Attachment X

2013 New Capacity Zone Study Report

January 14, 2013
Revised Presentation of Table 6

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1. New Capacity Zone Study Methodology

1.1. Background

This New Capacity Zone (NCZ) Study[1] is performed in accordance with the applicable rules set forth in the NYISO Market Administration and Control Area Services Tariff (Services Tariff), chiefly in Section 5.16, which require the use of certain parameters under Attachments S of the NYISO Open Access Transmission Tariff (OATT). The rules governing the NCZ Study were accepted by the Federal Energy Regulatory Commission (Commission) in its August 30, 2012 Order on Compliance.[2]

This NCZ Study rules require that it be performed using in large part the Deliverability test methodology in Attachment S of the OATT to determine whether the creation of a New Capacity Zone is warranted – *i.e.,* if there is a constrained Highway interface into one or more Load Zones.

The scope of this 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.[3] The methodology for evaluating and measuring Deliverability across the Highways is described below.

1.2. Transfer Capability Across Highway Interfaces

The NCZ Study was conducted by testing the transfer capability across the Highway interfaces. Generation-to-generation shifts are simulated from combinations of zones within the Rest Of State (ROS) Capacity Region (Zones A through I) from generation "upstream" of an interface to generation "downstream" of that interface (as such terms are used in the definition of "Highway" in Attachment S.) 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 a Capacity Region.

In the actual transfer limit assessment, all transmission facilities within the NYISO are monitored. Contingencies tested in the transfer limit assessment include all "emergency transfer criteria" contingencies defined by the applicable Northeast Power Coordinating Council (NPCC) Criteria and New York State Reliability Council (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.[4] It is 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) proportional up to the Pmax of all generators in the exporting zone(s) while all generators in the importing zone(s) are decreased uniformly to their minimum power levels. The FCITC and Highway transmission constraint(s) for the exporting zone(s) are noted for each export/import combination.

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

[2] *New York Independent System Operator, Inc.,* 140 FERC ¶ 61,160 (2012) (accepting the NYISO's November 7, 2011 proposed tariff revisions to comply with the Commissions' September 8, 2011 order in Docket No. ER04-449-023).

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

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

b. The *net generation available*[5] 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. (Byway constraints normally evaluated in an interconnection study are not evaluated in the NCZ Study.)

   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 upstream area.

[5] 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.

2. 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.

2.1. NCZ Study Assumption Matrix

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

Table 1: Parameters Established in NYISO Studies and Reports

#	Parameter	Description	Reference
1	Installed Capacity Requirement	NYCA Installed Capacity Requirement to achieve LOLE less than 0.1 day per year, which is based on the Installed Reserve Margin (IRM) identified by the New York State Reliability Council (NYSRC) and accepted by the Commission	2012 NYSRC IRM report for the period May 2012 to April 2013
2	IRM Emergency Transfer Limits	Emergency transfer limits on ROS interfaces corresponding to IRM study	
3	Locational Capacity Requirements	The Locational Capacity Requirements (LCR) for the NYC (Zone J) and Long Island (Zone K) Capacity Regions approved by the Operating Committee.	2012 LCR report, approved by Operating Committee on Jan. 12, 2012
Load model			
4	Peak Load Forecast	NCZ Study Capability Period peak demand forecast contained in the latest ISO's Load and Capacity Data report (i.e., "Gold Book")	2017 Summer peak load conditions from 2012 Gold Book
5	Impact of Load Forecast Uncertainty	The impact to IRM due to uncertainty relative to forecasting NYCA loads	2012 NYSRC IRM report
Generator model			
6	Existing CRIS generators, and all projects with Unforced Capacity Deliverability Rights	Existing Capacity Resource Interconnection service ("CRIS") generators in-service on the date of the latest ISO's Load and Capacity Data report	2012 Gold Book
7	Planned generation projects or Merchant Transmission Facilities	Project that have accepted either (a) Deliverable MW or (b) a System Deliverability Upgrade cost allocation and provided cash or posted required security pursuant to OATT Attachment S, which for (a) and (b) is from a Class Year Final Decision Round that occurs prior to the NCZ Study Start Date	
8	UCAP Derate Factor (UCDF)	Convert ICAP to Unforced Capacity (UCAP) based on derated generator capacity incorporating availability	2012 NYSRC IRM report and 2012 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	Generator units deactivated before September 1, 2009
Transmission model			
10	Existing transmission facilities	Identified as existing in the ISO's Load and Capacity Data report most recently published prior to the NCZ Study Start Date.	2012 Gold Book
11	Firm plans for changes to transmission facilities by TOs	Planned changes of facilities in the latest ISO's Load and Capacity Data report that are scheduled to be in-service prior to the NCZ Study Capability Period	
12	System Upgrade Facilities and System Deliverability Upgrades	Facilities associated with planned projects identified in (7) above, except that System Deliverability Upgrades will only be modeled if the construction is triggered	
Import/Export model			
13	External System Import/Export	NYCA scheduled imports from HQ/PJM/ISO-NE/IESO	NYISO Tariffs - OATT Section 25, Attachment S
14	Base case interchange schedules between NYCA Capacity Regions	Actual flow scheduled from ROS to NYC and LI consistent with the IRM and the LCRs for zones J and K	- ROS to NYC: Approximately 2422 MW - ROS to LIPA: Approximately 1072 MW

