

Changes to 2019 IRM Topology for 2020 IRM Study

Kai Jiang

Senior Planning Engineer,
Resource Adequacy

Kenneth Layman

Technical Specialist,
Resource Planning

TPAS Meeting

April 1, 2019, NYISO KCC

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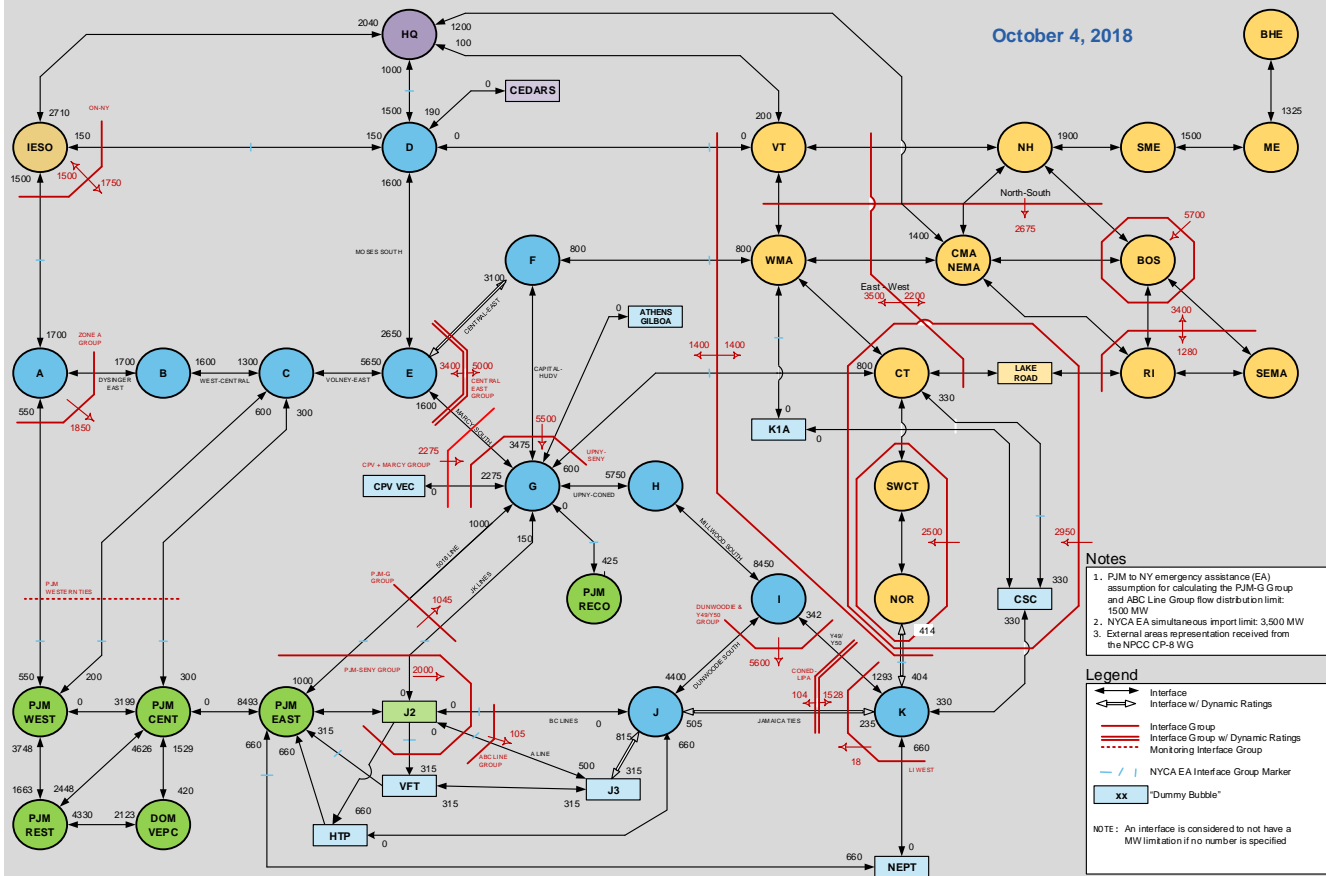
Agenda

- **2019 IRM Topology**
- **Changes to Topology for 2020 IRM Study**
 - Update 1: UPNY-SENY Interface Group
 - Update 2: Jamaica Ties (J to K)
 - Update 3: UPNY-ConEd Interface (G to H)
- **Next Steps**
- **Appendices**
 - A) Presentation on 2018 RNA topology to ESPWG/TPAS meeting on June 1, 2018
 - B) Presentation on 2018 RNA topology to ESPWG/TPAS meeting on March 13, 2018
 - C) Presentation on 2019-2028 Comprehensive Reliability Plan (CRP) to TPAS/ESPGWG meeting on March 6, 2019

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2019 IRM Topology (Summer Limits)

October 4, 2018



- Used for NYSRC 2019 IRM study final base case

Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-G Group and ABC Line Group flow distribution limit: 1500 MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation received from the NPCC CP-8 WG

Legend

- ↔ Interface
- ↔ Interface w/ Dynamic Ratings
- ▭ Interface Group
- ▭ Interface Group w/ Dynamic Ratings
- ▭ Monitoring Interface Group
- / - NYCA EA Interface Group Marker
- xx "Dummy Bubble"

NOTE: An interface is considered to not have a MW limitation if no number is specified

