Determining the New York Control Area (NYCA) Installed Reserve Requirements

Presented to the NEPOOL Reliability Committee

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New York State Reliability Council

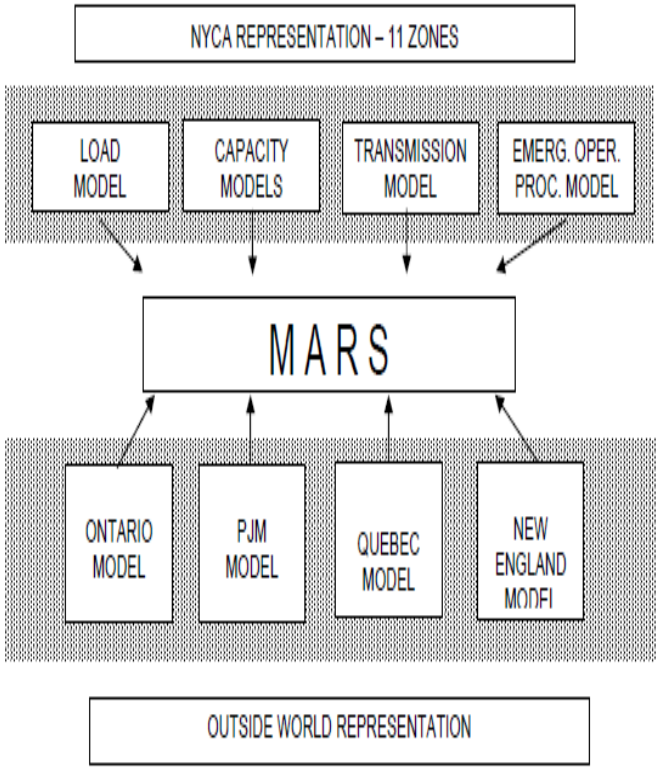
New York State Reliability Council

- Launched in May 1999 and approved by FERC as part of the comprehensive restructuring of the competitive wholesale electric market in NY
- Assist in the maintenance of system reliability through promulgation of reliability standards and monitoring of compliance
- Governed by Executive Committee and three primary sub committees including Installed Capacity Subcommittee (ICS)
- Establish IRM and reviews LCRs for consistency with IRM to ensure criteria is satisfied
- Utilizes Policy 5 “Procedure for Establishing NYCA Installed Capacity Requirements”

	NYSRC	NYISO
Primary Responsibility	Assist in maintenance of system reliability through promulgation of reliability standards and monitoring of compliance.	Reliable operation of power system and administration of market
Role in ensuring Reliability	Set reliability standards	Under terms of NYSRC/NYISO agreement Responsible for its compliance and compliance of market participants with NYSRC reliability standards
Role in setting Resource Adequacy Requirement	Establishes IRM and reviews LCRs for consistency with IRM to ensure criteria is satisfied	Establishes LSE ICAP requirements, including LCRs, & amount of maximum ICAP located externally to NYCA

Major Modeling Assumptions Their Source & Impacts

- MARS Computer Program
- NYCA Load Model
- NYCA Capacity Model
- Outside World Model
- Transmission System Model
- Emergency Operating Procedures



GE Multi Area Reliability Simulation (MARS) Program

- MARS is the primary tool used to calculate Loss of Load Expectation (LOLE) to determine NY Resource Adequacy requirements
- MARS computes Reliability Indices for IRM/LCR/Tie Benefit/and EOP calculations
- Any number of Zones/Areas can be modeled in considerable detail with accurate representation of random events (e.g. EFOR, LFU) and deterministic rules (e.g. Nomograms, EOPs)
- Year simulated with different sets of random events until statistical convergence is obtained

