

Electricity System and Energy Market Basics

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Products*

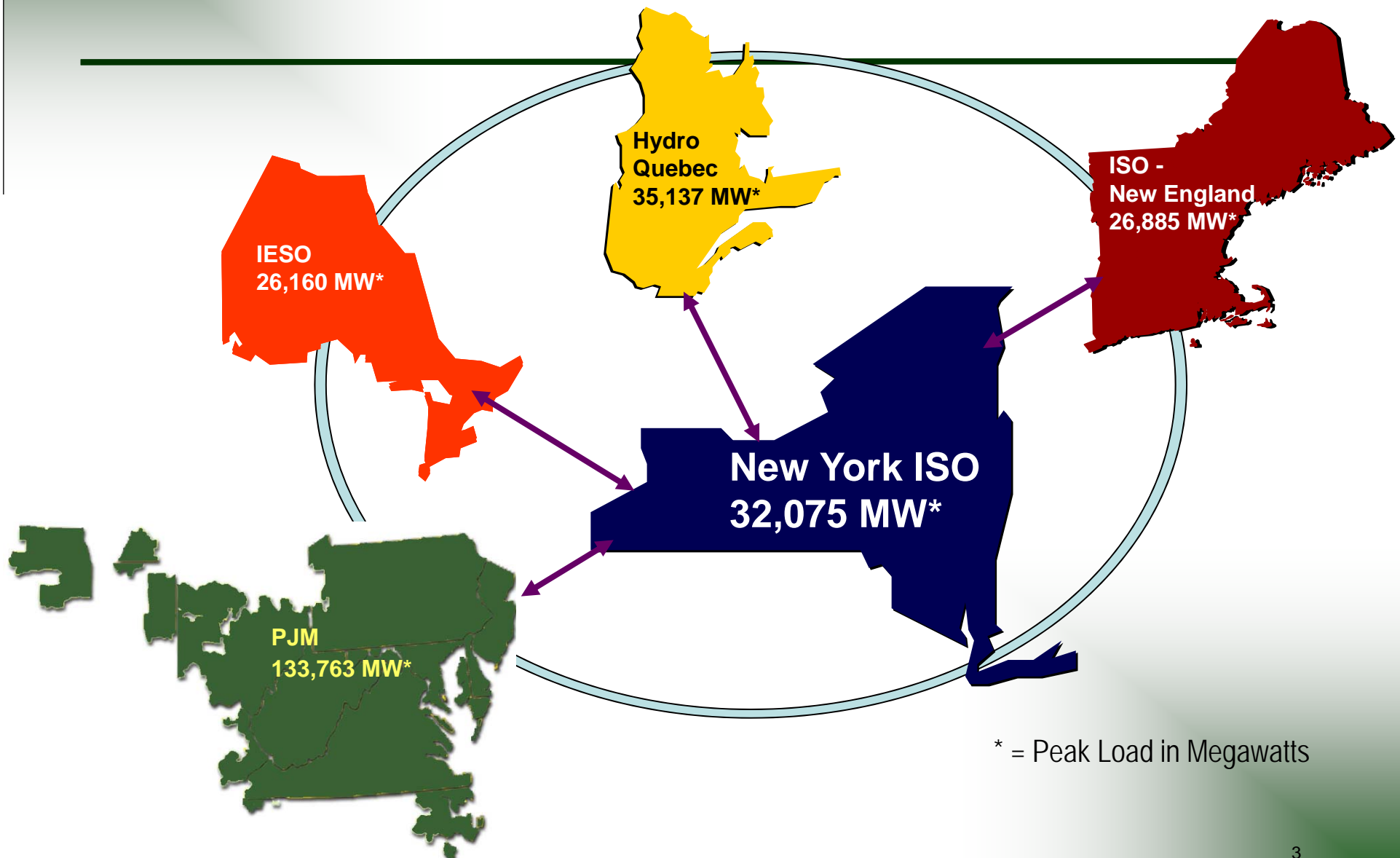
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Goals of This Presentation

