



2007 State of the Market Report New York Electricity Markets

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Executive Summary: Introduction

- This presentation provides the results of our assessment of the performance of the New York electricity markets in 2007.
- The New York ISO (“NYISO”) operates the most complete set electricity markets in the U.S. These markets provide substantial benefits:
 - ✓ Day-ahead and real-time markets jointly optimize energy, operating reserves and regulation. These markets lead to:
 - Prices that reflect the value of energy at each location on the network;
 - The lowest cost resources being started each day to meet demand;
 - Delivery of the lowest cost energy to New York’s consumers to the maximum extent allowed by the transmission network.
 - ✓ Capacity markets that ensure that the NYISO markets produce efficient long-term economic signals to govern decisions to:
 - Invest in new generation and demand response resources,
 - Maintain existing resources; and
 - ✓ The market for transmission rights allow participants to hedge the congestion costs associated with using the transmission network;



Executive Summary: Introduction

- The NYISO markets are at the forefront of market design and have been a model for market development in other areas.
- The NYISO was the first RTO market to:
 - ✓ Jointly optimize energy and operating reserve markets that efficiently allocate resources to provide these products.
 - ✓ Impose locational requirements in its operating reserve and capacity markets – the locational requirements play a crucial role in signaling the need for resources in transmission-constrained areas.
 - ✓ Introduce capacity demand curves that reflect the value of incremental capacity to the system and provide for increased stability in market signals.
 - ✓ Operating reserve demand curves that contribute to efficient prices during shortage conditions when resources are insufficient to satisfy both the energy and operating reserve needs of the system.



Executive Summary: Unique Aspects of the NYISO Markets

- In addition to its leadership in the areas listed above, the NYISO remains the only market to have:
 - ✓ *An optimized real-time commitment system to start gas turbines and schedule external transactions economically -- other RTOs rely on their operators to determine when to start gas turbines.*
 - ✓ *A mechanisms that allows gas turbines to set energy prices when they are economic -- gas turbines frequently do not set prices in other areas because they are inflexible and it distorts the prices in the real-time market.*
 - ✓ *A real-time dispatch system that is able to optimize over multiple periods (up to 1 hour), which allows the market to anticipate upcoming needs and move resources to efficiently satisfy the needs.*
 - ✓ *“Ex-ante” real-time prices that are consistent with the real-time market dispatch. Other RTOs use an “ex-post” pricing method that can result in less efficient prices that are not consistent with dispatch signals.*
 - ✓ *A mechanism that allows demand-response resources to set energy prices when they needed, this is essential for ensuring that prices signals are efficient during shortages. DR in other RTOs has distorted real-time signals by undermining the shortage pricing.*



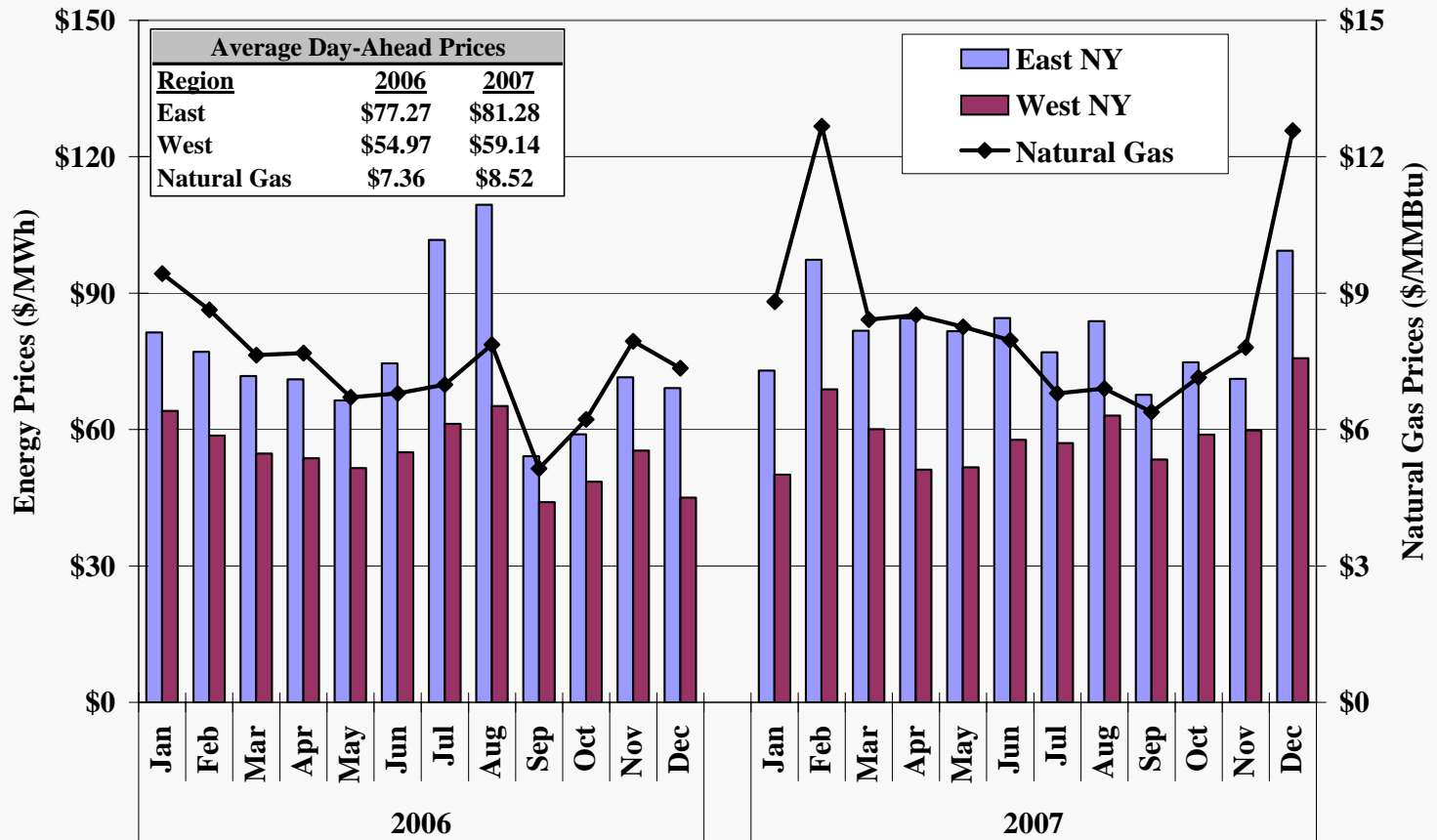
Executive Summary

Overall Market Performance and Prices

- The energy and ancillary services (operating reserves and regulation) markets performed competitively in 2007.
 - ✓ This report shows no evidence that suppliers have been withholding generation to inflate energy or ancillary services prices.
 - ✓ Recent rule changes should address the competitive issues in the NYISO capacity market in 2008.
- Energy prices increased 6 to 12 percent in most areas outside Long Island.
 - ✓ This is primarily due to fuel prices in 2007. Natural gas prices increased 15 percent on average.
 - ✓ The increase was partly offset by:
 - Substantial new transmission capacity that was added from New Jersey to Long Island in July 2007. The additional 660 MW of import capability led to a 3 percent decline in Long Island prices.
 - Milder summer weather, which reduced the frequency of real-time shortages 80 percent relative to the summer of 2006.



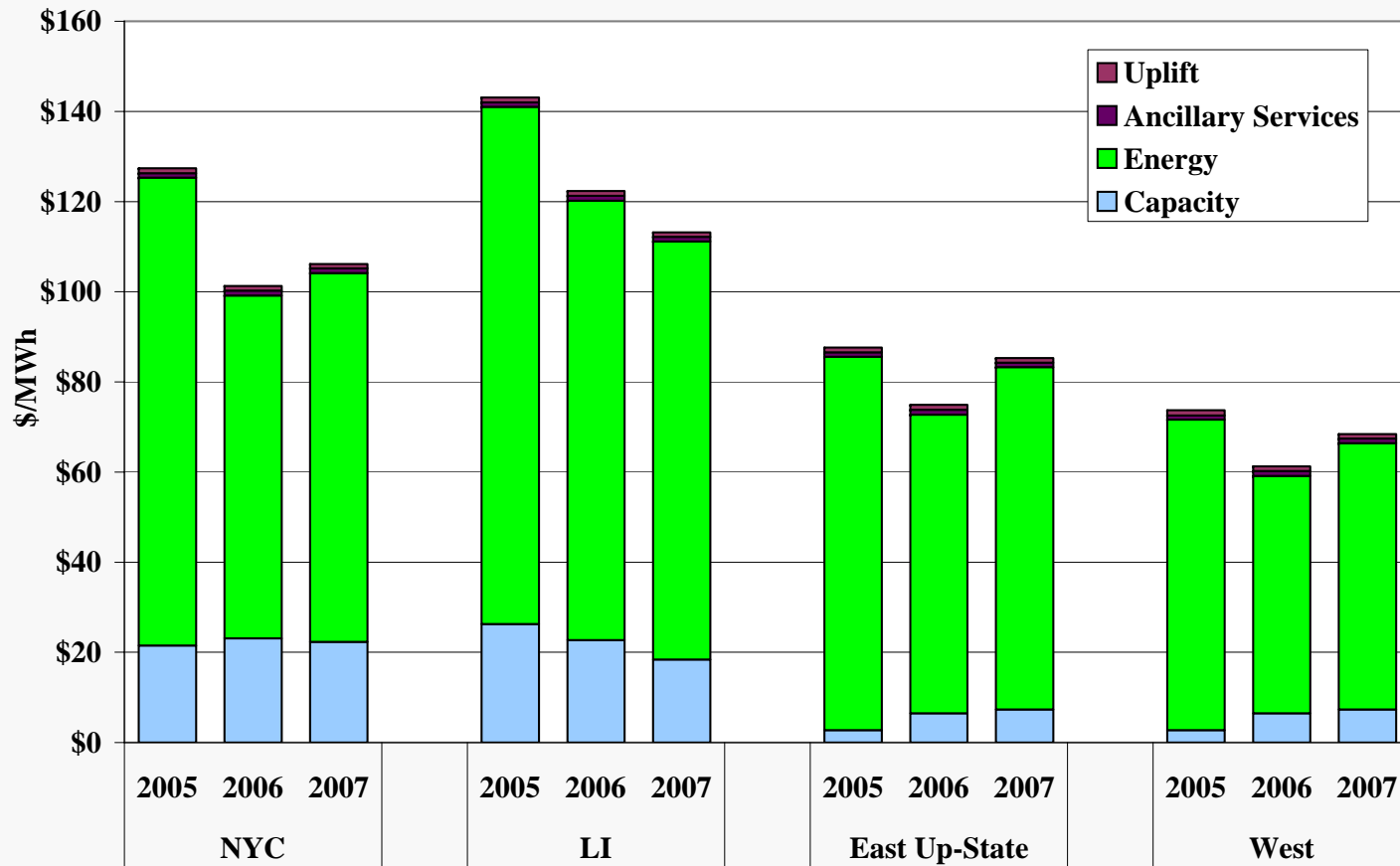
Day-Ahead Electricity and Natural Gas Prices 2006 – 2007



Note: The electricity prices are load-weighted averages.

