

NYISO Ancillary Services Markets

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Outline of Today's Presentation

- Introduction
- Reliability Rules
- Reserve Requirements
- Market Overview
- Operations
- Ancillary Services Markets



Introduction – New York ISO

- Responsible for administering the wholesale energy markets in New York State and for the reliable operation of the state's high voltage electric transmission system
- Highly divested and complex marketplace featuring co-optimized market clearing systems
- NYISO market volume is projected to be \$10 billion this year and \$40 billion since inception
- Unique challenge: New York City is world's biggest and most complex load pocket. World capitals of finance and communications
- Unique geography makes it the “Hub of the Northeast”





Reliability Rules

- **NYISO must comply with all Reliability Rules established by:**
 - ✓ ***NERC - North American Electric Reliability Council***
 - ✓ ***NPCC - Northeast Power Coordination Council***
 - ✓ ***NYSRC - New York State Reliability Council***

- **Specific rules for the New York Control Area are established by the NYSRC**
 - ✓ ***Inclusive of all NPCC and NERC Reliability Rules, and in some cases are more stringent***
 - Example – Solving for N-2 contingencies on transmission facilities into NYC when a “Thunderstorm Alert” is declared



Reserve Requirements - NERC

- **Standard BAL-002-0**
 - ✓ ***Contingency Reserve is required to meet Disturbance Control Standards***
 - ✓ ***Contingency Reserve Policies are defined by the Regional Reliability Councils***
 - ✓ ***Contingency Reserve may be made up of generation, controllable load resources or coordinated adjustments to Interchange Schedules***
- **Standard BAL-005-0**
 - ✓ ***Regulation Reserve is required to meet Control Performance Standards***



Reserve Requirements - NPCC

- **Operating Reserve Criteria A-06**

- ✓ ***10 Minute Reserve***

- Shall be at least equal to first contingency loss and sustainable for one hour

- ✓ ***30 Minute Reserve***

- Shall be at least equal to one-half the area's second contingency loss and be sustainable for one hour

- ✓ ***Regulation Reserve***

- Shall be sufficient to meet NERC control performance standards CPS1 and CPS2



Reserve Requirements - NYSRC

- **Reliability Rules Document – Version 14**

- ✓ **10 Minute Reserve**

- Equal to at least the size of the largest contingency or loss of energy purchases from another area, whichever is greater
 - At least 50% must be synchronized
 - Balance may be non-synchronized

- ✓ **30 Minute Reserve**

- Equal to at least one-half the size of the next largest contingency



Market Overview

Day-Ahead Market - Highlights

- **Security Constrained Unit Commitment (SCUC) scheduling software co-optimizes energy and ancillary service (reserve & regulation) bids for least cost solution**
- **Produces hourly Locational Based Marginal Prices (LBMP)**
- **Provides binding forward contracts issued to Suppliers and Loads**
- **Allows for bilateral transaction scheduling concurrently with supply and load bids**
- **Deviations from the Day-Ahead Market schedules are settled against the Real-Time Market prices**
- **Installed capacity suppliers are required to bid into the Day-Ahead Market**



Market Overview

Real-Time Market - Highlights

- External transaction and generation suppliers may adjust bids hourly for consideration in the Real-Time Market evaluation to address in-day operating conditions
- Real-Time Dispatch scheduling software re-optimizes energy, reserve and regulation on system-wide basis every 5-minutes
- Provides for commitment of “quick start” resources
- Produces 5-minute Locational Based Marginal Prices (LBMP)



Market Overview

Ancillary Services - Highlights

- **Co-optimization of energy, reserve & regulation bids for least cost solution**
- **Suppliers provide separate bids for energy, regulation and reserve services**
- **Markets allow for substitution of higher quality reserves for lower quality when it is more economic to do so**
- **Reserve commitment includes locational New York State requirements with locational clearing pricing**
- **Ancillary services are fully scheduled in the Day-Ahead Market, with re-scheduling made through the Real-Time Market process**



