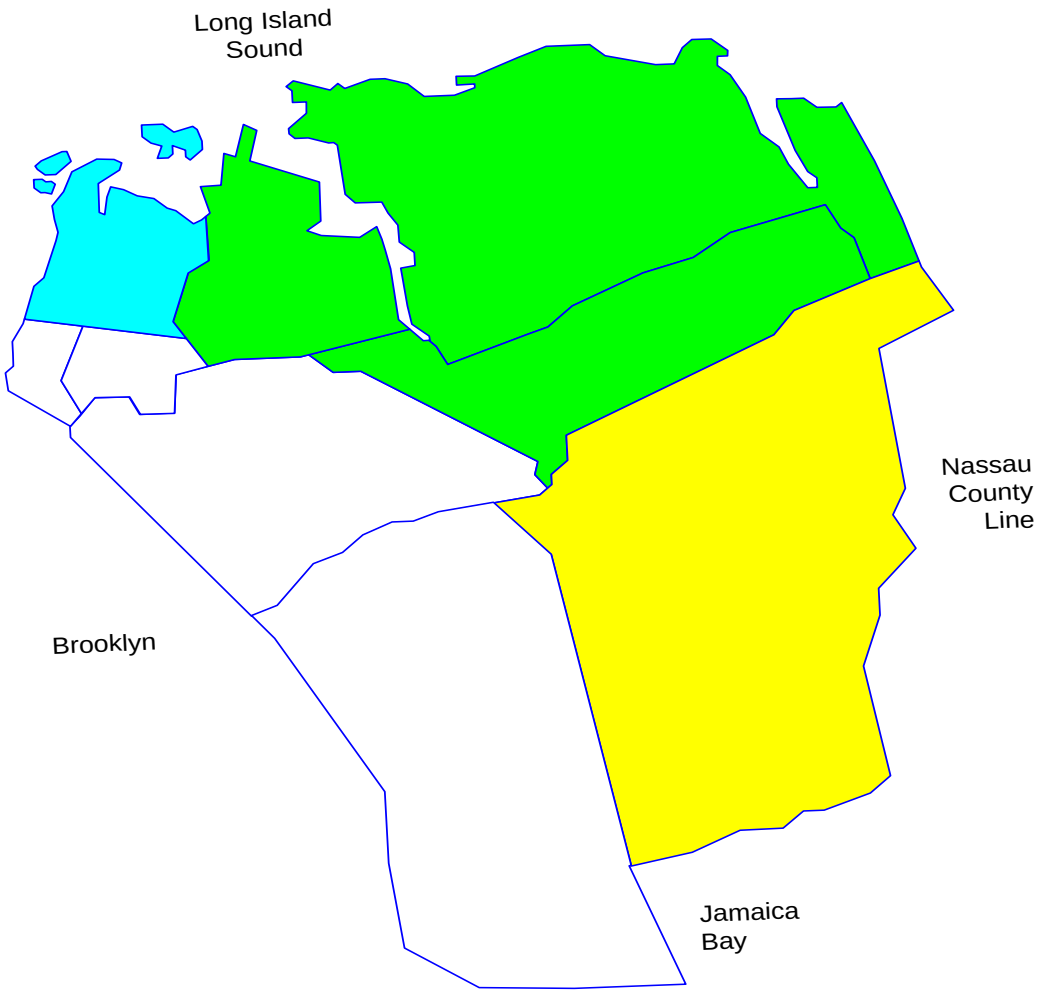
Study Year	Assumptions
2017	Con Edison Load (Coincident Peak) = 13,470 MW
	Indian Point Units 2 and 3 remain in service
	Under peak load conditions, Transmission Feeder 32077 is operated radially from Farragut to supply Water Street Load through Transformer #4
	2017 PJM – Con Edison Wheel is discontinued. Instead, a temporary 400 MW Operational Base Flow consisting of non-firm power is established along the same path as the Con Edison Wheel. New breaker at E 13th Street 345 kV, separating 46/37372 from M55/37373
	2018 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 New breaker 12 at Buchanan North 345 kV Substation, separating Transformer TA-5 from Y94 CPV Valley Generation becomes operational with maximum capability of 650 MW, connecting at Rock Tavern 345 kV Substation
	2019 Rainey-Corona Feeder Established, with Transformer and Phase Angle Regulator New breaker at E 13th Street 345 kV, separating Q35M/37376 from 48/37377
	2021 The Operational Base Flow between PJM and Con Edison is discontinued.
2022	Con Edison Load (Coincident Peak) = 13,600 MW
2027	Con Edison Load (Coincident Peak) = 13,860 MW

