Memorandum

TO: Richard J. Dewey

FROM: David Patton, Pallas LeeVanSchaick, and Joseph Coscia

DATE: October 20, 2020

RE: MMU Comments on 2020 Reliability Needs Assessment

The Reliability Needs Assessment ("RNA") is the first step in the NYISO's Comprehensive System Planning Process ("CSPP"). The RNA identifies the reliability needs for the Bulk Power Transmission Facilities ("BPTF") over a 10-year study period based on a set of assumed (i.e., Base Case) conditions. After the RNA identifies reliability needs and solicits proposals for market-based and regulated solutions, the Comprehensive Reliability Plan ("CRP") identifies the set of solutions that could be used to satisfy the reliability needs over the study period. The CRP also indicates whether any regulated solution must move forward to satisfy the system's reliability needs in any year during the study period.

As the Market Monitoring Unit for the NYISO, we are required to provide comments on the RNA regarding whether market design changes are needed to provide better incentives for the markets to help satisfy the reliability needs of the system.[1] This memo discusses the 2020 RNA and whether it highlights areas of the NYISO's market design that fail to provide appropriate incentives.

A. Executive Summary

The 2020 RNA identified future reliability needs associated with violations on BPTF and local transmission facilities. These needs are primarily driven by the impending retirement of peaking capacity in New York City. Resolving these reliability needs will require investment in solutions to maintain reliability in New York. In this memo, we highlight shortcomings in the NYISO market design that prevent these reliability needs from being accurately reflected in market prices. These shortcomings may lead to the need for regulated transmission or reliability-must-run (RMR) contracts where market-driven investment would otherwise have satisfied the needs efficiently. The following table summarizes the three market design gaps that inhibit market responses to the issues identified in the 2020 RNA:

1 See NYISO MST Section 30.4.6.8.2. "Following the Management Committee vote," the MMU evaluates "whether market rules changes are necessary to address an identified failure, if any, in one of the ISO's competitive markets."

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2020 RNA Finding	Market Design Gap	Consequences of Gap
Unmet reliability needs in Astoria East/Corona 138 kV TLA	A) DA/RT market does not signal the value of reserves in load pockets B) ICAP accreditation of SCRs is disconnected from transmission security value C) The ICAP market lacks locational signals in NYC	• RMR or regulated transmission may be needed to solve violation • Market-based solutions (small generation, DERs, storage) lack incentives
Unmet reliability needs violations in Greenwood/Fox Hills 138 kV TLA		
BPTF transmission security violation on NYC 345 kV/138kV TLA	A) DA/RT market does not signal the value of reserves adequately B) ICAP accreditation of large-contingency units and SCRs is disconnected from transmission security value	• RMR or regulated transmission may be needed to solve violation
Staten Island capacity not deliverable to NYC	C) The ICAP market lacks locational signals in NYC	• Capacity is over-valued in Staten Island • Deliverability upgrades create barrier to entry

The first two key findings shown in the table above are due to the DEC Peaker Rule that will cause retirements and lead to insufficient capacity in the Astoria East/Corona 138 kV TLA (rising from 110 MW in 2023 to 180 MW in 2030) and the Greenwood/Fox Hills 138 kV TLA (rising from 360 MW in 2025 to 370 MW in 2030). These deficiencies highlight several significant gaps in NYISO's market design:

- Gap A – The day-ahead and real-time markets do not signal the value of operating reserves for satisfying N-1, N-1-1, and N-1-1-0 contingency criteria within New York City. Consequently, these needs are routinely satisfied through out-of-market actions, which undermines incentives for market-based investment in these areas.

- Gap B – SCRs in these load pockets are not counted towards satisfying the local transmission security violations even though they receive the same compensation as other capacity resources. Modifying the capacity accreditation for SCRs would motivate some to register as DERs, which would enable them to help alleviate some local transmission security needs.

- Gap C – The current zonal capacity market configuration does not reflect that some resources are more valuable for satisfying local transmission security needs. We have recommended NYISO implement C-LMP so that locational variations in the value of capacity can be priced appropriately.

