Class Year 2008 Facilities Studies

Part 2 Studies (Sections 11, 12, 13 only): Deliverability Study and System Deliverability Upgrade Facilities (SDU)

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Section 11. Deliverability Study[1]

1. Introduction

Beginning with Class 2007, the Facilities Studies include a Deliverability Study, which evaluates the deliverability of the proposed capacity associated with the Class Year Projects. If the Deliverability Study determines that any of the proposed capacity is not fully deliverable, the study identifies the SDUs that would be required to make the proposed capacity fully deliverable, and, alternately, the amount of the proposed capacity that would be deliverable without SDUs.

After Operating Committee approval of the Part 2 Studies report (including Deliverability Study), the process enters a decision period during which the Class Developers are given the choice to accept or reject their respective cost allocation for SUFs as summarized in the ATRA, and separately, cost responsibility for any SDUs as summarized in the Deliverability Study. If any Developers reject their cost allocation for SUFs, the associated Projects are removed from the Class. Any Developers that accept their cost allocation for SUFs, but reject their cost responsibility for SDUs, remain in the Class, but would only be eligible for partial Capacity Resource Interconnection Service (CRIS) up to the amount of the proposed capacity of their Project has been determined to be deliverable, if any. NYISO re-evaluates the SUFs for the remaining Class Projects, makes any necessary adjustments, and issues a revised ATRA Report. Also, NYISO re-evaluates deliverability and associated SDUs for the remaining Class Year Projects as necessary.

Deliverability is broadly defined in the NYISO OATT as the ability to deliver the aggregate of NYCA capacity resources to the aggregate of the NYCA load under summer peak load conditions. This is implemented by evaluating the deliverability of proposed projects within the three Capacity Regions in New York State: Rest-of-State ("ROS" Zones A-I), New York City ("NYC" Zone J), and Long Island ("LI" Zone K).

The Class Year 2008 ("CY2008") Deliverability Study uses the base case representation (ATBA) for 2013 summer peak system condition and the case with all CY2008 participant projects (ATRA) modeled in service. All proposed projects in the CY2008 seeking Capacity Resource Interconnection Service (CRIS) are evaluated on an aggregate basis; that is, all CY2008 projects area evaluated as a group. Deliverability will be determined by simulating generation-to-generation transfer shifts within the Rest-of-State Capacity Region or New York City Capacity Region or Long Island Capacity Region and between the ROS Capacity Region and the New York City Capacity Region or Long Island Capacity Region.

[1] The following Sections 11 to 13 are part of the Class Year 2008 Facilities Study, Part 2, and presented separately in this report.

2. The Deliverability Test Methodology

The Deliverability Test Methodology developed by the NYISO Stakeholders outlines the general process to determine the deliverability of resources among the Capacity Regions, and is incorporated in the NYISO Open Access Transmission Tariff (OATT). The specific sections of the Tariff defining the modeling of the system and the test methodology applied to the analysis include:

NYISO OATT, Attachment S, VII.E, Sheet 679.04
NYISO OATT, Attachment S, VII.H.2.l, Sheet 679.09(i)
NYISO OATT, Attachment S, VII.H.2.k, Sheet 679.09
NYISO OATT, Attachment S, VII.H.2.m, Sheets 679.09-679.10
NYISO OATT, Attachment S, VII.I, Sheet 679.10
NYISO OATT, Attachment S, IX.C, Sheets 688.00-688.01

3. CY2008 ATBA-Deliverability Base Case Conditioning Steps

The initial CY2008 ATBA-Deliverability base case is the forecast summer 2013 "as found system" base case powerflow representation for the CY2008 study. All rules applicable to the 2013 power flow representation of transmission system and resource capacity additions in the CY 2008 ATBA-Deliverability base case are also applicable to the CY2008 ATRA-Deliverability base case for the Deliverability Study[2]:

a. Load forecast is the coincident summer 2013 peak load before reductions for emergency demand response programs in RNA study.
   Load Forecast Uncertainty applied to three capacity regions
   i. ROS 7.93%
   ii. NYC 5.20%
   iii. LI 5.90%
b. Network model shall include all transmission network changes and generators that have accepted cost allocation planned to be in service through the summer 2013 peak capability period.
c. Phase Angle Regulator ("PAR") schedules shall be consistent with the Class Year ATBA base case requirements, NYISO Tariff, procedures and inter-Area agreements guiding the determination of power schedules in system operation.
d. Determining initial CRIS capability and available capacity resources:
   i. CRIS (MW) capability for grandfathered (pre-CY2007) generators, except for wind generation, are based on the highest DMNC values reported in the ***NYISO Load & Capacity Data*** for the five (5) summer capability periods prior to the effective date of the NYISO Deliverability Standard (2004 – 2008 inclusive). CRIS values for units not having tested DMNC are their proposed nameplate values. CRIS values for wind projects are their actual or proposed

[2] for the purpose of this Study and Report, *ATBA-Deliverability base case* refers to the ATBA baseline powerflow network representation without the Class Year Projects; the *ATRA-Deliverability base case* is the ATBA-Deliverability base case with the Class Year Projects added.

nameplate capacity. These values provide the basis for the total CRIS to be evaluated. This is the ICAP value.

ii. CRIS (MW) capability for projects in the Class Year 2007 are based on the deliverable CRIS value as determined in the Class Year 2007 Deliverability Study

iii. The Pmax data for each respective resource within the ATBA (and ATRA) - Deliverability base case power flow representation is the CRIS value derated by applicable equivalent forced outage rate below. This is the UCAP value.

1. Derates are applied to specific types of generation resources:
    a. Small hydro 45%
    b. Large hydro 1.25%
    c. Land-based Wind 90%
    d. Off-shore Wind 70%
    e. Landfill Gas 13.7%
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[3]:
    a. Rest of State 5.78%
    b. New York City 6.90%
    c. Long Island 8.11%

[3] ***NYSRC – NYCA Installed Capacity Requirement for the Period May 2008 through April 2009.***

Table 1 – Summary of Resource Capacity by Type – ATBA

ATBA	In-service CRIS	Deactivated Capacity Adjustment	CRIS Capacity Adjustment	Total CRIS Capacity Base	**Uniform Capacity**	Large Hydro and P/S Hydro	Small Hydro	Landfill Gas	Land-based Wind	Off-shore Wind
A	5177.5	0.0	6.4	5183.9	**2337.5**	2700.0	3.4	22.6	120.5	0.0
B	805.9	0.0	6.4	812.3	**732.9**	0.0	55.1	17.6	6.6	0.0
C	6831.0	0.0	197.5	7028.5	**6472.6**	0.0	85.9	34.0	436.0	0.0
D	1678.2	0.0	218.0	1896.2	**354.6**	856.0	77.0	4.6	604.0	0.0
E	1142.3	0.0	422.5	1564.8	**272.4**	0.0	498.1	4.1	790.3	0.0
F	3936.2	0.0	717.6	4653.8	**3025.2**	1165.3	456.6	6.7	0.0	0.0
G	3077.2	0.0	0.0	3077.2	**2977.0**	0.0	100.2	0.0	0.0	0.0
H	2166.9	0.0	0.0	2166.9	**2166.9**	0.0	0.0	0.0	0.0	0.0
I	2.0	0.0	0.0	2.0	**0.0**	0.0	2.0	0.0	0.0	0.0
ROS	**24817.3**	**0.0**	**1568.4**	**26385.7**	**18339.2**	**4721.3**	**1278.3**	**89.6**	**1957.4**	**0.0**
J	9498.5	891.0	567.6	10957.1	**10957.1**	0.0	0.0	0.0	0.0	0.0
K	5437.0	0.0	310.0	5747.0	**5744.4**	0.0	0.0	2.6	0.0	0.0
NYCA	**39752.7**	**891.0**	**2446.0**	**43089.7**	**35040.6**	**4721.3**	**1278.3**	**92.2**	**1957.4**	**0.0**