NYISO Operations

- **Monitor Operating Reserve in a forecast mode and in real time**
 - ✓ *Review of Day-Ahead Market commitment and continuously monitor availability of resources in the Real-Time Market to meet required reserves*
- **Operations will take additional actions to maintain required reserves based on time frame and extent of reserve deficiencies:**
 - ✓ *Supplemental Resource Evaluations*
 - ✓ *Counting of regional reserve sharing energy*
 - ✓ *Counting/recalling energy exports from suppliers that have an installed capacity obligation to New York*
 - ✓ *Scheduling of emergency energy imports*
 - ✓ *Counting/activating EDRP/SCR*
 - ✓ *Counting quick response voltage reduction relief*



Ancillary Services Markets

- In February 2005, a number of enhancements to the Real-Time Market systems were implemented which were designed to improve the efficiency of the markets and use of generating resources
- Two settlement system for Reserve & Regulation Markets
 - ✓ *Similar to the energy market, this design provides financial incentives for suppliers to be available in real-time operation and to perform when called upon*
- Ancillary Service prices that incorporate marginal Lost Opportunity Cost (LOCs)
 - ✓ *Replaces separate LOC payments paid through uplift under the previous design*



Ancillary Services Markets

- **Ancillary Service Market Enhancements (continued):**
 - ✓ ***Reserve and Regulation Markets are scheduled and settled on a 5-minute basis in real time like the energy market***
 - ✓ ***All dispatchable capacity is considered for scheduling as energy or reserves***
 - ✓ ***Demand curves established for Reserve and Regulation***
 - During shortages, the demand curves reflect shortage costs into both the energy and ancillary service clearing prices