The third key finding shown in the table above is that the implementation of the DEC Peaker Rule will also lead to insufficient capacity in New York City more generally (rising from 700 MW in 2025 to 1,075 MW in 2030). This underscores gaps in NYISO's market design:

- Gap A – Inadequate signals for the value of operating reserves routinely lead to out-of-market actions, which undermines incentives for market-based investment in the city.

- Gap B – SCRs and large supply contingency resources are overcounted in the capacity market by a combined 690 MW relative to their value for satisfying the reliability needs for the NYC 345/138 kV TLA. Modifying the capacity accreditation for these resources would align capacity market compensation with the needs of the system.

The last key finding shown above is that resources in Staten Island are not fully deliverable to other areas of New York City and thus cannot be fully used to satisfy the transmission security and resource adequacy violations identified in the RNA. This further highlights shortcomings in the locational valuation of capacity:

- Gap C – The current zonal capacity market configuration does not reflect that some resources are not fully deliverable. Consequently, those resources are over-compensated relative to their value. This also creates significant barriers to entry of new flexible generation that could replace older inflexible units because the interconnection process requires such new entrants to upgrade the transmission system even when it would not be efficient to do so.

The reliability violations identified in the 2020 RNA and key drivers are discussed in Section B of this memo. Market design gaps and our recommendations to address the gaps are discussed in Section C. Finally, Section D provides a summary of our conclusions and recommendations.

B. Reliability Violations in 2020 RNA

Summary of NYISO Findings

The 2020 RNA Base Case identified violations or potential violations of reliability criteria throughout the entire 2024-2030 study period. These violations are concentrated in New York City. NYISO identified steady state thermal loading violations on the Con Edison 345 kV BPTF system, and Con Edison identified thermal overloads on lines entering two 138 kV load pockets in New York City. NYISO also identified a potential resource adequacy deficiency and dynamic stability criteria violations in New York City.

Con Edison identified transmission security violations on its non-BPTF system in the Astoria East/Corona 138 kV TLA (located in northern Queens) and Greenwood/Fox Hills 138 kV TLA (located in southern Brooklyn and eastern Staten Island). Both locations have significant amounts of existing generation that are assumed to become unavailable due to the NYSDEC "Peaker Rule" during the study period. The maximum observed deficiency in the Astoria East/Corona 138 kV TLA ranges from 110 MW in 2023 to 180 MW in 2030. The maximum observed deficiency in the Greenwood / Fox Hills 138 kV TLA ranges from 360 MW in 2025 to 370 MW in 2030.

The 2020 RNA identified eleven steady state transmission security N-1-1 violations and three N-1-1-0 violations, all on the Con Edison 345 kV system in NYISO zones I and J. Collectively, the area bounded by these constraints is referred to as the NYC 345 kV/138 kV TLA. It includes several lines from Zone I and Bronx south into Manhattan and Queens, from Staten Island west into Brooklyn, and from Con Edison's 345 kV system to the lower-voltage 138 kV system.[2] The observed maximum deficiency is 700 MW in 2025, growing to 1,075 MW by 2030. A deficiency is observed for a maximum consecutive duration of approximately 9 hours in 2025 and 13 hours in 2030. This limits the capability of duration-limited resources such as battery storage to satisfy these reliability needs.

NYISO also identified a resource adequacy violation beginning in 2027, resulting in an increase of NYCA LOLE above criteria due to a deficiency of generating capacity relative to demand. This violation is smaller in magnitude than the transmission security violations identified by the RNA and would be resolved by compensatory megawatts in Zone J of 100 MW in 2027 to 350 MW by 2030. This highlights large discrepancies between the amount of additional resources needed to satisfy resource adequacy needs for New York City (350 MW in 2030) and the amounted needed to satisfy transmission security needs for the same region (1,075 MW in 2030).

Contributing Factors to Violations

NYISO cites the expected unavailability of approximately 1,500 MW of existing peaking plants in Zone J due to the NYSDEC "Peaker Rule" and projected load growth of 495 MW as the primary drivers of reliability violations. These factors suggest that there will be less generation capacity relative to peak load unless solutions are implemented.