Column descriptions:

"In-service CRIS" is the total resources reported in the 2008
"Deactivated Capacity Adjustment" modeled CRIS-rights of retired units
"CRIS Capacity Adjustments" adds new units not reported in the 2008 Gold Book and subtracts units reported in the 2008 Gold Book that do not have CRIS.
"Total CRIS" represents the CRIS capacity basis for the ATBA-Deliverability case.
"Uniform Capacity" is the CRIS capacity that is derated by the ICAP/UCAP translation factor.

iv. 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 to its Pmax.

Table 2 – Summary of Capacity Derates by Resource Type – ATBA

ATBA	Total CRIS Capacity Base	Uniform Capacity Derate	Large & P/S Hydro Derate	Small Hydro Derate	LFG derate	Land-based wind derate	Off-shore wind derate	**Total All Capacity Derates**
A	5183.9	135.1	33.8	1.5	3.1	108.5	0.0	**281.9**
B	812.3	42.4	0.0	24.8	2.4	5.9	0.0	**75.5**
C	7028.5	374.1	0.0	38.7	4.7	392.4	0.0	**809.8**
D	1896.2	20.5	10.7	34.7	0.6	543.6	0.0	**610.1**
E	1564.8	15.7	0.0	224.1	0.6	711.2	0.0	**951.7**
F	4653.8	174.9	14.6	205.5	0.9	0.0	0.0	**395.8**
G	3077.2	172.1	0.0	45.1	0.0	0.0	0.0	**217.2**
H	2166.9	125.2	0.0	0.0	0.0	0.0	0.0	**125.2**
I	2.0	0.0	0.0	0.9	0.0	0.0	0.0	**0.9**
ROS	**26385.7**	**1060.0**	**59.0**	**575.2**	**12.3**	**1761.6**	**0.0**	**3468.1**
J	10957.1	756.0	0.0	0.0	0.0	0.0	0.0	**756.0**
K	5747.0	465.9	0.0	0.0	0.4	0.0	0.0	**466.2**
NYCA	**43089.8**	**2281.9**	**59.0**	**575.2**	**12.6**	**1761.6**	**0.0**	**4690.4**

Column descriptions:

"Total CRIS Capacity Base" is the total from previous Table 1

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.

4. Levelized Generation Dispatch used in the development of the ATBA-Deliverability and ATRA-Deliverability base case power flow models and transfer assessments includes the following considerations to determine the initial generation and interchange schedules for the NYCA and the three NY Capacity Regions[4]:

   a. Inter-Area external interchange schedules shall include all grandfathered long-term firm power transactions that are expected to be in place for the CY2008 case year (2013) by Tariff.
      1. Hydro Quebec to NY — 1090 MW
      2. PJM to NYSEG — 1043 MW

   b. Generating capacity associated with firm export commitments are represented as follows:
      1. NYPA to AMP-Ohio, PA-RECs — 182 MW
      2. NYPA to ISO-NE (Vermont) — 91 MW

   c. Grandfathered external firm capacity imports represented are consistent with Attachment E of the NYISO Installed Capacity Manual:
      1. FirstEnergy/Penelec to NYSEG — 37 MW
      2. ISO-NE to NY — 50 MW
      3. Ontario (IESO) schedule — 0 MW

   d. Generator reactive (MVAr) capabilities as determined by appropriate NYISO procedures, NPCC Criteria and NERC Standards requirements.

[4] 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.

e. Controlled tie lines with unforced deliverability rights ("UDR") will be represented at their respective UDR schedule from the external Area into the respective NYISO Zone.
    1. Linden VFT to New York City 300 MW
    2. Cross-Sound Cable to Long Island 330 MW
    3. Neptune HVdc to Long Island 660 MW

f. Actual base case interchange schedules between NYCA Capacity Regions are consistent with the topology limits the NYSRC Installed Reserve Margin study[5]:
    1. Rest of State to New York City 3400 MW
    2. Rest of State to Long Island 1000 MW

g. For the Deliverability Study all 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 area(s) or Capacity Region. Actual generation is proportionally scaled (up or down) to match the demand [load (including load forecast uncertainty), transmission losses, and external schedule commitments]. This "levelized dispatch" process results in all generation within each Capacity Region being at a uniform percentage of Pmax.[6]

5. Phase Angle Regulators (PARs) controlling external tie lines were set consistent with NYISO Service Tariff, Attachment M-1, and applicable operating procedures and agreements. Intra-Capacity Region PARs were adjusted to minimize actual or contingency overloads resulting from the levelized dispatch of all generation in service. Applicable procedures for the operation of all PARs were respected in establishing each case (ATBA or ATRA). The final base case schedules are summarized in Table 3.

Table 3 – Summary of Phase Angle Regulator Schedules
ATBA- and ATRA-Deliverability Power flow Cases

External (inter-Area) tie PAR schedules:

Circuit #	**Controlled Line**	**Schedule**
ISO-NE to NYCA		
7/K37	**Blissville – Whitehall**	**50**
138-1385	**Norwalk Harbor – Northport**	**100**
PV-20	**Sandbar – Plattsburgh**	**- 100**
PJM to NYCA		
5018	**Jefferson – Ramapo**	**1000**
B-3402	**Hudson – Farragut**	**400**
C-3403	**Hudson – Farragut**	**400**
A-2253	**Linden – Goethals**	**200**
J3410/69	**Waldwick – South Mahwah**	**- 455**
K3411/70	**Waldwick – South Mahwah**	**- 545**
IESO to NYCA		
L33P	**St.Lawrence – Moses**	**0**
L34P	**St.Lawrence – Moses**	**0**

Inter-Capacity Region PAR schedules:

5 NYS Reliability Council: ***NYCA Installed Capacity Requirement for the Period May 2008 through April 2009***, Figure A-10, pg. 45..

6 Generation in G,H and I is at Pmax and generation in the rest of load zones in ROS is at a uniform percentage of Pmax.

Circuit #	Controlled Line	Schedule
(ROS to NYC)		
99031	Dunwoodie N – Sherman Creek	75
99032	Dunwoodie N – Sherman Creek	75
99153	Dunwoodie S – E. 179th St.	100
M29	Sprain Brook – Sherman Creek	300
X28	Sprain Brook – Tremont	300
(ROS to LI)		
Y49	Sprain Brook – E. Garden City	600
(NYC to LI)		
903	Jamaica – Lake Success	- 164
901	Jamaica – Valley Stream	- 122

Intra-Capacity Region PAR schedules:

Circuit #	Controlled Line	Schedule
(ROS)		
	Inghams	120
(NYC)		
18001	Corona – Jamaica	85
18002	Corona – Jamaica	85
21191	Fresh Kills (345/138)	215
21192	Fresh Kills (345/138)	215
42231	Gowanus (345/138)	215
42232	Gowanus (345/138)	215
BT	Astoria East (West-East ring)	-20
(LI)		
	Barrett – Freeport	-120
	Pilgrim – Hauppauge	192
	Northport bus tie(1&2) – (3&4)	150

6. Developing the CY2008 ATRA-Deliverability Base Case:

All CY2008 projects area evaluated as an aggregate group. The group of projects for this Class Year consists of eight wind projects in ROS, two landfill gas projects in ROS (one of them is uprate project), one hydro uprate project in ROS, one nuclear uprate project in ROS and one HVdc merchant transmission project in NYC.