2.2. NCZ Study Base Case Creation

The NCZ study base case is a five-year look-ahead of the New York Control Area (NYCA) system. The base case originates from the NYISO FERC 715 2017 summer case, and is then further 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.

2.2.1. Load Modeling

Load forecast is the coincident summer 2017 firm peak load before reductions for Emergency Demand Response Providers. The impact of Load Forecast Uncertainty (LFU) for each Capacity Region to the 2012 IRM is applied individually to the peak load forecast MW:

- ROS 9.97%
- NYC 4.3%
- LI 5.3%

2.2.2. NYCA Generator Modeling

The initial CRIS capability and available capacity resources are determined by the combination of various inputs, consistent with Section 5.16.1 of the Services Tariff:

I. The CRIS (MW) capability of approved generating units is modeled according to the CRIS cap listed in 2012 Gold Book.

II. CRIS rights terminate three years after deactivation pursuant to Attachment S to the OATT. Based on the NCZ Study Start Date of September 3, 2012 of this NCZ Study, units deactivated in and before September 2009 are thus not modeled in the NCZ Study case. Generators deactivated after September 2009 are modeled as in-service with their applicable CRIS levels, per the 2011 and 2012 Gold Book.

III. The Pmax data for each respective resource within the NYCA Study base case power flow representation is the CRIS value derated by applicable equivalent forced outage rate below:

III.1. Derates are applied to specific types of intermittent generation resources:

a. Small hydro 45%
b. Large hydro 1.22%
c. Land-based Wind 89%
d. Off-shore Wind 70%
e. Landfill Gas 8.99%

III.2. Derates are applied to the aggregate of all remaining generation (“Uniform Capacity”) within the exporting zone(s) for the purpose of determining the net capacity available for deliverability. These are the ICAP/UCAP translation factors for each Capacity Region consistent with the applicable NYSRC Installed Reserve Margin study:

a. Rest of State 6.92%
b. New York City 12.13%
c. Long Island 11.44%

III.3. 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 zone is uniformly increased to its Pmax.

III.4. Tables 2 and 3 summarize the Resource Capacity and Capacity Derates for the NCZ Study base case:

Table 2: Summary of Resource Capacity by Type

Zone	Landfill Gas	Large Hydro	Small Hydro	Wind	Uniformed	Total CRIS Capacity
A	24.8	2700.0	3.1	210.5	2261.7	5200.1
B	13.6		54.8	6.6	732.8	807.8
C	34.9		71.0	539.4	6396.8	7042.1
D	4.8	856.0	90.2	600.7	354.5	1906.2
E	4.8		449.6	521.2	272.4	1248.0
F	7.3		350.2		4130.1	4487.6
G			98.5		2981.1	3079.6
H					2120.4	2120.4
I			1.8			1.8
ROS	**90.2**	**3556.0**	**1119.1**	**1878.4**	**19249.8**	**25893.5**
J					10609.5	10609.5
K	0.0				5723.4	5723.4
NYCA	**90.2**	**3556.0**	**1119.1**	**1878.4**	**35582.7**	**42226.4**