In addition, we highlight the following factors that contribute to larger expected transmission security violations compared to resource adequacy violations. These factors are of interest because resource adequacy shortfalls are more easily addressed through the NYISO markets than transmission security violations:

- *Non-deliverable areas in NYC*: The results of the 2020 RNA suggest that capacity located in Staten Island cannot satisfy resource adequacy or transmission security needs in New York City. In the transmission security analysis, limitations on the lines between Staten Island and Brooklyn contribute to steady state N-1-1 violations. In the resource adequacy analysis, the Free Flow Analysis indicates that removing the "J to J3" limit (an internal limit modeled in GE MARS representing bottlenecks between Staten Island and the rest of Zone J) improves NYCA LOLE significantly. This suggests that while capacity in Staten Island receives the same compensation as capacity in other areas in Zone J, capacity in Staten Island is less valuable because of transmission constraints that separate it from the rest of the zone.

[2] See Appendix A for the list of 2020 RNA Base Case steady state transmission security N-1-1 and N-1-1-0 violations.

- *Large contingency size units*: Transmission security violations on the Con Edison 345 kV system are exacerbated by the need to secure the system against the loss of individual large generators. This is because all capacity of a large unit can be lost in a single contingency, whereas multiple smaller units with the same total capacity are less likely to be lost simultaneously. In particular, the loss of Ravenswood 3 is the primary or secondary contingency that triggers the majority of BPTF N-1-1 violations and all of the N-1-1-0 violations identified in the RNA.[3] If the MWs supplied by Ravenswood 3 were instead supplied by multiple smaller units, compensatory MWs to address the BPTF violations would fall by approximately 215 MW.[4] Hence, securing for the loss of a single large unit significantly raises the Transmission Security need.
- *SCRs not modeled in transmission security analysis*: In its transmission security analyses, the NYISO generally assumes that individual capacity resources can be adjusted up to their upper operating limits as necessary to resolve various N-1 and N-1-1 transmission constraints. However, demand response resources that sell capacity ("SCRs") are assumed to provide 0 MW for transmission security needs even though such resources are paid for installed capacity. The NYISO has explained that it uses these assumptions to prudently plan the reliability of the transmission grid.[5]

C. Market Design Gaps and Recommendations

The results of the 2020 RNA are significant because they identify future transmission security and resource adequacy violations that will require investment in solutions. There are many possible combinations of solutions, including front-of-meter generation, transmission upgrades, demand response or DERs. Hence, it is important to ensure that the NYISO market design provides accurate signals for investment whenever market-based solutions are possible. If the NYISO markets fail to incentivize projects that help relieve reliability issues, then reliability-must-run contracts or regulated transmission will appear to be necessary, even if they pose greater cost and risk to consumers.

In addition to conventional generation, non-traditional generation and demand solutions can contribute to solving reliability issues in New York City's BPTF and load pockets if provided efficient incentives. For example, there are currently 1,590 MW of battery storage resources

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3 See list of N-1-1 and N-1-1-0 violations and associated contingencies in Appendix A.

4 This is based on comparing the most severe N-1-1 violation on the Dunwoodie-Motthaven (71 line) in 2025 (which was 110 percent of the 925 MW rating) and the most severe N-1-1 violation of the same element where Ravenswood 3 is not one of the contingent facilities (which was 101 percent of the rating) and then dividing by the shift factor of Ravenswood 3 (which is 39 percent). The actual impact may vary from year-to-year.

5 The NYISO does not consider SCRs when identifying transmission security related reliability needs, but SCRs are eligible as market-based solutions as part of the Comprehensive Reliability Plan. The NYISO has stated that it is appropriate that such resources be assumed to not be available for two reasons: (1) there is no long-term commitment for such SCR resources to be available; and (2) such resources are not subject to the NYISO's generation deactivation process that provides for generation to remain on-line if needed for reliability until a permanent transmission solution can be built.

seeking to interconnect in the NYC 345 kV/138 kV TLA in the NYISO interconnection queue. Consumers that invest in behind-the-meter solar and storage assets and participate in the Value Stack program earn a direct pass-through of NYISO energy and capacity prices.[6] Con Edison has also developed demand-billed retail rate structures that directly pass through NYISO capacity prices, giving price-sensitive customers an incentive to adjust their demand based on price levels. To encourage efficient investment in these and other solutions, it is important that NYISO market prices accurately signal the value of capacity and energy at each location.

