

# NYISO / PJM - Focused Study Reliability Analysis

Northeast Coordinated System Plan  
IPSAC09  
November 06, 2009



# Study Objective

- The objective of the study is to analyze the NYISO / PJM interface. The study will specifically look at the Southeastern New York / New Jersey interface for the year 2013.
- The study will consist of reliability analysis that includes voltage and thermal testing and market efficiency analysis that includes production cost simulations.
- This presentation addresses only the reliability portion of the results.
- Develop a consistent base case for NCSP09 work that includes updated representation of ISO-NE, NYISO and PJM.

# NYISO / PJM – RELIABILITY STUDY SCOPE

# NYISO / PJM Focused Study

- Reliability Analysis (Completed)
  - N-1-1 thermal analysis for all 230 kV and above facilities.
  - Generator deliverability testing of PJM generation while monitoring adjacent area facilities.
  - Load deliverability thermal analysis simulating peak summer conditions under a capacity emergency in the combined Public Service-North/RECO / Southeastern NY system.
  - Load deliverability of the PS North and NYC area

# NYISO / PJM Focused Study - Reliability

- All 100 kV and greater facilities and all tie lines to neighboring systems will be monitored.
- Contingency analysis includes all 230 kV and greater facilities in ISO-NE, NYISO and PJM as well as all tie lines to neighboring systems.
- N-1-1
  - Standard NERC category C3 test.  
(<http://www.nerc.com/files/TPL-003-0.pdf>)
- Generator Deliverability
  - PJM generation has been tested using the procedures detailed in manual 14B.  
(<http://www.pjm.com/documents/~//media/documents/manuals/m14b.ashx> )
- Load Deliverability
  - PJM - Public Service-North and Rockland Electric
  - NYISO - Area G, H, I, J and K (Hudson Valley, ConEd and LIPA)

# ISO-NE / NYISO / PJM - Reference Case Assumptions

# NYISO / PJM Focused Study – Topology Assumptions

- Unless indicated otherwise power flow models for load, capacity and topology will be based on the most recent ERAG MMWG power flow base case.
- PJM topology is a Summer 2013 base case – updated with RTEP upgrades approved as part of the 2008 RTEP plan.
- NYISO topology is based on 2009 RNA system model for the year 2013.
- ISO-NE topology is based on RSP 08.
- Thermal and voltage criteria is consistent with those used in planning for PJM, NYISO and ISO-NE.

# Major Backbone Projects in PJM

- Susquehanna – Roseland 500kV Circuit
- MAPP (Possum Point – Burches Hill – Chalk Point – Calvert Cliffs 500 kV AC)
- MAPP (Calvert Cliffs - Indian River 500 kV DC)
- Branchburg – Roseland – Hudson 500 kV
- PATH ( Amos – Kempton 765 kV)
- TRAIL (502 Junction – Loudoun 500 kV)

# Merchant Transmission Projects

- Includes new ties between New York and PJM
  - Neptune project (PJM Queue G07\_MTX) modeled at 685 MW exporting to LIPA according to its firm withdrawal rights
  - VFT (PJM Queue G22\_MTX) modeled at 330 MW exporting to ConEd according to its firm withdrawal rights
  - Hudson Transmission Partners (PJM Queue O66) modeled at 670 MW exporting to ConEd's 49<sup>th</sup> Street Substation
- Cross Sound Cable modeled consistent with 2009 RNA.