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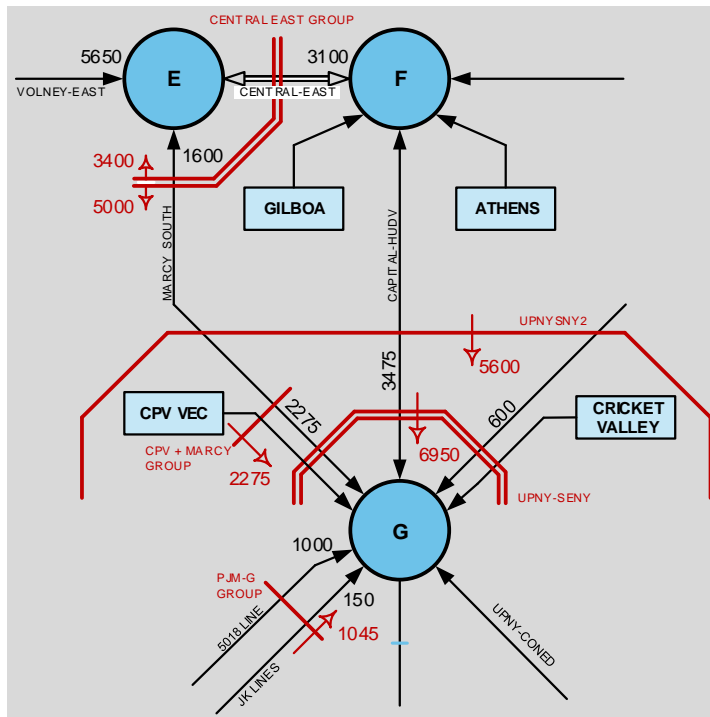
Changes to Topology for 2020 IRM Study

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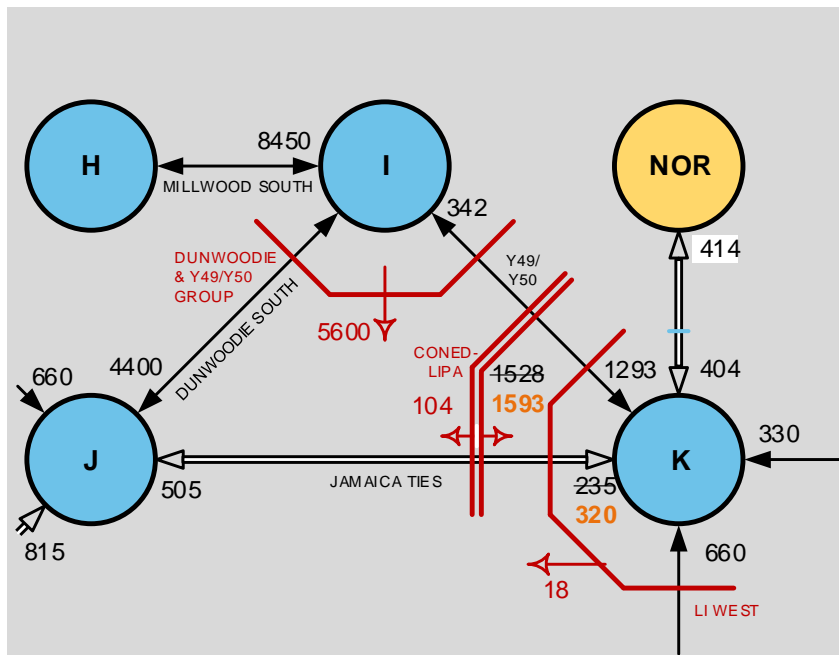
Update 1: UPNY-SENY Interface Group



- Key factors driving this topology change
 - Cricket Valley Energy Center (1,020 MW CRIS in Zone G)
 - Leeds-Hurley Avenue SDU (series compensation)
 - Both I/S prior to Summer 2020
- Consistent with 2018 RNA study topology (see appendices A & B)

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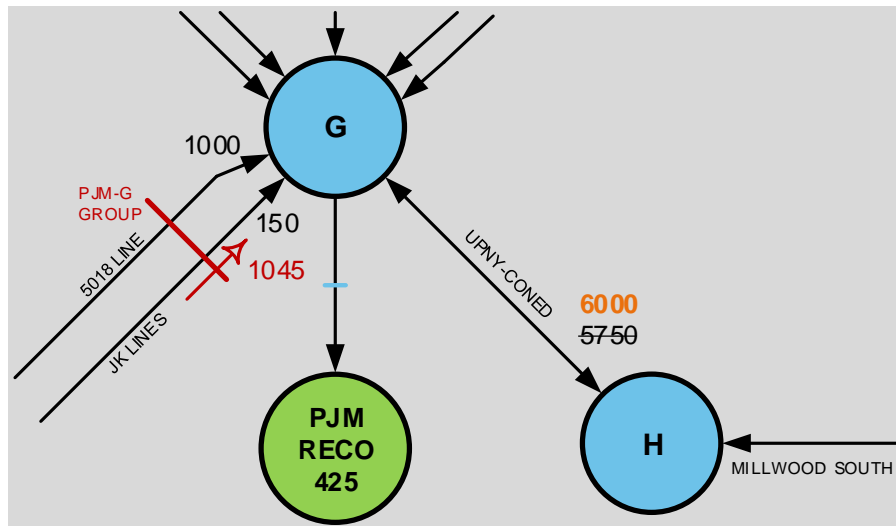
Update 2: Jamaica Ties (J to K)



- Key factor causing this topology change
 - Addition of Rainey-Corona 345/138 kV PAR
 - Target I/S: Summer 2019
- Based on PSEG-LI's input and consistent with 2019-2028 CRP updates (see appendix C)