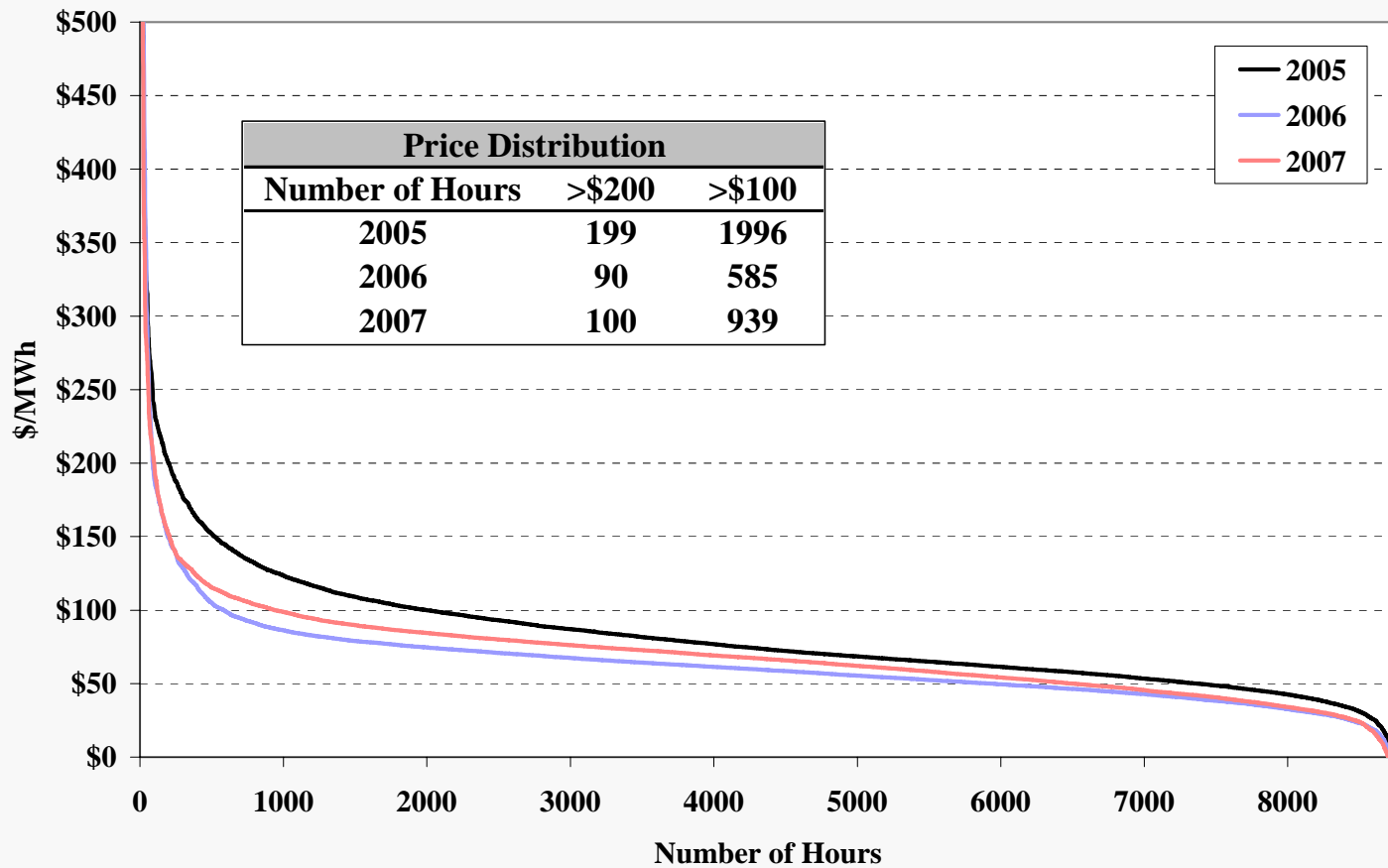


Average All-In Price 2005 – 2007

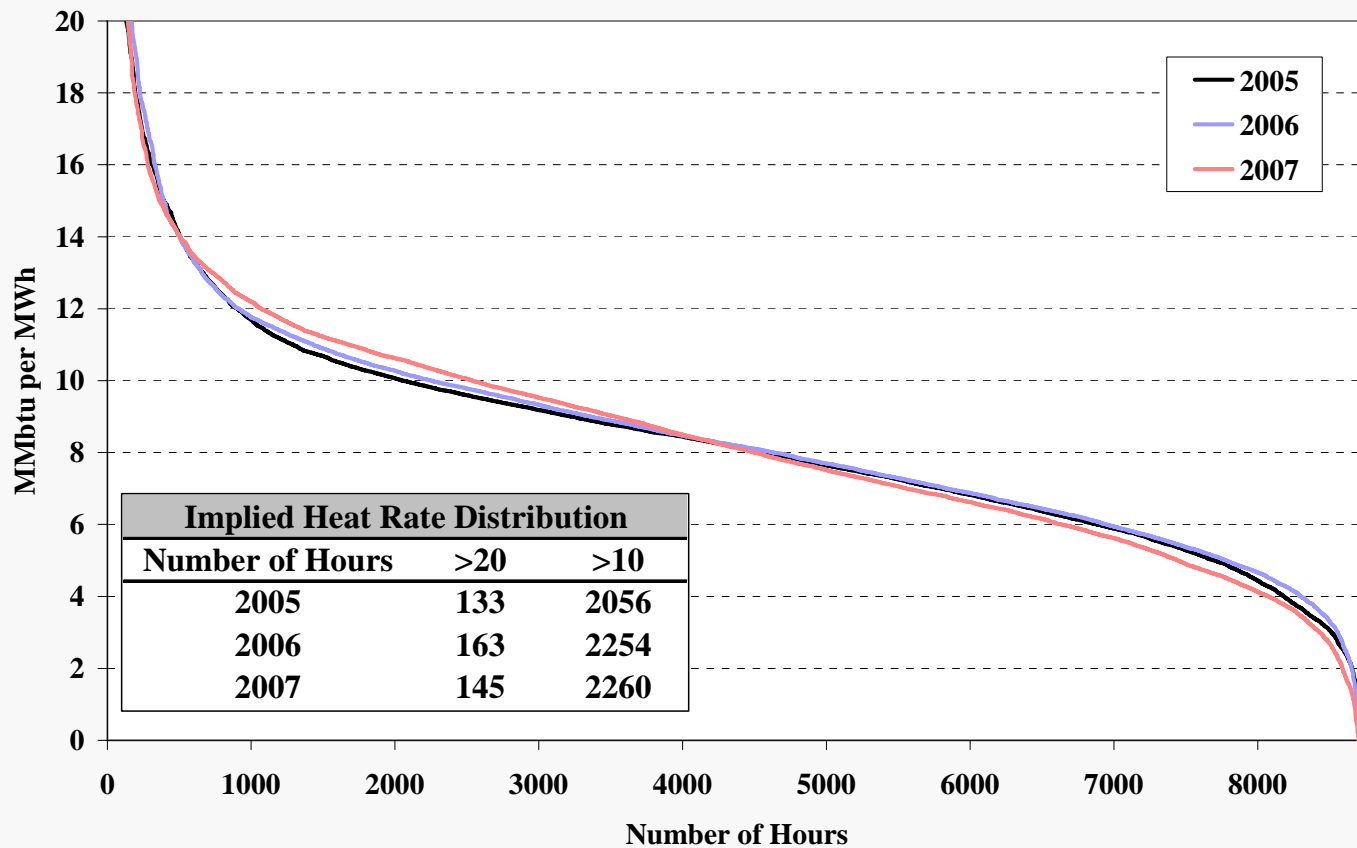




Price Duration Curves State-wide Average Real-Time Price, 2005 – 2007



Implied Marginal Heat Rate Duration Curves Based on State-wide Average Real-Time Price, 2005 – 2007





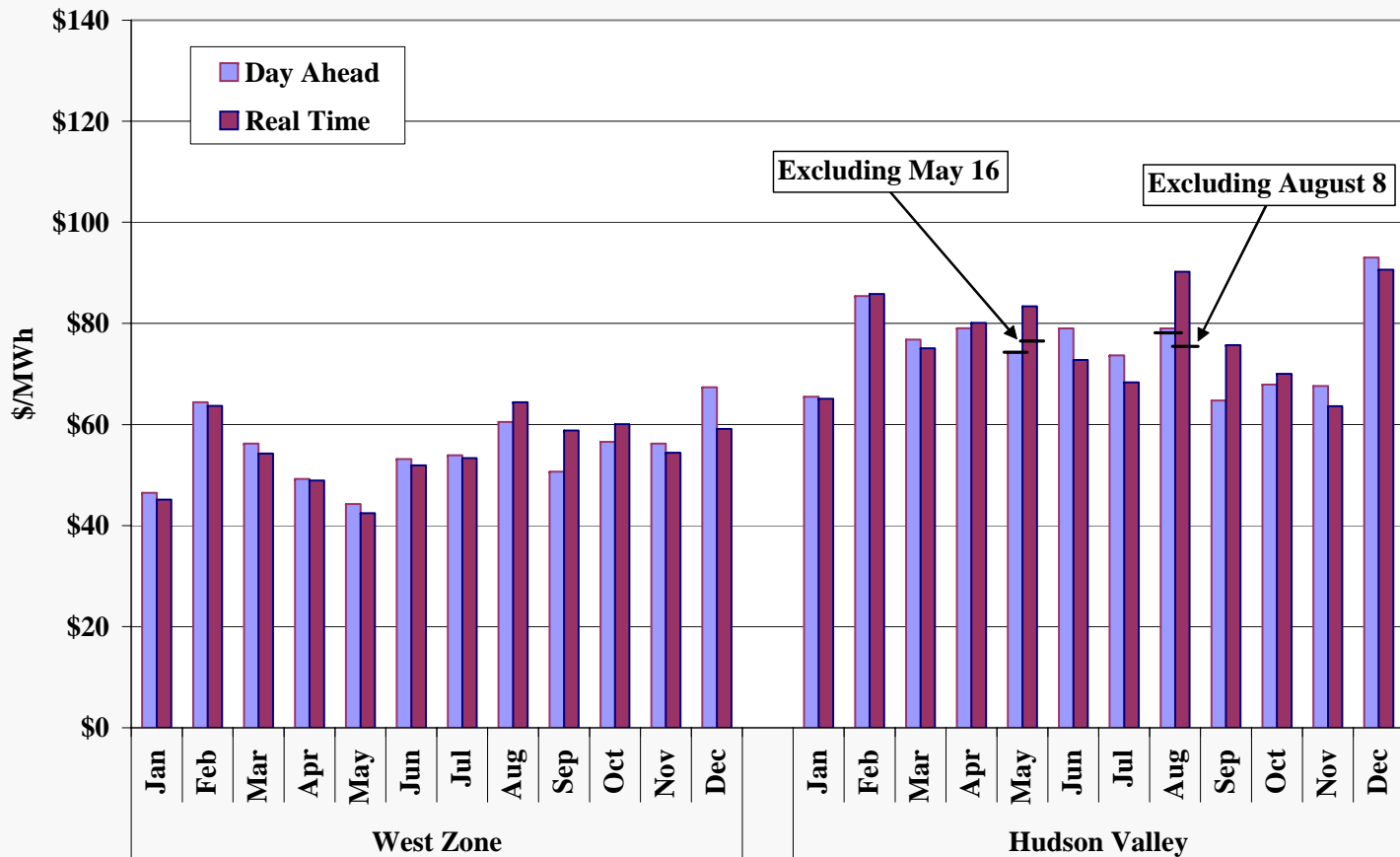
Executive Summary

Market Performance and Prices (cont.)

- Prices between New York and adjacent markets have not been well-arbitraged.
 - ✓ This is particularly important during peak conditions when adjusting the flow is more likely to have a substantial price impact.
 - ✓ The report includes several recommendations to address this issue.
- Convergence between prices in the day-ahead and real-time markets is important because the day-ahead market plays an important role in determining which resources are started each day.
 - ✓ Convergence in the energy markets continues to be good in most areas.
 - ✓ However, price convergence at specific locations within New York City was not as good as in other areas in the State. The NYISO is considering a proposal to address this issue.
 - ✓ Convergence in the operating reserve market was better in 2007, but still needs improvement. The report includes two recommendations to address this issue.