Table 3: Summary of Capacity Derates by Resource Type

Zone	Total CRIS Capacity	LFG derate	Large Hydro Derate	Small Hydro Derate	Wind derate	Uniform Derate	Total Capacity Derates	UCAP
A	5200.1	2.2	32.9	1.4	187.3	156.5	**380.4**	**4819.7**
B	807.8	1.2	0.0	24.7	5.9	50.7	**82.5**	**725.3**
C	7042.1	3.1	0.0	32.0	480.1	442.7	**957.8**	**6084.3**
D	1906.2	0.4	10.4	40.6	534.6	24.5	**610.6**	**1295.6**
E	1248.0	0.4	0.0	202.3	463.9	18.9	**685.5**	**562.5**
F	4487.6	0.7	0.0	157.6	0.0	285.8	**444.1**	**4043.6**
G	3079.6	0.0	0.0	44.3	0.0	206.3	**250.6**	**2829.0**
H	2120.4	0.0	0.0	0.0	0.0	146.7	**146.7**	**1973.7**
I	1.8	0.0	0.0	0.8	0.0	0.0	**0.8**	**1.0**
ROS	**25893.5**	**8.1**	**43.4**	**503.6**	**1671.8**	**1332.1**	**3559.0**	**22334.6**
J	10609.5	0.0	0.0	0.0	0.0	1286.9	**1286.9**	**9322.6**
K	5723.4	0.0	0.0	0.0	0.0	654.8	**654.8**	**5068.6**
NYCA	**42226.4**	**8.1**	**43.4**	**503.6**	**1671.8**	**3273.8**	**5500.7**	**36725.8**

Column descriptions:

- *"Total CRIS Capacity" is the total from Table 2.*
- *Each "Derate" column is the amount of capacity reduction based on the application of the derate factor to the represented capacity.*
- *Uniform Capacity Derate uses the specific ICAP/UCAP translation factor for the Capacity Region; hydro and wind use the technology-specific derate factors.*
- *"Total All Capacity Derates" is the sum of category derates by zone.*

2.2.3. Capacity Regions Import/Export Modeling

The initial generation and interchange schedules for the NYCA and the three Capacity Regions are determined via the combination of various inputs:

1. External Generation Source

I. Inter-Area external interchange schedules include the following grandfathered long-term firm power transactions for the NCZ Study base case by Tariff:

- External CRIS Right: Quebec (via Chateauguay) to NY 1090 MW
- Existing Transmission Capacity for Native Load: PJM to NYSEG 1080 MW

II. Generating capacity associated with firm export commitments are represented as follows:

- NYPA to AMP-Ohio, PA-RECs 182 MW
- NYPA to ISO-NE (Vermont) 91 MW

III. Grandfathered external firm capacity imports:

- ISO-NE to NY 50 MW
- Ontario (IESO) schedule 0 MW

IV. Generator reactive (MVAr) capabilities as determined by appropriate NYISO procedures, NPCC and NYSRC Criteria, and North American Electric Reliability Corporation (NERC) Standards requirements.

V. Wheeling contracts:

- ROS to NYC via ABC/JK through PJM 1000 MW
- ROS to NYC via Lake Success/Valley Stream through LIPA 287 MW
- ROS to LIPA via Northport Norwalk Cable through ISO-NE 100 MW

The total external generation resources including items (I) to (V) are summarized in Table 4.

Table 4: Summary of External Generation Resources (MW)

From	ROS import	NYC import	LI import	NYCA
Ontario	0	0	0	0
HQ	1090	0	0	1090
PJM	-102	1000	0	899
ISO NE	-141	0	100	-41
Total External Generation Source	848	1000	100	

2. **ROS Direct MW Transfer**

Actual base case interchange schedules between NYCA Capacity Regions are consistent with the Installed Reserve Margin and the Locational Capacity Requirements:

- Rest of State to New York City 2422 MW
- Rest of State to Long Island 1072MW

3. **Capacity Deliverability Rights (UDR)**

Merchant transmission projects with Unforced Capacity Deliverability Rights (UDR) are represented at their respective UDR capacity from the external Area into the respective NYISO Zone.

- 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 660 MW

To summarize, the total import of each Capacity Region including items (1) to (3) is summarized in Table 5.