The CY2008 projects were added to the ATBA-Deliverability case; the assumed CRIS values for these projects are the proposed nameplate values and the Pmax values represent the derated (UCAP equivalent) nameplate values. The levelized generation dispatch within each of the effected Capacity Regions (ROS and NYC) is adjusted to reflect the additional capacity represented by the projects.

7. Transfer limits assessments Required for Determination of Deliverability

After applying the Base Case conditioning steps described above, the transfer limit calculations are performed on the ATBA and ATRA cases using a linear transfer simulation (PSS™MUST). Generation-to-generation transfers are simulated from combinations of zones within the ROS Region from generation "upstream" of an interface to generation "downstream" of that interface are evaluated. Simulation of power transfer within each Capacity Region determines the ability of the network to deliver capacity from generation in one (or more) surplus zone(s) to another deficient zone(s) within that Capacity Region.

Table 4 – Transfer Interfaces Evaluated and Corresponding Zone-to-Zone Transfer

Interface	Exporting Zone(s)	Importing Zone(s)
Dysinger East	A	BCDEFGHI
West Central	AB	CDEFGHI
Volney East	ABC	DEFGHI
Moses-South	D	ABCEFGHI
Central East/Total East	ABCDE	FGHI
UPNY-SENY	ABCDEF	GHI
UPNY-ConEdison	ABCDEFG	HI
Millwood-South	ABCDEFGH	I
Dunwoodie South	ABCDEFGHI	JK

The facilities monitored in the deliverability analyses are consistent with those in the IRM and CRPP processes, and the defined ***Highway***[7] and ***Byway***[8] facilities. (The list of ***Highway*** facilities is included as Attachment G.) In the actual transfer limit assessment, all modeled facilities above 100kV within the NYISO were monitored; potential transfer constraints were identified when the response factor (TDF) was greater than 4%. Contingencies tested in the transfer limit assessment include all "emergency transfer criteria" contingencies defined by applicable NPCC Criteria and NYSRC Reliability Rules.

8. In the deliverability testing process, the transfer capability can be expressed in two forms: incremental transfer capability or total transfer capability. To compare the overall transmission system transfer capability, or evaluate impact on that capability for the Capacity Region interfaces and external Area interfaces ("Other Interfaces"), or the ROS Capacity Region Highway interfaces, the "first contingency total transfer capability" (FCTTC) is used. When making the final determination of deliverable capacity within the Capacity Region, the "first contingency incremental transfer capability" (FCITC) will be used. The FCITC also represents the amount that generation in the exporting area can be increased to reach the interface transfer constraint. 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 area(s) are uniformly increased (scaled) proportional up to the Pmax of all generators in the exporting zone(s) while all generators in the importing area(s) are decreased uniformly to their minimum power levels. The FCITC and "Highway" transmission constraint(s) for the exporting area(s) are noted for each export/import combination.

[7] ***Highway*** is a defined term: NYISO OATT, Attachment S, Sheet 656A
[8] ***Byway*** is a defined term: NYISO OATT, Attachment S, Sheet 656.

b. The *net generation available*[9] is compared to the FCITC "Highway" transmission constraint(s) for the exporting area(s)' transmission. 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 may not exclusively constrain deliverability, but should be noted for later comparison when testing deliverability of individual Class Year projects.

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

c. Simulation of power transfer between two Capacity Regions determines the transmission constraint limits between the Capacity Regions by uniformly increasing generation in the exporting Region and decreasing generation in the importing Region. An assessment of deliverability between two Capacity Regions can be performed similarly by determining the FCITC between the Capacity Regions.

9. Analysis of the Class Year 2008 Deliverability

Transfer limit assessments were performed on the ATBA-Deliverability and ATRA-Deliverability cases for the External Areas (Ontario, Quebec, New England, and PJM Classic) into NYCA. The analysis of transfer capability from each external Area to NYCA was performed on the levelized ATBA-Deliverability and ATRA-Deliverability cases. For all external Areas analyses, schedules on all PARs were unchanged.

In the ATRA-Deliverability case the representational values for existing capacity resources (CRIS, ICAP, UCAP, and Pmax) are the same as for the ATBA-Deliverability case with the Class Year 2008 Projects added. Tables 5 and 6 summarize the Resource Capacity and Capacity Derates for the CY2008 ATRA-Deliverability base case:.

Table 5 – Summary of Resource Capacity by Type – ATRA

ATRA	Total CRIS from ATBA	Deactivated Capacity Adjustment	CY2008 new capacity	Total ATRA CRIS	**Uniform Capacity**	Large Hydro and P/S Hydro	Small Hydro	Landfill Gas	Land-based Wind	Off-shore Wind
A	5183.9	0.0	231.1	5415.0	**2337.5**	**2700.0**	**3.4**	**29.0**	**345.2**	**0.0**
B	812.3	0.0	79.2	891.5	**732.9**	**0.0**	**55.1**	**17.6**	**85.8**	**0.0**
C	7028.5	0.0	174.4	7202.9	**6640.6**	**0.0**	**85.9**	**40.4**	**436.0**	**0.0**
D	1896.2	0.0	79.3	1975.5	**354.6**	**856.0**	**77.0**	**4.6**	**683.3**	**0.0**
E	1564.8	0.0	387.0	1951.8	**272.4**	**0.0**	**498.1**	**4.1**	**1177.3**	**0.0**
F	4653.8	0.0	8.5	4662.3	**3025.2**	**1165.3**	**465.0**	**6.7**	**0.0**	**0.0**
G	3077.2	0.0	0.0	3077.2	**2977.0**	**0.0**	**100.2**	**0.0**	**0.0**	**0.0**
H	2166.9	0.0	0.0	2166.9	**2166.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
I	2.0	0.0	0.0	2.0	**0.0**	**0.0**	**2.0**	**0.0**	**0.0**	**0.0**
ROS	**26385.7**	**0.0**	**959.4**	**27345.1**	**18507.2**	**4721.3**	**1286.7**	**102.4**	**2727.5**	**0.0**
J	10957.1	0.0	0.0	10957.1	**10957.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
K	5747.0	0.0	0.0	5747.0	**5744.4**	**0.0**	**0.0**	**2.6**	**0.0**	**0.0**
NYCA	**43089.7**	**0.0**	**959.4**	**44049.1**	**35208.6**	**4721.3**	**1286.7**	**105.0**	**2727.5**	**0.0**

[9] The "net generation available" in any defined exporting area is the difference between the sum of the area's generators' Pmax and the sum of the area's generators' actual MW output to satisfy the area's demand.