# NYISO / PJM Focused Study - Generation Assumptions

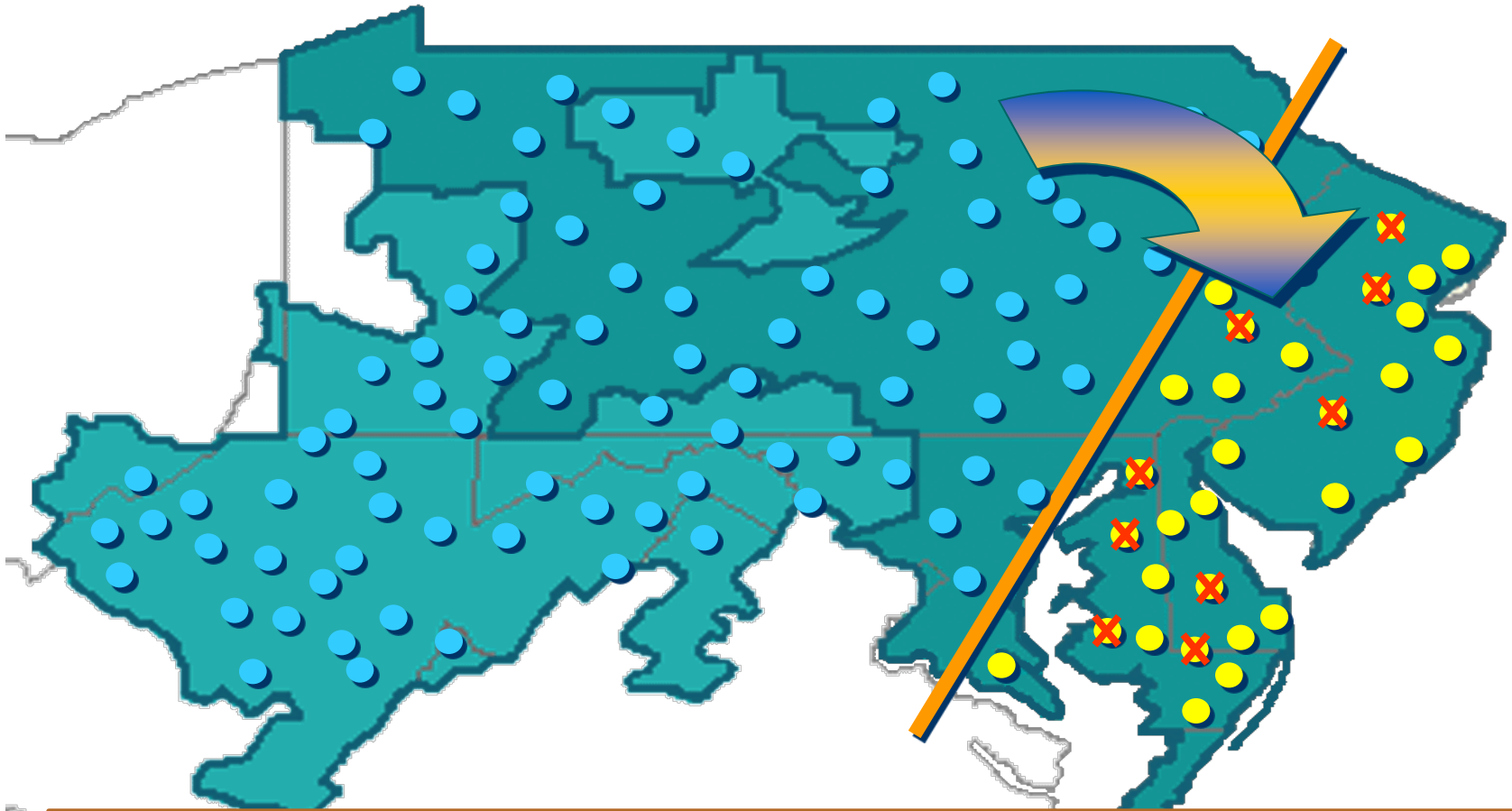
- All existing generation expected to be in service for the year being studied was modeled.
- NYISO capacity generation resource assumptions were consistent with the 2009 RNA.
- PJM generation assumption were consistent with the 2009 RTEP.
- ISO-NE generation assumptions were consistent with the RSP08.

# NYISO/PJM Focused Study – Interchange Assumptions

- Interchange assumption are based on firm transaction
  - PJM interchange is consistent with 2009 RTEP interchange.
  - ISO-NE interchange is consistent with RSP2008.
  - NYISO interchange is consistent with the 2009 RNA model.
- Public Service / ConEd Wheel is modeled at 1000 MW in to PJM and 1000 MW out to NYISO.
  - Assumption is the combined area is experiencing a capacity emergency.
- Initial setting of the Ramapo PAR is set to 900 MW into NYISO.