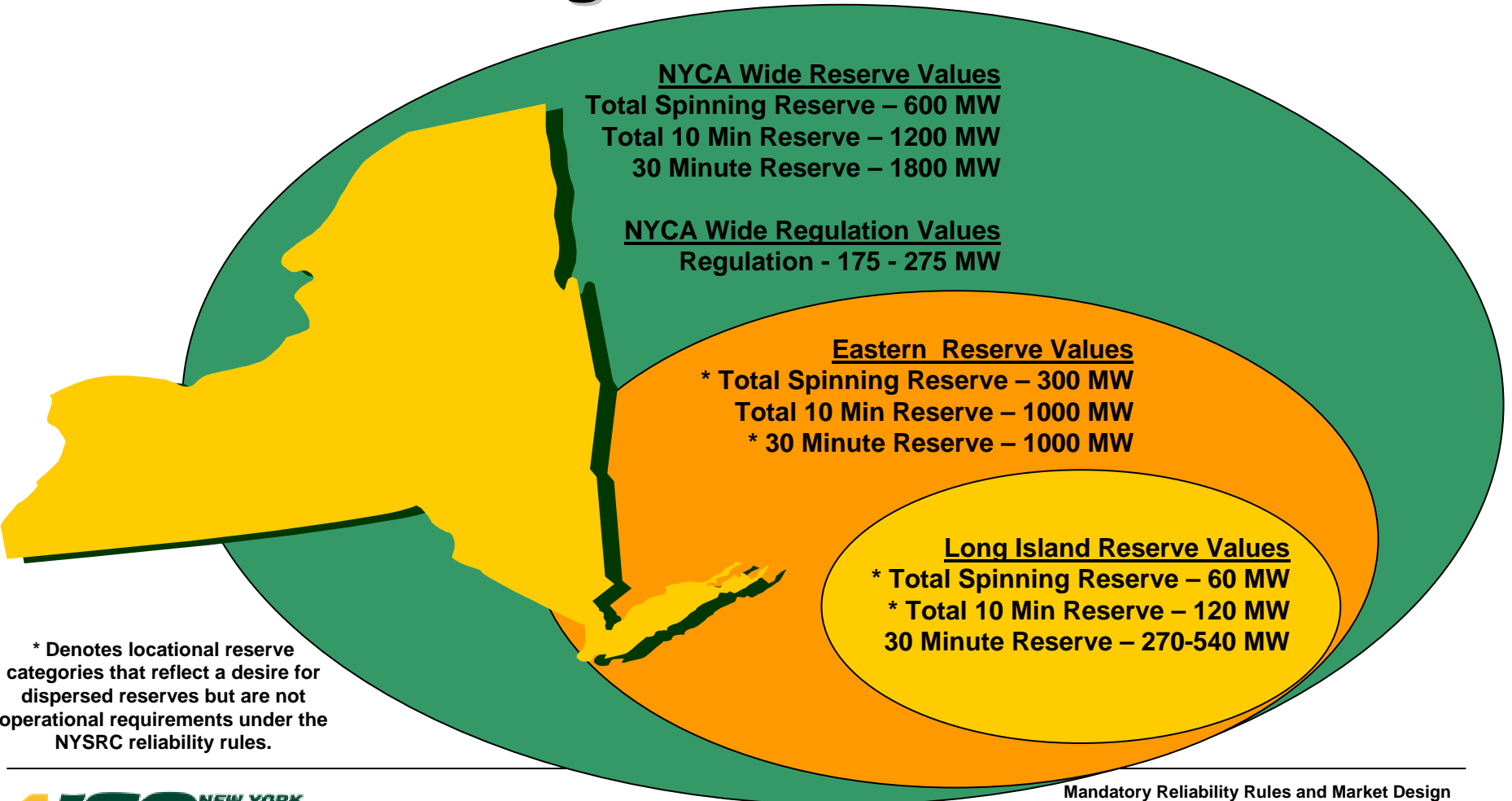


Ancillary Services Markets

- Under the Demand Curve approach:
 - ✓ *In shortage situations, the price of reserves is set by the demand curve*
 - ✓ *Markets clear with a price that reflects the level of the shortage even when the desired reserves are not available at any price*

- Objectives in establishing the Demand Curve prices were:
 - ✓ *To schedule resources to meet the required reserve constraints when they are available*
 - ✓ *To send the desired price signals to the market when true shortages occur*

Reserve & Regulation Values



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



Reserve & Regulation Demand Curves

	NYCA	East	Long Island
Spinning 10 Minute Reserve	\$500/MWh	\$25/MWh	\$25/MWh
Total 10 Minute Reserve	\$150/MWh	\$500/MWh	\$25/MWh
30 Minute Reserve	200 MW @ \$50/MWh 200 MW @ \$100/MWh Remainder @ \$200/MWh	\$25/MWh	\$300/MWh
Regulation	25 MW @ \$250/MWh Remainder @ \$300/MWh		



Reserve Demand Curve

- Reserve Demand Curve pricing example assuming shortage of all reserve categories
- This example demonstrates the additive nature of the demand curves

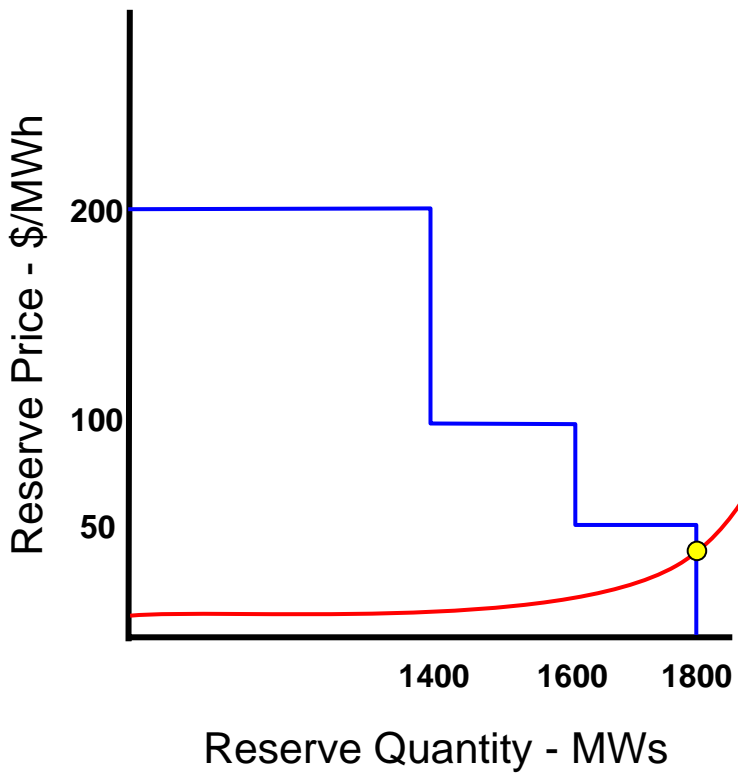
	NYCA	East
Total Spinning Reserve	\$850	\$1,400
Total 10 Minute Reserve	\$350	\$875
30 Minute Reserve	\$200	\$225