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Update 3: UPNY-ConEd Interface (G to H)



- Key factor causing this topology change
 - Retirement of IP #2 unit in 2020
- UPNY-ConEd Interface limit
 - Current value: 5750 MW
 - 2018 RNA study with retiring both IP units: 6250 MW (500 MW increase)
 - The scenario of retiring only one IP unit not addressed in 2018 RNA study
 - Calculated limit with retiring only IP #2 unit: 6000 MW (250 MW increase)

Next Steps

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Next Steps

- Report to following ICS meetings
- Evaluate the impact of these topology changes in 2020 IRM study
- Return to TPAS/ICS if any further topology changes after being presented today

Appendix A

Presentation on 2018 RNA topology to
ESPWG/TPAS meeting on June 1, 2018

*Note: The final 2018 RNA topologies and results reside in the final 2018 RNA Report posted here:

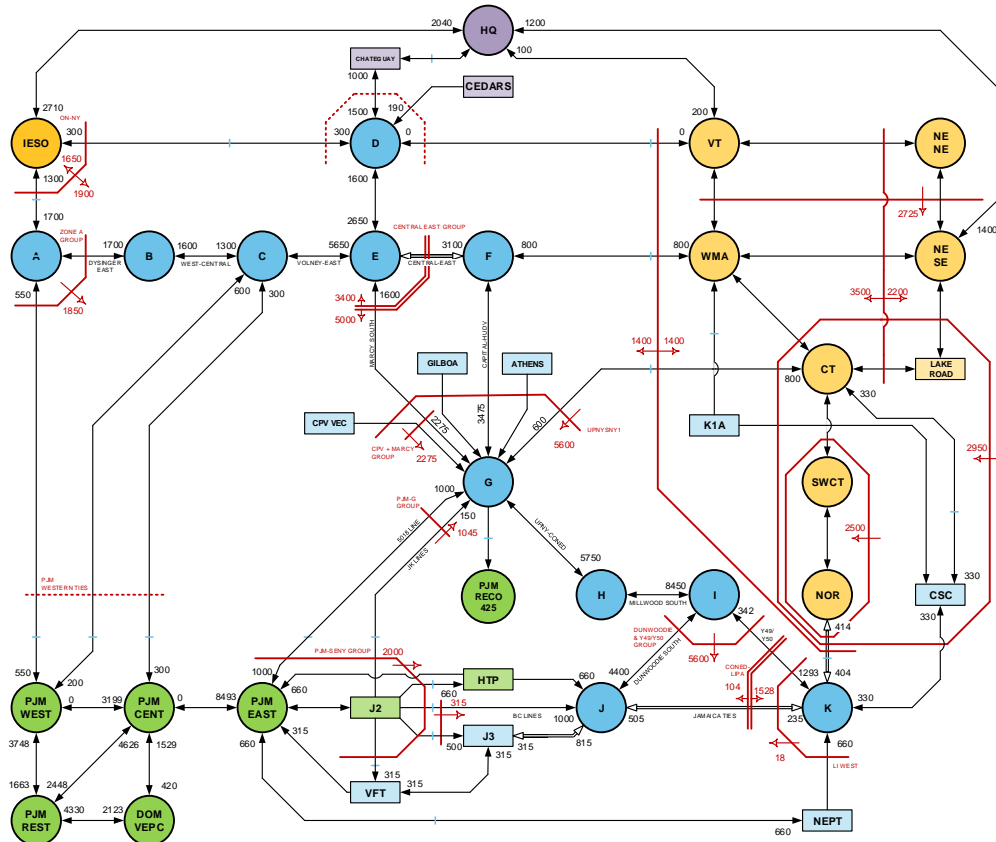
<https://www.nyiso.com/documents/20142/2248793/2018-Reliability-Needs-Assessment.pdf/c17f6a4a-6d22-26ee-9e28-4715af52d3c7>

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Topology for 2018 RNA – Study Year 2019