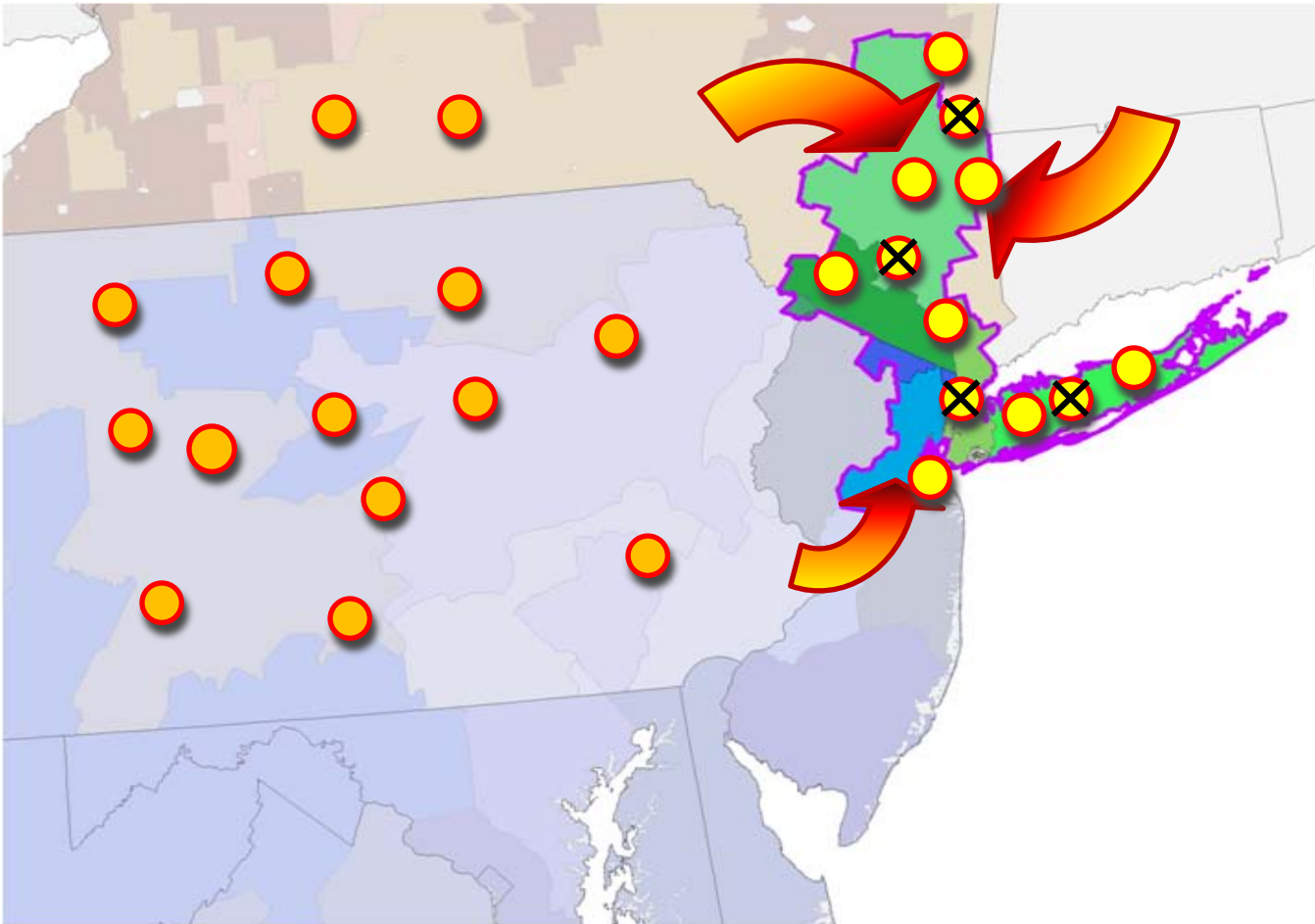
# NYISO / PJM Focused Study Load Deliverability Test

# Load Deliverability Test



**Transmission system's capability to deliver energy from aggregate of all capacity resources to an electrical area experiencing a capacity deficiency.**

# Load Deliverability Test (NYISO / PJM)



# Load Deliverability Test

- Load Deliverability is really two separate studies
- A “MARS” Style Reliability Analysis (CETO – capacity emergency transfer objective)
  - Sets an objective for the amount of transmission transfer capability needed to achieve a local reliability level (assumes adequate external generation)
- A Power Flow Transfer Analysis (CETL – capacity emergency transmission limit)
  - Determines the transmission transfer capability to see if the objective of the CETO is met.

# MARS Style Reliability Analysis (CETO)

- Capacity Emergency Transfer Objective (CETO)
  - CETO value represents the amount transmission transfer capability into a given area to maintain an LOLE of 1 event in 25 years (1/25) when that area is experiencing capacity deficiency.
    - A local capacity resource deficiency dispatch is created for the area under study
      - Based on localized 90/10 load level assumption and local generation outages, and with the activation of Active Load Management (ALM), Special Case Resources (SCR) and Emergency Demand Response Program (EDRP)
    - The external area is at 50/50 load level conditions and no capacity emergency
    - The transfer “Objective” necessary to achieve the 1:25 index is calculated

# Power Flow Transfer Analysis - CETL

- Capacity Emergency Transfer Limit (CETL)
  - The CETL represents the ability of the Transmission System to support deliveries of energy to a localized electrical area
  - Power transfers to the local area are modeled by progressively outaging local generation.
  - Single branch contingency analysis is performed until a limit is reached
  - If the power transfer limit into the area exceeds or is equal to the reliability study objective, then the import capability into the area is deemed adequate (load delivery test is passed).