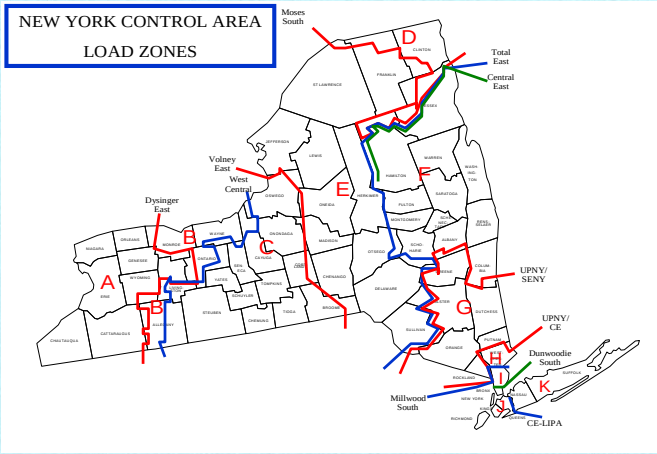
NYSRC Reliability Rule AR-1

"1 day in 10 years"

The NYSRC shall establish the IRM requirement for the NYCA such that the probability (or risk) of disconnecting any firm load due to resource deficiencies shall be, on average, not more than once in ten years. Compliance with this criterion shall be evaluated probabilistically, such that the loss of load expectation (LOLE) of disconnecting firm load due to resource deficiencies shall be, on average, no more than 0.1 day per year. This evaluation shall make due allowance for demand uncertainty, scheduled outages and deratings, forced outages and deratings, assistance over interconnections with neighboring control areas, NYS Transmission System emergency transfer capability, and capacity and/or load relief from available operating procedures.

In determining resource adequacy requirements NYSRC utilizes the most advanced features of MARS

NYCA Load Model

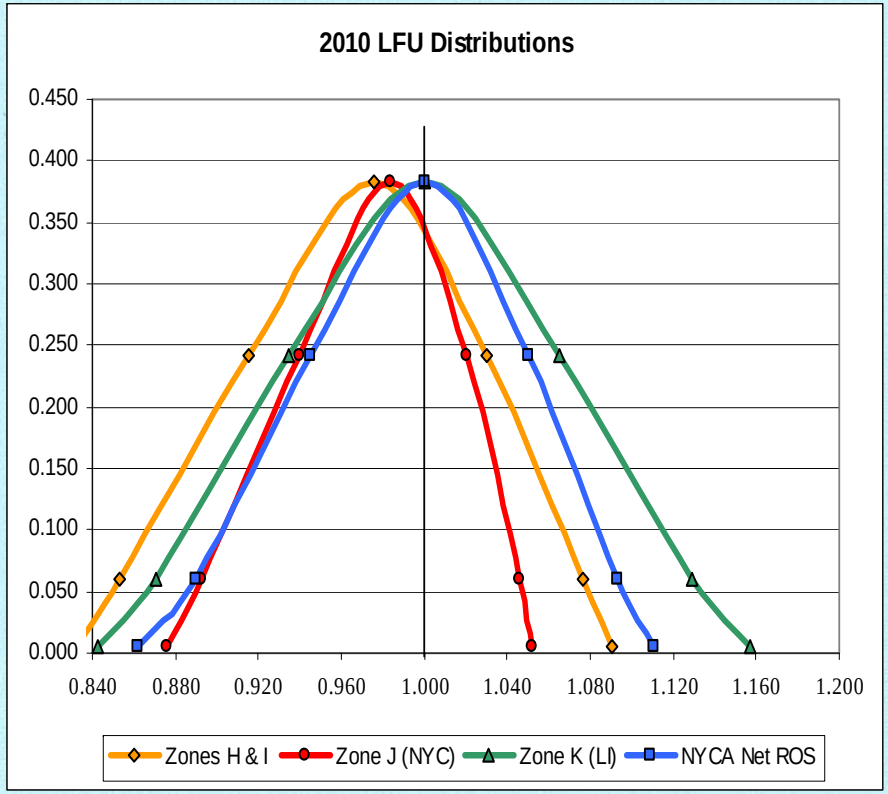


Sources

- 8760 hours of zonal data. Present load shape from the year 2002
- Preliminary peak load forecast updated in September
- Load forecast uncertainty for Zones H& I, J K, and Rest of State

Impacts

- More days near peak mean higher IRM requirement
- Less diversity between Zones



Based on the results of 2010-11 IRM Study consideration of Load Forecast Uncertainty impacts NY IRM by appx. 6%