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC GP-8 WG

Legend

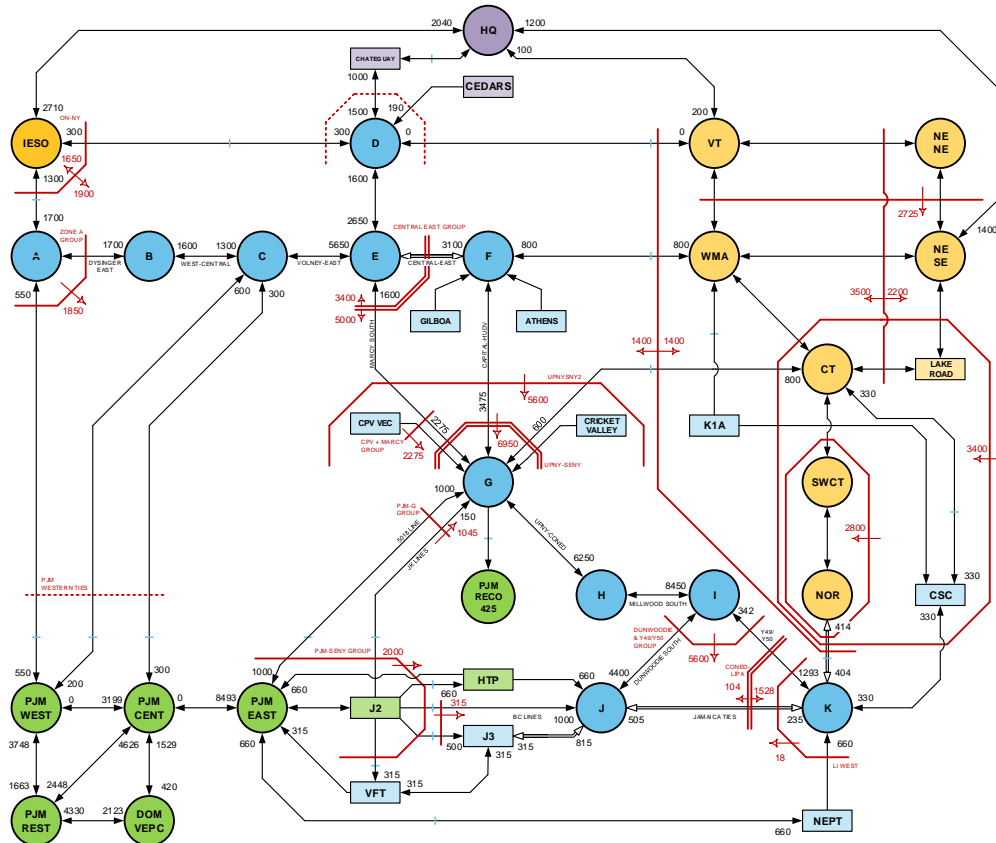
- Interface
 - Unidirectional Interface
 - Interface w/ Dynamic Ratings
 - Interface Group
 - Interface Group w/ Dynamic Ratings
 - Monitoring Interface Group
 - NYCAEA Interface Group Marker
 - "Dummy Bubble"
- NOTE: An interface is considered to not have a MW limitation if no number is specified

2018 RNA Draft Topology Y2019 (CPV in) – for June 1 ESPWG/TPAS Discussions Only

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<https://www.nyiso.com/documents/20142/2248793/2018-Reliability-Needs-Assessment.pdf/c17f6a4a-6d22-26ee-9e28-4715af52d3c7>



Topology for 2018 RNA – Study Year 2021



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC OP-8 WG

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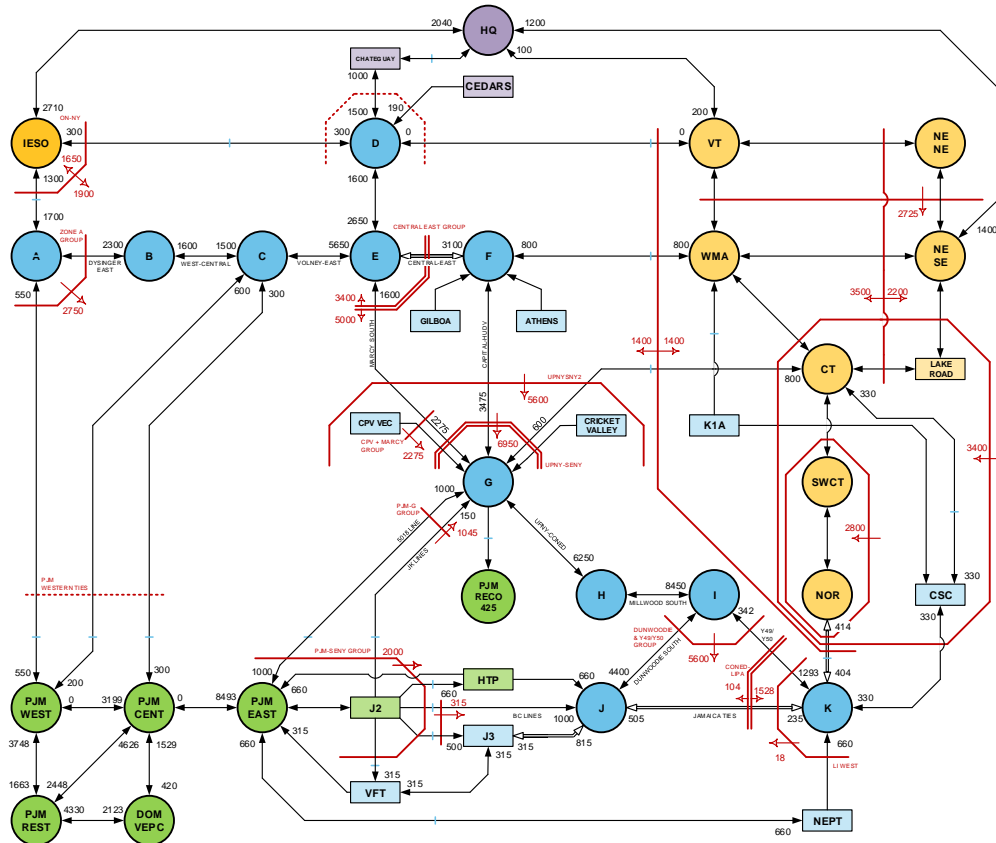
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2018 RNA Draft Topology Y2021 (CVEC in, CPV in, IP off) – for June 1 ESPWG/TPAS Discussions Only

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Topology for 2018 RNA – Study Years 2022-2028



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC OP-8 WG

Legend

- Interface
 - Unidirectional Interface
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 - "Dummy Bubble"
- NOTE: An interface is considered to not have a MW limitation if no number is specified

2018 RNA Draft Topology Y2022-2028 (CVEC in, CPV in, IP off, WNY in) – for June 1 ESPWG/TPAS Discussions Only

*Note: The final 2018 RNA topologies and results reside in the final 2018 RNA Report posted here:

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Appendix B

Presentation on 2018 RNA topology to
ESPWG/TPAS meeting on March 13, 2018

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2018 RNA

Draft MARS Topology

Ken Layman and Mike Welch
Reliability Planning

ESPWG/TPAS

March 13, 2018, KCC

*Note: The final 2018 RNA topologies and results reside in the final 2018 RNA Report posted here:

<https://www.nyiso.com/documents/20142/2248793/2018-Reliability-Needs-Assessment.pdf/c17f6a4a-6d22-26ee-9e28-4715af52d3c7>

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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**

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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

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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

*Note: The final 2018 RNA topologies and results reside in the final 2018 RNA Report posted here:

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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 ($=5,500 - 0.3 \times 677.6$) can flow through the UPNY-SENY interface.

