2023/2024 New Capacity Zone Study

A Report by the
New York Independent System Operator

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1. Introduction

The New Capacity Zone (NCZ)[1] Study is performed to determine whether any Highway interface(s) are constrained, which would trigger the Services Tariff requirement to file tariff revisions with the Commission to establish a NCZ(s).

The previous (2019/2020) NCZ Study, which was performed for the 2024 Summer Capability Period, did not find any Highway interfaces constrained that would trigger the Services Tariff requirement to file tariff revisions with the Commission to establish a NCZ.

This 2023/2024 NCZ Study was performed for the 2028 Summer Capability Period and, since none of the Highway interfaces were found to be constrained, the conclusion of this 2023/2024 NCZ Study is also that there is no need to trigger the Services Tariff requirement to propose tariff revisions to establish a NCZ.

2. New Capacity Zone Study Methodology

2.1 Background

The NCZ Study is a deliverability study that is performed in accordance with the procedures and methodology set forth in Section 5.16 of the Services Tariff.

The NCZ Study rules require that it be performed using in large part the deliverability test methodology in Attachment S of the OATT to determine if there is a constrained Highway interface into one or more Load Zones.

The scope of the NCZ Study is limited to the evaluation of deliverability across the Highways, and not Byways in accordance with Section 5.16.1 of the Services Tariff.[2] The methodology for evaluating and measuring deliverability across the Highways is described below.

2.2 Transfer Capability Across Highway Interfaces

The NCZ Study was conducted by testing the transfer capability across the Highway interfaces within the Rest of State (ROS) Capacity Region (Load Zones A through F) and across the UPNY-ConEd Highway interface located within the Lower Hudson Valley (LHV) Capacity Region (Load Zones G through I). For the

[1] Terms with initial capitalization used but not defined herein have the meaning set forth in the Market Administration and Control Area Services Tariff (Services Tariff), and if not defined therein, then as set forth in the Open Access Transmission Tariff (OATT).

[2] Section 5.16.1 of the Services Tariff sets forth the NCZ Study Methodology.

ROS, generation-to-generation shifts are simulated for combinations of Load Zones within the Capacity Region, increasing generation "upstream" of an interface, and reducing generation "downstream" of that interface (as such terms are used in the definition of "Highway" in Attachment S of the OATT). Transfer limit assessment determines the ability of the network to deliver capacity from generation in one (or more) surplus zone(s) to other deficient zone(s) within the Capacity Region. The transfer capability across the UPNY-ConEd interface is evaluated by increasing generation upstream of the interface (Load Zone G) and decreasing generation downstream of the interface (Load Zones H and I).

In the actual transfer limit assessment, all transmission facilities within the New York Control Area (NYCA) are monitored. Contingencies tested in the transfer limit assessment include all "emergency transfer criteria" contingencies defined by the applicable Northeast Power Coordinating Council, Inc. (NPCC) Basic Design and Operating Criteria and New York State Reliability Council, L.L.C. (NYSRC) Reliability Rules.

The concept of "first contingency incremental transfer capability" (FCITC) is used in the determination of deliverable capacity across ROS Highway interfaces within the Capacity Region. The FCITC measures the amount of generation in the exporting zone that can be increased to load the interface to its transmission limit.[3] FCITC represents the additional generation capacity that could be exported from a given zone(s) above the base case dispatch level.

a. All generators in the exporting zone(s) are uniformly increased (scaled) in proportion to their maximum power limits (Pmax) while all generators in the importing zone(s) are decreased uniformly in proportion to the difference between their initial generation dispatch level (Pgen) and their minimum power limits (Pmin). The FCITC and Highway transmission constraint(s) for the exporting zone(s) are noted for each export/import combination.

b. The net generation available[4] is compared to the FCITC Highway transmission constraint(s) for the exporting zone(s) transfer. If the net generation available upstream is greater than the calculated FCITC, that amount of generation above the FCITC is considered to be constrained or "bottled" capacity and may not be fully deliverable under all conditions.[5]

   If the net generation available upstream is less than the FCITC (that is, there is not sufficient available generation upstream to reach the transmission limit,) the difference is an indication of the available "transfer capability" to accommodate additional generation resources in the

[3] The amount of such generation is described in Services Tariff § 5.16.1.1.1, and in Table 1.