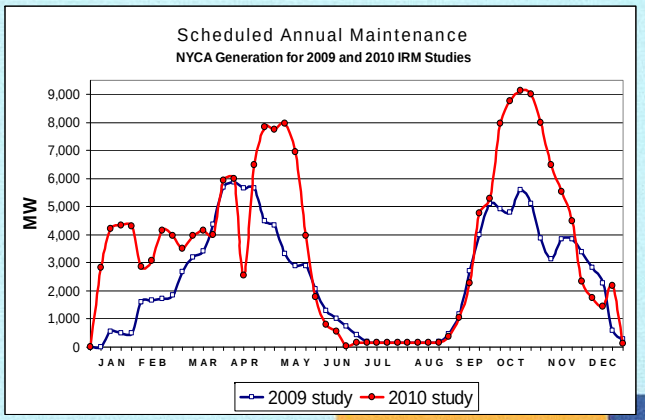
NYCA Capacity Model

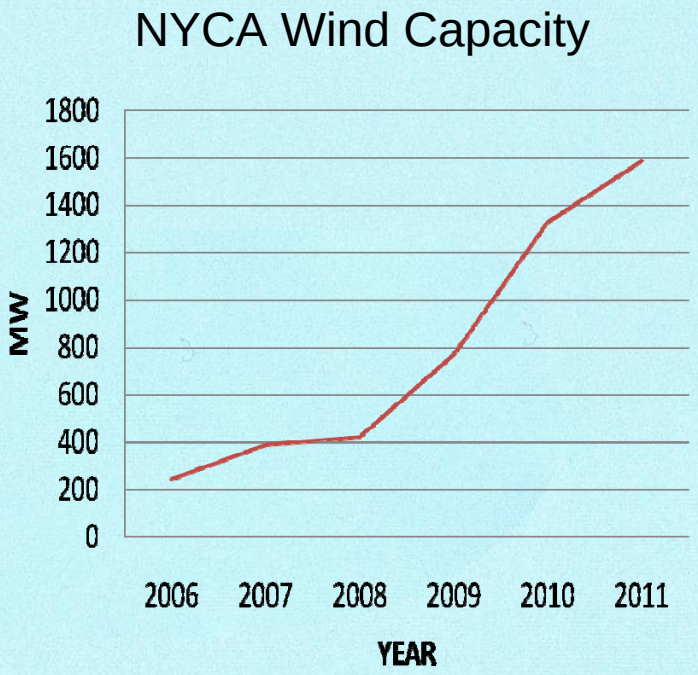
Sources

- Unit capacities are from the Gold Book based on semi-annual DMNC tests.
- Planned outages from schedules, adjusted by history
- New units are given 4 weeks of planned maintenance

Impacts

- More wind units are raising the IRM requirement
- No planned outrages during summer peak, but 150 MW is modeled to reflect history.