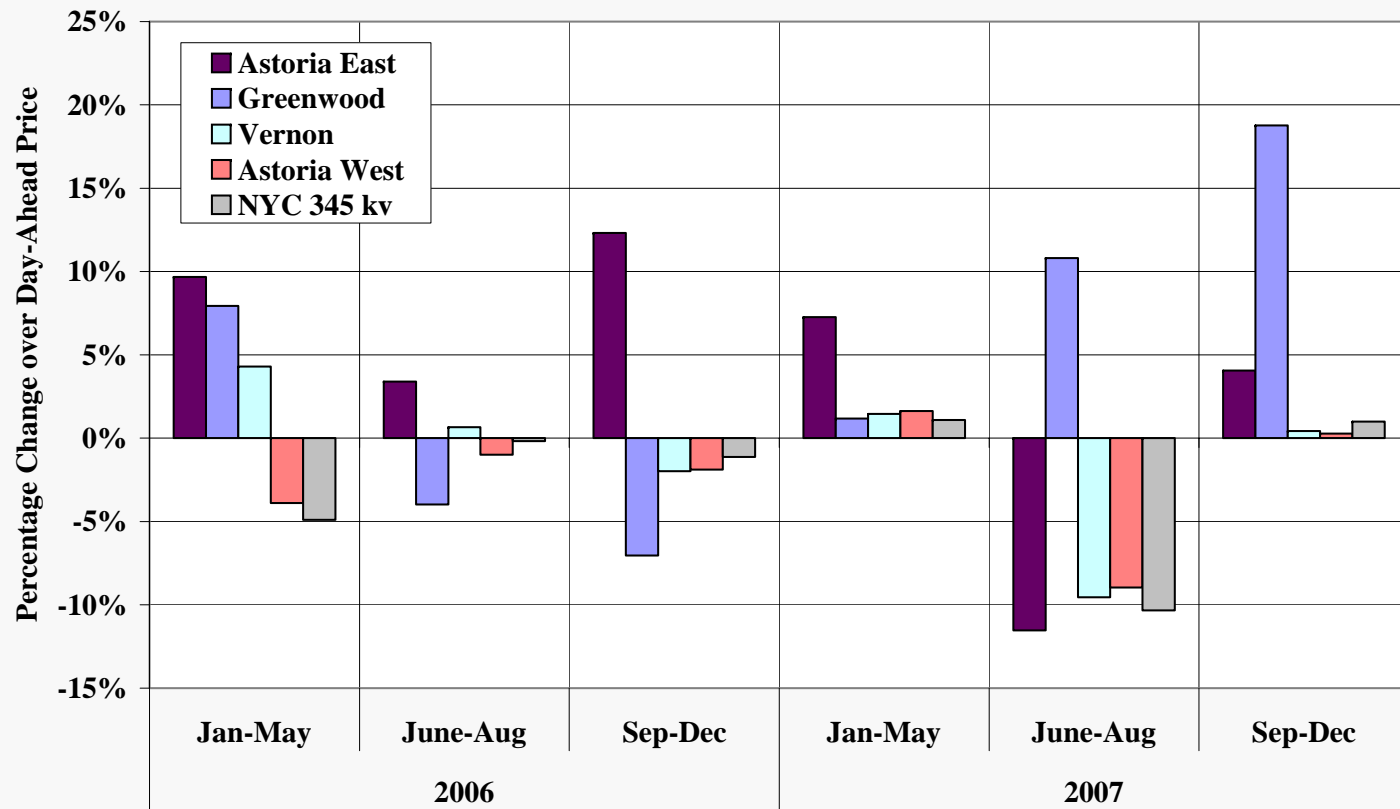
Average Monthly Day-Ahead and Real-Time Energy Prices West Zone and Hudson Valley, 2007



Note: The prices are load-weighted averages.



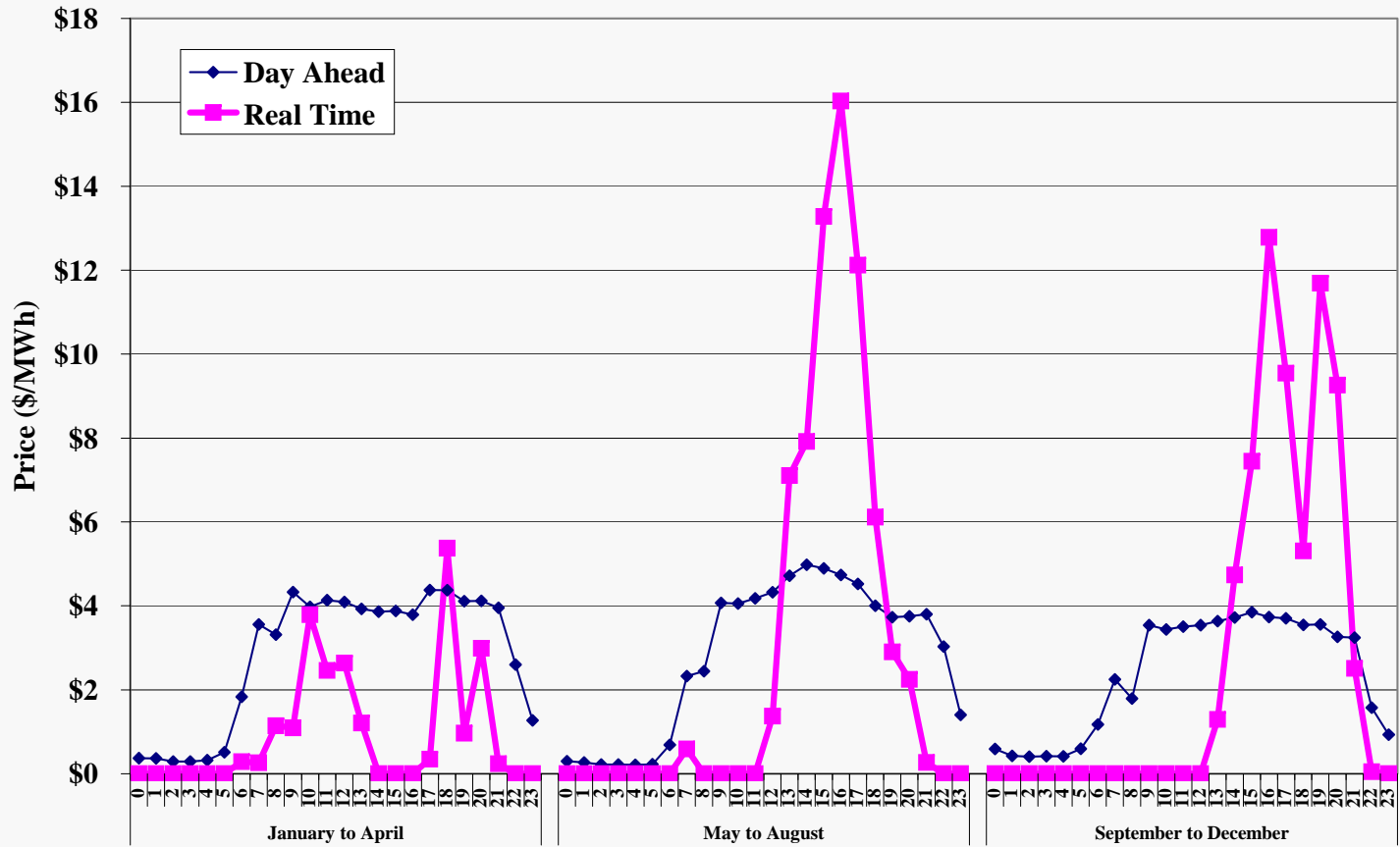
Average Real-Time Price Premium in NYC Load Pockets 2006-2007



Note: The prices are load-weighted averages. Individual generator buses were used to represent the areas listed in the figure: Astoria GT 2/1 for Astoria East, Gowanus GT 1/1 for Greenwood, Ravenswood 1 for Vernon, Astoria GT 10 for Astoria West, and Poletti for the New York City 345kV area.



10-Minute Total Reserve Prices in East NY by Hour of Day, 2007





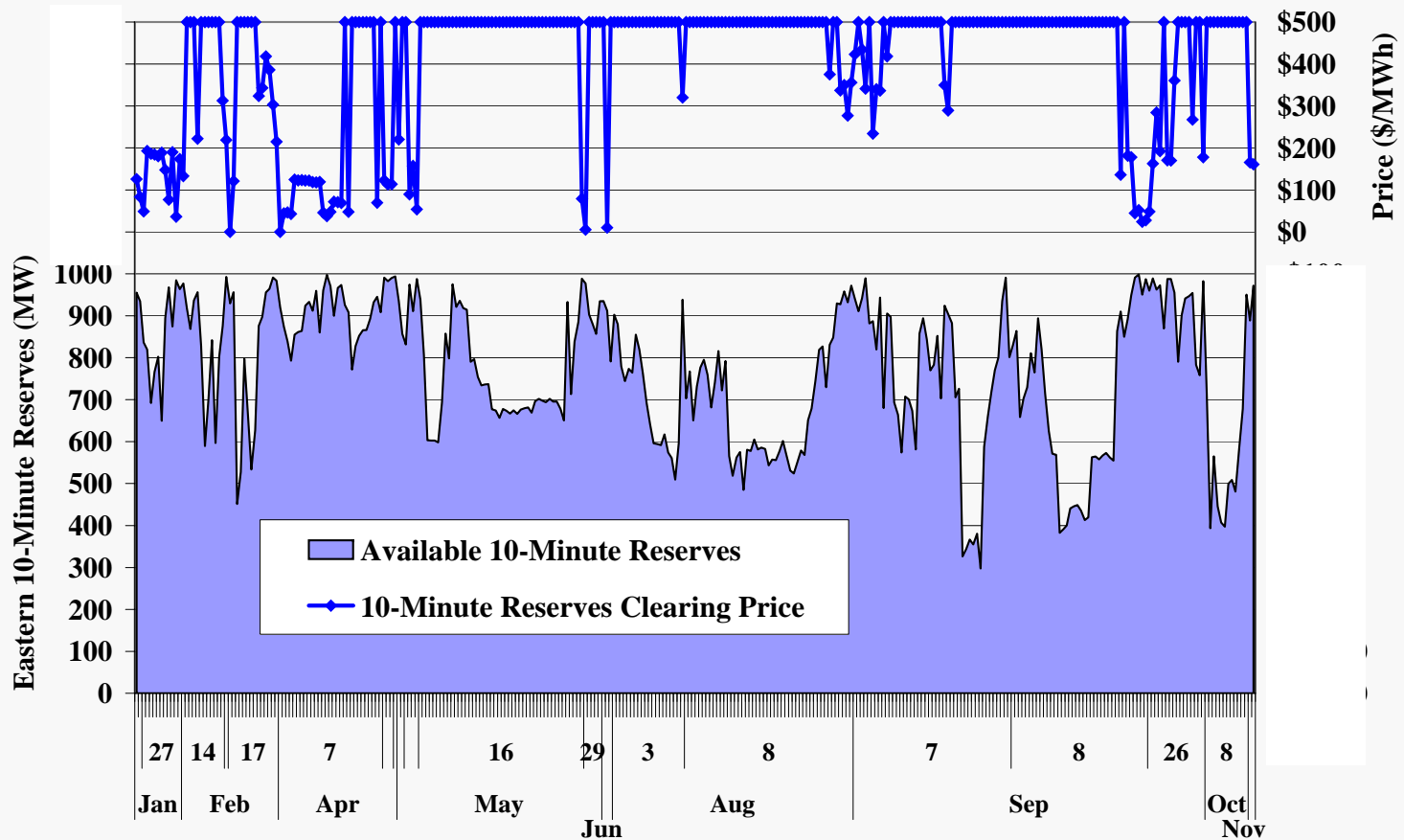
Executive Summary

Market Performance during Shortage Conditions

- Prices that occur under shortage conditions are an important contributor to efficient long-term price signals.
- Very high prices that reflect the diminished reliability of the system (“shortage pricing”) should occur when resources are insufficient to meet the energy and operating reserves needs of the system, including:
 - ✓ During operating reserve shortages;
 - ✓ When transmission constraints are not fully resolved; or
 - ✓ During activation of NYISO Reliability Based Emergency Demand Response resources.
- *Operating Reserve Shortages*: The markets produced prices reflecting shortage conditions during most reserve shortages in 2007.
 - ✓ 72 percent of the instances of physical shortages of eastern 10-minute reserves were accompanied by corresponding shortage prices.
 - ✓ The report includes a proposal to improve these results.