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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**

*Note: The final 2018 RNA topologies and results reside in the final 2018 RNA Report posted here:

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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.

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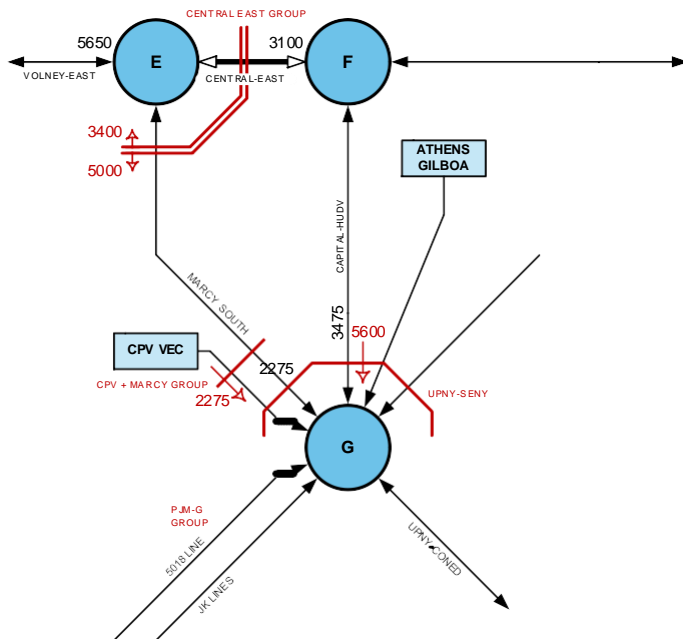
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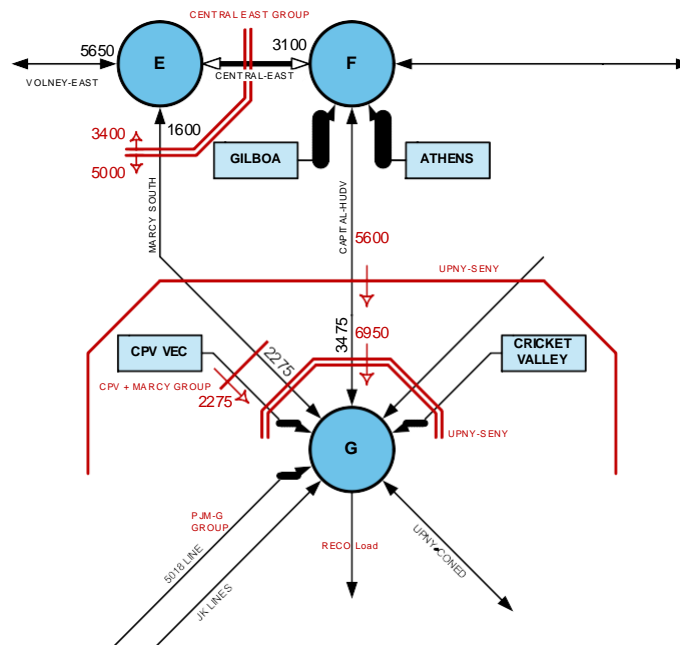


UPNY-SENY changes post CVEC and CPV Valley

2016 RNA UPNY-SENY Model



2018 RNA Draft UPNY-SENY Model



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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 modified Limit (MW)	Units Available		
	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		

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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**

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Other Major Changes since 2016 RNA

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

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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**

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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 % <i>(Jan 31, 2017 filing)</i>	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)

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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.:**
 - $47\% \times 1,500 = 705$ MW on PJM to G emergency assistance limit;
 - $705 + 340$ MW RECO delivery = 1,045 MW limit on the PJM to G grouping.

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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

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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**

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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)