The current NYISO market design does not send adequate investment signals because it does not account for certain transmission security considerations that affect how different resources and locations contribute to reliability needs. As a result, certain resources are over- or under-valued in the NYISO markets and market participants lack incentives to solve transmission security issues unless they receive a regulated "out of market" contract. The following market design gaps contribute to this disconnect.

1. Locational value of capacity

The NYISO capacity market does not provide sufficiently granular signals to invest in locations where capacity is needed. It produces prices for four capacity zones: the NYCA region and the NYC, Long Island and Lower Hudson Valley localities. However, transmission constraints on both the BPTF and lower-voltage systems can result in an effective requirement for capacity in sub-regions within these capacity zones, such as in the NYC load pockets. These sub-regions do not have their own ICAP market demand curves, resulting in a disconnect between the market design and the actual reliability planning criteria used by the NYISO.

The results of the 2020 RNA demonstrate the consequences of this disconnect. The 2020 RNA indicates an upcoming need for large amounts of capacity in the NYC 345 kV/138 kV TLA, Astoria East/Corona 138 kV TLA and Greenwood/Fox Hills 138 kV TLA. However, projects that could locate in these areas (as opposed to other locations in NYC) lack incremental market-based incentives to do so. In other words, developers receive no more revenue by entering in these high-value locations than in other NYC locations that have prevailing surplus capacity. Meanwhile, projects whose capacity is not deliverable throughout the zone (such as generators in Staten Island) are over-compensated relative to their actual contribution to reliability. The NYISO markets therefore lack a mechanism to guide investment towards the locations where reliability planning indicates that it is needed.

The results of the Class Year 2019 SUF and SDU report further demonstrate how the lack of granular capacity pricing currently creates barriers to entry for new generation. The report finds that multiple generators seeking to interconnect to the 345 kV system in Zone J are not deliverable due to N-0 thermal violations between the 345 kV and 138 kV network in NYC, requiring deliverability upgrades with estimated cost of $300 million.[7] Previous studies have

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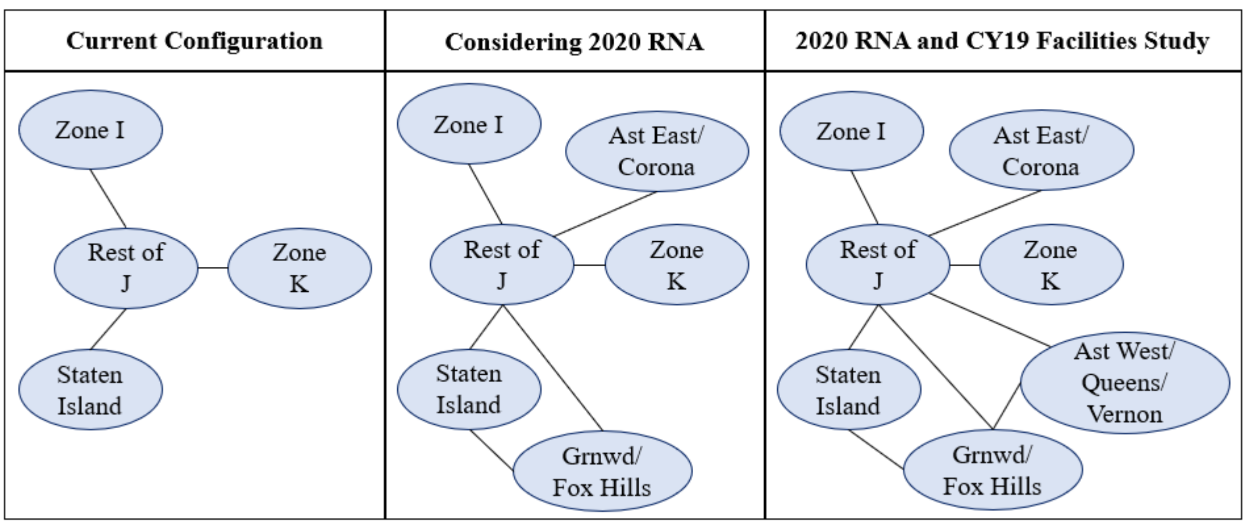
6 See NYSERDA, "Summary of New Value Stack Order," April 2019, https://www.nyserda.ny.gov/-/media/NYSun/files/2019-04-25-Updated-VS-Order-Overview-Slides.pdf