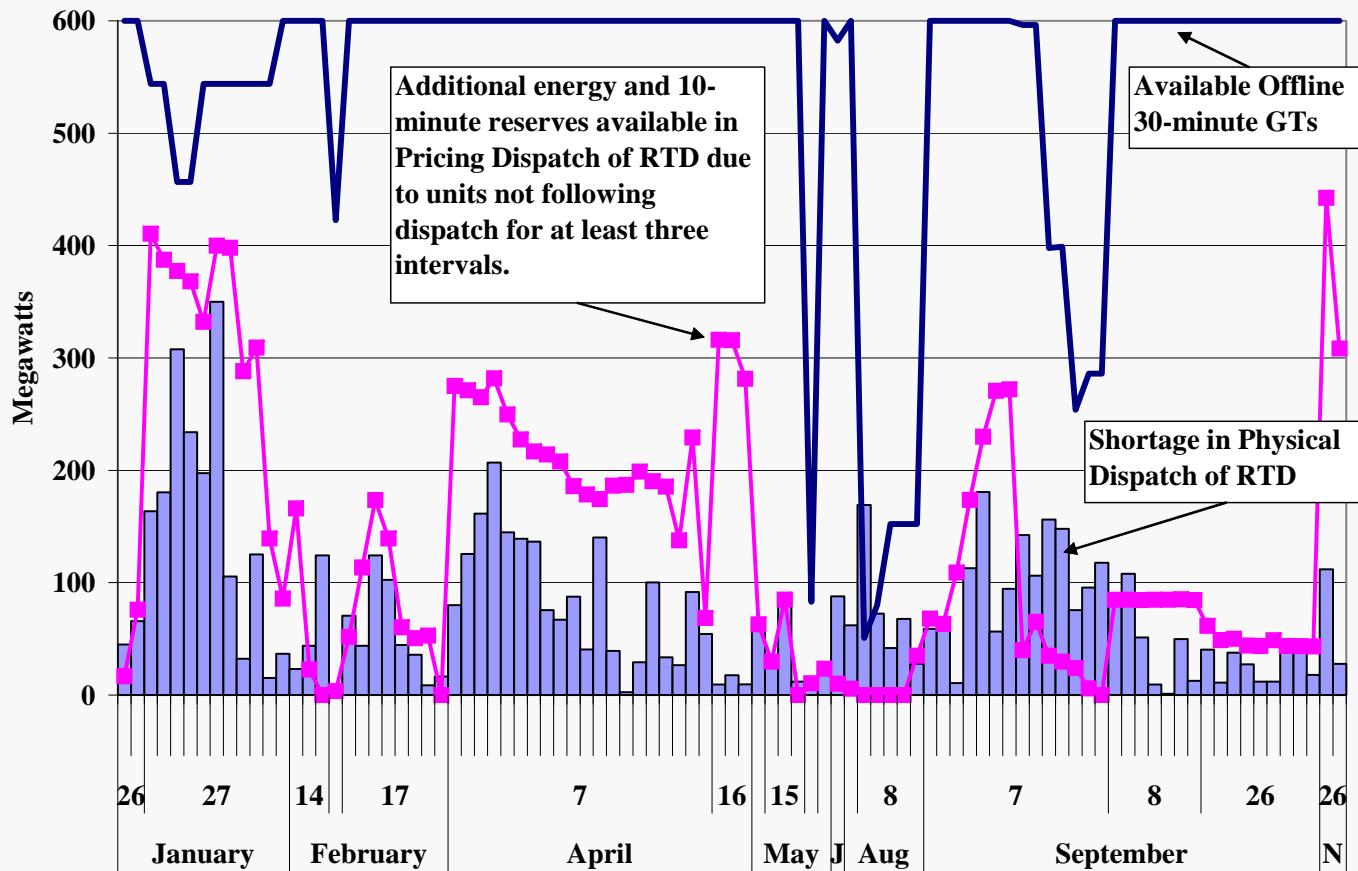
Scheduling and Pricing of 10-Minute Reserves in the East During Physical Shortage Intervals – 2007



Note: In cases where the East 10-Minute Non-Spin price exceeds \$500/MWh, the figure shows \$500/MWh.



Impact of Units Not Following Dispatch Instructions Shortage Intervals without Shortage Pricing, 2007



Note: In cases where the amount of available offline 30-minute GTs exceeds 600 MW, the figure shows 600 MW.



Executive Summary

Market Performance during Shortage Conditions (cont.)

- *Unresolved Transmission Constraints:* During such periods, the markets had fewer price corrections in 2007.
 - ✓ In June 2007, the NYISO implemented “Transmission Shortage Pricing,” which greatly reduced the frequency of price corrections during such periods.
 - ✓ Reliable price signals are especially important in periods of extreme scarcity.
- *Activation of NYISO Reliability Based Emergency Demand Response:* New operating procedures improved the efficiency of prices during such periods.
 - ✓ In July 2007, the NYISO implemented the Targeted Demand Response Provider (“TDRP”) program, which enables the local TO to activate small blocks of TDRP resources for local issues.
 - ✓ Previously, the TO activated resources in the entire zone when it had a local problem. This can lead to uneconomic curtailments, depressed energy prices, and increased uplift.
 - ✓ The report includes one recommendation to further improve shortage pricing during the activation of demand response.



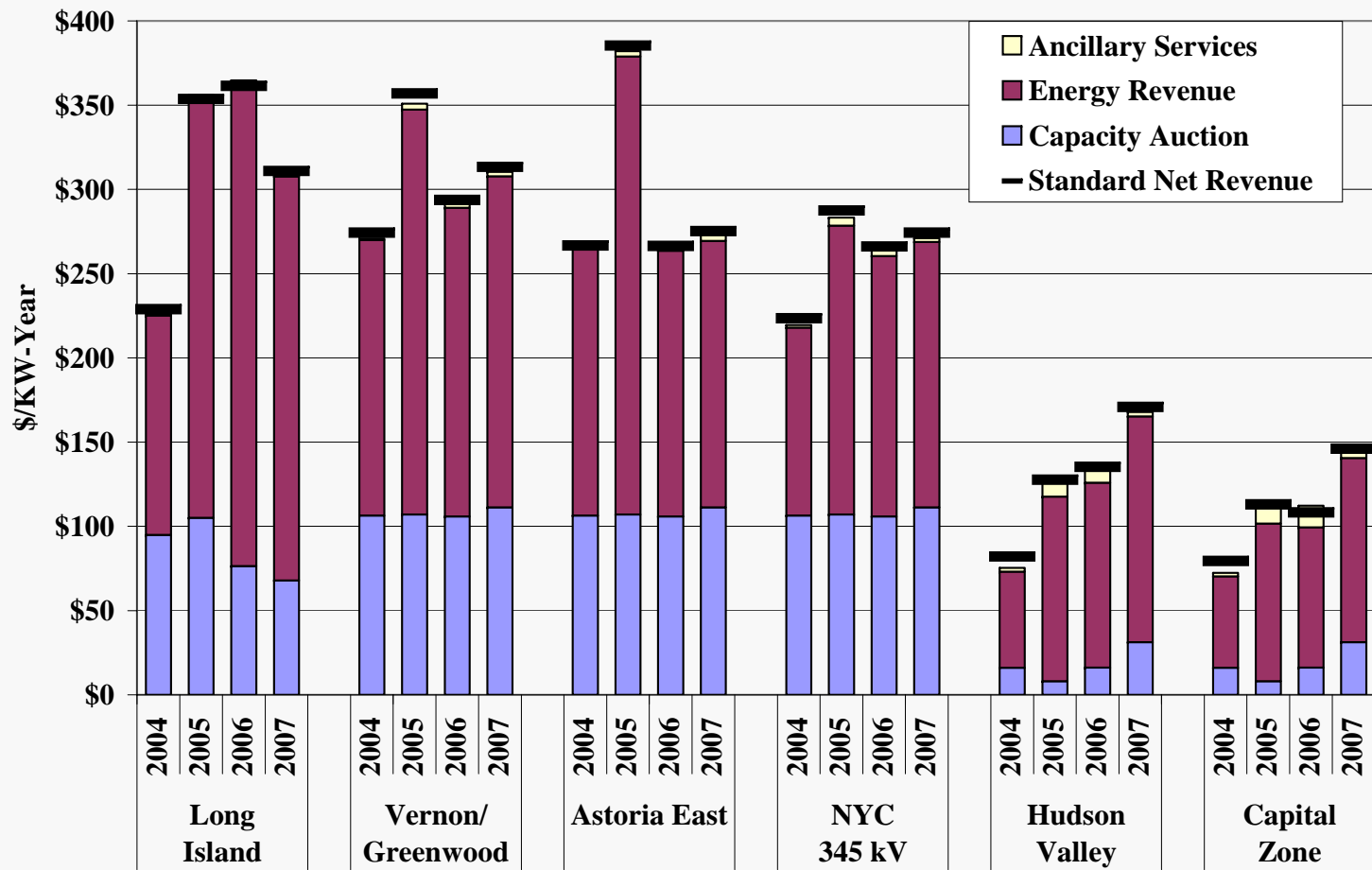
Executive Summary

Long-Term Economic Signals

- The report shows that prices in 2007 would not support investment in new peaking generation in most locations.
 - ✓ This is consistent with short-term conditions because there is a surplus of generation in most areas and the summer weather was relatively mild.
 - ✓ Price signals will be affected over the next few years by increasing load, unit retirements and additions, and the introduction of new mitigation measures in the capacity market.
- The report shows that market signals have generally shifted in favor of investment in baseload and intermediate resources that, while more costly to build, are less costly to run and produce more electricity.
 - ✓ Over time, the markets provide efficient incentives to invest in a diverse array of generating resources, demand response resources, and transmission.
 - ✓ Currently, market conditions appear most favorable for investment in combined-cycle generation, which have constituted most of the recent entry.
 - ✓ Depending on the entry costs for a CC (we do not have reliable estimates), it may be economic to build a CC in some areas under the current market conditions.