[4] The "net generation available" in any defined exporting zone is the difference between the sum of the zonal generators' Pmax and the sum of the zonal generators' actual MW output.

[5] Byway constraints normally evaluated in an interconnection study are not evaluated in the NCZ Study.

upstream area.

3. NCZ Study Case Modeling and Assumptions

This section of the report describes the assumptions and base case conditioning steps of the NCZ Study, consistent with Section 5.16.1 of the Services Tariff. (See the presentation titled "New Capacity Zone (NCZ) Study: Inputs and Assumptions" presented by the NYISO at the September 18, 2023 Installed Capacity Working Group meeting.[6])

3.1 NCZ Study Assumption Matrix

The NCZ Study case setup utilizes results from various studies and reports. The sources for the parameters used in the NCZ Study are summarized in Table 1.

Table 1: Parameters Established in Other Studies and Reports

#	Parameter	Description	Reference
1	Installed Capacity Requirement	NYCA Minimum Installed Capacity Requirement to achieve a loss of load expectation (LOLE) of no greater than 0.1 day per year, which is based on the NYCA Installed Reserve Margin (IRM) identified by the NYSRC and accepted by the Commission	2023 NYSRC IRM report (for the 2023-2024 Capability Year)
2	IRM Emergency Transfer Limits	Emergency transfer limits on interfaces corresponding to 2022 RNA study	Transfer limits from the 2022 RNA report
3	Locational Capacity Requirements	The Locational Minimum Installed Capacity Requirements (LCR) for New York City (Load Zone J), Long Island (Load Zone K) and the G-J Locality	2023 NYISO LCR report (for the 2023-2024 Capability Year; approved by Operating Committee on January 23, 2023)
		Load model	
4	Peak Load Forecast	NCZ Study Capability Period peak demand forecast contained in the ISO's most recent Load and Capacity Data report (Gold Book)	2028 Summer peak load conditions from 2023 Gold Book
5	Load Forecast Uncertainty	The impact to IRM due to uncertainty relative to forecasting NYCA loads	2023 NYSRC IRM report
		Generator model	
6	Existing CRIS generators, and all projects with Unforced Capacity Deliverability Rights	Generators with Capacity Resource Interconnection Service (CRIS) and transmission facilities with Unforced Capacity Deliverability Rights (UDRs) and External-to-ROS Deliverability Rights (EDRs) in-service on the date of the most recent Gold Book	2023 Gold Book
7	Planned generation projects or Merchant Transmission Facilities	Projects that have accepted either (a) Deliverable MW or (b) a System Deliverability Upgrade (SDU) cost allocation and provided cash or posted required security for the SDU cost allocation	2023 Gold Book

[6] This presentation is available at:
https://www.nyiso.com/documents/20142/40044890/6%20New%20Capacity%20Zones%20Study%20Inputs%20and%20Assumptions%20-%20ICAPWG%2009-18.pdf

#	Parameter	Description	Reference
8	UCAP Derate Factor (UCDF)	Factor used to convert ICAP to Unforced Capacity (UCAP) based on derated generator capacity incorporating historic performance on a Capacity Region basis	2023 NYSRC IRM report and 2023 NYISO LCR report
9	Deactivated CRIS units	Units retaining CRIS rights for three years after being considered "deactivated" unless the ability to transfer those rights has been exercised or expired	OATT Attachment S
		Transmission model	
10	Existing transmission facilities	Identified as existing in the most recent Gold Book	
11	Firm plans for changes to transmission facilities by TOs	Planned changes of facilities in the ISO's most recent Load and Capacity Data report that are scheduled to be in-service prior to the 2028 Summer Capability Period	
12	System Upgrade Facilities (SUFs) and System Deliverability Upgrades (SDUs)	SUFs and SDUs for which planned projects have accepted cost allocations and paid cash or post required security, except that ROS Highway SDUs will only be modeled if the construction is triggered	2023 Gold Book
		Import/Export model	
13	External System Import/Export	NYCA scheduled imports from HQ/PJM/ISO-NE/IESO	OATT Attachment S

3.2 NCZ Study Base Case Creation

The NCZ Study base case is a five-year look-ahead. The base case originates from the 2023 NYISO FERC 715 2028 Summer peak load case, and then is customized to meet the specific requirements of Section 5.16.1 of the Services Tariff. The conditioning steps are applied to the modeling of load, NYCA generation, and external system import/export.