7 NYISO, "Class Year 2019 Facilities Study System Upgrade Facilities (SUF) and System Deliverability Upgrade (SDU) Report," September 21, 2020.

found that similarly large upgrades would be required for capacity located in Staten Island to interconnect and be deliverable.[8] More granular capacity pricing would allow these projects the option to interconnect and sell capacity at lower prices reflecting the true value of their location. At present, capacity prices fail to indicate whether the projects are actually deliverable within their capacity zone.

We have recommended that NYISO adopt a locational marginal price of capacity ("C-LMP") framework in our 2019 State of the Market report (see Recommendation #2013-1c).[9] Under this approach, the NYISO would set capacity clearing prices at multiple locations based on the marginal benefit to system reliability for resources at those locations. C-LMP would provide flexibility to model key constraints identified by transmission security analysis within the resource adequacy framework, resulting in differentiated price signals for resources upstream and downstream of those constraints. In the resource adequacy analysis, transmission constraints are represented by the GE MARS topology, and C-LMP would set a clearing price for each location represented in the topology.

Currently, the GE MARS topology represents transmission limitations between Staten Island and the rest of NYC. However, the topology could be modified to represent the transmission constraints resulting in transmission security violations in the 2020 RNA and the Class Year 2019 Facilities Study. These alternatives are illustrated in the following figure, which shows: (a) the current configuration represented in GE MARS topology, (b) a possible configuration implied by the transmission security violations in the 2020 RNA, and (c) a possible configuration if the Class Year 2019 Facilities Study is also considered.



8 For example, see NYISO Class Year 2017 Notice of Preliminary System Deliverability Upgrade (SDU) Decision Period, May 17, 2018, indicating a preliminary SDU cost of $224 million to $312.6 million for the Linden Cogen Uprate project interconnecting to Staten Island. The developer eventually rejected its SDU in Class Year 2017 and chose to proceed as an energy-only project.

9 See our 2019 State of the NYISO Market report and MMU presentations to ICAPWG on January 15, 2020, February 6, 2020, February 19, 2020 and March 10, 2020.

Enhancing the GE MARS topology to reflect transmission limitations among areas within New York City would allow for the resource adequacy analysis to model the differences in the value of resources in different areas of New York City. If these enhancements were implemented along with C-LMP, capacity prices would rise in import-constrained load pockets such as the Greenwood/Fox Hills 138 kV TLA, which would likely reduce or eliminate the need for out-of-market investment there. Furthermore, these enhancements would cause capacity prices to fall in export-constrained areas such as Staten Island and the "Rest of J" where new entry is currently limited by transmission upgrade costs in the interconnection process.

2. ***Locational reserve pricing***

The NYISO energy and ancillary services markets do not appropriately compensate resources that provide needed reserve capacity in transmission-constrained areas. Current reserve markets do not require procurement of resources in the Astoria East/Corona 138 kV TLA, the Greenwood/Fox Hills 138 kV TLA, or any other load pocket. Instead, out-of-market actions are taken when necessary to ensure that sufficient generating resources are online inside of load pockets. While conventional generation projects and battery projects are in the NYISO interconnection queue in these locations, market prices do not provide them with incentives commensurate with their reliability value. We have recommended several enhancements to the reserve markets that NYISO is currently pursuing, including the following:

- Compensate reserve providers that enable higher loading of transmission facilities constrained for N-1 criteria. (See SOM Recommendation #2016-1)
- Model dynamic N-1-1 reserve requirements in New York City load pockets. (See SOM Recommendations #2017-1 and #2015-16)

These recommendations would improve energy and reserve market compensation of resources in NYC load pockets, making it more attractive for market-based investment (including BTM resources that receive a pass-through of wholesale prices) to locate there. They would also tend to reduce overall capacity prices while improving total compensation for resources in high-value locations, increasing overall market efficiency.