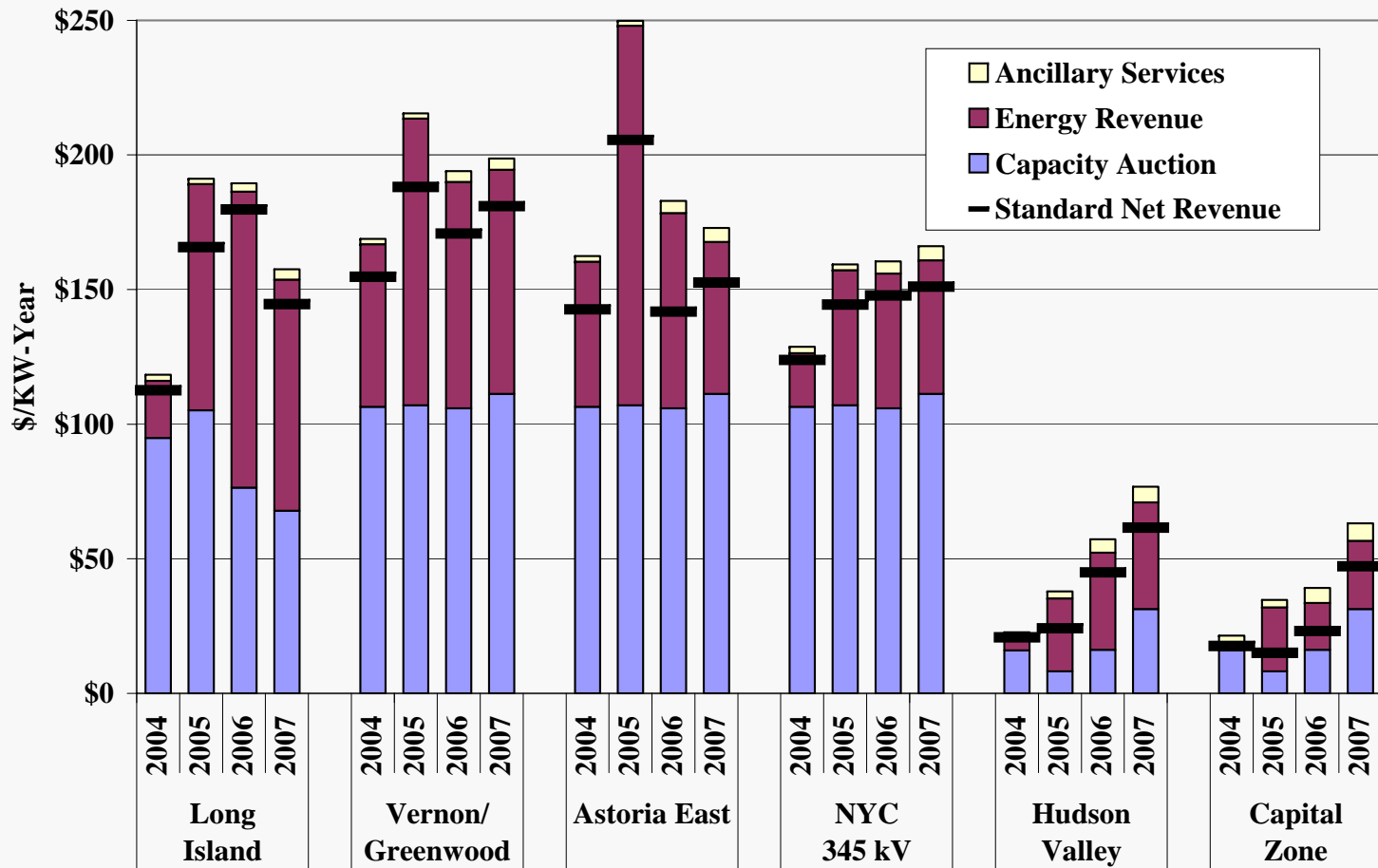


Enhanced Net Revenue Analysis Gas Combined-Cycle Unit, 2004 – 2007



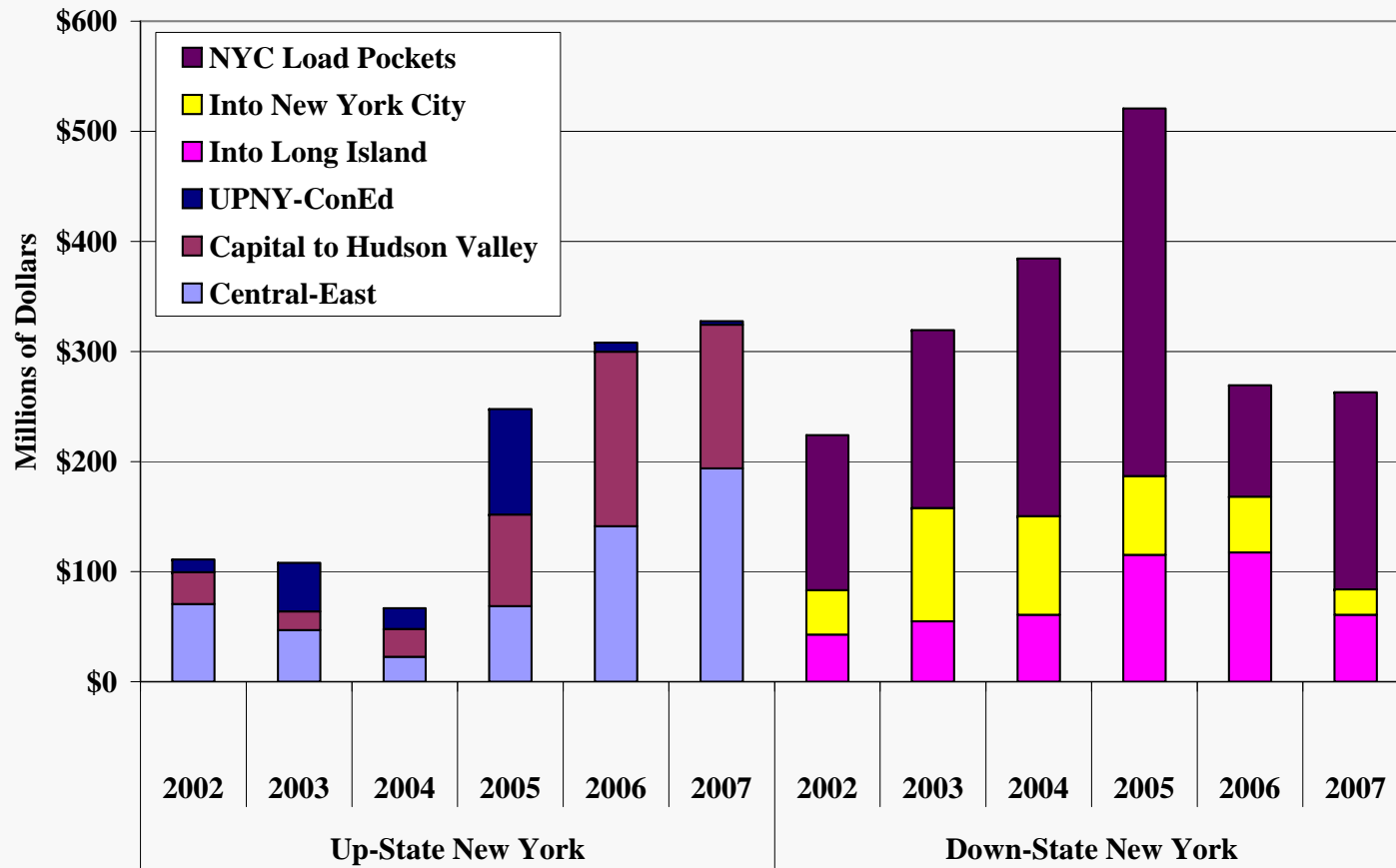


Enhanced Net Revenue Analysis Gas Combustion Turbine, 2004 – 2007



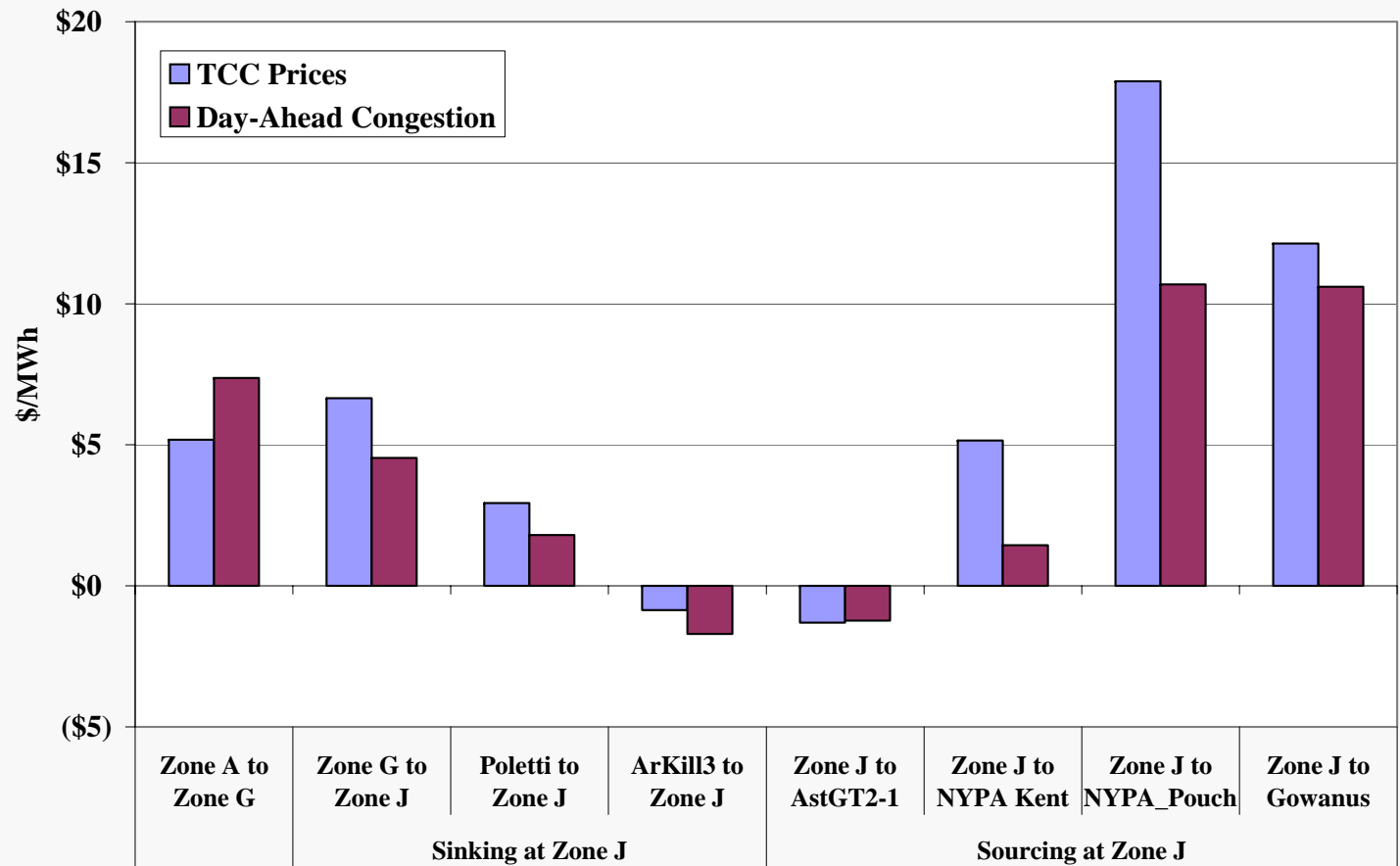


Value of Real-Time Congestion on Major Interfaces 2002 – 2007



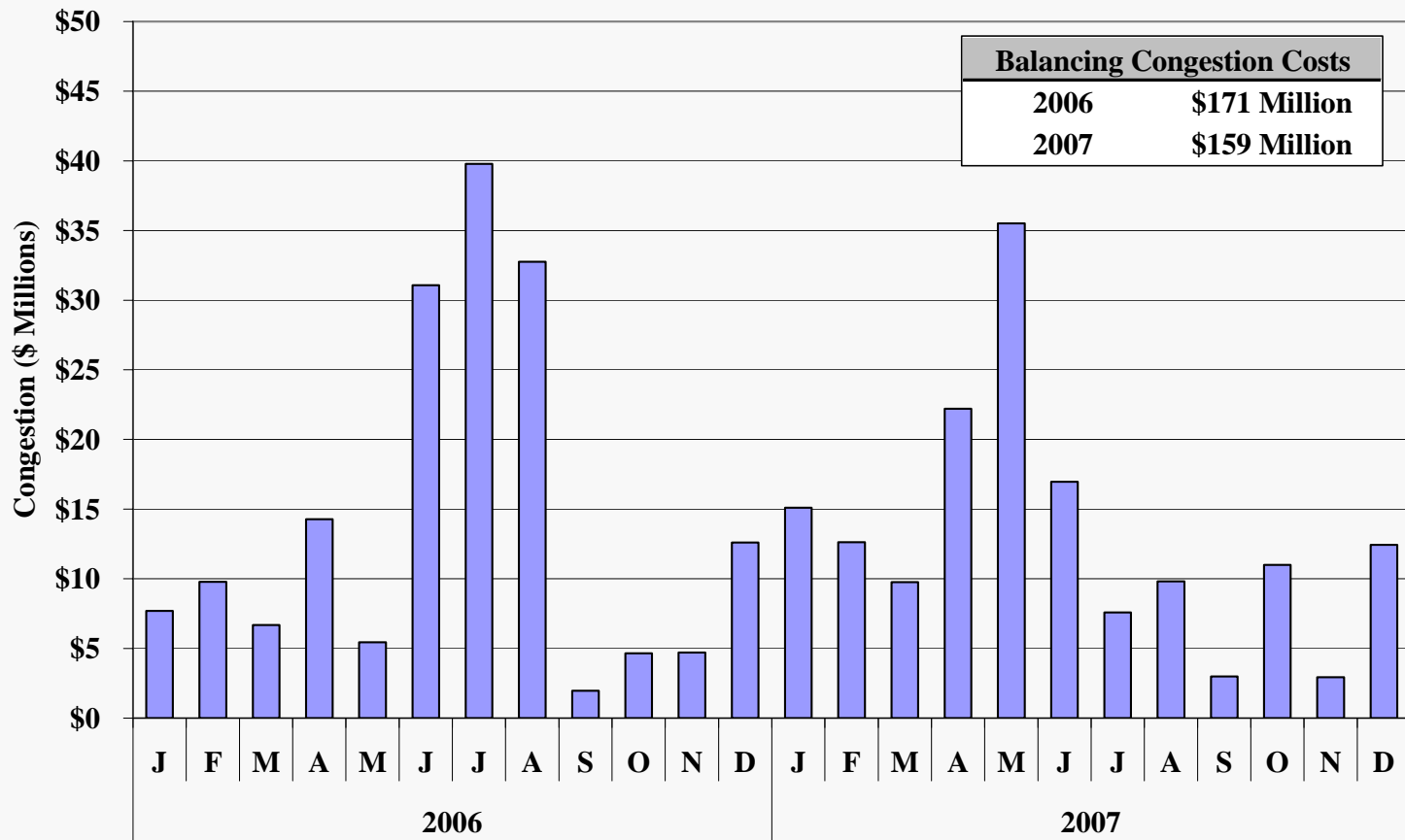


TCC Prices and Day-Ahead Congestion May to October 2007





Balancing Congestion Costs 2006-2007





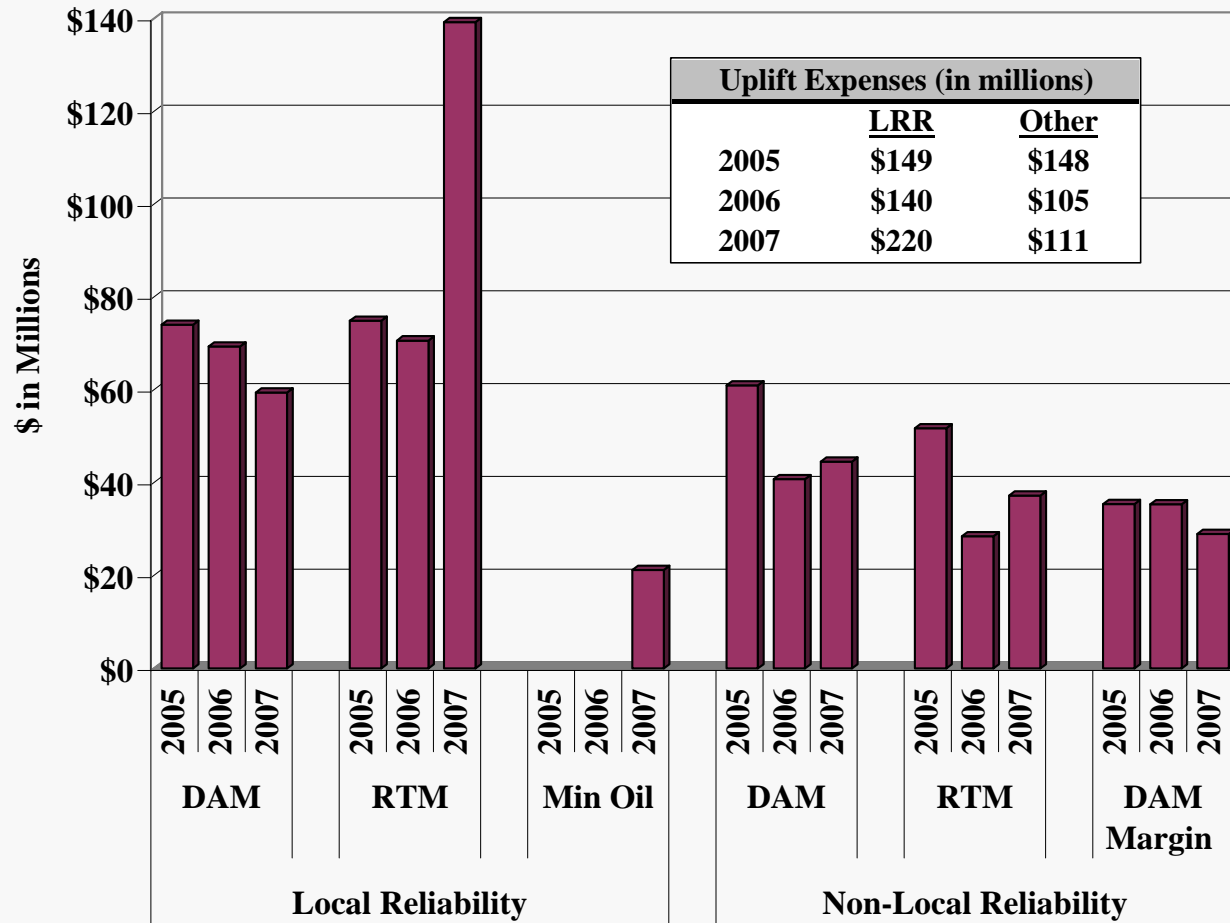
Executive Summary

Uplift Costs

- Local reliability uplift charges increased by \$80 million from 2006 to 2007.
 - ✓ Approximately 75 percent of the increase is associated with payments to generators that are committed for local reliability after the Day-ahead Market.
 - In response to the prior recommendations, the NYISO is developing a proposal to better integrate commitments for local reliability in the Day-Ahead Market.