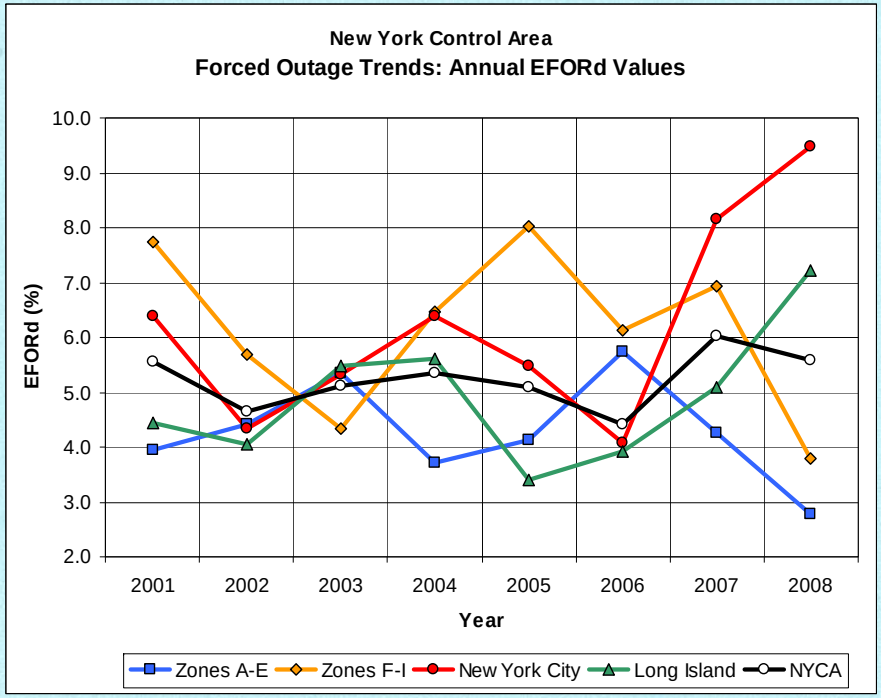


Based on the results of 2010-11 IRM Study consideration of Wind resources impacts NY IRM by appx. 4%

NYCA Capacity Model Availability

Sources

- Partial and full forced outages for thermal units come from the Generating Availability Data System (GADS) reporting
- This data is converted into transition rates and emulates Equivalent Forced Outage Rates EFORd
- Ambient Temperature derates for GTs
- Solar & Wind is based on 8760 hourly wind readings near site, translated to hourly output based on collected hourly wind data. Summer Peak Hour capacity factor based on June 1-Aug 31, hours (beginning) 2-5 PM translates into Wind 11% & Solar 65%
- Hydro uses a monthly derate, based on history.
- New thermal units get either NERC class Averages or NYCA fleet averages (for new GTs).

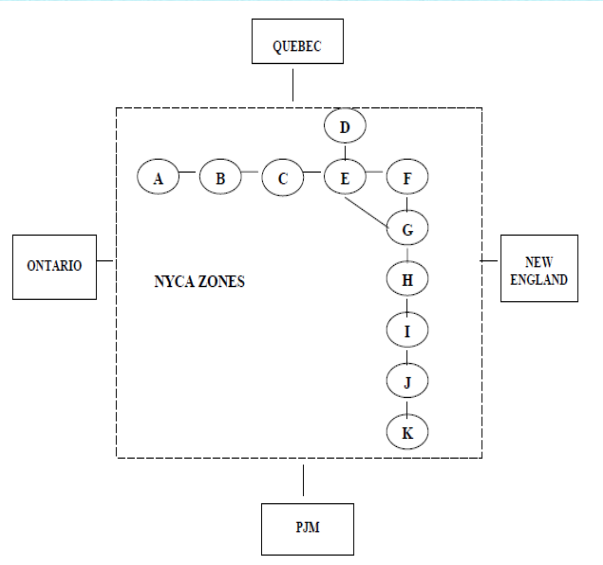


Based on the results of 2010-11 IRM Study using "best" versus "worst" recent 5 year performance impacts NY IRM by up to 4%

NYCA Capacity Model
External Capacity from Contracts

Sources

- Grandfathered contracts from NE, PJM and HQ are included
- Limited to avoid impacting IRM Requirement