3. ***Alignment of resources' capacity contribution with transmission security***

Certain resources are compensated in the capacity market in a way that is inconsistent with their impact on transmission security analyses, which includes very large units and SCRs. As a result, when there is a reliability need driven by transmission security as identified in the 2020 RNA, these resources are over-compensated relative to their actual contribution to system reliability.

Large Resources. Individual large-contingency units are less effective from a reliability standpoint than multiple smaller units with equivalent capacity. This is because reliance on large units can increase the severity of N-1 or N-1-1 contingencies. A larger amount of compensatory megawatts is needed to secure the system against loss of a larger generator. In the 2020 RNA, the loss of Ravenswood 3 (a unit with summer capability of 989 MW) is the first or second contingency for the majority of projected BPTF thermal violations. The next largest generator contingency is considerably smaller. The compensatory megawatts needed to resolve the NYC

345 kV/138 kV TLA reliability need would be lower by up to 215 MW if the largest generator contingency were a unit smaller than Ravenswood 3.[10] This implies that large supply contingency units are over-valued in the ICAP market, since they can create the need for additional supply to secure the transmission network against their loss. To align the ICAP market with transmission security considerations, we recommend NYISO discount the amount of capacity that can be offered by larger units based on their impact on reliability needs identified in the RNA.

Special Case Resources. SCRs are included as capacity resources in resource adequacy analyses but are not considered in the transmission security analyses for the RNA. This treatment is not be appropriately reflected in their compensation for installed capacity and may misalign capacity prices from actual reliability needs. Furthermore, some of the 476 MW of SCRs in New York City may be capable of registering as DERs, which would allow them to be used to help alleviate transmission security violations on the local and/or bulk system, but they will not have an incentive to do so if the compensation and performance obligations for the SCR program are more attractive. The price impacts of the SCRs can cause the monthly capacity market to fail to provide adequate investment signals in the NYC zone that reflect the supply deficiency identified in the 2020 RNA. This could compel NYISO to contract for supply out-of-market to satisfy reliability needs. To address this concern, we recommend NYISO discount the capacity compensation to SCRs to be commensurate with their value in satisfying the planning reliability needs of the system.

Overall, 476 MW of SCRs and 215 MW of the capacity from a large generating facility receive capacity payments but do not contribute toward satisfying the local and BPTF transmission security violations identified in the 2020 RNA. Consequently, out-of-market investments may be needed to maintain reliability. NYISO has sought to refine the capacity accreditation for certain resource types in recent years, but additional refinement will be necessary as the resource mix evolves over the coming decade.[11] We recommend modifying the capacity accreditation to SCRs and large supply contingency resources to be more consistent with their value for satisfying the planning reliability needs of the system. These recommendations will form a part of a forthcoming SOM Recommendation #2020-1 to modify the capacity accreditation to be more consistent with the value of resources in satisfying the reliability needs of the system.

D. Conclusions and Recommendations

The 2020 RNA finds significant violations of resource adequacy and transmission security planning criteria in New York City beginning in 2023 and continuing through 2030. These violations are driven principally by the removal of older peaking generators in compliance with

10 This is based on comparing the most severe N-1-1 violation on the Dunwoodie-Motthaven (71 line) in 2025 (which was 110 percent of the 925 MW rating) and the most severe N-1-1 violation of the same element where Ravenswood 3 is not one of the contingent facilities (which was 101 percent of the rating) and then dividing by the shift factor of Ravenswood 3 (which is 39 percent). The actual impact may vary from year-to-year.

11 For example, the NYISO has considered capacity value of availability-based generators (including intermittent renewables) in its Tailored Availability Metric project and capacity value of energy storage and other duration-limited resources in its Expanding Capacity Eligibility project.

the DEC's Peaker Rule. An estimated 1,075 MW of additional resources will be needed by 2030 in New York City with approximately half required in two load pockets in the 138 kV system. It may be necessary for NYISO to seek out-of-market investment to satisfy these reliability criteria.