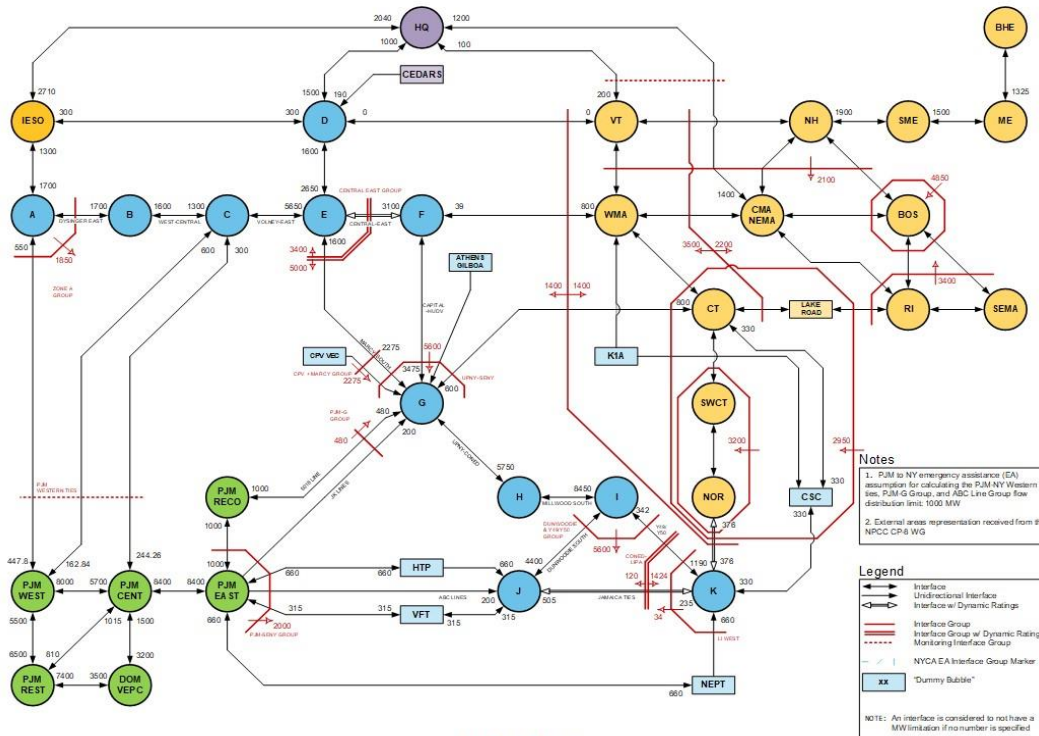
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2016 RNA: Final Topology

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



2016 RNA Final

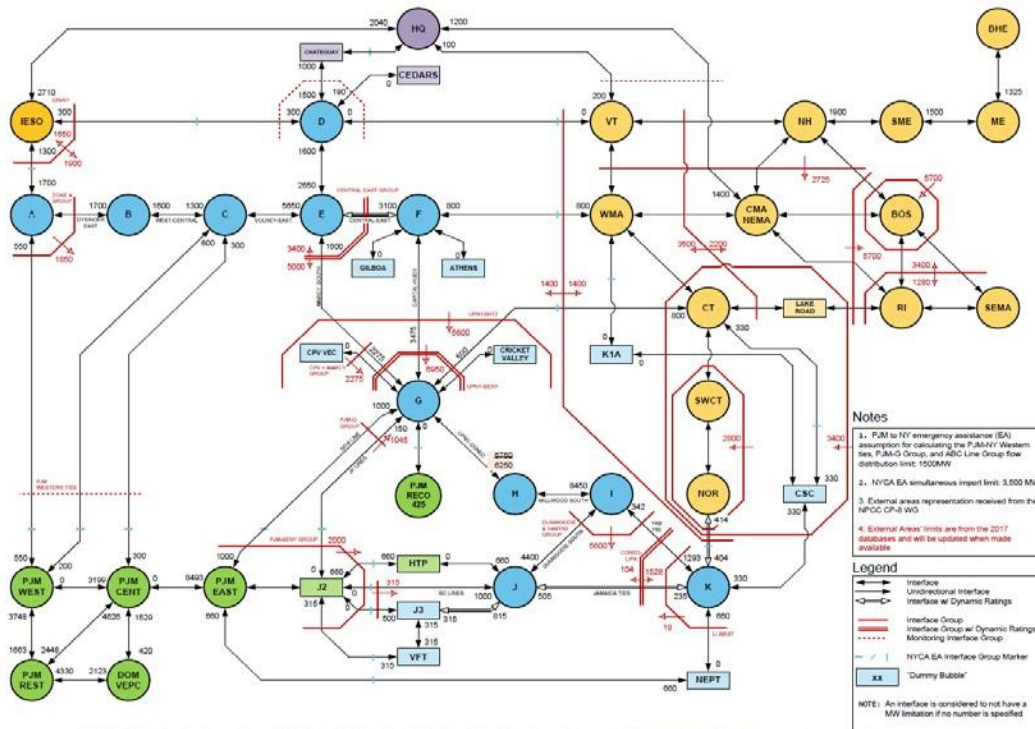
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2018 RNA: Draft Topology for Study Year 2021

Topology for 2018 RNA – Year 2021



2018 RNA Draft Topology Y2021 (CVEC in, CPV in, IP off) – for March 13 ESPWG/TPAS Discussions Only

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Appendix C

Presentation on 2019-2028 Comprehensive Reliability Plan (CRP) to TPAS/ESPWG meeting on March 6, 2019

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2019-2028 Comprehensive Reliability Plan (CRP)

Laura Popa

Manager, Resource Planning

TPAS/ESPWG

March 6, 2019, KCC

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Agenda

- **Reliability Planning Process (RPP)**
- **2018-2019 RPP (RNA and CRP covering 2019-2028)**
- **CRP Report Schedule**

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Reliability Planning Process