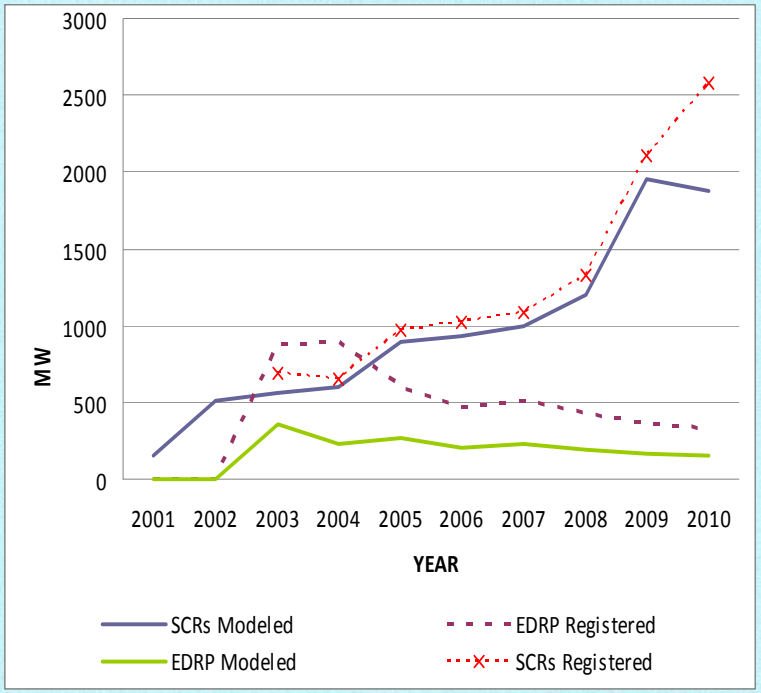


No IRM impact – imports displace NYCA installed capacity

Emergency Operating Procedures

Sources

- NYISO Operations Group forecasts levels based on historic levels measured at the NYISO
- Order of EOPs based on NYISO procedures and experience
- Levels for Special Case Resources (SCRs) and Emergency Demand Response Program (EDRP) are adjusted to incorporate historical participation.
- EDRPs are limited to 4 calls per month and some SCRs are emission limited
- In 2009 NYSRC implemented an improved performance model for Special Case Resource (SCR) that better represents the likely load reduction during peak periods



Impacts

- SCR and EDRP programs continue to grow since there inception In 2001
- EDRP programs always lower the IRM while SCRs tend t o increase it because of their lower performance.
- There has been migration from voluntary programs (EDRP) towards the paid programs (SCR)

Based on the results of 2010-11 IRM Study consideration of SCR and EDRP resources impacts NY IRM by appx. 2%

Emergency Operating Procedures

Step	Procedure	Effect	MW Value
1	Special Case Resources (SCRs)	Load relief	2575 MW*
2	Emergency Demand Response Programs (EDRPs).	Load relief	329 MW**
3	5% manual voltage Reduction	Load relief	72 MW
4	Thirty-minute reserve to zero	Allow operating reserve to decrease to largest unit capacity (10-minute reserve)	600 MW
5	5% remote voltage Reduction	Load relief	479 MW***
6	Voluntary industrial curtailment	Load relief	61 MW***
7	General public appeals	Load relief	88 MW
8	Emergency Purchases	Load relief	Varies
9	Ten-minute reserve to zero	Allow 10-minute reserve to decrease to zero	1200 MW
10	Customer disconnections	Load relief	As needed

* *The SCR's are modeled as monthly values. The value for July is 2,575 MW.*
** *The EDRPs are modeled as 329 MW discounted to 148 MW in July and August and further discounted in other months. They are limited to 5 calls a month.*
*** *These EOPs are modeled in the program as a percentage of the hourly peak. The associated MW value is based on a forecast 2010 peak load of 32,976 MW.*

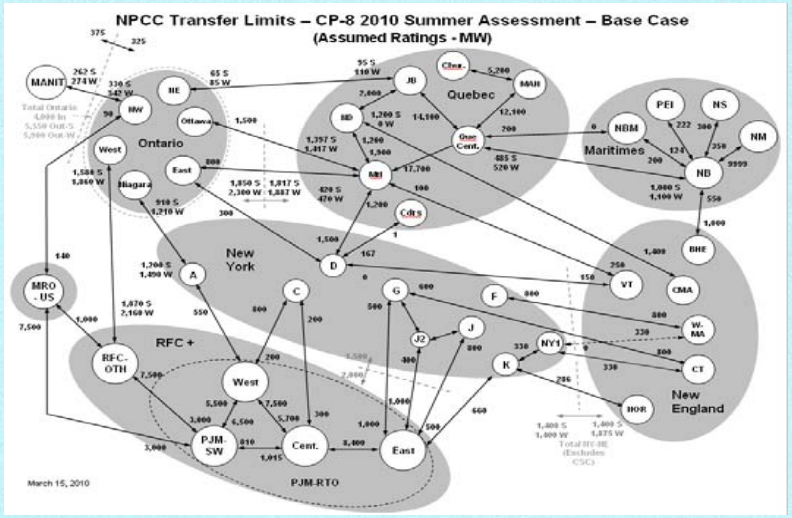
Outside World Models

Sources

•The Northeast Power Coordinating Council's CP-8 working group

•Getting data directly from some of the Areas.