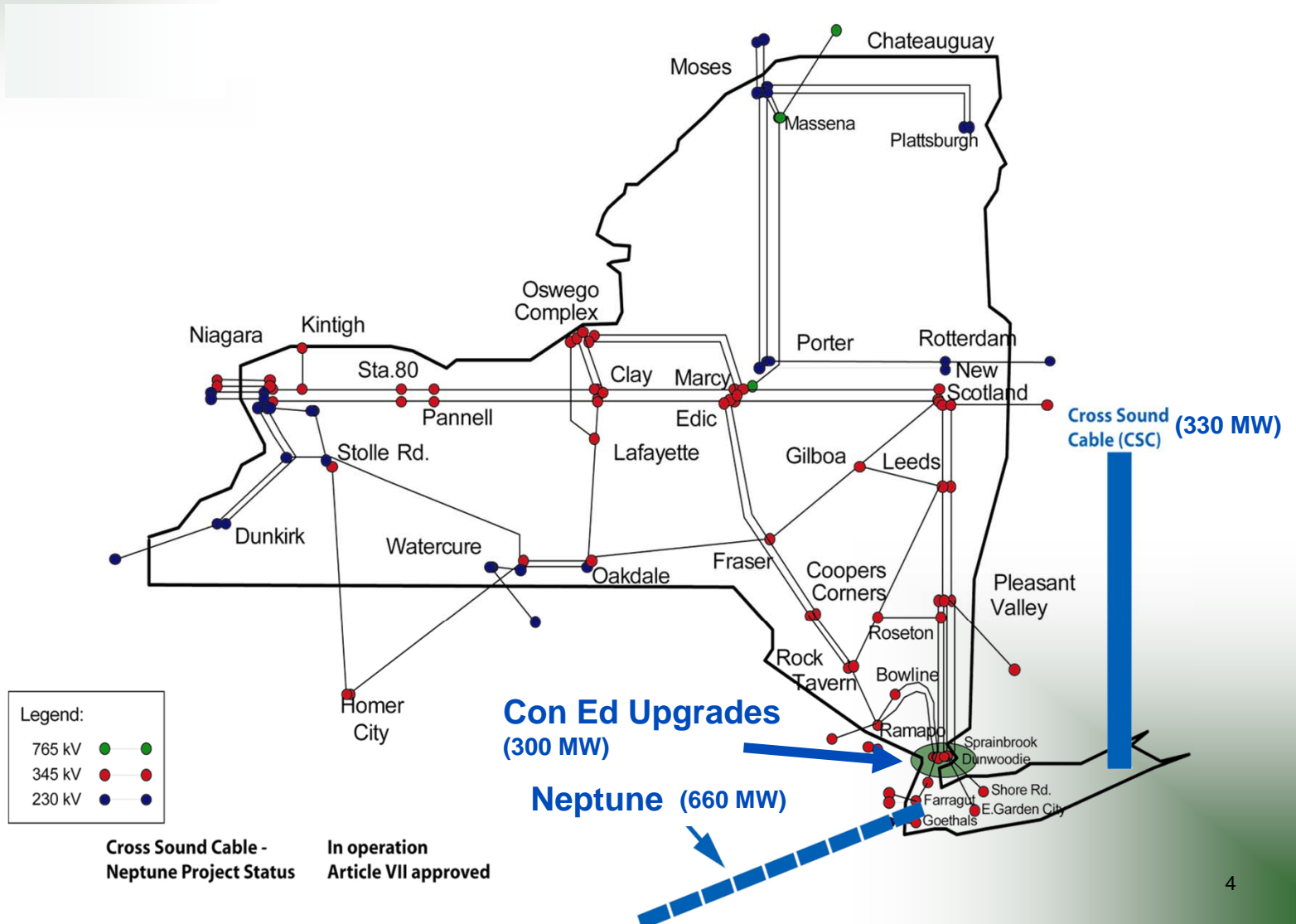
- ◆ Provide an overview of how wholesale electricity markets treat imports and exports
- ◆ Discuss how reliability is maintained through market design and system planning processes
- ◆ Summarize historical external interface limits and flows

New York ISO

"Hub of the Northeast"

