2018 RNA Draft MARS Topology

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Reliability Planning

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RNA Process Background

- The 2018 Reliability Planning Process (RPP) starts with the 2018 Reliability Needs Assessment (2018 RNA) followed by the Comprehensive System Plan (CRP)
 - 2018 RNA Study Period: year 1 = 2019 through year 10 = 2028
- The RPP is part of the Comprehensive System Planning Process and is performed pursuant to the Attachment Y of the NYISO OATT; see Section 31.2.
 - Additional implementation details, including recently updated RNA Base Case inclusion rules, are captured in the RPP Manual #26
- 2018 RNA will be based on the information from the Gold Book 2018, the 2018 FERC 715 filing (power flow cases and auxiliary files), historical data, and market participant data



GE's MARS and Topology Background

- The NYISO uses GE's MARS program for assessing the resource adequacy of the NY system
- GE's MARS program is a probabilistic analysis tool used for calculating expected values of reliability indices such as Loss of Load Expectation (LOLE, days/year) and includes load, generation, and transmission representation; the four external Control Areas interconnected to the NYCA are also modeled
- The transmission system is modeled through transfer limits on the interfaces between pairs of interconnected areas;
 - aka "the topology"
- A graphical representation of the topology is developed and provided as a communication tool

This presentation has the goal to highlight the major factors influencing the topology changes, as compared with the 2016-2017 RPP

• This is a preliminary overview of known major changes, and before the final RNA Base Case inclusion rules application



Primary Factors Driving the Topology Changes (to date)

- CPV Valley: 680 MW CRIS proposed in Zone G (COD 2018)
 - Also included in the 2016 RNA
- Cricket Valley Energy Center (CVEC): 1020 MW CRIS proposed in Zone G (COD 2020)
- Indian Point Energy Center deactivation
 - Unit 2 starting 2020, Unit 3 starting 2021
- NY-PJM Joint Operating Agreement (JOA) January 2017 filing
- 3500 MW external emergency assistance limit implementation
- HTP scheduled to 0 MW capacity (continue to model the 660 MW emergency assistance)
- Modeling enhancements
 - Last 4 first implemented in the 2017 IRM and planning studies



UPNY-SENY Changes

CPV Valley and Cricket Valley Inclusion



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UPNY-SENY Changes to include CPV Valley (prior to CVEC addition to the model)

Same as the 2016 RNA implementation:

- Added new bubble containing CPV's MW capacity and a tie to Zone G.
- The impact on Marcy South is represented with a new interface group that combines E to G (Marcy South) and the tie from "CPV VEC" bubble to Zone G.
 - The new CPV_MarcySouth grouping has a limit of 2275 MW.
 - The flow from the CPV VEC bubble has a coefficient of 0.9.
- The impact on UPNY-SENY interface is represented by including the flow from the CPV VEC bubble with a coefficient* of 0.3. The limit on the UPNY-SENY grouping is kept at 5500 MW.
- UPNY-ConEd changed from 5600 MW to 5750 MW, and I to J and K grouping from 5400 MW to 5600 MW

Note: * A coefficient of 0.3 means that the UPNY_SENY grouping flow is reduced by 30% of CPV Valley flow at any time. As an example, if CPV at max of 677.6 MW, then up to 5,297 MW (=5,500 – 0.3x677.6) can flow through the UPNY-SENY interface.

UPNY-SENY Changes to include Cricket Valley

- The flow equation for the UPNY-SENY interface is removed
- Dynamic Limit Tables (DLT) implemented to change limit based on status of CVEC, CPV Valley and Athens
- MARS model has 3 CVEC units, 3 Athens units, 2 CPV Valley units
- Highest probability states were modeled discretely covering 98% of probable commitment combinations



UPNY-SENY Changes to include Cricket Valley

- Added new bubble containing CVEC MW capacity and a tie to Zone G.
- DLT construct required creating an additional UPNY-SENY modified interface
 - (F_to_G) + (E_to_G) (HUDV_NE) + (CPV to G) + (CVEC to G)
- This topology also features changes to how the Athens and Gilboa units are connected:
 - In prior models the Athens units and two of the Gilboa units were placed in a separate bubble which was connected to AREA_G.
 - Gilboa units have been placed in their own bubble and connected to AREA_F. The Athens bubble has also been reconnected to AREA_F.