• Per NYSRC Policy 5 - Outside Areas are modeled so they are not more reliable than their own or NYCA's criterion and their IRM is no higher than their design level.



Based on the results of 2010-11 IRM Study consideration of outside world assistance impacts NY IRM by appx 7%

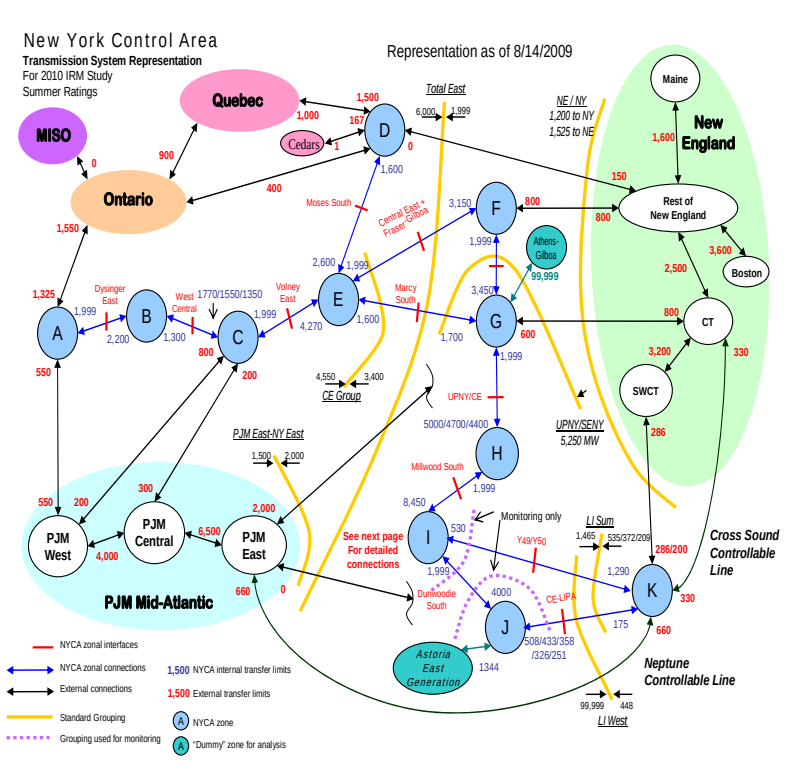
Transmission System Model Components

Topology

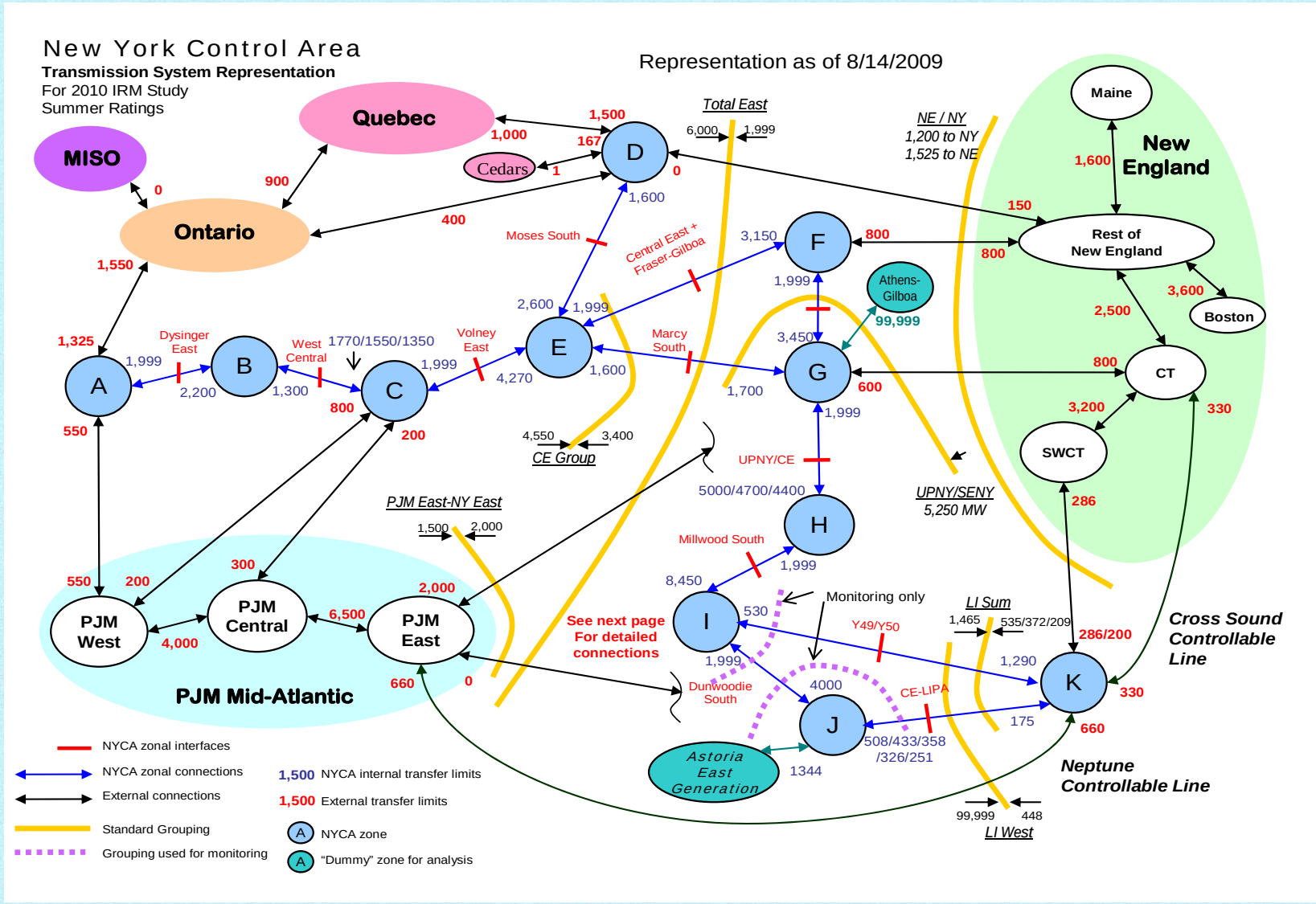
- "Bubble Diagram" Construction and Interfaces
- Transfer Capability between the Zones (Bubbles)
- Transmission Cable Outages – Cable EFORs

Reconciliation of Transportation vs. Network Model

- Use of Interface Grouping to capture simultaneous impacts and flow distributions (Shift factors based on network impedance)
- Use of dynamic transfer limits to capture resource and load sensitivities.
- Emergency transfer limits allow short term emergency (STE) ratings