TLA Assessment Results

Two TLAs show need for system reinforcements:

- Astoria East / Corona 138 kV TLA
  - Queens
- Greenwood / Staten Island 138 kV TLA
  - Brooklyn and Staten Island

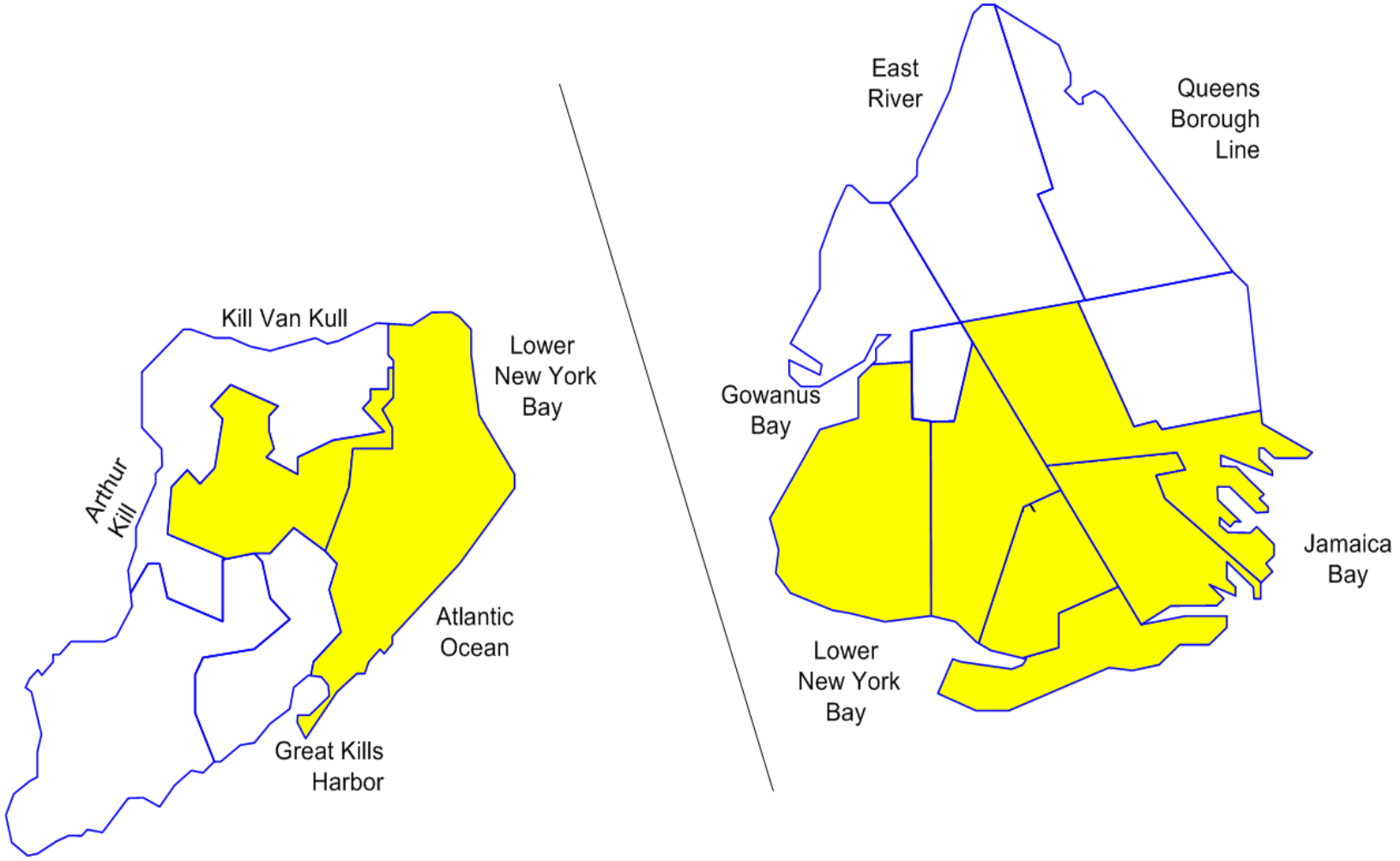
Areas Served by the Astoria East / Corona 138 kV TLA (in Blue / Green), and the Corona /Jamaica 138 kV TLA (in Green-Yellow)