Ancillary Services Markets

Reserve Demand Curve – 30 Minute Reserves

- In this example sufficient reserve bids are available to the market scheduling systems to meet the reserve values
- The clearing price of reserves will reflect the cost of the last MW scheduled to meet the requirement

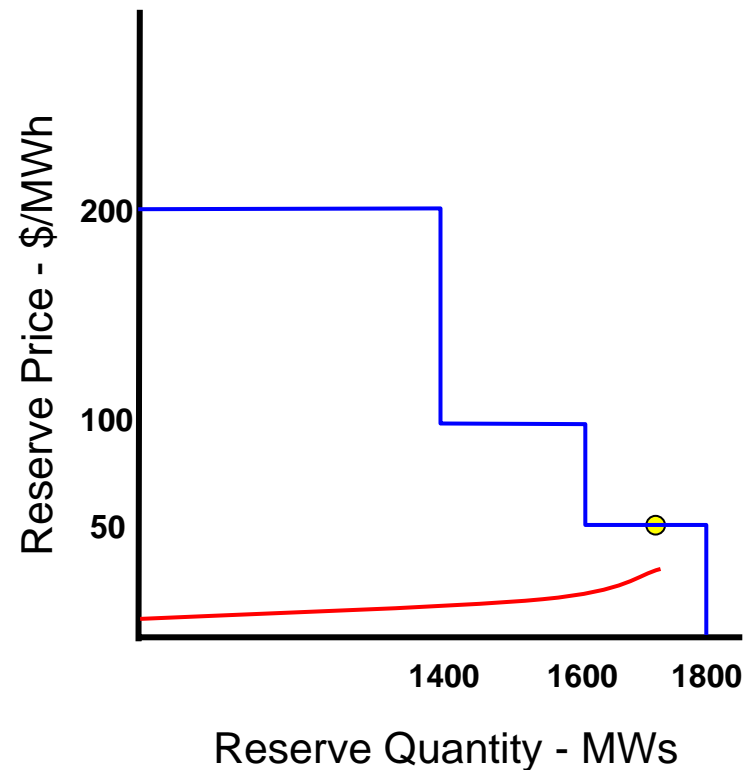




Ancillary Services Markets

Reserve Demand Curve – 30 Minute Reserves

- In this example a shortage exists and the requirement cannot be met with the resources available to the market scheduling system
- Without a demand curve, the market price would reflect the cost of the last MW of available supply scheduled
- With a demand curve, the price is set by the demand curve. The market clears at a price higher than it otherwise would have and sends the desired price signal to the market consistent with the level of reserve shortage





Demand Curve Conclusions

- **The NYISO's experience under the demand curve approach has demonstrated reliable operation during the record peak load conditions in Summer 2005**
- **The demand curves allow for the efficient integration of normal market scheduling processes and, if necessary, additional operational actions to meet reliability objectives**
- **The NYISO believes demand curves enhance reliability under LBMP operation by sending the desired market signals to suppliers under shortage conditions**