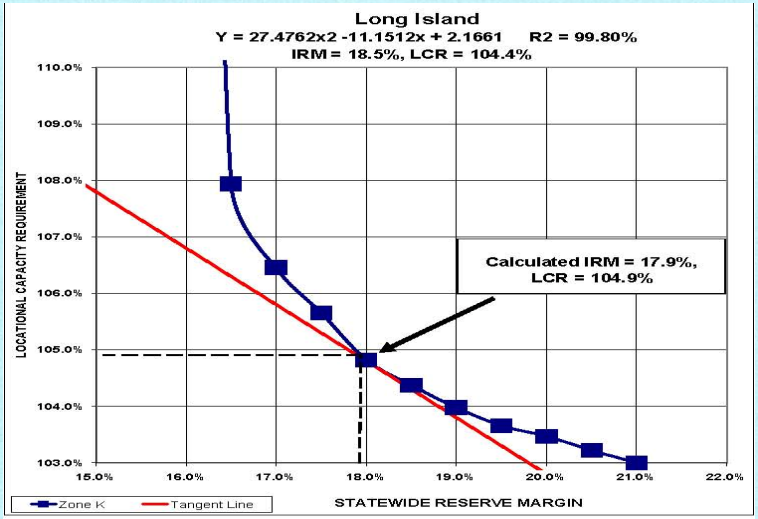


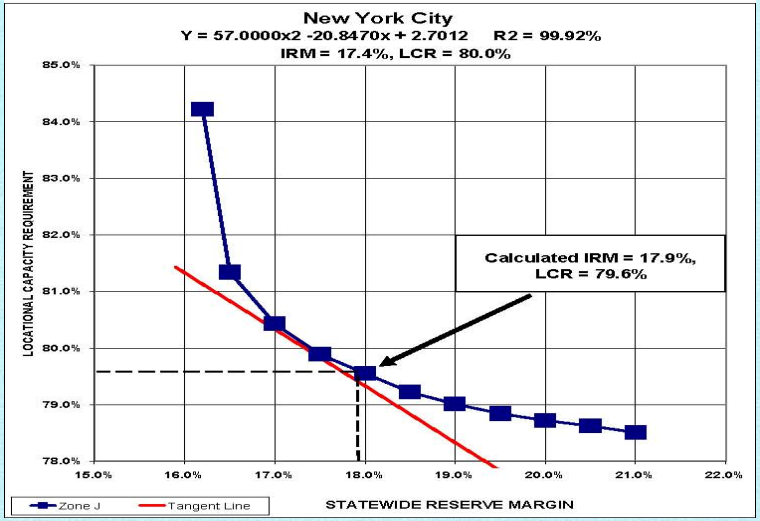
Based on the results of 2010-11 IRM Study consideration of transmission constraints impacts NY IRM by appx. 2.5 %


New York Control Area
Transmission System Representation
For 2010 IRM Study
Summer Ratings
Representation as of 8/14/2009
Quebec
MISO
Ontario
Cedars
Maine
New England
Rest of New England
Boston
CT
SWCT
Athens-Gilboa
PJM West
PJM Central
PJM East
PJM Mid-Atlantic
Total East
NE / NY
1,200 to NY
1,525 to NE
Moses South
Central East + Fraser-Gilboa
Dysinger East
West Central
1770/1550/1350
Volney East
Marcy South
CE Group
PJM East-NY East
UPNY/CE
5000/4700/4400
UPNY/SENY
5,250 MW
Millwood South
See next page For detailed connections
Monitoring only
Y49/Y50
LI Sum
Dunwoodie South
CE-LIPA
508/433/358 /326/251
Astoria East Generation
1344
Cross Sound Controllable Line
Neptune Controllable Line
LI West
NYCA zonal interfaces
NYCA zonal connections
External connections
Standard Grouping
Grouping used for monitoring
1,500 NYCA internal transfer limits
1,500 External transfer limits
NYCA zone
"Dummy" zone for analysis

"Unified Methodology"
The IRM-LCR Curve

- The method for the ICS and Reliability Council for setting the statewide reserve margin and the NYISO setting the locational ICAP requirements is unified (the same)
- The procedure generates a curve showing the relationship between installed reserve margins (IRMs) and locational capacity requirements (LCRs)
- Uses multi-order polynomial regression analysis to fit a tangent -45 degree line to find the base case point.
- NYSRC computed 2010-11 Requirements as 18% IRM. Increase over 2009-10 requirements primarily result of improved SCR model and increased forced outage rates.





Potential Differences in NY and NE Modeling Approaches – For Discussion Purposes Only

- MARS Computer Program (vs Westinghouse?)
- NYCA Load Model (differences in LFU, Load Shape?)
- NYCA Capacity Model (different assumption on Ambient Temp derate for GTs , Summer maintenance, Wind?)
- Emergency Operating Procedures (performance factors, EDRP and some SCRs limited to four calls/month ?)
- Outside World Model (limit reliance on outside per Policy 5)
- Transmission System Model (use of explicit Nomograms, EFORs?)
- Integrated IRM & LCR's through Tan 45 calc. (use of xmis)
- Other?

REFERENCES

- Policy 5

  www.nysrc.org/policies.asp
- IRM Studies
  www.nysrc.org/NYSRC_NYCA_ICR_Reports.asp
- Load and Capacity Data (Gold Book)
  www.nyiso.com/public/markets_operations/services/planning/documents/index.jsp
- Assumptions are in the IRM Reports