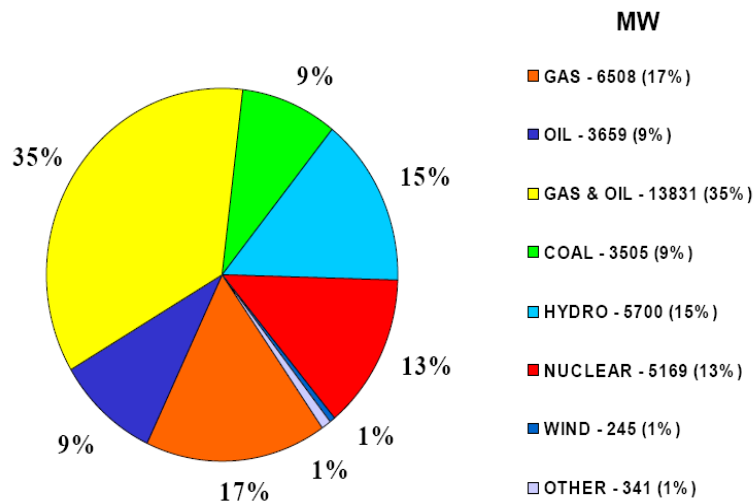


NYISO Transmission – Proposed and Operational

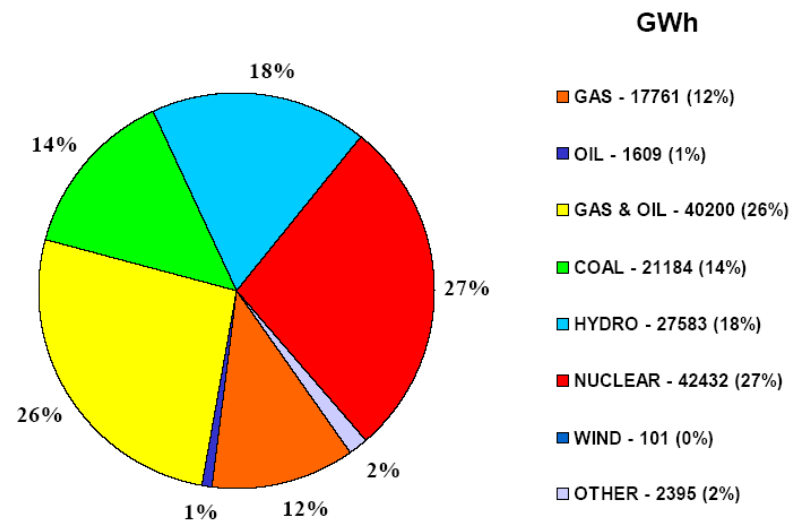


NYISO Generation Mix

2006
NYCA CAPACITY BY FUEL TYPE



2005
NYCA GENERATION BY FUEL TYPE



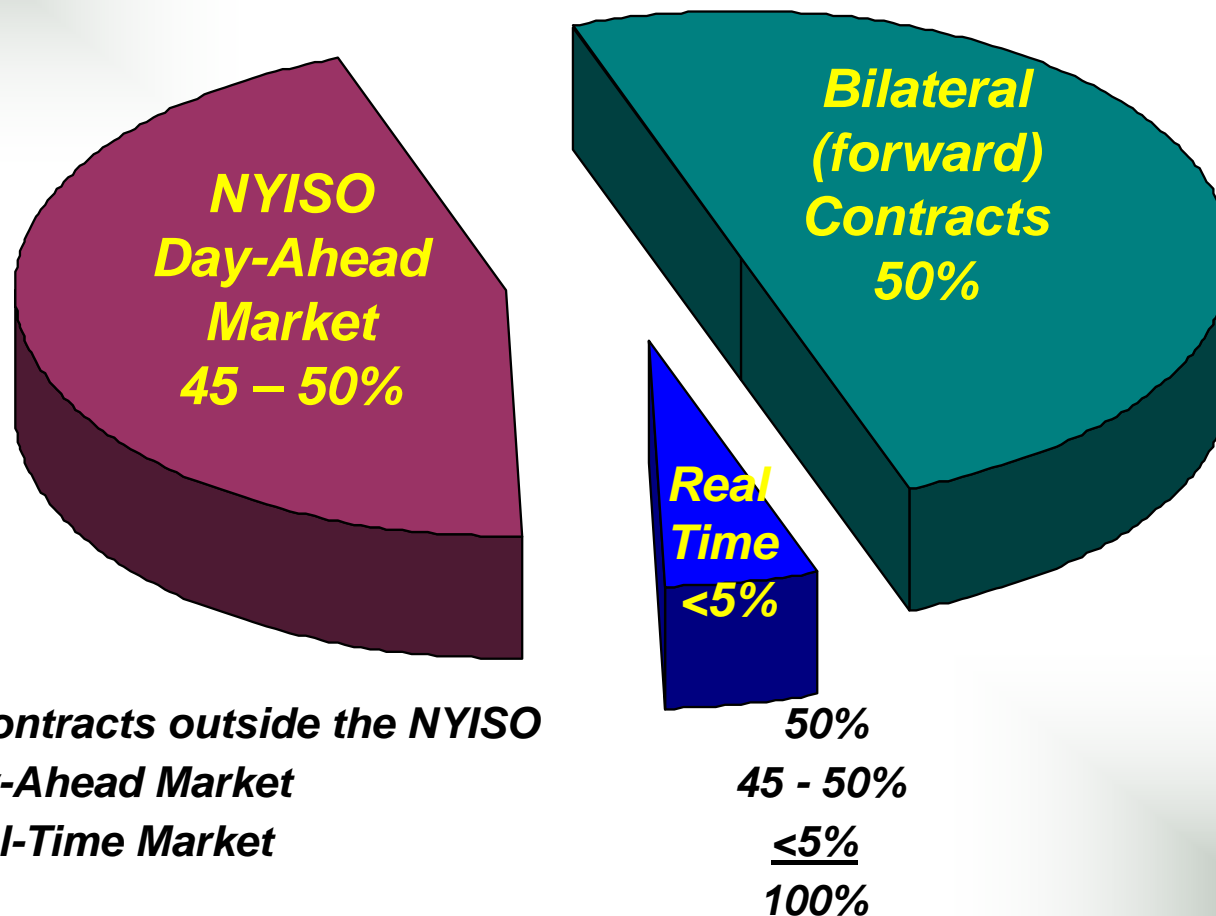
Comparison of NE, NY, & PJM Electric Power Systems

	ISO-NE	PJM	NYISO
Peak Demand	26,885 MW	133,763 MW	32,075 MW
Generation Capacity	32,000 MW	164,634 MW	38,956 MW
High Voltage Transmission Lines	8,000 + miles	56,070 miles	10,775 miles
Population	14 million	51 million +	19.2 million
Locational Marginal Pricing	YES	YES	YES
Financial Transmission Rights	YES	YES	YES
Responsibility for System Planning	YES	YES	YES

Market Overview

- ◆ Two Settlement System
 - *Day-Ahead Market*
 - *Real-Time Market*
- ◆ Locational Marginal Pricing
 - *Nodal congestion management pricing system*
 - *Includes marginal losses*
 - *Locational pricing for Energy and Reserves*

Buying Power in New York



Bilateral Contracts outside the NYISO
NYISO Day-Ahead Market
NYISO Real-Time Market