Table 6 – Summary of Capacity Derates by Resource Type – ATRA

ATRA	Total ATRA CRIS	Uniform Capacity Derate	Large & P/S Hydro Derate	Small Hydro Derate	LFG derate	Land-based wind derate	Off-shore wind derate	**Total All Capacity Derates**
A	5415.0	135.1	33.8	1.5	4.0	310.7	0.0	**485.0**
B	891.5	42.4	0.0	24.8	2.4	77.2	0.0	**146.8**
C	7202.9	383.8	0.0	38.7	5.5	392.4	0.0	**820.4**
D	1975.5	20.5	10.7	34.7	0.6	614.9	0.0	**681.4**
E	1951.8	15.7	0.0	224.1	0.6	1059.5	0.0	**1300.0**
F	4662.3	174.9	14.6	209.3	0.9	0.0	0.0	**399.6**
G	3077.2	172.1	0.0	45.1	0.0	0.0	0.0	**217.2**
H	2166.9	125.2	0.0	0.0	0.0	0.0	0.0	**125.2**
I	2.0	0.0	0.0	0.9	0.0	0.0	0.0	**0.9**
ROS	**27345.1**	**1069.7**	**59.0**	**579.0**	**14.0**	**2454.8**	**0.0**	**4176.5**
J	10957.1	756.0	0.0	0.0	0.0	0.0	0.0	**756.0**
K	5747.0	465.9	0.0	0.0	0.4	0.0	0.0	**466.2**
NYCA	**44049.2**	**2291.6**	**59.0**	**579.0**	**14.4**	**2454.8**	**0.0**	**5398.8**

10. Results of Deliverability Testing

a. Analysis of Inter-Capacity Region and Inter-Area Transfer Limits

This is the “Other Interfaces No Harms” test to determine impact of the CY2008 Projects on the transfer capability among the Capacity Regions and from external Areas into NYCA. The analysis is summarized in Table 7.

The transfer capabilities between external Areas and NYCA were evaluated for *import* constraints into NYCA and for constraints into the ROS Capacity Region only. These transfer simulations were evaluated individually and represent non-simultaneous transfer capabilities. All external Area transfer simulations assume the PARs between Ontario and Michigan are holding scheduled flow.

The *interface transfer limit* between a specific external Area and applicable NYCA Capacity Region(s) is a measure of the ability of the transmission system to move capacity from that external Area into the applicable NYCA Capacity Region; that is, how much power may be moved between the external Area and a NYCA Capacity Region. The power transfer between the external Area and NYCA could represent firm capacity and energy, non-firm energy, or emergency assistance in various combinations.

Each external interface was evaluated independently and the calculated transfer limits are non-simultaneous. Therefore, the individual transfer limits should not be interpreted as an indication that sufficient capacity resources are available within that external Area to support that level of power transfer at all times.

When simulating the import transfer into NYCA or ROS from an external Area, all generation in the importing area (NYCA or ROS) was uniformly scaled down in proportion to the ratio of each generator's Pmax to the sum of the Pmax of all generators in the importing area (NYCA or ROS).

Table 7 – Other Interfaces "No Harms" Assessment

Interface	Exporting Region	Importing Region	ATBA Interface Limit(MW)	ATRA Interface Limit(MW)	ATRA-ATBA Delta(MW)	Constraint
I-J	ROS	NYC	3078.9	3067.4	-11.5	Leeds-Pleasant Valley 345KV @ STE l/o Athens-PV 345KV
			3973.6	3950.4	-23.2	Dunwoodie-Mott Haven 345KV @ STE l/o Dunwoodie-Mott Haven 345KV
I-K	ROS	LI	673.2	667.1	-6.1	Leeds-Pleasant Valley 345KV @ STE l/o Athens-PV 345KV
			1286.6	1286.6	0	Dunwoodie-Shore Rd 345KV @ NOR
PJM-ROS	PJM-Classic	ROS	3130.9	3123.2	-7.7	Homer City-Watercure 345KV @ NOR
			3211.4	3198.3	-13.1	Watercure 345/230 @ STE l/o Watercure-Oakdale 345KV
IESO-NYISO	Ontario	ROS	1846.2	1804.2	-42	Stolle-Meyer 230KV @ NOR
			2011.9	2018.5	6.6	Niagara-Rochester 345KV @ STE l/o Kinti-Rochester 345KV
ISO-NE-NYISO	New England	ROS	2041.5	2044.8	3.3	Renolds Road 345/115KV @ STE l/o New Scotland-Alps 345KV
MSC-7040	Hydro-Quebec	ROS	1500	1500	0	MSC-7040 Scheduling Limit(1500MW)
			2656.4	2667.9	11.5	Marcy-Edic 345KV @ STE l/o Marcy-New Scotland 345KV

Discussion – Other Interfaces "No Harms" Results

1. ROS-Zone J transfer limit is constrained by transmission facility across the I-J interface, Dunwoodie - Mott Haven 345KV line(71). The limit decreases by 23.2MW. This is less than the de minimus. The limit, based on the Leeds – Pleasant Valley 345 KV constraint, decreases by 11.5MW.

2. ROS-Zone K transfer limit is unchanged as constrained by pre-contingency loading on the Dunwoodie-Shore Road 345KV line (Y50).

3. The transfer limit from PJM into ROS is reduced slightly (7.7MW) as constrained by Homer City - Watercure 345KV line and reduced by 13.1MW as constrained by Watercure 345/230 transformer bank for the loss of Oakdale - Watercure 345KV line. In both cases, the changes are less than the de minimus.

4. The degradation of transfer limit from Ontario into ROS is more than 25MW for the Stolle Road-Meyer 230KV pre-contingency constraint. However, the ATRA transfer limit is still significantly higher than the transfer capability that is used in resource adequacy assessment model (1450MW). For this reason, the Class Year 2008 projects would not limit transfers between Ontario and ROS.

5. The transfer limit from ISO-NE into ROS has increased slightly by 4.8MW as constrained by Reynolds Rd 345/115 transformer for the loss of Alps-New Scotland 345KV line.

6. The indicated limit (1500MW) for Quebec to ROS represents the existing scheduling limit for the HQ-NY interconnection is unchanged. There is a 11.5MW increase based on the Marcy – Edic constraint.

Conclusion – Other Interfaces "No Harms" Results

Overall, only Ontario-ROS interface transfer limit decreases by more than 25MW. However the transfer limit is still higher than the transfer capability that is used in resource adequacy assessment model (1450MW). Therefore, all CY08 projects have passed Other Interfaces No Harm Test.

b. Analysis of ROS Capacity Region Transfer Capability

The ROS "Highway" (Cross-State) transfer limits were 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. A summary of these interface transfer for the ATBA-Deliverability and ATRA-Deliverability cases is presented in Table 8. The Table also references the corresponding transfer limits included in the NYCA Transmission System Representation (topology) in the 2008 IRM Study.