RPP = RNA + CRP

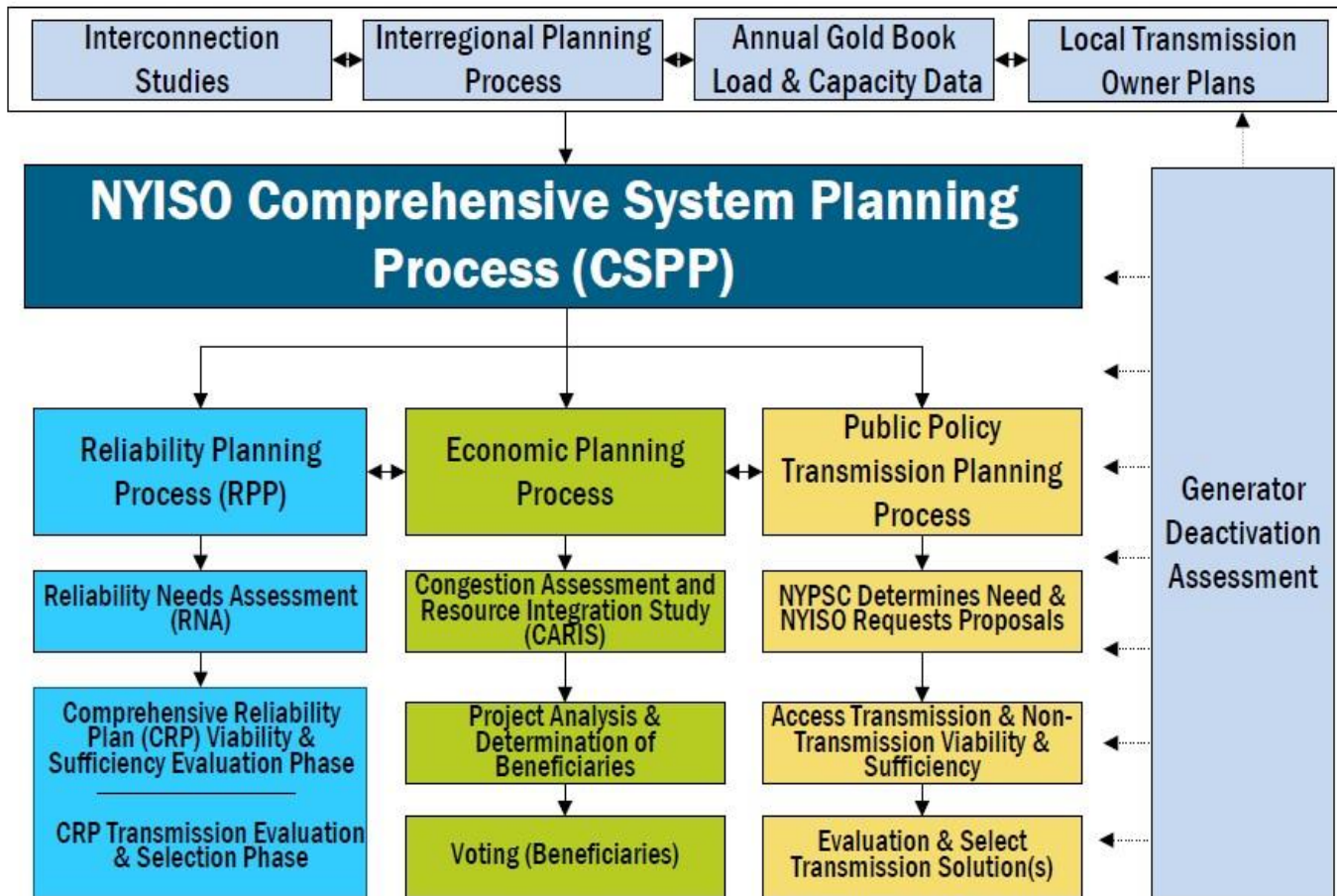
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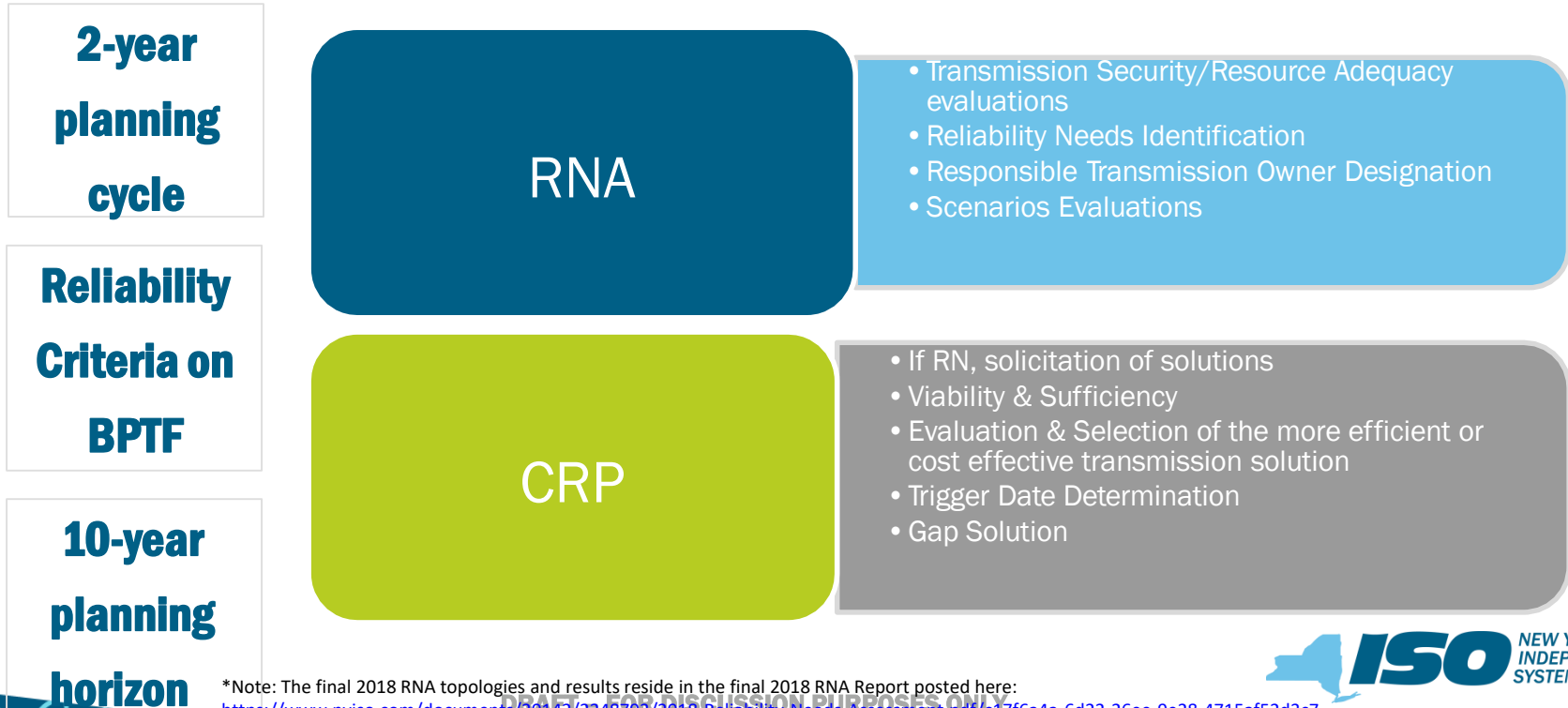