3.2.1 Load Modeling

The Load forecast used in the NCZ Study base case is the coincident 2028 Summer firm peak load before reductions for the Emergency Demand Response Program. The following adjustments for "load forecast uncertainty" (LFU) are applied to each of the four Capacity Regions:

ROS	10.62%
LHV	7.80%
New York City (NYC)	5.60%
Long Island (LI)	8.20%

Table 1A shows a summary of baseline peak load forecast, plus LFU.

Table 1A: Summary of 2028 Summer Peak Load Forecast Assumptions (MW)

Capacity Region	Baseline	LFU	Total
ROS	12,389	762	13,151
LHV	4,091	112	4,203
NYC	10,880	483	11,363
LI	4,950	323	5,273

3.2.2 NYCA Generator Modeling

The initial CRIS capability and available capacity resources are determined as follows:

- CRIS (MW) capability of existing generating units, as listed in the 2023 Gold Book and proposed generating units with CRIS that accepted their cost allocation in a prior Class Year are modeled in the NCZ Study base case.
- CRIS Expiration: Units deactivated for more than 3 years lose their CRIS rights pursuant to Section 25.9.3.1 of Attachment S of the OATT. The CRIS for a facility is modeled in the NCZ Study base case unless that CRIS will expire prior to the NCZ Study Start Date (September 1, 2023). As a result, units deactivated before September 1, 2020 are not modeled in the NCZ Study base case. Units deactivated after September 1, 2020 are modeled as in-service using their respective CRIS levels as set forth in the 2023 Gold Book.
- The Pmax data for each respective resource within the NCZ Study base case is the CRIS value derated by applicable equivalent forced outage rate, as detailed below. This step incorporates the ICAP/ UCAP translation of different generation resources and Capacity Regions.
    - Derates applied to certain specific types of generation resources are as follows:
        - Small hydro 52.59%
        - Large hydro 1.28%
        - Land-based wind 84.46%
        - Landfill gas 30.57%
        - Solar 65.61%
        - Offshore wind 65.00%
    - Derates for other resources not within the categories identified above are applied to the aggregate of all remaining generation (Uniform Capacity) within the Capacity Region. The following ICAP/UCAP translation factors for each Capacity Region were

utilized for the NCZ Study (these values are consistent with the 2023 NYSRC IRM study):

- ROS 3.32%
- LHV 10.77%
- NYC 6.78%
- LI 8.15%

- The "derated capacity," or Pmax, is available to supply load and losses within each Capacity Region and adjacent Capacity Region(s). When power transfers are simulated, all generation in the exporting area is uniformly increased in proportion to its Pmax.
- Table 2 and Table 3 below summarize the capacity resource assumptions used for the NCZ Study.

Table 2: Summary of Capacity by Resource Type (MW)