NYISO Market Overview

- ◆ Bid- and Offer-Based Markets
 - *Co-optimized Energy, Regulation and Reserves*
 - *Multi-part supplier offers*
 - *Load bids, including firm and price-sensitive components*
 - *Hourly variation in offers*
 - *Voluntary – bilaterals & self-supply accommodated*
- Other Markets
 - *Installed Capacity*
 - *Transmission Congestion Contracts*

Day-Ahead Energy Market

- ◆ Security Constrained Unit Commitment (SCUC) scheduling software simultaneously co-optimizes energy and ancillary services for least bid cost solution for 24 hour day period
- ◆ Day-Ahead Market (DAM) Schedules are binding forward contracts to Suppliers and Loads
- ◆ Bilateral transaction scheduling accommodated concurrently with DAM supply and load bids
- ◆ Installed capacity suppliers required to bid into DAM
- ◆ Virtual resources (zonal supply/demand) allowed to bid into DAM
- ◆ Deviations between DAM and Real-Time Market (RTM) settled against Real-Time Market \$

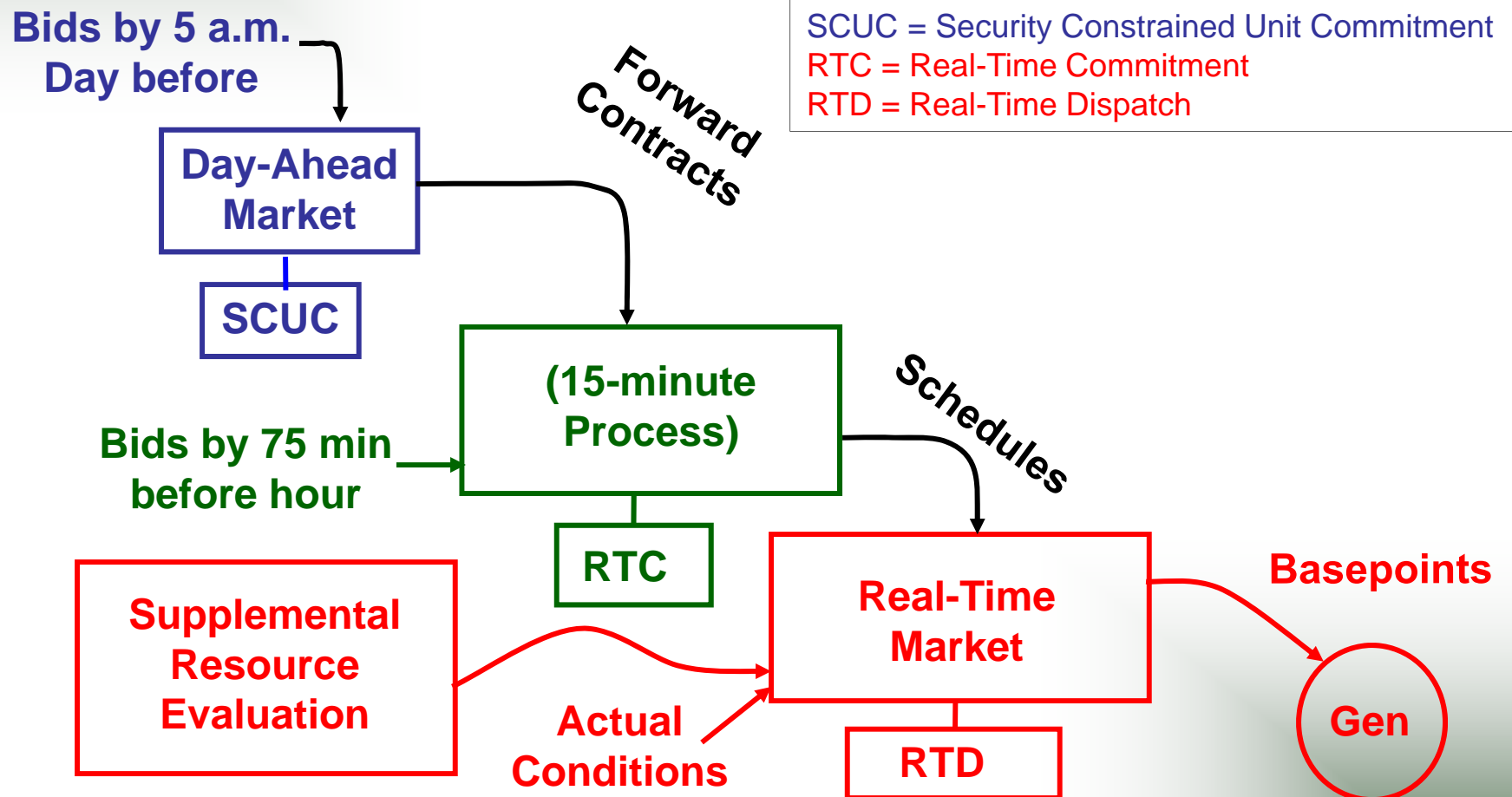


Real-Time Energy Market

- ◆ Real-Time Commitment (RTC)
 - *Security constrained unit commitment & dispatch software*
 - *Co-optimizes to simultaneously solve load, reserves & regulation requirements*
 - *Runs every 15 minutes, optimizes over next 2 ½ hour period*
 - *Issues binding commitments for units to start*