Table 8 – Highway Interfaces "No Harms" Assessment

Interface	Exporting Region	Importing Region	Reference Limit from IRM Analysis(MW)	ATBA Interface Limit(MW)	ATRA Interface Limit(MW)	ATRA-ATBA Delta(MW)	Constraint
Dysinger-East	A	BCDEFGHI	2600	2774.2	2746.3	-27.9	Batavia-Golah 115KV @ STE l/o Niagara-Rochester 345KV
	A	BCDEFGHI	2600	2803.8	2793.1	-10.7	Lockport-Mortimer 111 115KV @ l/o STE Niagara-Rochester 345KV
	A	BCDEFGHI	2600	2961.7	2953.2	-8.5	Lockport-Telegraph Rd 114 115KV @ l/o STE Niagara-Rochester 345KV
	A	BCDEFGHI	2600	2984.6	2956.4	-28.2	Stolle-Meyer 230KV @ NOR
West Central	AB	CDEFGHI	1770	1100	1100	0	West Central Interface @1100MW Voltage Constraint(Sta/80 l/o Ginna)
	AB	CDEFGHI	1770	1422.2	1391.8	-30.4	Batavia-Golah 115KV @ STE l/o Niagara-Rochester 345KV
	AB	CDEFGHI	1770	1686.8	1653.1	-33.7	Stolle-Meyer 230KV @ NOR
	AB	CDEFGHI	1770	1814	1794.9	-19.1	Lockport-Mortimer 114 115KV @ STE l/o Niagara-Rochester 345KV
Volney-East	ABC	DEFGHI	4270	5434.1	5483.1	49	Coopers Corners-Fraser 345KV @ NOR
	ABC	DEFGHI	4271	5458.3	5395.7	-62.6	Delhi 115KV Bank @ STE l/o Fraser-Oakdale 345KV
	ABC	DEFGHI	4272	6336.3	6339	2.7	Caly-Edic 345KV @ STE l/o Cla-Edic 345KV
Moses-South	D	ABCEFGHI	2900	2350.8	2377	26.2	Brown's Falls-Talylorville 115KV @ STE l/o Chateauguay-Massena, Massena-Marcy 765KV = Rej. HQ-NY
Total East	ABCDE	FGHI	6000	7043.9	7034.5	-9.4	Central East Interface@3100MW Voltage Constraint l/o Marcy South North section
	ABCDE	FGHI	6000	7245.2	7288.8	43.6	Coopers Corners-Fraser 345KV @ NOR
UPNY-SENY	ABCDEF	GHI	5150	5709.4	5701.1	-8.3	Leeds-Pleasant Valley 345KV @ STE l/o Athens-PV 345KV
UPNY-ConEd	ABCDEFG	HI	5000	4493	4487.7	-5.3	Leeds-Pleasant Valley 345KV @ STE l/o Athens-PV 345KV
	ABCDEFG	HI	5000	6744.4	6732.8	-11.6	Rock Tavern-Ramapo 345KV @ STE l/o Roseton-Fishkill 345KV
Millwood South	ABCDEFGH	I	8450	7382.7	7378.6	-4.1	Leeds-Pleasant Valley 345KV @ STE l/o Athens-PV 345KV

Discussion – ROS Highway Interfaces "No Harms" Results

1. The Dysinger East interface transfer limit is reduced by more than 25MW by Batavia-Golah 115KV line constraint at the loss of Niagara to Rochester 345KV line. However, this constraint occurs at transfer level greater than 2600MW reference limit used in NYSRC's Installed Reserve Margin Study[10] so this constraint would not adversely impact LOLE.

2. The West Central interface transfer limit is firstly limited at 1100MW by the Rochester 345KV voltage constraint proxy and is unchanged. The next constraint is Batavia-Golah 115KV line at the loss of Niagara to Rochester 345KV line. The 3rd constraint is Stolle Road to Meyer 230 KV line. While transfer limits for both constraints are decreased by more than 25MW in ATRA deliverability case, neither has a measurable impact on the LOLE.[11]

3. The Volney East interface transfer limit as constrained by Fraser to Coopers Corners 345KV line is 49MW higher in ATRA-deliverability case than that in ATBA-deliverability case.

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[10] ***NYSRC – NYCA Installed Capacity Requirement for the Period May 2009 through April 2010***.

[11] See discussion in section 3.3.1, page 51, (re: transfer limit sensitivity testing) in ***Facilities Study for Class 2007 Projects: Part 2 - System Upgrade Facilities***, July 2008. (Base case LOLE was 0.043, sensitivity case with revised West Central limit resulted in an LOLE of 0.044)

4. The Moses-South interface limit increases by 26.2MW as constrained by Brown's Falls to Taylorville 115KV line for the loss of Chateauguay-Massena-Marcy 765KV line with rejection.

5. The Total East interface limit based on Central East voltage constraint is 9.4MW lower in the ATRA Deliverability case. The limit on Fraser to Coopers Corners 345KV constraint increases by more than 40MW.

6. The transfer limits on the remaining interfaces (UPNY-SENY, UPNY-ConEd and Millwood-South) decrease slightly(less than 10MW each).

Conclusion – ROS Highway Interfaces "No Harms" Results

Overall, transfer limit on Dysinger East decreases by more than 25MW. However, the constraint for the transfer limit would not have an impact on LOLE. Therefore, all the CY2008 projects in ROS have satisfied the ROS Highway Interface "No Harms" test.

c. Assessment of CY 2008 Project(s) Deliverability in ROS

Table 9 – Deliverability within the ROS Capacity Region

Deliverability Test	Exporting Zone(s)	Importing Zone(s)	Load (incl. LFU and losses)	Base Generation Dispatch	Available CRIS	Net Capacity Exports	Capacity Derates	Net Available Capacity	FCITC (export limit)	Headroom (+) or Bottled (-) capacity
ATBA										
Dysinger-East	A	BCDEFGHI	2897.0	4750.0	5183.9	-62.2	281.9	152.0	1049.2	**897.2**
West Central	AB	CDEFGHI	5006.9	5417.4	5996.2	-62.2	357.4	221.3	751.3	**530.0**
Volney-East	ABC	DEFGHI	8120.9	11061.4	13024.7	-354.8	1167.3	796.0	2140.4	**1344.4**
Moses-South	D	ABCEFGHI	920.8	1188.0	1896.2	-988.9	610.1	98.2	1094.6	**996.4**
Total East/Central I	ABCDE	FGHI	10521.0	12936.9	16485.8	-1343.7	2729.0	819.9	1678.2	**858.3**
UPNY-SENY	ABCDEF	GHI	13065.6	16846.1	21139.6	-1409.2	3124.8	1168.7	-373.6	**-1542.3**
UPNY-ConEdison	ABCDEFG	HI	15704.0	19693.1	24216.8	-844.5	3342.0	1181.7	-336.4	**-1518.1**
Millwood-South	ABCDEFGH	I	16432.9	21690.2	26383.7	-844.5	3467.2	1226.3	-326.4	**-1552.7**
ATRA										
Dysinger-East	A	BCDEFGHI	2897.3	4750.0	5415.0	-67.1	485.0	180.0	1016.7	**836.7**
West Central	AB	CDEFGHI	5006.0	5417.5	6306.5	-67.1	631.8	257.2	742.7	**485.5**
Volney-East	ABC	DEFGHI	8121.7	11061.5	13509.4	-351.9	1452.2	995.7	2192.4	**1196.7**
Moses-South	D	ABCEFGHI	920.8	1188.2	1975.5	-988.6	681.4	105.9	1120.7	**1014.8**
Total East/Central I	ABCDE	FGHI	10521.6	12937.3	17436.7	-1340.5	3433.6	1065.8	1670.5	**604.7**
UPNY-SENY	ABCDEF	GHI	13066.1	16847.2	22099.0	-1407.0	3833.2	1418.6	-380.5	**-1799.1**
UPNY-ConEdison	ABCDEFG	HI	15704.4	19695.4	25176.2	-841.5	4050.4	1430.4	-342.5	**-1772.9**
Millwood-South	ABCDEFGH	I	16431.9	21693.2	27343.1	-841.5	4175.6	1474.3	-332.3	**-1806.6**