Astoria East / Corona 138 kV TLA

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	2017	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
	2022	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
	2027	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	2017	Utilize 300 hour ratings for feeders 34051/52 and 701/702 until new transmission line established in 2019		
	2022	None required		
	2027	None required		
Planning Solution	2017	None required – See Operational Remediation		
	2022	None required – See Planned Changes in Load Area		
	2027	None required		
Short Circuit Considerations	None			

Area Served by Greenwood / Staten Island 138 kV TLA



Greenwood / Staten Island 138 kV TLA

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	2017	First Contingency	Bus Fault with Stuck Breaker #4N results in loss of Gowanus GTs 1&3, Narrows GT2, Feeder 42232.	No deficit
	2022	First Contingency	Bus Fault with Stuck Breaker #4S results in loss of Gowanus GTs 2&4, NYPA GTs, Feeder 42231.	No deficit
	2027	First Contingency	Bus Fault with Stuck Breaker #4S results in loss of Gowanus GTs 2&4, NYPA GTs, Feeder 42231.	No deficit
Operational Remediation	2017	None required		
	2022	None required		
	2027	None required		
Planning Solution	2017	None required		
	2022	None required		
	2027	None required		
Short Circuit Considerations	None			

Distribution System Implementation Plan

- Five-year roadmap to have integrated approximately 800 MW of Distributed Energy Resources (DER) by 2020
  - Builds on the robust growth of solar energy
  - Enables the steady growth of combined heat and power which enhances resiliency
  - Provides greater opportunity to benefit from the Company's successful Energy Efficiency and Demand Response programs
- Grid modernization investment plans in support of DER
  - Builds adaptability and increases grid edge monitoring so the grid benefits from increasing amounts of DER
  - 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, such as Time Of Use, or TOU Billing (Pilot)
  - Seeks strategic transmission investments to enable Large Scale Renewables (LSR)
- Multi-pronged plan to stimulate DER growth
  - 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
  - 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.

BQDM Demand Response Auction

Under this BQDM DR Auction initiative, DR resources will have opportunities to earn additional compensation compared to that currently offered by Con Edison's peak shaving distribution DR program (CSRP or Commercial System Relief Program), including through higher performance payments, additional compensation for consistent performance above the contracted load relief amount, as well as an auction starting price set well above CSRP reservation price levels.

Con Edison has filed with the NY Public Service Commission requesting approval to allow the use of the 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 CSRP.

BQDM Demand Response Auction

- Overall plan is to reduce peak load in BQDM area by 52 MW (41 MW CSS / 11 MW USS). By reducing the need for power in these areas, Con Edison will defer the construction of a $1.2 billion substation. Components of reduction include Energy Efficiency, Demand Response, DG, etc.
- Companies known as “demand response providers” submitted bids indicating how much money they wanted for reducing reliance on energy from the grid at peak times.
- To meet the varying need, the auction had two time frames -- 4 p.m. to 8 p.m. and 8 p.m. to 12 a.m. For 2017, the prices for the two time increments had ceilings of $250 per kilowatt-year and $1,250 per kilowatt-year. In 2018, the ceilings were $750 per kilowatt-year and $1,250 per kilowatt-year.
- The auction started with ceiling prices for roughly a dozen bidders, who then offered lower prices. Each bid had to be lower than a previous bid. Once the auction was over, however, every winner was awarded the higher clearing price, even if the demand response provider had put in a lower bid.
- 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.
- The auction produced a successful result. Con Edison expects energy usage to drop by 22 MW aggregate by 2018 on afternoons and evenings when the company asks participating customers to cut back on their consumption of energy from the grid.
- It is now up to the demand response providers to sign up Con Edison customers that are willing to reduce energy usage, or otherwise provide relief to the grid, in their stores, office buildings, warehouses and other facilities on afternoons and evenings when Con Edison requests it.
- BQDM Program extension filed with PSC to provide additional CSS load reductions for 2 years beyond 2018, to defer load relief need to 2021.

Transmission Substations

- There are no plans for any new Transmission Stations over the next ten years

New Merchant Generation and Transmission Proposals

- New York City continues to attract significant amounts of new generation and transmission capacity

- NYISO's interconnection queue listing, dated 9-30-17 shows
  - Proposed Generation Facilities: 5,275 MW
  - Proposed Transmission Facilities (including HVDC): 7,675 MW

Contact Information

- Parties interested in commenting on Con Edison's Transmission Planning Process can e-mail comments and suggestions to:

  TPlan@coned.com