 - This should reduce the uplift and market inefficiencies that result from local reliability commitments.
 - ✓ The rest of the increase is from payments to generators that must burn fuel oil uneconomically to satisfy New York City reliability requirements.
- Non-local reliability uplift payments to generators have declined \$37 million since 2005.
 - ✓ This reduction is primarily due to more efficient use of peaking resources, which can be attributed to refinements of the real-time scheduling software.
 - ✓ Lower natural gas prices have also helped reduce this category of uplift.

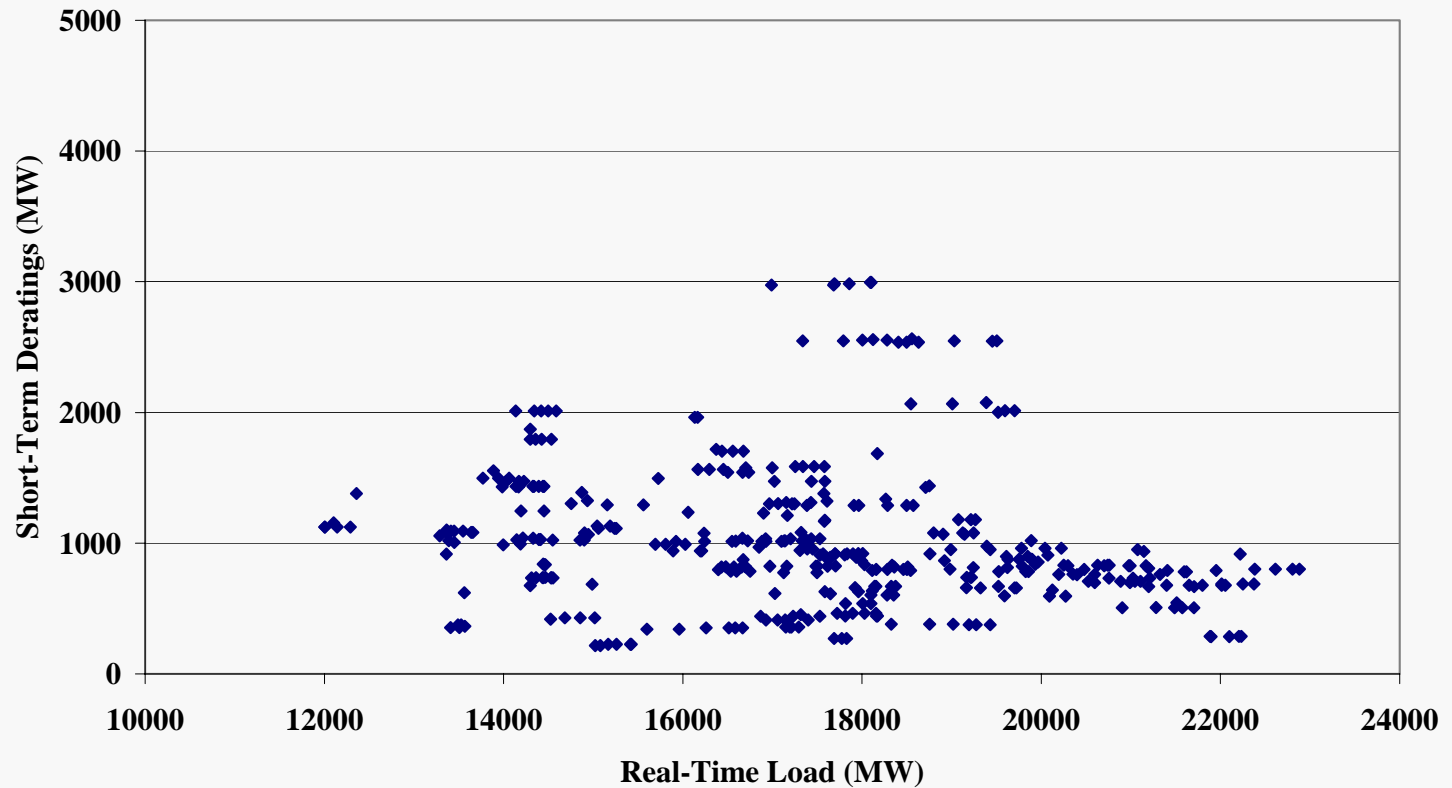


Uplift Expenses from Guarantee Payments 2005 to 2007





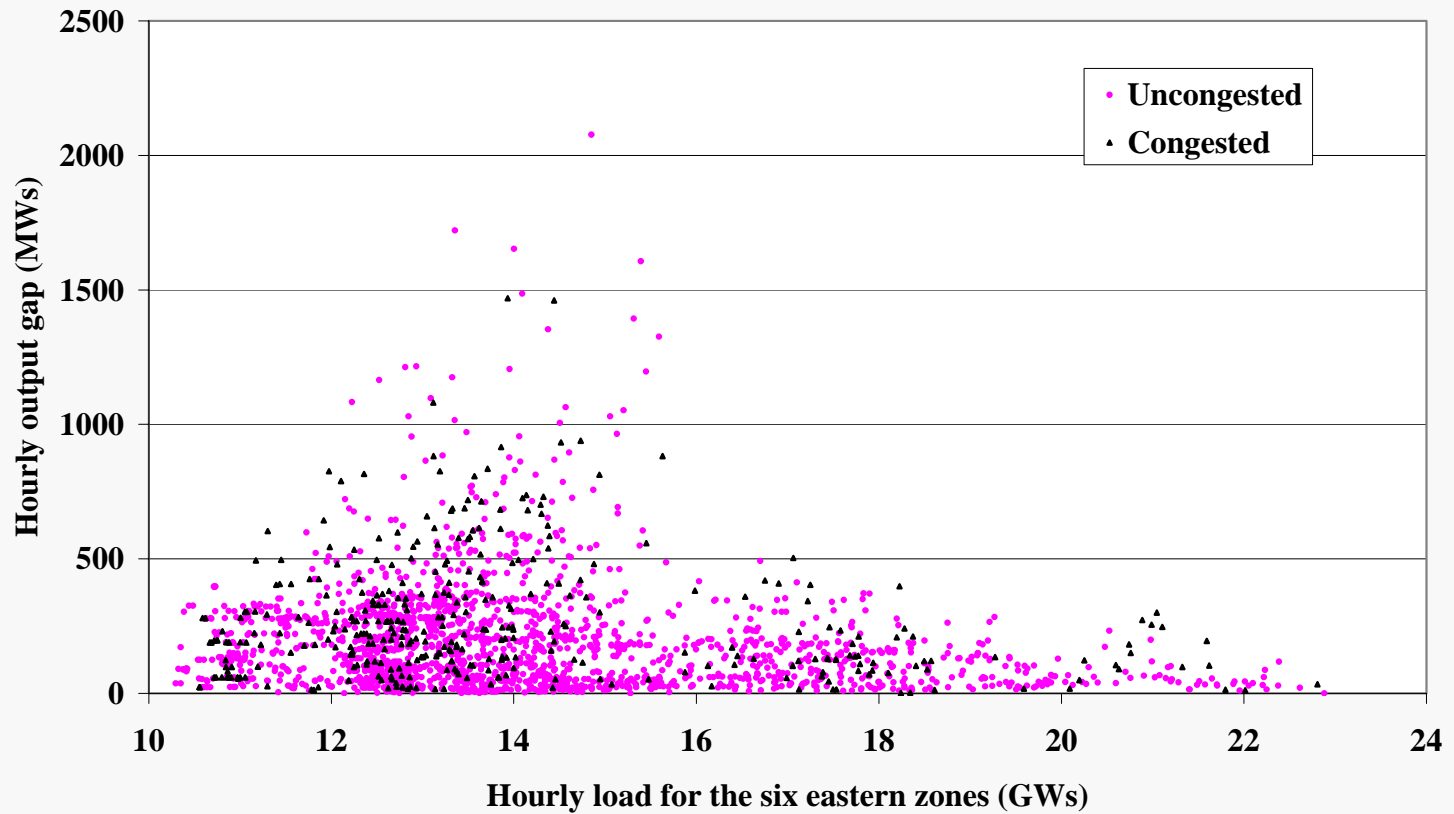
Short-Term Deratings versus Actual Load in Eastern NY Day-Ahead Market, Peak Hours*, Summer 2007



* Peak hours are defined as weekdays from 12 PM to 6 PM for purposes of this analysis.