Column descriptions:

"Deliverability Test" is the Highway Interface evaluated.
"Exporting Zones"/"Importing Zones" indicate the zones within the ROS Capacity Region where generation is being increased/decreased.
"Load" includes the load forecast uncertainty and transmission losses within the exporting area.
"Base Generation Dispatch" is the actual generation output in the exporting area.
"Available CRIS" represents the CRIS capacity in the exporting area.
"Net Capacity Exports" is the net of firm capacity imports (-) and exported (+) with Area(s) external to NYCA
"Capacity Derates" is the total of the generation derates (ICAP/UCAP) applied to the exporting area.
"Net Available Capacity" is the remaining CRIS available after consideration of base generator dispatch, capacity derates, and net capacity exports.
"FCITC" is the incremental transfer limit corresponding to the most limiting FCTTC in the Highway interface analysis.
"Headroom or Bottled Capacity" is the available unused transfer capability (+) or the amount of CRIS that is bottled (-) by the interface constraint.

Discussion – Deliverability within ROS Capacity Region

Deliverability within the ROS Capacity Region is primarily constrained at the UPNY-SENY interface. The Leeds-Pleasant Valley 345KV line is limiting constraint for the contingency loss of Athens-Pleasant Valley 345KV line in the ATBA-Deliverability case. The deliverability constraint is aggravated by CY2008 Projects in ROS and the surplus ("bottled") capacity increases by 256.8 MW from Zones A through F to Zones G through I in the ATRA-Deliverability case.

Conclusion – Deliverability within ROS Capacity Region

Since the capacity upstream of UPNY-SENY interface is already bottled in ATBA deliverability case, CY08 projects are not eligible to obtain any partial CRIS. To qualify for CRIS, the CY08 projects in ROS would be responsible for System Deliverability Upgrades (SDU) sufficient to create 257MW additional transfer capacity on the UPNY-SENY interface.

d. SDU in ROS Capacity Region
Please refer to System Deliverability Upgrade Facilities report.

e. Deliverability Study in NYC Capacity Region

Table 10 – Deliverability within the NYC Capacity Region

Project Name	UDR (MW)	Exporting Generation	Importing Generation	ATRA FCTTC(MW)	Constraint	Contingency
Hudson Transmission Project	660	HTP Proxy Generator	Rest of Generation in NYC	1150.3	Rainey West to Vernon West 138KV	Base Case

Discussion – Deliverability within NYC Capacity Region

The transfer limit from HTP to the rest of generation in NYC as constrained by Rainey W-Vernon W 138KV is significantly higher than HTP's UDR 660MW.No PAR adjustment is needed within NYC capacity region.

Conclusion – Deliverability within NYC Capacity Region

HTP is deliverable throughout NYC Capacity Region.

Section 12. System Deliverability Upgrade Facilities

Introduction

As part of the Deliverability Study for the Class Year 2008 Facilities Study, certain transmission system upgrades have been evaluated that could increase the available transfer capability to accommodate the deliverability requirements for the proposed projects in the Class Year.

The initial Deliverability Study indicates that 257MW of additional transfer capability is needed at the UPNY-SENY interface to make all of the Class Year projects in the Rest of State (ROS) Capacity Region deliverable and eligible for Capacity Resource Interconnection Service. Based on the No-Harms Highway Interfaces assessment, all participant Class Year projects in ROS are uniformly constrained at UPNY-SENY, and no ROS other interfaces or highway facilities constrained the projects in the aggregate. There were no deliverability constraints, highway or byway, identified for individual projects within ROS.

Recommendation

The recommended system deliverability upgrade is the installation of phase angle regulation on the Leeds – Hurley Avenue 345kV circuit consisting of two (2) 345kV 575MW (625MVA, +/- 30 degree shift) located at NationalGrid's Leeds 345kV station, and one (1) 135MVAr switched shunt capacitor bank located at Central Hudson's Hurley Avenue 345kV station. This provides 257MW transmission transfer capability for the CY2008 projects in ROS for their CRIS rights, and 195MW additional transfer capability for future Class Years. The preliminary SDU project cost estimate is $ 80,420,000.00 (2009$); relative to deliverable capacity the upgrade cost is approximately $177,920/CRIS-MW.

Discussion

The identified constraint on UPNY-SENY is the transmission between Leeds and Pleasant Valley 345kV stations. Several alternative upgrades and reinforcements were evaluated to increase the transfer limit at this point in the system. These included:

- 345kV phase angle regulator on the Leeds-Hurley Avenue 345kV circuit #301
- 115kV transmission upgrades and phase angle regulator at Pleasant Valley
- Reconductor existing 345kV transmission between Leeds and Pleasant Valley
- A 3rd 345kV transmission line between Leeds and Pleasant Valley
- A new 345kV transmission line between Castleton and Pleasant Valley

An initial feasibility evaluation of these alternatives was performed to identify the amount of transmission benefit that could be realized and if there were potential constraints on other existing facilities that might be aggravated by the proposed reinforcement.

SDU Description	UPNY-SENY FCITC(MW)
As Found System - No reinforcement	-381
Pleasant Valley 115KV Bus Tie Phase Angle Regulator	-119
Leeds-Hurley Phase Angle Regulating Transformer (2-450MW)	-291
Leeds-Hurley Phase Angle Regulating Transformer (2-500MW)	-110
Leeds-Hurley Phase Angle Regulating Transformer (2-575MW)	71
Leeds-Hurley Phase Angle Regulating Transformer (3-575MW)	588
Leeds-Hurley Phase Angle Regulating Transformer (2-750MW)	588
Reconductor Existing Leads - Pleasant Valley Circuits	687
Reconductor Existing New Scotland - Pleasant Valley Circuits	726
Construct 3rd Leeds - Pleasant Valley 345kv Circuit	1048
Construct 3rd Leeds - Pleasant Valley 345kv Circuit and reconductor New scotland - Leeds	1048
Construct 3rd New Scotland - Pleasant Valley 345kv Circuit	2378
Construct new Castleton - Pleasant Valley 345kv Circuit	1373

A preliminary cost estimate was developed for each of the alternatives that included identified issues from the feasibility testing. The alternatives were then ranked based on the cost, transmission benefit and other considerations (including preferred station locations, local station transmission upgrades, operability and overall system benefit). The NYISO Open Access Transmission Tariff, Att. S, Sheet 658A defines the system deliverability upgrade:

> ***System Deliverability Upgrades:*** *The least costly configuration of commercially available components of electrical equipment that can be used, consistent with Good Utility Practice and Applicable Reliability Requirements, to make the modifications or additions to Byways and Highways and Other Interfaces on the existing New York State Transmission System that are required for the proposed project to connect reliably to the system in a manner that meets the NYISO Deliverability Interconnection Standard at the requested level of Capacity Resource Interconnection Service.*

Based on the overall project cost, the initial recommendation is the installation of phase angle regulation control on the Leeds – Hurley Avenue 345kV circuit #301. Using PAR control on the Leeds – Hurley line to increase the flow toward Hurley reduces the flow on the constraining Leeds – Pleasant Valley circuits. The additional transfer capability requirement to accommodate the CY2008 ROS projects requires a schedule of approximately 1000MW from Leeds to Hurley Avenue; this requires two (2) nominal 500MW phase angle regulating transformers operated in parallel to accomplish this. Variations of this using 2 or 3 PARs to accommodate the full thermal rating of the 301 line (1500MVA) were also considered.