Table 5: Summary of External Resources (MW)

From	ROS import	NYC import	LI import
Total External Generation Source	848	1000	100
ROS direct MW transfer		2422	1072
Total UDR		975	990

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.[6]

Phase Angle Regulators (PARs) controlling external tie lines are set consistent with NYISO Service Tariff, Attachment M-1, NYISO-PJM Joint Operating Agreement and applicable operating procedures and agreements.

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

3. NCZ Study Results

The deliverability tests within the ROS Capacity Region are evaluated from west-to-east and north-to-south by exporting from one (or more) zones in upstate NY to the remaining zone(s) within the ROS Capacity Region, similar to Highway Interface Capability assessment.

Additional Transmission Capacity or Bottled Generation Capacity is calculated by FCITC less the amount of net available capacity. A summary of these interface transfer for the NCZ case is presented in Table 6. As shown in the table, all Highway interfaces have passed the deliverability test, except for the UPNY-SENY. The UPNY-SENY interface has constrained about 849 MW of generation from moving from Zones A through F to Zones G through I.

Table 6: ROS Capacity Deliverability Study Results

Highway Tested	Export-ing Zone	Importing Zone	Load (incl. LFU) (1)	Base Genera-tion Dispatch (2)	Available CRIS (3)	Available CRIS Derate (4)	UCAP (5)	Net Available Capacity (6)	FCITC (export limit) (7)	Additional Transmission Capacity (+) or Bottled Generation Capacity (-) (8)	Transfer Limit Constraint
Dysinger-East	A	BCDEFG HI	2927.8	4528.4	5200.1	380.4	4819.7	291.3	1570.5	**1279.2**	Stolle Rd-Sheldon 230KV @ NOR
West Central	AB	CDEFGHI	5156.3	5209.9	6007.9	462.9	5545.0	335.1	1778.0	**1442.9**	Stolle Rd-Sheldon 230KV @ NOR
Volney-East	ABC	DEFGHI	8332.7	10925.7	13050.0	1420.7	11629.3	703.6	2820.1	**2116.5**	Coopers Corners-Fraser 345KV @ NOR
Moses-South	D	ABCEFGH I	884.3	1217.3	1906.2	610.6	1295.6	78.3	1276.7	**1198.4**	Adirondack-Moses 230KV @ STE l/o Chateauguay-Massena-Marcy 765KV with Rej
Total East	ABCDE	FGHI	10693.0	12671.5	16204.2	2716.8	13487.4	815.9	2520.5	**1704.6**	Coopers Corners-Fraser 345KV @ NOR
UPNY-SENY	ABCDEF	GHI	13293.1	16470.7	20691.8	3160.8	17531.0	1060.3	211.1	-849.2	Leeds-Pleasant Valley 345KV @ STE l/o Athens-PV 345KV
UPNY-ConEdison	G	HI	2587.8	2658.0	3079.6	250.6	2829.0	171.0	1785.1	**1614.1**	Roseton - E. Fishkill 345KV @ NOR

Column descriptions:

1. *"Load" includes the load forecast uncertainty and transmission losses within the exporting zone.*
2. *"Base Generation Dispatch" is the actual generation output in the exporting zone.*
3. *"Available CRIS" represents the total CRIS capacity in the exporting zone(s).*
4. *"Available CRIS derate" is the total of the generation derates (ICAP/UCAP) applied to the exporting zone.*
5. *"UCAP" is the difference between Available CRIS (3) and Capacity Derates (4).*
6. *"Net Available Capacity" is the remaining CRIS available after consideration of base generator dispatch, capacity derates, and net capacity exports. It is the difference between UCAP (5) and Base Generation Dispatch (2).*
7. *"FCITC" is the incremental transfer limit corresponding to the most limiting FCTTC in the Highway interface analysis calculated by the software PSS®MUST.*
8. *"Additional Transmission Capacity or Bottled Generation Capacity" is the available unused transfer capability (+) or the amount of CRIS that is bottled (-) by the interface transfer limit constraint. It is calculated by FCITC (7) less Net Available Capacity (6).*

4. Conclusions

The UPNY-SENY Highway interface is bottling 849.2 MW generation from upstream (Zones A through F), thus indicating a need to create a New Capacity Zone.