

NYISO Overview

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Agenda

- NYISO Background
- Bulk Electric Transmission & Generation
- Reliability Criteria
- Long Term Planning
- Seasonal Planning
- Operations & Markets
- Real Time Bid Cost Increase







Evolution of the NYISO





The Roles of the NYISO



Reliable operation of the bulk electricity grid

 Managing the flow of power nearly 11,000 circuit-miles of transmission lines from more than 300 generating units



Administration of open and competitive wholesale electricity markets

Bringing together buyers and sellers of energy and related products and services

Planning for New York's energy future

 Assessing needs over a 10-year horizon and evaluating projects proposed to meet those needs

Advancing the technological infrastructure of the electric system

Developing and deploying information technology and tools to make the grid smarter





NYISO Governance



Stakeholder committees of participants from market sectors: Transmission Owners, Generation Owners, Other Suppliers, End-Use Consumers, and Public Power & Environmental Parties



NYISO Voting Sectors





Bulk Electric Transmission & Generation





Transmission Additions







NY Gas-Fired Generation

Gas or Duel-Fuel Generating Capacity

- Statewide 61%
- Long Island 76%
- New York City 95%
- The majority of gas-fired generation stations do not have firm gas wheeling arrangements with their pipeline suppliers
- Daily gas procurement are managed by the generator owners reflected in their bid curves
- Inability to meet electric obligations result in capacity derates
 - Capacity derates can impact generator capacity revenues







Wind Capacity

Wind Power Nameplate Capacity: 2003-2012





Statewide Generating Capacity





Downstate Generating Capacity



Summer 2012



Wind Power in New York









Reliability Regulation

NYISO must comply with all Reliability Rules established by:



North American Electric Reliability Corporation (NERC)

- Independent, self-regulatory, not-for-profit organization with mission to improve the reliability and security of the bulk power system in the U.S., Canada and part of Mexico
- Compliance with NERC Reliability Standards became mandatory and enforceable in the U.S. in 2007

Northeast Power Coordinating Council (NPCC)

- Includes New York, New England, Ontario, Québec, and the Maritimes
- Formed as voluntary, not-for-profit, regional reliability organization in 1966
- Restructured in 2007 to act as Regional Entity to NERC for the Northeast

New York State Reliability Council (NYSRC)

- Not-for-profit organization established in 1999
- Responsible for Reliability Rules specific to the New York State Power System
- U.S. law authorizes New York State to impose more stringent reliability standards
- New York PSC adopted NYSRC Reliability Rules



NYS Reliability Council Local Reliability Rules

I-R3: Loss of Generator Gas Supply (New York City)

"The NYS Bulk Power System shall be operated so that the loss of a single gas facility does not result in the loss of electric load within the New York City zone."

- Con Edison develops minimum oil burn requirements based on loss of gas supply studies at different electric load levels
- Con Edison presents these minimum oil burn requirements to the NYISO Operating Committee for approval
- In some cases the minimum oil burn requirements consider the automatic fuel switching capability where applicable.



NYS Reliability Council Local Reliability Rules

I-R5: Loss of Generator Gas Supply (Long Island)

"The NYS Bulk Power System shall be operated so that the loss of a single gas facility does not result in the uncontrolled loss of electric load within the Long Island zone."

- Long Island develops minimum oil burn requirements based on loss of gas supply studies at different electric load levels.
- Long Island presents these minimum oil burn requirements to the NYISO Operating Committee for approval



Annual Peak Loads



<u>Year</u>	Peak Load
1998	28,166 MW
1999	30,311 MW
2000	28,136 MW
2001	30,983 MW
2002	30,664 MW
2003	30,333 MW
2004	28,433 MW
2005	32,075 MW
2006	33,939 MW
2007	32,139 MW
2008	32,432 MW
2009	30,844 MW
2010	33,452 MW
2011	33,865 MW



Installed Capacity Requirement





Reserve & Regulation Requirements

NYCA Wide Reserve Values Total Spinning Reserve – 600 MW Total 10 Min Reserve – 1200 MW 30 Minute Reserve – 1800 MW

NYCA Wide Regulation Values Regulation - 175 - 275 MW

> Eastern Reserve Values * Total Spinning Reserve – 300 MW Total 10 Min Reserve – 1000 MW * 30 Minute Reserve – 1000 MW

> > Long Island Reserve Values * Total Spinning Reserve – 60 MW * Total 10 Min Reserve – 120 MW 30 Minute Reserve – 270-540 MW

* Denotes locational reserve categories that reflect the objective for dispersed reserves but are not operational requirements under the NYSRC reliability rules.