System Deliverability Upgrade Project

The proposed SDU (SDU 2a) for the aggregate CY2008 ROS projects is installation of two (2) 575MW phase angle regulating transformers. These have sufficient thermal capability to increase the flow on the line to Hurley to 1150MW; this would result in an additional 195MW beyond the CY2008 projects' requirement that would be made available to future projects' deliverability. However, the 1150MW normal capability of the 2 PARs would be more limiting than the conductor rating of the existing Leeds – Hurley line; to realize the conductor rating (1500MVA) would require additional PAR capacity: either 3-500MW units, or 2-750MW units. Reviewing conditions modeled in various planning and operating studies indicates that the (freeflowing) Leeds – Hurley typically loads to 800-900MW in peak load heavy transfer scenarios; on that basis the 1150MW limitation on the line would not be limiting.

Steady-state voltage performance: Additional power flow analyses of this upgrade indicated that at the higher flow levels would also require reactive compensation. The uncompensated pre-contingency voltage at Hurley 345kV was 1.009 (per unit). Both pre-contingency steady-state and post-contingency (for loss of Hurley – Roseton 345kV) conditions were modeled and indicated that an additional 135MVAr switched shunt capacitor would be desirable to compensate for the increased reactive losses of the Leeds – Hurley and Hurley – Roseton transmission lines. With the recommended shunt compensation, all voltages in the area, including the Central Hudson 115kV are acceptable within the 1.0 – 1.05 (per unit) range for both pre- and post-contingency cases; no voltage drop or increase greater than 2.5% was observed.

Steady-state thermal performance: Post-contingency overloading of the Hurley Avenue 345/115kV transformer and the Hurley Avenue – Ohioville 115kV line exceed STE by 23% and 3%, respectively for the pre-contingency PAR schedule is 1500MW; for the 1000MW PAR schedule case the Hurley – Ohioville line is 5% over *normal* rating; there were no STE violations.

For comparison, the next lowest cost upgrade (SDU 3a) proposes reconductoring of both Leeds – Pleasant Valley 345kV circuits at an estimated cost of $ 103,000,000. This upgrade would provide substantially more transfer capability (1068MW) and corresponding lower cost $/CRIS-MW.

The affected transmission owners (NationalGrid and Central Hudson) have been provided with the preliminary analysis of the proposal to allow their review and to assist in developing more detailed specifications and cost information.

System Deliverability Upgrade Cost Allocation Methodology

The specific sections of the Tariff defining the Highway SDU cost allocation methodology include:

NYISO OATT, Attachment S, VII.K., Sheet 679.11

For Class Year 2008, the needed transfer capability (257 MW) is 57% of the total transfer capability provided by the recommended Leeds-Hurley PAR SDU (452 MW). Since the portion of the SDU needed by Class 2008 projects does not exceed 90% of the total size of the recommended SDU, the Class Year 2008 projects are allocated the cost of 257MW portion of the transfer capability created by the SDU. Also note that, since the total cost allocation of the SDU to the Class 2008 Developers is less than the 60% threshold for going forward with construction of the SDU, the SDU would be deferred. In the event that the 60% threshold for going forward with the SDU, or other possible replacement SDU, has been paid for by current and subsequent Class Year Developers, the Leeds-Hurley SDU, or possible replacement SDU, will be built by the applicable Transmission Owner(s). When the Leeds-Hurley SDU (or other possible replacement SDU) is built, any resulting Incremental TCCs and Headroom will be distributed to the Developers and/or LSEs in proportion to their funding of the SDU.

Attachment: Steady-state assessment for Hurley 345kV Upgrade

Loss of Hurley – Roseton #303 345kV;

#301 at 1000MW (pre-ctg flow)

```
2008 NYISO CLASS YEAR ATRA - SDU#2A PAR ON #301 @ 1000MW
 2013 SUMMER PEAK LOAD W/ PJM DYN RTEP 2013
                        OUTPUT FOR AREA 7 [HUDSON      ]
```

Pre-Contingency base case BRANCH LOADINGS ABOVE 100.0 % OF RATING SET A:

```
 X--------- FROM BUS ----------X X---------- TO BUS -----------X       CURRENT(MVA)
   BUS# X-- NAME --X BASKV  AREA   BUS# X-- NAME --X BASKV  AREA CKT LOADING  RATING PERCENT
                                              (none)
```

```
2008 NYISO CLASS YEAR ATRA - SDU#2A PAR ON #301 @ 1000MW
 2013 SUMMER PEAK LOAD W/ PJM DYN RTEP 2013
                        OUTPUT FOR AREA 7 [HUDSON      ]
```

Post-Contingency base case BRANCH LOADINGS ABOVE 100.0 % OF RATING SET A:

```
 X--------- FROM BUS ----------X X---------- TO BUS -----------X       CURRENT(MVA)
   BUS# X-- NAME --X BASKV  AREA   BUS# X-- NAME --X BASKV  AREA CKT LOADING  RATING PERCENT
 125020 DANSKAMA    115.00     7 125021 DC CBLTP    115.00*    7  1    185.2   178.0   104.0
 125030 HURLEY 1    115.00*    7 125042 OHIOVLE1    115.00     7  1    136.0   129.0   105.4
 126294 PLTVLLEY    345.00*    7 137451 LEEDS 3     345.00     6  2   1412.1  1331.0   106.1
 126294 PLTVLLEY    345.00*    7 137455 ATHENS      345.00     6  1   1364.6  1331.0   102.5
```

Post-Contingency base case BRANCH LOADINGS ABOVE 100.0 % OF RATING SET C:

```
 X--------- FROM BUS ----------X X---------- TO BUS -----------X       CURRENT(MVA)
   BUS# X-- NAME --X BASKV  AREA   BUS# X-- NAME --X BASKV  AREA CKT LOADING  RATING PERCENT
                                              (none)
```

Loss of Hurley – Roseton #303 345kV;

#301 at 1500MW (pre-ctg flow)

2008 NYISO CLASS YEAR ATRA - SDU#2 PAR ON #301 LINE @ 1500MW
2013 SUMMER PEAK LOAD W/ PJM DYN RTEP 2013
OUTPUT FOR AREA 7 [HUDSON]

Pre-Contingency BRANCH LOADINGS ABOVE 100.0 % OF RATING SET A:

X--------- FROM BUS			----------X	X---------- TO BUS			-----------X		CURRENT(MVA)		
BUS#	X-- NAME --X	BASKV	AREA	BUS#	X-- NAME --X	BASKV	AREA	CKT	LOADING	RATING	PERCENT
125000	HURLEY 3	345.00	7	137475	HURLEY PAR	345.00*	7	1	758.8	637.0	119.1
125000	HURLEY 3	345.00	7	137475	HURLEY PAR	345.00*	7	2	758.8	637.0	119.1
125002	ROSETON	345.00	7	126281	FISHKILL	345.00*	8	1	1966.7	1935.0	101.6
125020	DANSKAMA	115.00*	7	125021	DC CBLTP	115.00	7	1	182.7	178.0	102.7
137451	LEEDS 3	345.00	6	137475	HURLEY PAR	345.00*	7	1	1517.6	1395.0	108.8