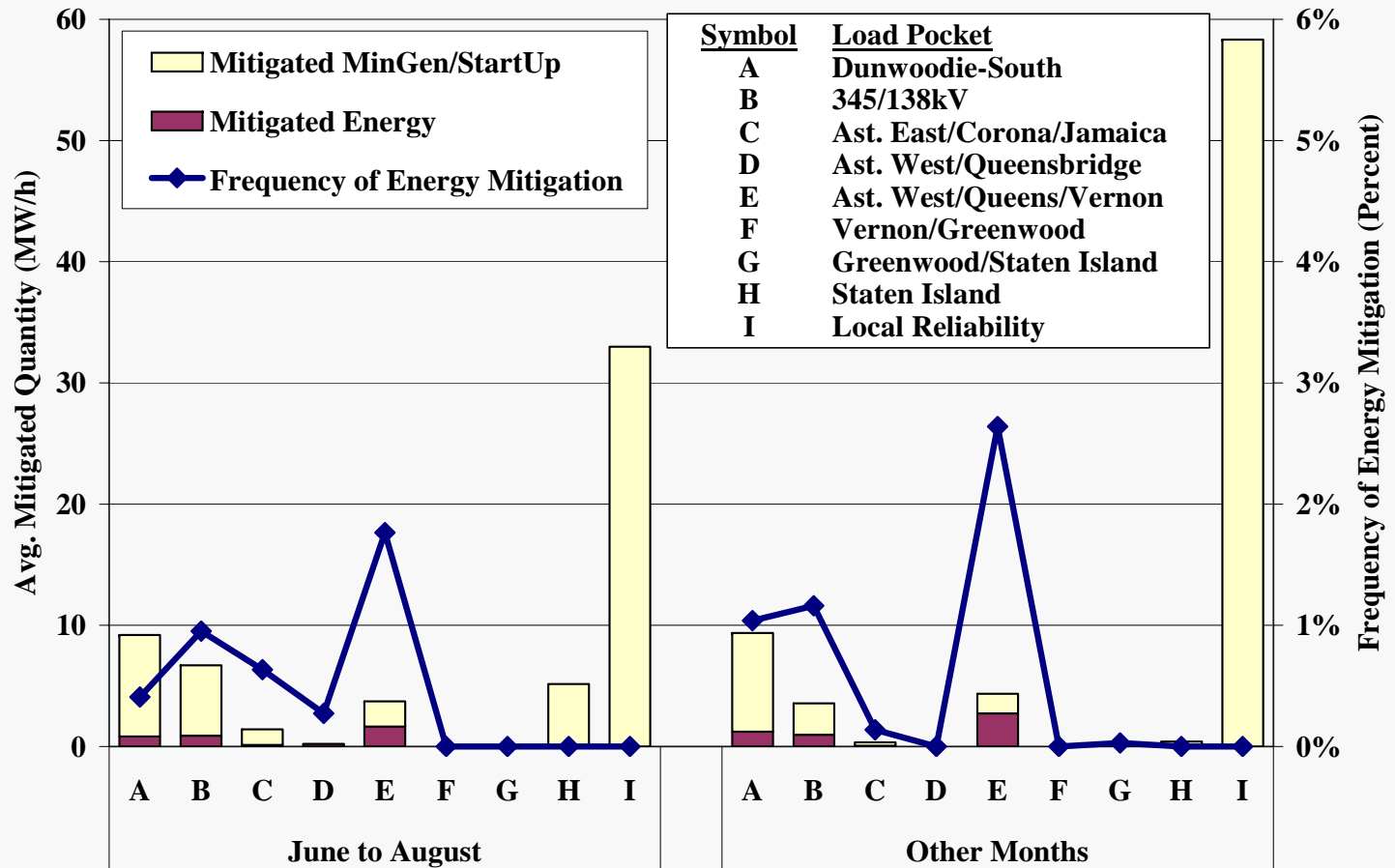
Output Gap at Lower Threshold vs. Actual Load in East NY Real-Time Market, Peak Hours*, 2007



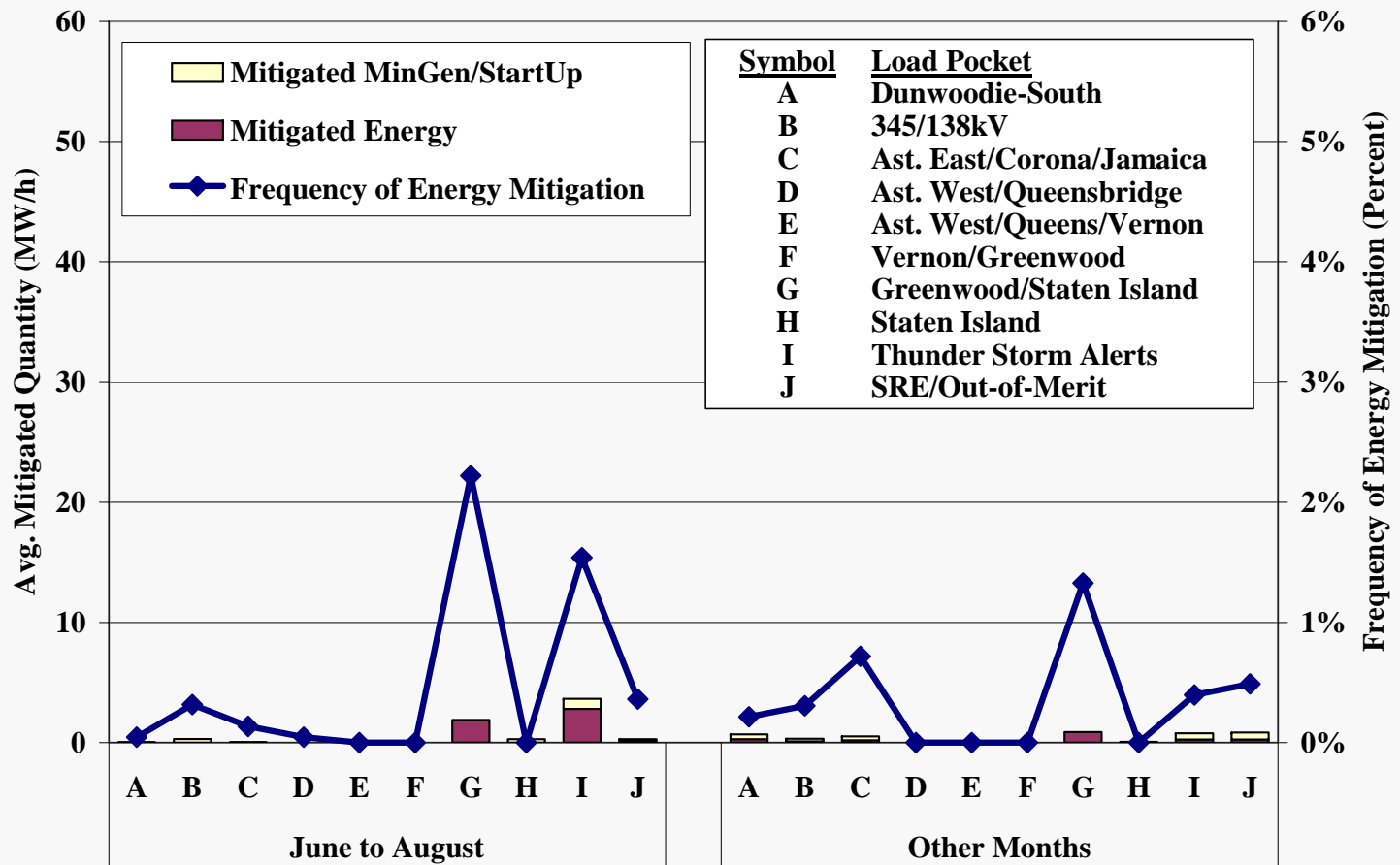
* Peak hours are defined as weekdays from 12 PM to 6 PM for purposes of this analysis.