# NYISO / PJM Focused Study – Load Deliverability Test Assumptions

- PJM generation outage rates were based on the most recent Reserve Requirement Study performed by PJM.
- NYISO generation outage rates were based on most recent IRM database update.
- Generation outage rates for future PJM and NY units were estimated based on class average rates.

# NYISO / PJM Focused Study – Reliability (Total PSN+SENY)

- Load Deliverability Testing Continued
  - Performed consistent with PJM load deliverability test procedures.
    - See PJM Manual 14B and PJM Manual 20 for additional detail  
(<http://www.pjm.com/documents/~/media/documents/manuals/m14b.ashx> )  
(<http://www.pjm.com/documents/~/media/documents/manuals/m20.ashx> )
- Study area includes
  - Public Service-North and Rockland Electric – PJM
  - Area J – NYC
  - Area K – LIPA
  - Area G – I (Hudson Valley, Millwood & Dunwoodie )
- Monitored all 100kV facilities in PJM / NYISO / ISO-NE
- Contingency analysis included NERC category B consistent with comprehensive area transmission review for ISO-NE / NYISO / PJM

# Updated Model (Total PSN + RECO + SENY) 2013 Delivery Year

Region	Area Name	Unrestricted Peak Demand (MW)	Load Management (Including SCR & EDRP) (MW)	BTM Generation	CETO Solved load (MW)	Summer Capacity (MW)	Num of units	Reserve Level
NY	G - I	4,493	56	0		5,538	33	24.8%
NY	J - NYC	12,295	451	0		9,191	151	-22.4%
NY	K - LIPA	5,469	197	0		5,646	88	7.1%
	NY Sub Total =	22,257	704	0		20,375	272	-5.5%
PJM	PS North (PSN)	5,357	71	0		3,964	46	-25.0%
PJM	RECO	467	0	0		0	0	
	PJM Sub Total =	5,824	71	0		3,964	46	-31.1%
	Total NY - PJM Region =	28,081	775	0	27,306	24,339	318	-10.9%
	Smaller Region (PSN, RECO, NYC) =	18,119	522	0	17,597	13,155	197	-25.2%

# Results - Load Deliverability (Total PSN + RECO + SENY) (updates included)

- CETO of 9180 MW (slight decrease from previous reported results)
- CETL **9390 MW** ( Exceeds CETO by 210 MW) – **Passed Test**
- CETL computed based on the following overload and single contingency .
  - Limiting facility **Shoemaker– Chester 138kV in NYISO**
  - Loss of Rock Tavern – Ramapo 345kV ckt and Rock Tavern v1 – Sugarloaf 115kV ckt.
- Hudson to Farragut PAR angles were relaxed to maintain wheel of 1000MW.
- Several 138kV and one 345kV circuit were above 95% loading.

# NYISO / PJM Focused Study – Reliability Sensitivity

- Sensitivity to a more narrow local study area
- Sensitivity Study area includes
  - Public Service-North and Rockland Electric – PJM
  - Area J – NYC
- Redo the Load Delivery Tests

# Model Representation (PSN + RECO + NYC)

	CETO(MW)	Reserve Margin	# Units	Summer Capacity	Peak 2013 Demand	Total Load Management (Including SCR & EDRP)	BTM Gen
Area J - NYC		-22.4%	151	9,191	12295	451	0
<b>NY Sub Total =</b>		<b>-22.4%</b>	<b>151</b>	<b>9191</b>	<b>12295</b>	<b>451</b>	<b>0</b>
PSN		-25.0%	46	3,964	5,357	71	0
RECO			0	0	467	0	0
<b>Total NY-PJM Region</b>	<b>8340MW</b>	<b>-25.2%</b>	<b>197</b>	<b>13,155</b>	<b>18,119</b>	<b>522</b>	<b>0</b>

# Results - Load Deliverability Test Results (PSN + RECO + NYC)

- CETO of 8340 MW.
- CETL Tested at 8340, no limits near CETO level - Test Passed
- CETO computed based on single contingency .

# Questions or Comments