2008 NYISO CLASS YEAR ATRA - SDU#2 PAR ON #301 LINE @ 1500MW
2013 SUMMER PEAK LOAD W/ PJM DYN RTEP 2013
OUTPUT FOR AREA 7 [HUDSON]

Post-contingency BRANCH LOADINGS ABOVE 100.0 % OF RATING SET A:

X--------- FROM BUS			----------X	X---------- TO BUS			-----------X		CURRENT(MVA)		
BUS#	X-- NAME --X	BASKV	AREA	BUS#	X-- NAME --X	BASKV	AREA	CKT	LOADING	RATING	PERCENT
125000	HURLEY 3	345.00*	7	125030	HURLEY 1	115.00	7	1	601.4	419.0	143.5
125020	DANSKAMA	115.00*	7	125021	DC CBLTP	115.00	7	1	196.0	178.0	110.1
125030	HURLEY 1	115.00*	7	125042	OHIOVLE1	115.00	7	1	218.5	129.0	169.4
125038	MILAN	115.00*	7	125043	PL.VAL 1	115.00	7	1	126.7	124.0	102.2
125090	BOULEVRD	69.000	7	125104	HURLEY 6	69.000*	7	1	70.6	62.0	113.9
126294	PLTVLLEY	345.00*	7	137451	LEEDS 3	345.00	6	2	1351.0	1331.0	101.5

Post-contingency BRANCH LOADINGS ABOVE 100.0 % OF RATING SET C:

X--------- FROM BUS			----------X	X---------- TO BUS			-----------X		CURRENT(MVA)		
BUS#	X-- NAME --X	BASKV	AREA	BUS#	X-- NAME --X	BASKV	AREA	CKT	LOADING	RATING	PERCENT
125000	HURLEY 3	345.00*	7	125030	HURLEY 1	115.00	7	1	601.4	488.0	123.2
125030	HURLEY 1	115.00*	7	125042	OHIOVLE1	115.00	7	1	218.5	211.0	103.5

Steady-state voltage (with 2 – 135MVAr shunt capacitors at Hurley 345kV)

Pre-contingency Voltages	Hurley 345kV	1.017	Hurley 115kV	1.024
Post-contingency Voltages	Hurley 345kV	1.042	Hurley 115kV	1.025

Summary of Alternative Solutions

Alternate	Project Description	UPNY-SENY FCITC	Est. Cost (k$)	Est. Transfer capability (MW)
(none)	As Found System - no reinforcement	-381		
SDU-1	Pleasant Valley 115kV Bus Tie Phase Angle Regulator	-119	$ 176,500.00	262
SDU-2a	Leeds-Hurley Phase Angle Regulating Transformer (2 - 575)	71	$ 80,420.00	452
SDU-2b	Leeds-Hurley Phase Angle Regulating Transformer (3 - 575)	588	$ 107,755.00	969
SDU-3a	Reconductor Existing Leeds-Pleasant Valley Circuits	687	$ 103,000.00	1068
SDU-3b	Reconductor Existing New Scotland-Pleasant Valley Circuits	726	$ 167,500.00	1107
SDU-4a	Construct 3rd Leeds-Pleasant Valley 345kV Circuit	1048	$ 286,500.00	1429
SDU-4b	Construct 3rd New Scotland-Leeds-Pleasant Valley 345kV Circuit	2378	$ 395,500.00	2759
SDU-5	Construct new Castleton-Pleasant Valley 345kV Circuit	1373	$ 278,150.00	1754

Project: **Leeds-Hurley Phase Angle Regulating Transformer**

SDU-2a *(minimum feasible upgrade)*	Units	Unit Cost (k$)	Extention (k$)
Existing Station Upgrades			
Line terminal upgrades in Leeds 345kV station	1	$ 9,000.00	$ 9,000.00
Line terminal upgrades in Hurley 345kV station	1	$ 1,500.00	$ 1,500.00
install 135MVAr Capacitor at Hurley 345kV	1	$ 2,750.00	$ 2,750.00
Upgrade existing #301 line protection	2	$ 500.00	$ 1,000.00
New Station Construction			
Expand existing Leeds 345kV station	1	$10,000.00	$ 10,000.00
(2) 575MVA Phase Angle Regulating Transformers	2	$22,335.00	$ 44,670.00
(2) civil works, bus work, unit protection/ea	2	$ 5,000.00	$ 10,000.00
PAR bypass circuit switcher	1	$ 1,500.00	$ 1,500.00
Transmission Upgrades			
(none)			
Transmission Additions			
(none)			
Total estimated project cost			**$ 80,420.00**
Total estimated project transfer capability (UPNY-SENY MW)	**452**		
Approximate cost $/MW			**$ 177,920.35**

Section 13. SDU cost per project summary

The below table summarizes the cost per project for Leeds – Hurley PAR.(Recommended)

SDU Name	Leeds-Hurley PAR
Estimated Cost of SDU	$80,420,000
Transfer Capability Created by SDU(MW)	452
Cost Per MW Transfer Capability($/MW)	$177,920
Transfer Capability needs to be restored to get CRIS(MW)	256.8
Percentage Secured by CY08 developers	56.81%
Total Cost of SDU for CY08 projects in ROS	**$45,689,947**

NYISO Queue	Project Name	Project Nameplate (MW)	Project UCAP (MW)	Generation Distribution Factor on the constraining line	Impact on the constraint (MW)	Cost Allocation in percentage	Cost Allocation	Cost paid or posted as Security to Central Hudson(5.9%)	Cost paid or posted as Security to National Grid(94.1%)
152	Moresville Energy Center	99.0	9.90	0.23823	2.36	3.78%	$1,728,687	$102,105	$1,626,582
160	Jericho Rise Wind Farm	79.2	7.92	0.25021	1.98	3.18%	$1,452,495	$85,791	$1,366,703
169	Alabama Ledge Wind Farm	79.2	7.92	0.24717	1.96	3.14%	$1,434,847	$84,749	$1,350,098
178	Allegany Windpark	100.5	10.05	0.24653	2.48	3.97%	$1,816,020	$107,263	$1,708,757
197	Tug Hill	78.0	7.80	0.24947	1.95	3.12%	$1,426,257	$84,242	$1,342,015
198	New Grange Arkwright Summit Wind Farm	79.2	7.92	0.24632	1.95	3.13%	$1,429,913	$84,458	$1,345,455
207	Cape Vincent	210.0	21.00	0.24924	5.23	8.40%	$3,836,382	$226,596	$3,609,786
216	Nine Mile Point Uprate	168.0	158.29	0.24939	39.48	63.33%	$28,934,514	$1,709,014	$27,225,500
231	Seneca (uprate)	6.4	5.52	0.24718	1.37	2.19%	$1,000,665	$59,104	$941,561
233	Sherman Island Uprate	8.5	4.65	0.23980	1.11	1.79%	$816,871	$48,248	$768,622
234	Steel Winds II	45.0	4.50	0.24662	1.11	1.78%	$813,440	$48,046	$765,394
239A	Modern Innovative Plant	6.4	5.52	0.24698	1.36	2.19%	$999,856	$59,056	$940,799
	SUM:	959.4	250.99			100.00%	$45,689,947	$2,698,673	$42,991,274