Summary of Day-Ahead Mitigation New York City -- 2007

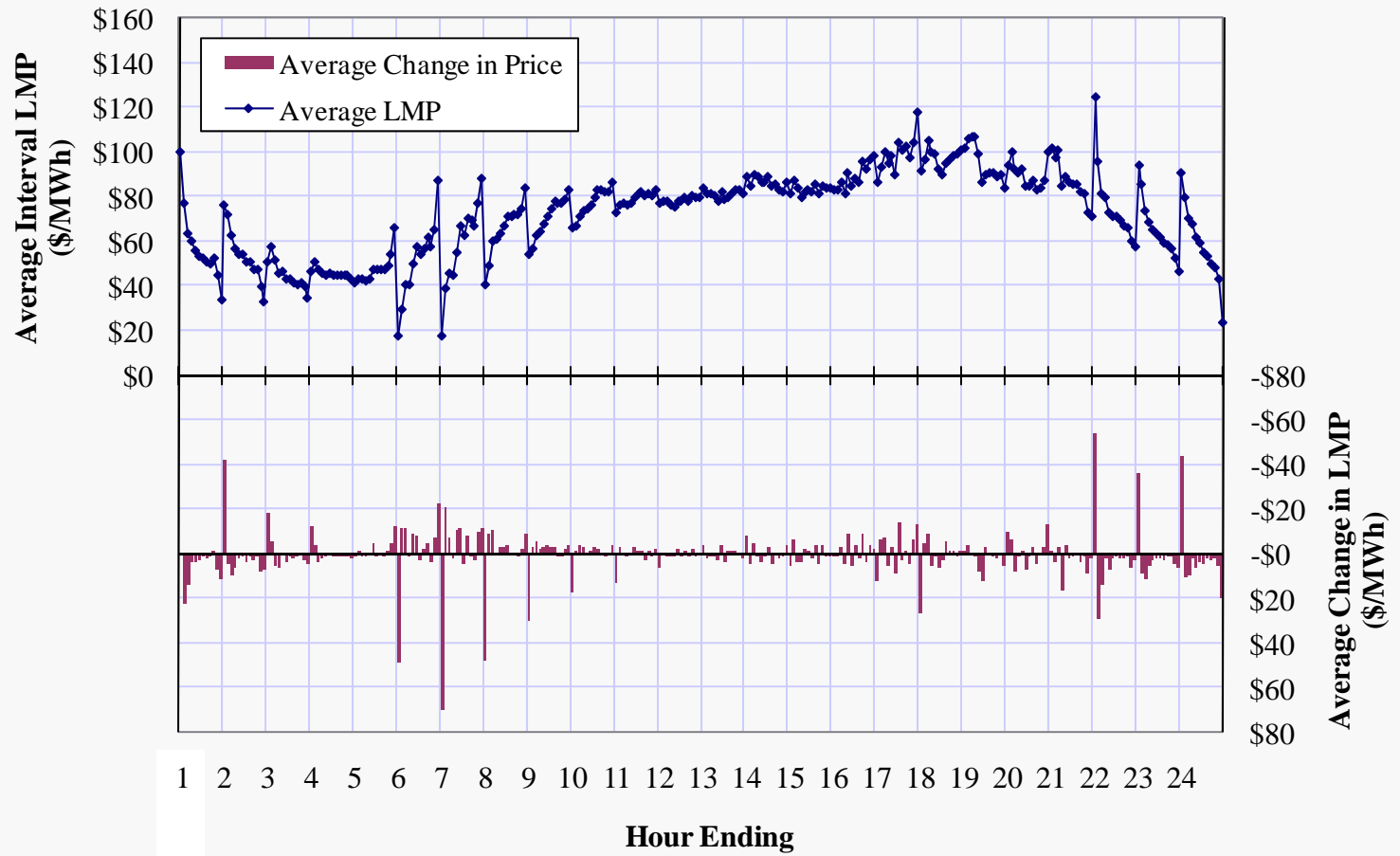


Summary of Real-Time Mitigation New York City -- 2007





Five Minute Pricing by Time of Day





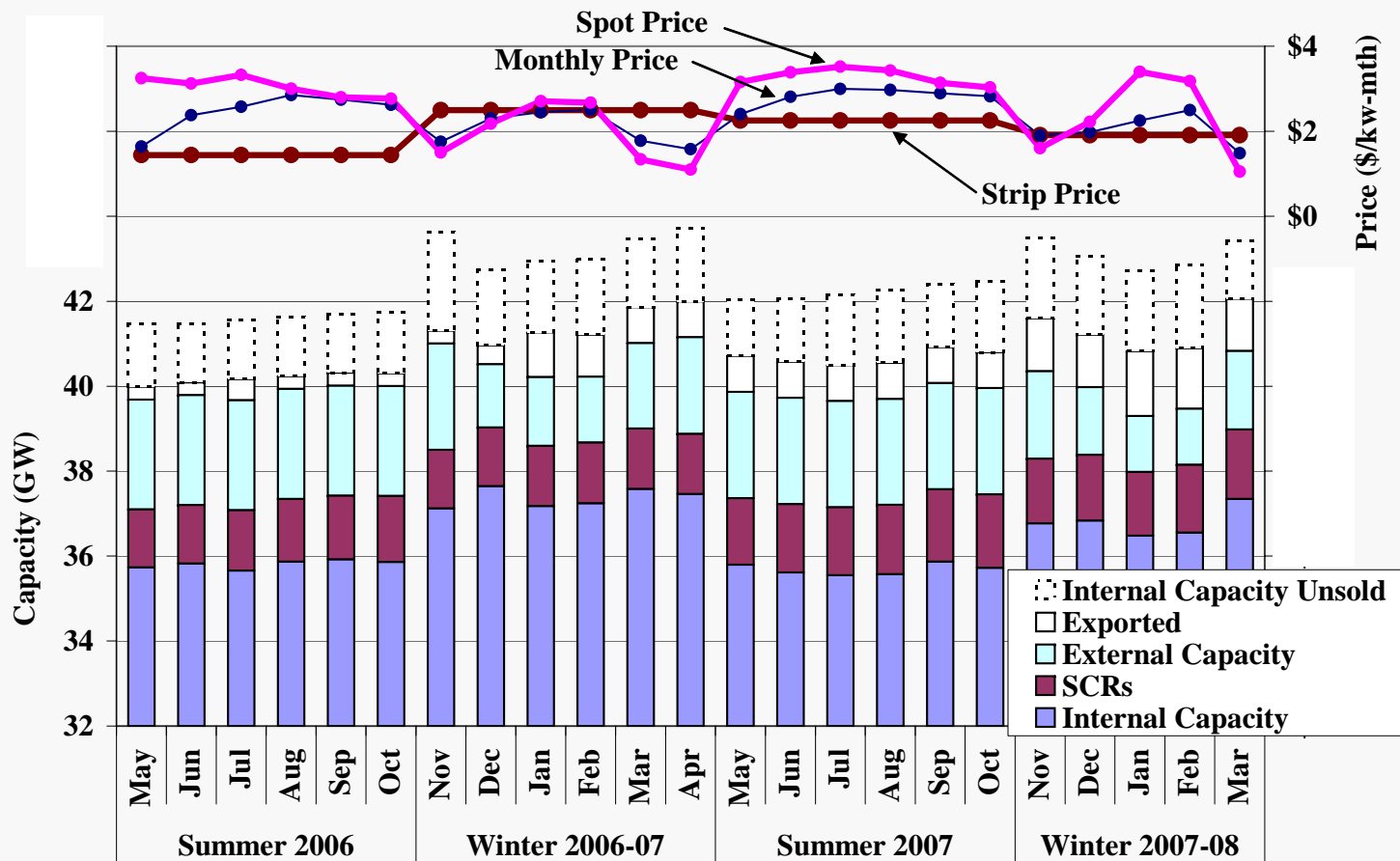
Executive Summary

Capacity Market

- The capacity market plays an important role in contributing to the long-term economic signals that govern new investment and retirement decisions for generation, transmission, and demand response resources.
- The capacity market results in New York City were not highly competitive in 2006 and 2007.
 - ✓ Recently approved market power mitigation rule changes are expected to improve the competitiveness of the New York City capacity market.
- The capacity market results in the Rest of State (“ROS”) have been relatively competitive, although changes in neighboring capacity markets have contributed to lower net imports and higher prices.
- Based on the 2008 Reliability Needs Assessment, additional resources will likely be needed in Southeast New York between 2012 and 2014.
 - ✓ This report includes one recommendation to address capacity price signals in this area.



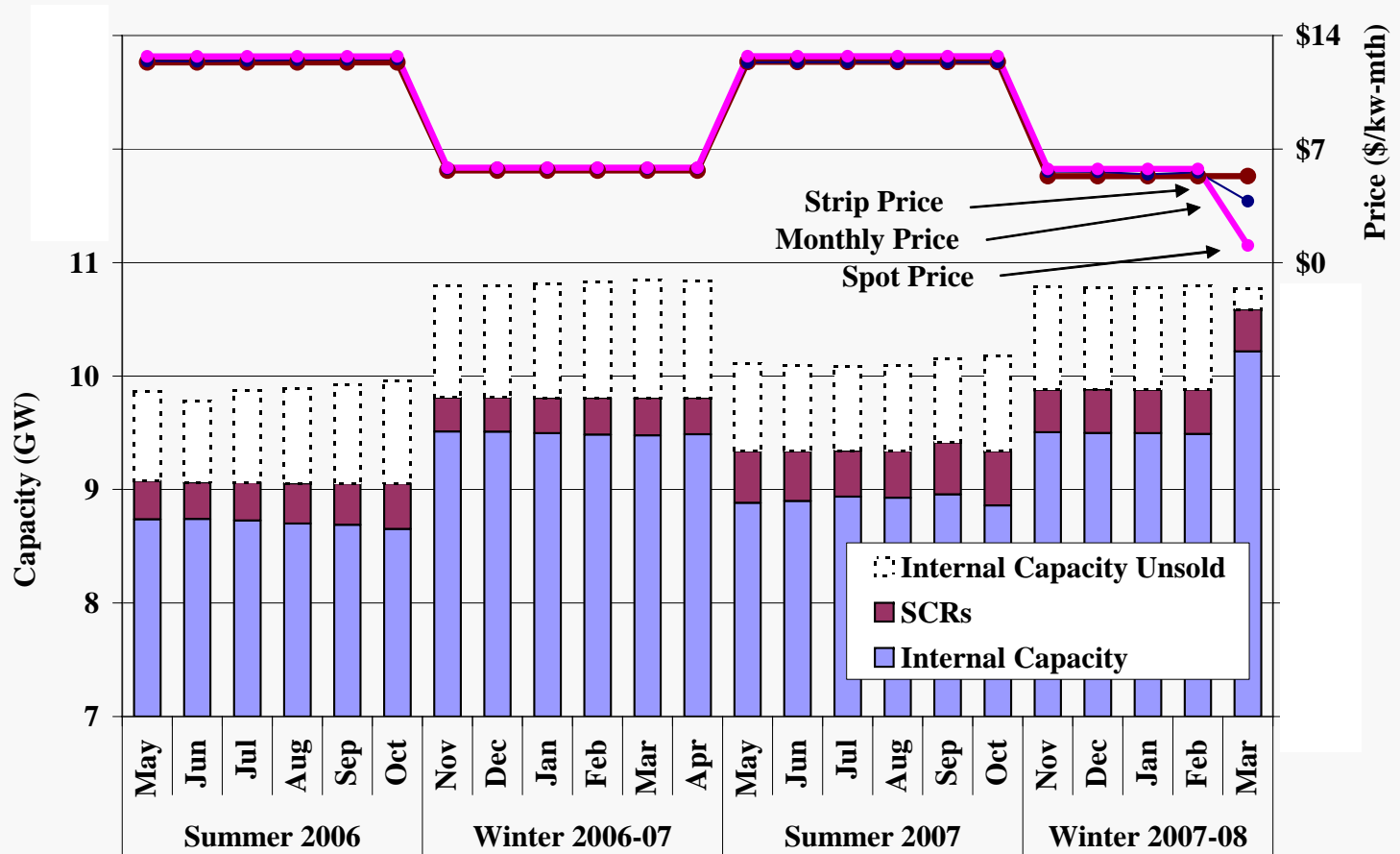
UCAP Sales – New York State May 2006 to March 2008



Note: UDRs are included in "Internal Capacity"



UCAP Sales – New York City May 2006 to March 2008





Executive Summary

Demand Response Programs

- Demand response resources participate in both the capacity and energy markets in New York.
 - ✓ New York has close to 1800 MW of real-time demand response resources, which satisfy a significant portion of the local and statewide capacity requirements – these quantities have grown steadily over the past eight years.
 - ✓ Real-time demand response resources can be activated to maintain operating reserves or for local reliability.
- Demand response resources set clearing prices when their activation prevents shortages at the state-level or eastern New York – this is essential for efficient short-term and long-term price signals.
 - ✓ The report includes a recommendation to allow demand response to be reflected in clearing prices under additional circumstances when appropriate.
- Since July 2007, the Targeted Demand Response Provider (“TDRP”) program enables the local TO to activate demand response in individual load pockets.
- The NYISO has filed Tariff changes that would allow demand response to provide operating reserves and regulation under the same performance requirements as generators.



Executive Summary: Recommendations

- 1. Continue the work with neighboring control areas to better utilize the transfer capability between regions, ideally by directly coordinating the physical interchange.*
- 2. Evaluate potential improvements real-time commitment model (“RTC”) and the real-time dispatch model (“RTD”) to improve their consistency and improve the management of ramp capability at the top of the hour.*
 - ✓ The RTD/RTC real-time market framework has delivered substantial benefits that are documented in this report.
 - ✓ However, the report identifies some inconsistencies between RTC and RTD that can affect the efficiency of the commitments and market outcomes.
 - In January 2008, the NYISO modified the treatment of external transactions in RTC, which should help improve consistency.
 - ✓ Additionally, ramp constraints are frequently binding at the top of the hour in the morning and evening due to changes in external schedules, hourly generation schedules and generator commitments/decommitments.
 - A re-evaluation of the assumptions and periods used in RTD and RTC could potentially improve the ramp management and lower price volatility.



Executive Summary: Recommendations

3. *Evaluate changing two provisions in the mitigation measures that may limit competitive 10-minute reserves offers in the Day-Ahead Market.*
 - ✓ The provisions limit the reference levels of some GTs to \$2.52/MWh and the offers of 10-minute spinning reserves in New York City to \$0/MWh.
4. *Consider whether additional capacity zones are needed outside of New York City and Long Island.*
 - ✓ This may be necessary to allow the markets' economic signals to reflect that resources will be needed relatively soon in Southeast New York.
5. *Evaluate whether it is feasible to enable the NYISO Reliability Based Emergency Demand Response resources to set clearing prices in local areas when they are needed to maintain transmission system reliability.*



Executive Summary: Enhancements Currently Under Consideration

The NYISO has work underway in response to prior recommendations. Results in 2007 continue to suggest that these changes would be beneficial.

- 1. Modeling of local reliability rules in New York City to include them in the initial day-ahead commitment.***
 - ✓ Commitments by the local reliability pass of the day-ahead market and by ISO operators after the day ahead to meet local requirements in NYC can lead to uneconomic commitment and increased uplift throughout the state.
- 2. Re-calibrating the dispatch levels in the real-time market's pricing model for units that are not responding to dispatch signals.***
 - ✓ Further improvements to the consistency of the pricing and physical dispatch passes of RTD could improve the efficiency of NYISO's energy and ancillary services pricing (particularly during shortages) and reduce uplift.
- 3. Virtual trading at a more disaggregated level.***
 - ✓ This recommendation is designed to improve price convergence in the New York City load pockets.