Load Zone	HVDC	Landfill Gas	Large Hydro	Offshore Wind	Small Hydro	Solar	Uniform	Land-based Wind	Total CRIS
A	0.0	18.4	2,700.0	0.0	3.1	1,170.0	747.9	644.0	5,283.4
B	0.0	11.2	0.0	0.0	54.8	400.0	716.8	200.1	1,382.9
C	0.0	42.5	0.0	0.0	72.2	677.0	5,968.0	1,384.2	8,143.9
D	0.0	6.4	856.0	0.0	59.6	180.0	335.9	1,127.4	2,565.3
E	0.0	11.2	0.0	0.0	398.1	240.0	196.6	852.2	1,698.1
F	0.0	14.1	1,165.1	0.0	313.4	630.5	3037.7	0.0	5,160.8
ROS	**0.0**	**103.8**	**4,721.1**	**0.0**	**901.2**	**3,297.5**	**11,002.9**	**4,207.9**	**24,234.4**
G	0.0	0.0	0.0	0.0	74.0	173.2	5,038.4	0.0	5,285.6
H	0.0	0.0	0.0	0.0	0.0	0.0	1,093.9	0.0	1,093.9
I	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	40.0
LHV	**0.0**	**0.0**	**0.0**	**0.0**	**74.0**	**173.2**	**6,172.3**	**0.0**	**6,419.5**
J	1,250.0	0.0	0.0	816.0	0.0	0.0	10,409.3	0.0	12,475.3
K	0.0	0.0	0.0	1,060.0	0.0	90.4	5,520.6	0.0	6,671.0
Grand Total	**1,250.0**	**103.8**	**4,721.1**	**1,876.0**	**975.2**	**3,561.1**	**33,105.1**	**4,207.9**	**49,800.2**

"Total CRIS" represents the sum of CRIS capacity for all resources.
"Uniform" is the CRIS capacity related with any generator that is not in a technology-specific group listed in Table 2.

Table 3: Summary of Capacity After Derates by Resource Type (MW)

Load Zone	HVDC	Landfill Gas	Large Hydro	Offshore Wind	Small Hydro	Solar	Uniform	Land-based Wind	Total UCAP
A	0.0	12.8	2,665.4	0.0	1.5	402.4	723.1	100.1	3,905.2
B	0.0	7.8	0.0	0.0	26.0	137.6	693.0	31.1	895.4
C	0.0	29.5	0.0	0.0	34.2	232.8	5,769.9	215.1	6,281.5
D	0.0	4.4	845.0	0.0	28.3	61.9	324.7	175.2	1,439.6
E	0.0	7.8	0.0	0.0	188.7	82.5	190.1	132.4	601.6
F	0.0	9.8	1,150.2	0.0	148.6	216.8	2,936.8	0.0	4,462.2
ROS	**0.0**	**72.1**	**4,660.7**	**0.0**	**427.3**	**1,134.0**	**10,637.6**	**653.9**	**17,585.5**
G	0.0	0.0	0.0	0.0	35.1	59.6	4,495.8	0.0	4,590.4
H	0.0	0.0	0.0	0.0	0.0	0.0	976.1	0.0	976.1
I	0.0	0.0	0.0	0.0	0.0	0.0	35.7	0.0	35.7
LHV	**0.0**	**0.0**	**0.0**	**0.0**	**35.1**	**59.6**	**5,507.5**	**0.0**	**5,602.2**
J	1,250.0	0.0	0.0	285.6	0.0	0.0	9,703.5	0.0	11,239.1
K	0.0	0.0	0.0	371.0	0.0	31.1	5,070.7	0.0	5,472.8
Grand Total	**1,250.0**	**72.1**	**4,660.7**	**656.6**	**462.3**	**1,224.7**	**30,919.4**	**653.9**	**39,899.6**

Each derate column is the amount of capacity after reduction based on the application of the applicable derate factor, using, as applicable, the specified technology-specific derating factor or the specified ICAP/UCAP translation factor for the Capacity Region. In other words, the data presented in Table 3 represents the capacity values specified in Table 2 as adjusted to account for the applicable UCDF.

3.2.3 External System Imports Modeling

The initial generation and interchange schedules for the NYCA and the four New York Capacity Regions[7] are determined as follows:

External Generation Source

1. Inter-area external interchange schedules include the following grandfathered long-term firm power transactions for the NCZ Study base case year (2028):
    a. External CRIS Right: Quebec (via Chateauguay) to NY: 1,110 MW
    b. Existing Transmission Capacity for Native Load (ETCNL):
    PJM to NYSEG: 1,080 MW
2. Generating capacity associated with firm export commitments are represented as follows:
    a. NYPA to AMP-Ohio, PA-RECs 183 MW
    b. NYPA to ISO-NE (Vermont) 84 MW

[7] Schedules representing short-term external ICAP are not modeled in this assessment; deliverability of external ICAP is determined during the annual process of setting import rights.