We identify three major gaps in the market design that undermine incentives for market-based investment that would help address the violations:

A. Operating reserve requirements are not adequately represented in the day-ahead and real-time markets, diminishing the revenues for new entrants in constrained load pockets. SOM Recommendations #2016-1, #2017-1, and #2015-16 are designed to address these deficiencies.

B. SCR resources and very large supply contingency resources are over-compensated in the capacity market. This over-compensation accounts for 690 MW of the 1,075 MW transmission security violation for the NYC 345/138 kV TLA in 2030. NYISO has worked with stakeholders to enhance the capacity accreditation rules. Forthcoming SOM Recommendation #2020-1 will identify additional improvement in the capacity accreditation rules to better align compensation with value.

C. The capacity market sets a single clearing price for New York City, but the 2020 RNA suggests there should be four distinct pricing regions. We recommend NYISO implement the C-LMP framework to reflect differences in locational value when appropriate. (See #2013-1c)

Implementation of these recommendations would likely reduce or eliminate the need for out-of-market investment and would enhance the efficiency of the NYISO's market signals.

E. Exhibit A: Steady State Transmission Security Violations in 2020 RNA

Figure A-1: Steady State Transmission Security N-1-1 Violations in 2020 RNA

Zone	Owner	Monitored Element	Normal Rating (MVA)	Contingency Rating (MVA)	1st Contingency	2nd Contingnecy	2025 Summer Peak Flow (%)	2030 Summer Peak Flow (%)
I/J	ConEd	Sprainbrook-W49th St 345 kV (51)	844	1029	Sprainbrook-Dunwoodie 345 kV (W75)	Tower F38 & F39	-	112
I/J	ConEd	Sprainbrook-W49th St 345 kV (52)	844	1029	Sprainbrook-Dunwoodie 345 kV (W75)	Tower F38 & F39	-	112
I/J	ConEd	Dunwoodie-Mott Haven 345 kV (71)	785	925	Loss of Ravenswood 3	Dunwoodie-Mott Haven 345 kV (72)	110	118
I/J	ConEd	Dunwoodie-Mott Haven 345 kV (72)	785	925	Loss of Ravenswood 3	Dunwoodie-Mott Haven 345 kV (71)	108	116
J	ConEd	Mott Haven-Rainey West 345 kV (Q12)	785	925	Mott Haven-Rainey 345 kV (Q11)	Loss of Ravenswood 3	-	108
J	ConEd	Mott Haven-Rainey East 345 kV (Q11)	785	925	Mott Haven-Rainey 345 kV (Q12)	Loss of Ravenswood 3	-	108
J	ConEd	Goethals-Gowanus 345 kV (26)	518	738	Loss of Ravenswood 3	Stuck Breaker at Goethals 5	102	130
J	ConEd	Goethals-Gowanus 345kV (25)	518	738	Loss of Ravenswood 3	Gowanus - Goethals 345 kV (26)	103	130
I	ConEd	Sprainbrook/Dunwoodie 345/138 kV (N7)	366	423	Loss of Ravenswood 3	Tower W89 & W90	106	109
I	ConEd	Sprainbrook/Dunwoodie 345/138 kV (S6)	309	438	Loss of Ravenswood 3	Tower W89 & W90	103	107
I	ConEd	Dunwoodie 345/138 kV (W73)	310	388	Loss of Ravenswood 3	Sprainbrook/Dunwoodie 345/138 kV	-	106

Figure A-2: Steady State Transmission Security N-1-1-0 Violations in 2020 RNA

Zone	Owner	Monitored Element	Normal Rating (MVA)	Contingency Rating (MVA)	1st Contingency	2nd Contingnecy	2025 Summer Peak Flow (%)	2030 Summer Peak Flow (%)
I/J	ConEd	Dunwoodie-Mott Haven 345 kV (71)	785	925	Loss of Ravenswood 3	Dunwoodie-Mott Haven 345 kV (72)	132	149
I/J	ConEd	Sprainbrook-W49th St 345 kV (51)	844	1029	Loss of Ravenswood 3	Dunwoodie-Mott Haven 345 kV (72)	-	106
I/J	ConEd	Sprainbrook-W49th St 345 kV (52)	844	1029	Loss of Ravenswood 3	Dunwoodie-Mott Haven 345 kV (72)	-	106