Planning Processes









Outage Scheduling & Coordination

Generator Maintenance Outages

- Annual
 - Generators submit proposed outages for the next 2 years by Sept.1st
 - NYISO performs a reliability assessment and reschedules outages as necessary
 - Results are posted in the NYISO Maintenance Load and Capacity Survey
- Planned (minimum of 2 days notice required)
 - Emerging equipment problems
 - NYISO performs a reliability assessment and reschedules outages as necessary
 - Revise the NYISO Maintenance Load and Capacity Survey

Generator Forced Outages

- In response, NYISO will activate reserves (and re-establish reserves for the next contingency) to maintain system reliability
- Generator required to inform the NYISO as soon as possible of forced outage
- NYISO performs a reliability assessment and reschedules other outages as necessary



Outage Scheduling & Coordination

Transmission Maintenance Outages

- Annual
 - Transmission Owners (TOs) submit proposed outage schedules for the next year by Oct. 1st
 - NYISO determines the impact on reliability and transfer criteria and reschedules as necessary
 - Approved schedules are posted on NYISO's Open Access Same Time Information System
- Planned
 - TOs submit outage requests within the minimum notification time
 - Facilities expected to impact system Transfer Capability of the NYISO system: No later than 30 calendar days prior to the first day of the operative TCC month
 - The NYISO approves transmission outages based on reliability criteria
 - Approved outages are posted on NYISO's Open Access Same Time Information System
 - In Real-Time, Grid Operations coordinates the outage with the TO
- Emergency (with advanced notice)
 - TO informs the NYISO as soon as possible of emergency condition
 - NYISO evaluates the impacts of the outage and makes pre-outage verifications and system adjustments
 - In Real-Time, Grid Operations coordinates the outage with the TO

Emergency Transmission Outages (without advanced notice)

 In response, the NYISO will redispatch generation and re-evaluate external transactions to maintain system reliability







Operations Responsibilities

- Reliable operation of the New York Control Area power system, in accordance with all applicable NERC, NPCC, and NYSRC reliability rules and standards
- Effective administration and operation of the Day-Ahead and Real-Time wholesale Energy Markets
- Operate the New York State transmission system power flows within applicable operating limits
 - Secure day ahead generation commitment
 - Operate electric power flows within
 - Thermal ratings
 - Voltage limits
 - Stability limits
 - Maintain adequate operating reserves
 - Maintain adequate frequency control



Capacity Markets

- All Load Serving Entities (LSEs) must secure sufficient installed capacity to meet their forecast peak and Installed Reserve Margin
 - Installed Reserve Margin set to maintain a statistical loss of load event of one event in ten years
- Bilateral Installed Capacity qualifies for certification
- The NYISO facilitates:
 - Six-Month Strip Installed Capacity Auction
 - Monthly Installed Capacity Auction
 - Spot Auction



Day-Ahead Market Overview

- Security Constrained Unit Commitment (SCUC) scheduling software optimizes for the least cost solution
 - Installed capacity providers are required to bid
 - Hourly generation bids (startup cost, MWh, \$/MW)
 - Transaction bids are submitted from participants in adjacent ISO's
 - Hourly Load Serving Entity (LSE) bids
 - Transmission topology, transmission status, transmission ratings
 - Load Forecast, Wind Forecast
- The results of the Day-Ahead Market are available by 11AM.
 - TOs have the opportunity to review the load flow and commitment results to ensure all local reliability requirements are met
 - Generators are able to secure the gas supply required to meet their commitment
 - Binding forward contracts issued to Suppliers and Loads
- Hourly Locational Based Marginal Prices (LBMP) calculated & posted



Real Time Dispatch (RTD)

- Runs automatically every 5 minutes evaluating a 1hour time horizon
- Multi-period security constrained economic dispatch allows for generation ramping prior to known system changes
- Primary function is dispatch of resources
- Co-optimizes to simultaneously solve load, reserves & regulation requirements
- Determines NYISO real time prices
- Output results passed to Energy Management System (EMS)
 - Automatic Generation Control (AGC)
 - Contingency Analysis (CA)



Generation Bidding

DAM - Bidding Time Lines





Day-Ahead and In-Day Operations





Day-Ahead to Real-Time Transition





The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and conducts reliability and resource planning for the state's bulk electricity system.



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