3. Grandfathered external firm capacity import rights:

    a. ISO-NE to NY 0 MW

    b. Ontario (IESO) schedule 0 MW

4. Generator reactive (MVAr) capabilities as determined by applicable NYSRC, NPCC, and NERC requirements, and NYISO procedures.

5. Wheeling contracts:

    a. ROS to NYC via ABC/JK through PJM 0 MW

    b. ROS to NYC via Lake Success/Valley Stream through LIPA 287 MW

    c. ROS to LIPA via Northport Norwalk Cable through ISO-NE 0 MW

The total external generation resources including items (1) through (5) are summarized in Table 4.

Table 4: Summary of External Generation Resources (MW)

Capacity Regions / External Regions	ROS Import (A-F)	LHV Import (G-I)	NYC Import (J)	LI Import (K)	NYCA
Ontario	0	0	0	0	0
HQ	1,190[8]	0	0	0	1,190
PJM	491[9]	343	63	0	897
ISO NE	-84	0	0	0	-84
Total External Generation Source	1,598	0	0	0	2,003

ROS and LHV Direct MW Transfer

Actual base case interchange schedules between New York Capacity Regions are consistent with the IRM and the LCRs:

- ROS (A-F) and LHV (G-I) supply to New York City: 2,831 MW
- ROS (A-F) and LHV (G-I) supply to Long Island: 492 MW
  (Including the 287 MW wheeling contract)
- ROS (A-F) supply to LHV (G-I): 608 MW

[8] ROS import from HQ is the sum of External CRIS right 1,110 MW via Chateauguay and 80 MW External-to-ROS Deliverability Rights associated with the Cedar Rapids Transmission Project.

[9] ROS import from PJM is the sum of ETCNL 1,080 MW into NYCA and 183 MW NYPA export to AMP-Ohio and PA-RECs (1,080-183 = 897 MW).

Unforced Capacity Deliverability Rights and External-to-ROS Deliverability Rights

Transmission projects with UDRs and EDRs are represented at their respective UDR and EDR capacity from the external area into the respective NYCA Capacity Region.

- Linden VFT to New York City 315 MW
- Cross-Sound Cable to Long Island 330 MW
- Neptune HVDC to Long Island 660 MW
- Hudson Transmission Project to New York City 0 MW
- Cedar Rapids Transmission Project 80 MW

The total import of each Capacity Region is summarized in Table 5. As derived from the external resources, Tables 6 and 7 detail the NY-PJM scheduled flows.

Table 5: Summary of External Resources into Capacity Regions (MW)

From \ To	ROS Import (A-F)	LHV Import (G-I)	NYC Import (J)	LI Import (K)
Total External Source	1,598	343	63	0
ROS direct MW transfer	0	608	2,832	779
LHV direct MW transfer	0	0	300	0
Total UDR	0	0	315	990

Table 6: PJM – New York Scheduled Interchange and Wheels

PJM – New York Scheduled Interchange and Wheels	MW
ETCNL (PJM to ROS)	1,080
NYPA Exports (from ROS)	-183
ConEd /PSE&G Wheel:	
ROS to PJM via LHV (ROS to LHV, LHV to PJM via the J&K tie-lines)	0
PJM to NYC (via the ABC tie-lines)	0
Wheel for RECO Load:	
PJM to ROS and LHV (20% PJM to ROS, ROS to LHV, 80% PJM to LHV)	394
LHV to PJM (RECO Load)	-394
PJM to NY Net Interchange Schedule via the AC Tie-lines	**897**

Table 7: PJM – New York Scheduled Flows

PJM – New York Scheduled Flows	MW
PJM to ROS (A – F):	
46% of PJM to NY Net Interchange (0.46 * 897)	412
20% of RECO Load (0.20 * 394)	78
Total Scheduled Flow to ROS via the zones A and C tie-lines	**490**
PJM to LHV (to Zone G):	
32% of PJM to NY Net Interchange via 5018 tie (0.32 * 897)	287
80% of RECO Load via the 5018 tie (0.80 * 394)	315
J&K ties (0 MW Wheel and 15% of PJM to NY Net Interchange) (0.15 * 897)	134
RECO Load delivered from LHV	-394
Total Scheduled Flow to LHV via the Zone G tie-lines	**342**
PJM to NYC (to Zone J)	
ABC ties (0 MW Wheel and 7% of PJM to NY Net Interchange, B&C out) (0.07 * 897)	62