UPNY-SENY changes post CVEC and CPV Valley



2018 RNA Draft UPNY-SENY Model



UPNY-SENY Changes due to Cricket Valley's Addition to the Model, cont.

- DLTs change limits on the UPNY-SENY Modified interface based on the unit availability.
- The discrete combinations account for about 98% of probable states

UPNY-SENY	Units Available		
modified Limit (MW)	CPV Valley	Cricket Valley	Athens
6950	2	3	3
6850	2	3	2
6700	1	3	3
6550	2	2	3
6150	2	1	3
5950	1	1	3
5800	2	0	3
6600	All Other Conditions		



UPNY-Con Ed Change

- The UPNY-Con Ed voltage limit for MARS is increased from 5750 to 6250 MW
 - IPEC units removed
 - Cricket Valley added



Other Major Changes since 2016 RNA

- External Emergency Assistance
 HTD
- HTP
- NY-PJM JOA
- Modeling Enhancements



External Emergency Assistance

 In 2017, the NYSRC Executive Committee approved setting the external emergency assistance level into NYCA at 3500 MW.

HTP

- HTP scheduled to 0 MW capacity
- Will continue to model the 660 MW total capability as emergency assistance



Changes related with the PJM-NY JOA

 The JOA specifies flow percentages to represent how power from PJM into NY will be scheduled across the transmission lines connecting the two systems.

PJM-NY JOA flow distribution % (Jan 31, 2017 filing)	RECO Load Deliveries	PJM-NY Emergency Assistance
PJM-NY Western Ties	20%	32%
5018 Line	80%	32%
JK Lines	0%	15%
A Line	0%	7%
BC Lines	0%	14%

- The flow percentages for PJM-NY EA are enforced by using three interface groups:
 - PJM-NY Western Ties Interface Group: 32%
 - PJM-G Interface Group: 47% (= 32% on 5018 line + 15% on J and K lines)
 - PJM-J Interface Group: 21% (= 7% on each of the A,B, and C lines)

Changes Related with the PJM-NY JOA, cont.

- The assumed level of PJM NY assistance for distribution on the PJM-NY non-UDR ties is 1,500 MW
 - The 2017 IRM assumed 1,000 MW
 - 1,500 MW is supported by the recent analysis to establish the 3,500 MW limit for the external assistance into NYCA.
- This value is multiplied by the above percentages to calculate the MW limit for each group
 - This method was also applied for the 2017 IRM, with slightly different % values
- The limits for the first two groups are further increased to allow the RECO load delivery to flow through the interfaces without impacting the assumed emergency assistance limit, *e.g.:*
 - 47% x 1,500 = 705 MW on PJM to G emergency assistance limit;
 - 705 + 340 MW RECO delivery = 1,045 MW limit on the PJM to G grouping.



Modeling Enhancements

- Add a new J2 "dummy" bubble as an extension of PJM East
 - This provides for the representation of the electrical separation among the connections emanating from New Jersey (e.g.: J, K lines on the Zone G side, and A,B,C, HTP and VFT on the Zone J side) and improves the flow monitoring



Modeling Enhancements, cont.

- Separated VFT from J3 bubble: the A Line and the Linden VFT are now connected to Area J through the J3 bubble
 - This separation allows for:
 - Better monitoring of flows,
 - Dynamic limits on the J_to_J3 path to reflect the impact of the status of the Staten Island generation (AK2&3 and Linden CoGen).
 - The flow distribution % described in the JOA is modeled by defining limits on the applicable interface groups
- The limits for the 5018, J, K, A, B, and C lines are all set to their line ratings with interface groups being used to enforce the JOA interchange distributions





Modeling Enhancements, cont.

- RECO Load modeled as constant 425 MW load in its own bubble connecting radially to Zone G
 - This also allows for explicit modeling of 5018 Line
- Used the MARS firm contract feature to simulate RECO Load delivery from PJM_East through NY system, and using the JOA distributions:
 - 80% of the MW load delivered from the 5018 Line (=340 MW)
 - 20% flow from PJM-NY Western Ties (=85 MW)



2016 RNA: Final Topology

Topology for 2016 RNA, 2018-2026 (y2 to y10)





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2018 RNA: Draft Topology for Study Year 2021

Topology for 2018 RNA – Year 2021





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April 2nd TPAS/ESPWG: inclusion rules application, and updates to prior presentations, as applicable



Questions?

We are here to help. Let us know if we can add anything.



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- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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