- ◆ Real-Time Dispatch (RTD)
 - *Multi-period security constrained dispatch*
 - *Co-optimizes to simultaneously solve load, reserves & regulation requirements*
 - *Runs approximately every 5 minutes*
 - *Optimizes over next 60 minute period*
 - *Issues binding dispatch instructions for units to operate*

New York's Two-Settlement Process



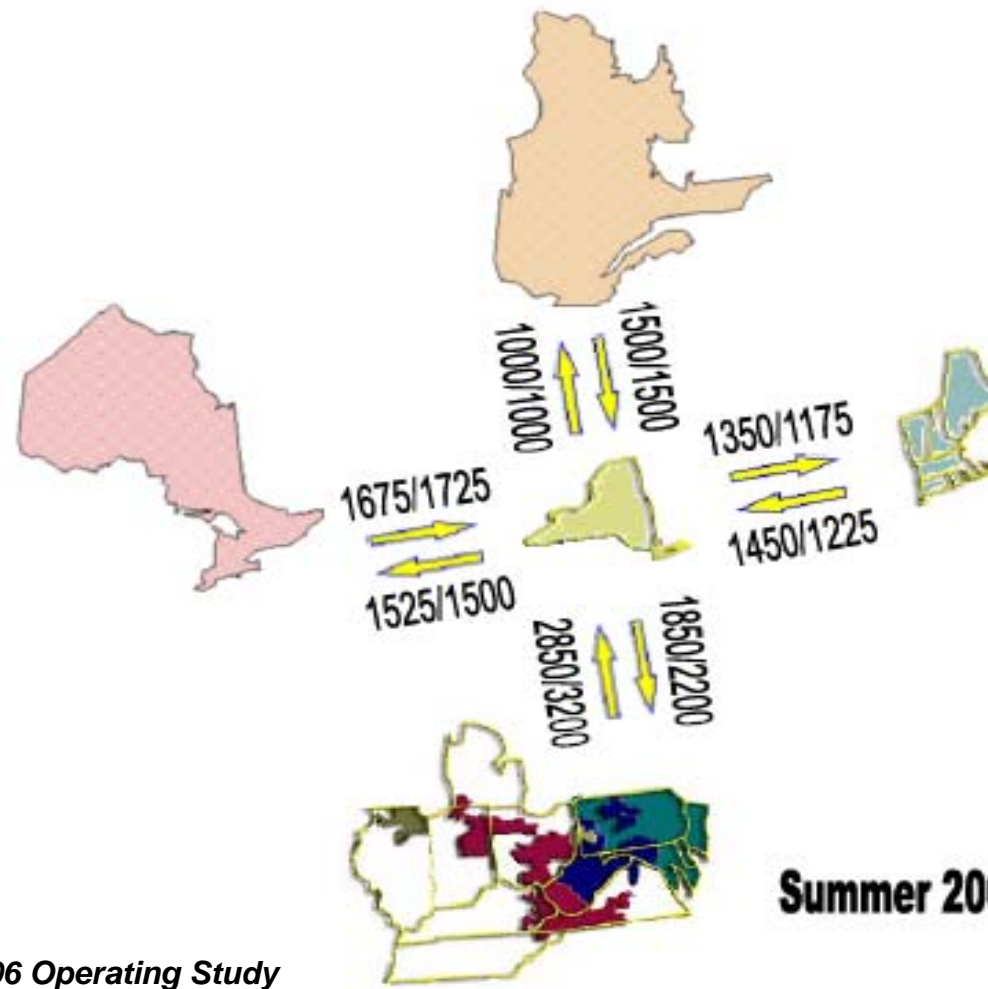
Maintaining System Reliability

- ◆ Real Time
 - *Synchronous and non-synchronous reserve markets*
 - *Emergency operating procedures (including demand response)*
- ◆ Day Ahead
 - *Security-constrained unit commitment*
 - *Commitment for local reliability*
 - *ICAP must-offer requirement*

Maintaining System Reliability

- ◆ Annual/Seasonal
 - *Summer and Winter operating studies*
 - *Resource adequacy markets*
 - *Installed reserve margin studies*
- ◆ Longer-term Planning Studies
 - *5- to 10-year look-ahead at resource requirements*
 - *Inter-regional planning*