3.3 Balancing Generation and Load

This step balances the supply of resources and demand of loads and losses. All CRIS generation within each Capacity Region is placed in-service and scaled proportional to the ratio of its Pmax to the sum of the Pmax in the respective exporting or importing zone(s) or Capacity Region. Actual generation is proportionally scaled (up or down) to match the demand.[10]

Phase angle regulators (PARs) controlling external tie lines are set consistent with the NYISO-PJM Joint Operating Agreement (see Attachment CC of the OATT) and applicable operating procedures and agreements.

UDRs are converted into proxy generators while the amount of external resources remains the same.

[10] Demands include load (including load forecast uncertainty), transmission losses, and external schedule commitments

4. NCZ Study Results

Deliverability tests were performed for each of the five Highway interfaces located within the ROS Capacity Region and for the UPNY-ConEd Highway interface located within the LHV Capacity Region. The deliverability tests within the ROS Capacity Region (Load Zones A through F) are evaluated from west-to-east and north-to-south by exporting from one (or more) zones (exporting zones) to the remaining zone(s) within the ROS Capacity Region. The deliverability test for the UPNY-ConEd Highway within the LHV Capacity Region (Load Zones G through I) is evaluated by exporting from Load Zone G to Load Zones H and I.

The level of deliverability across each Highway interface is measured as either "Additional Transmission Capacity" (*i.e.*, deliverability "headroom"), or "Bottled Generation Capacity," which is calculated as the FCITC of the interface less the amount of net available capacity in the exporting zone(s). A summary of the Highway interface deliverability analysis for the NCZ Study case is presented in Table 8. As shown in the table, all Highway interfaces were determined to have Additional Transmission Capacity and, therefore, passed the Highway deliverability test.

Table 8: Highway Deliverability Test

Interface	Source	Sink	FCITC* (MW) [a]	Net Available Capacity@ (MW) [b]	Transmission (+) or Bottled (-) Capacity (MW) [c=a-b]	Constraint
West Central	AB	CDEF	2,214	352	1,862	(1)
Dysinger East	A	BCDEF	1,950	267	1,683	(2)
Moses South	D	ABCEF	2,019	106	1,913	(3)
Volney East	ABC	DEF	4,140	813	3,327	(4)
Total East	ABCDE	F	5,766	963	4,803	(5)
UPNY-ConEd	G	HI	2,644	1,784	861	(6)

Notes:
*FCITC is the incremental transfer limit corresponding to the most limiting constraint in the Highway interface analysis
@"Net Available Capacity" is the excess UCAP in the exporting zone(s) available for export
(1) Mortimer – Lawler 115 kV ckt 2 @ STE 158 MW L/O Mortimer – Lawler 115 kV ckt 1
(2) Lockport – Telegraph Rd115 kV ckt 1 @ STE 180 MW L/O Lockport – Shel-113 115 kV ckt 1
(3) Colton - Flat Rock 115 kV ckt 1 @ STE 154 MW L/O Colton – Higley 115 kV ckt 1
(4) JA Fitzpatrick – Edic 345 kV ckt 1 @ STE 1661 L/O Volney – Marcy 345 19
(5) Edic - Gordon Rd 345 kV ckt 1 @ Norm 1331 MW Base Case
(6) Buchanan S – Lovett ST 345 kV ckt 1 @ Norm 1793 MW Base Case

5. Conclusion

All of the Highway interfaces were found to have positive Additional Transmission Capacity, indicating that none of the Highway interfaces were found to be constrained. The conclusion of this 2023/2024 NCZ Study is that there is no need to trigger the Services Tariff requirement for the filing of tariff revisions to establish a NCZ. In accordance with the Services Tariff, the NYISO will file its determination with the Commission on or before March 31, 2024.[11]

[11] *See* Services Tariff Section 5.16.4(b).