*Note: The final 2018 RNA topologies and results reside in the final 2018 RNA Report posted here:

<https://www.nyiso.com/documents/20142/2248793/2018-Reliability-Needs-Assessment.pdf/c17f6a4a-6d22-26ee-9e28-4715af52d3c7>

RPP = Reliability Needs Assessment (RNA)+ Comprehensive Reliability Plan (CRP)



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2018-2019 RPP

2018 RNA (covering 2019-2028)
2019-2028 CRP

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2018 RNA

- **The 2018 RNA concluded that there are no Reliability Needs throughout the 10-year Study Period (2019-2018)**
 - 2018 RNA and CRP Base Cases were based on the 2018 Gold Book and FERC 715 filing
 - Based on the RNA Base Case, the NYISO evaluated whether there are Reliability Needs of the New York State Bulk Power Transmission Facilities (BPTFs) in accordance with applicable Reliability Criteria (*i.e.*, NERC, NPCC, and NYSRC)
 - Reliability evaluations consisted of resource adequacy and transmission security evaluations of the New York BPTF over a 10-year Study Period (*i.e.*, 2019-2028)
 - As an initial step to the 2018 RNA, the NYISO provided preliminary results to stakeholders and sought any material updates that could address the preliminary Reliability Needs
 - Preliminary evaluations identified transmission security Reliability Needs on BPTF which were subsequently addressed by either updated LTPs, or temporary operational means (until the permanent solution is in service)
 - Therefore, no final Reliability Needs were ultimately identified under the 2018 RNA

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2019-2028 CRP

- The 2019-2028 CRP re-iterates RNA's conclusion that there are no Reliability Needs on the BPTF over the 10-year Study Period
- This conclusion is based on the CRP base case, which was developed by updating the RNA Base Case:

Changes from the 2018 RNA to 2018 CRP Base Case	Notes
Add back Pilgrim I and II 91.8 MW, Zone K/LIPA	Rescission of GDA Notice (Nov 2018)
Remove Cayuga II 167.2 MW Coal, Zone C/NYSEG	ICAP Ineligible Forced Outage as of 7/1/2018
ConEdison's B3402 & C3403 345 kV cables out of service	Long-term unavailability
By-pass the Series Reactors on 71, 72, M 51, M52 for summer (with Y49, 41, 42, SR in service)	After Indian Point 2 and 3 Deactivations (2020 and 2021)
J to K (Jamaica ties) emergency limit represented in the MARS topology changed from 235 MW to 320 MW	Due to addition of Rainey- Corona 345/138 kV PAR; target I/S summer 2019
Add back Selkirk I and II 360.2 MW Combined Cycle, Zone F/ National Grid	Rescission of GDA Notice (Dec 2018)

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2019-2028 CRP: Scenario

- A scenario will also be performed under the CRP process, for information only
- The scenario will simulate retirement of over 3,500 MW (nameplate) peaking generation in downstate New York; additionally, the last two coal plants are also removed for the purpose of this scenario, starting 2021
- **Scenario Simulation Background**
 - New York State Department of Environmental Conservation (DEC) has initiated a process to develop a regulation to limit Nitrogen Oxide (NOx) emissions from Simple Cycle Combustion Turbine (“peaking units”)
 - In June 2018 DEC posted a “Stakeholder Draft” outlining a proposed rule prior to initiating formal rulemaking (“the peaker rule”). The Stakeholder Draft proposes new emission limits that would become applicable May 1, 2025 for all applicable units, while system averaging would be phased-out beginning May 1, 2023 during the ozone season for applicable units that test above 100 ppm.
- **For this scenario simulation, no retrofit of existing units will be assumed**
- **Results will identify and quantify any potential reliability deficiencies on the bulk and non-bulk systems**

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CRP Next Steps

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CRP: Schedule

- **March 6: TPAS/ESPGWG:**
 - Draft 1 of the CRP Report (no scenario)
 - Comments to lpopa@nyiso.com and kdepugh@nyiso.com by March 11
- **March 19: ESPWG/TPAS:**
 - Peaker scenario results presentation
 - CRP (no scenario) updated draft, if comments
- **April 12: ESPWG/TPAS:**
 - CRP Report, including peaker scenario
- **May Operating Committee and Management Committee**

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Questions?

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

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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