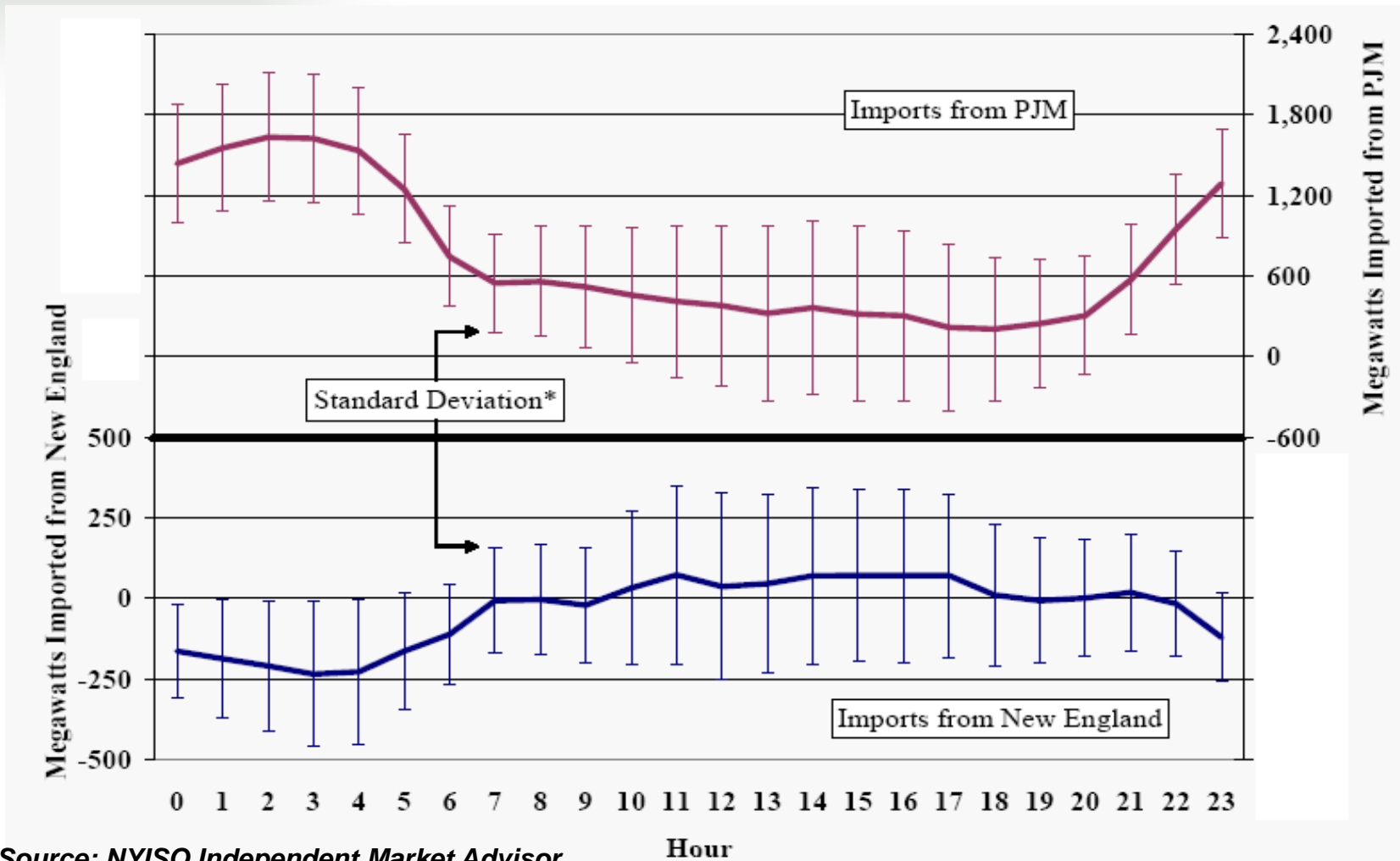
Thermal Transfer Capabilities with Adjacent Control Areas



Summer 2006/Summer 2005

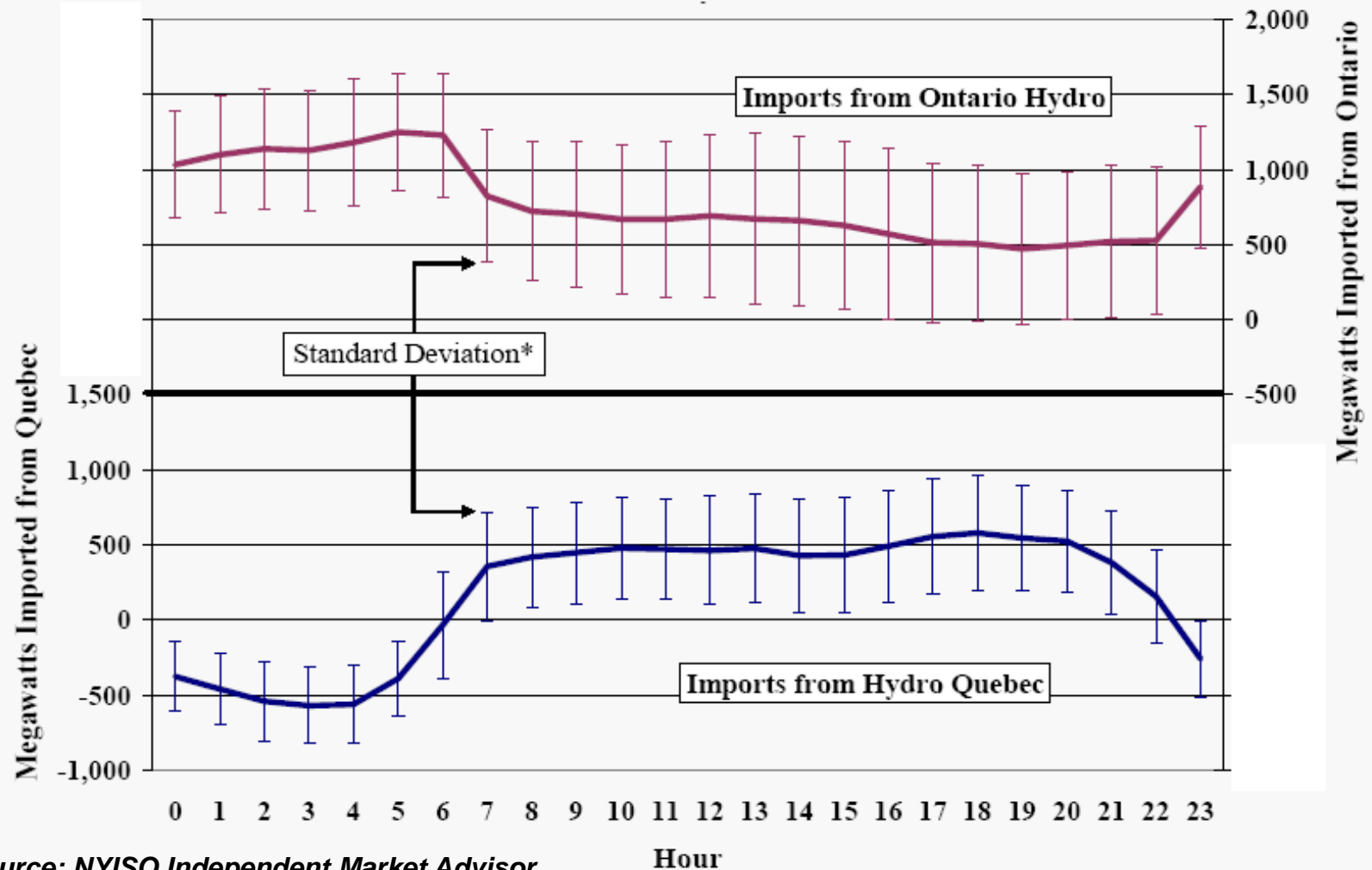
Source: Summer 2006 Operating Study

Average Net Imports from LMP Markets by Hour of Day Weekdays, 2004



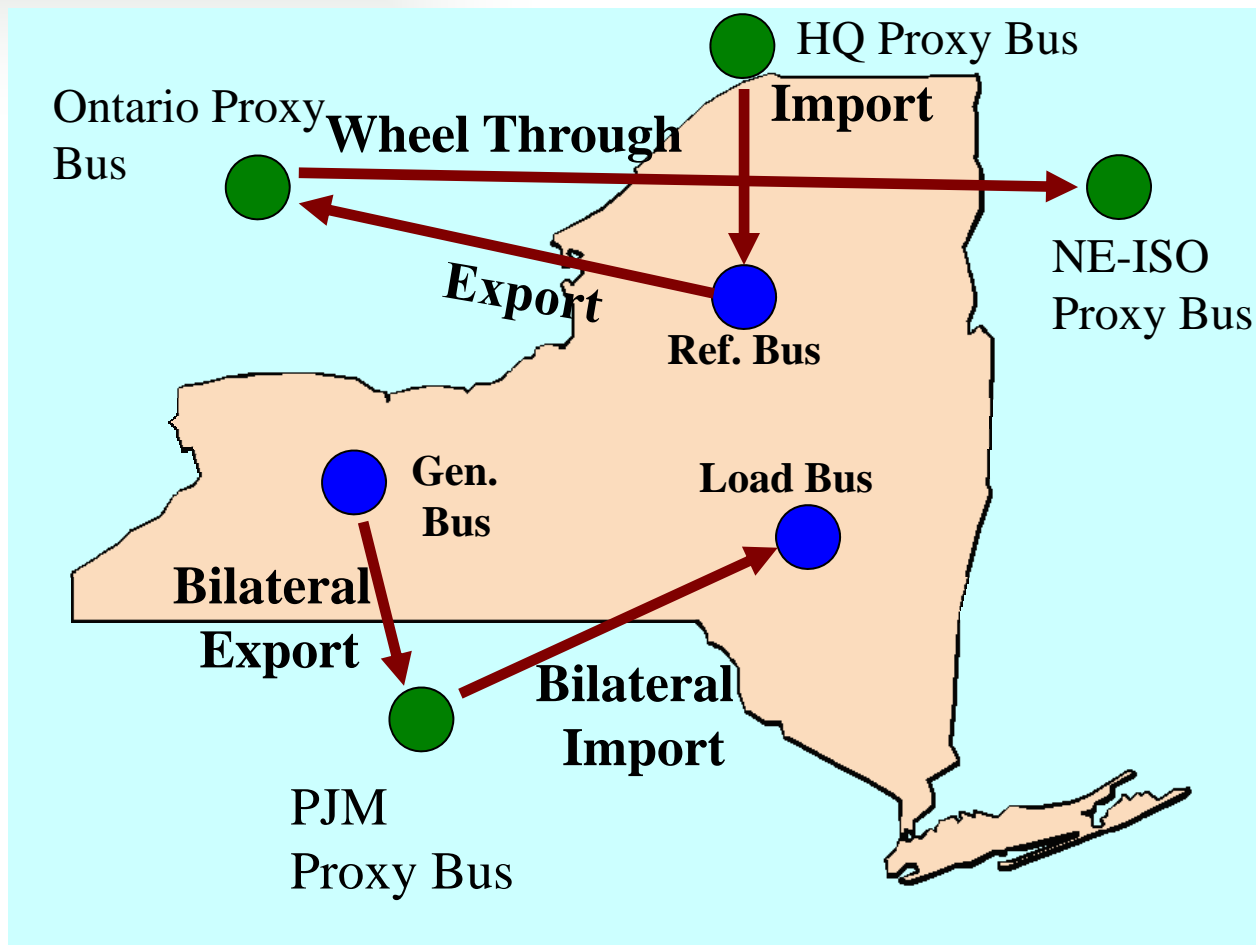
Source: NYISO Independent Market Advisor
2004 State of the Market Report

Average Net Imports from Canada by Hour of Day Weekdays, 2004



Source: NYISO Independent Market Advisor
2004 State of the Market Report

External Transactions

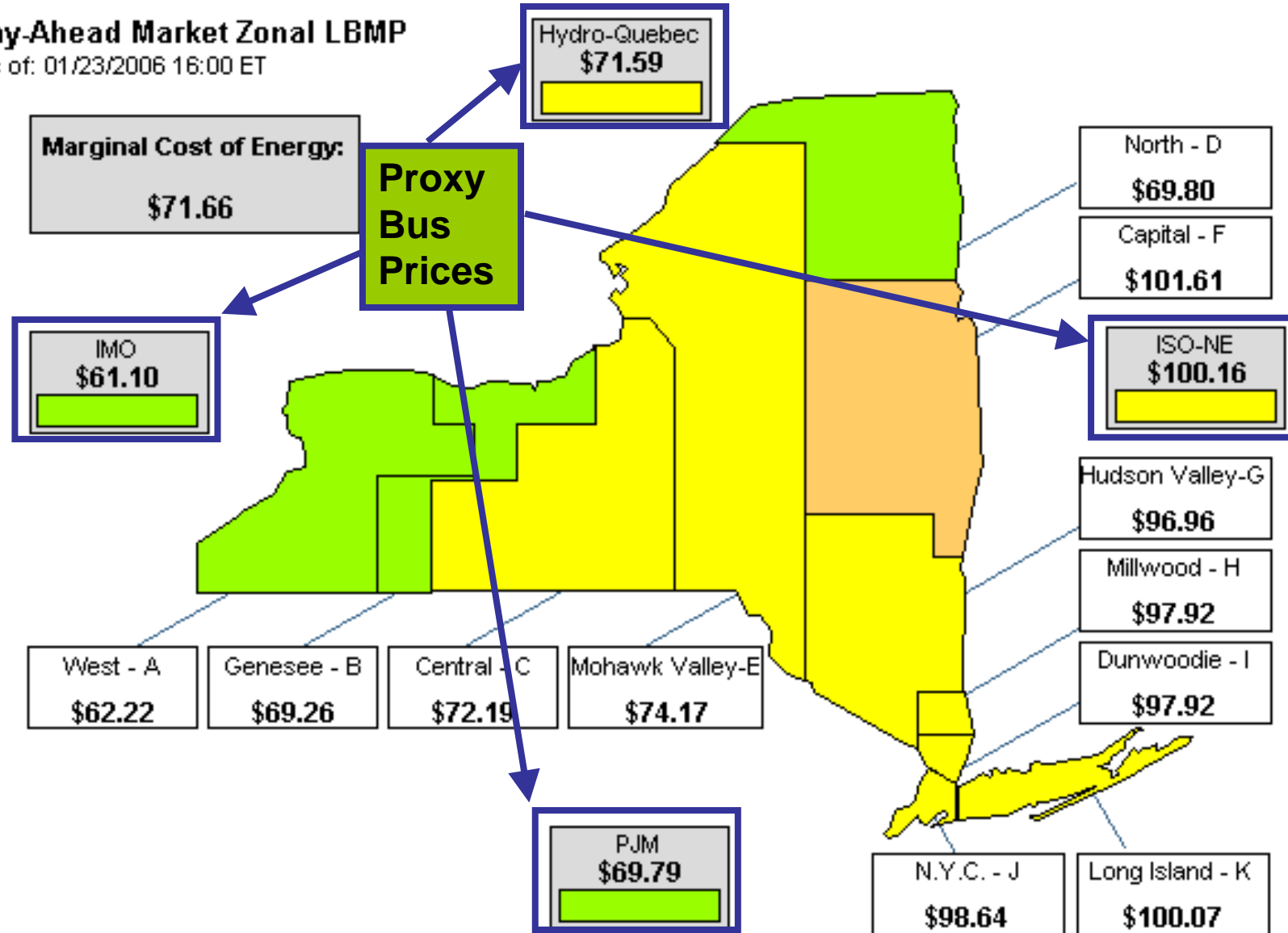


- Proxy buses are New York's representation of the borders with our neighbors
- Are used whenever a Market Participant engages in an external transaction

DAM **HAM** **RT** **Load/Flow**

Day-Ahead Market Zonal LBMP

as of: 01/23/2006 16:00 ET



Questions?

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