



Highlights from the 2016 State of the Market Report for the NYISO Markets

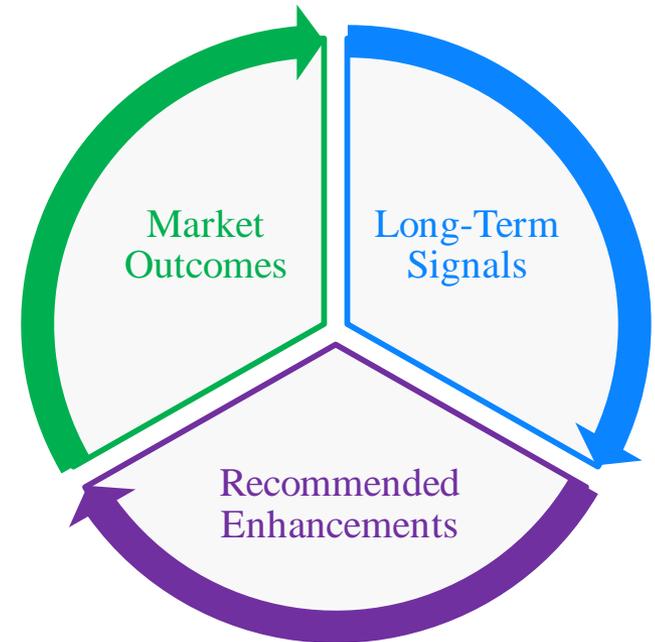
Pallas LeeVanSchaick
NYISO Market Monitoring Unit
Potomac Economics

Business Issues Committee
May 17, 2017



Overview

- Schedule of Presentations
- Market Highlights
 - ✓ Prices, Congestion, Uplift
- Long-Term Investment Signals
 - ✓ Fossil-fuel Units
 - ✓ Nuclear & Renewable
- Recommendations
 - ✓ New in the 2016 Report
 - ✓ High Priority
 - ✓ Cumulative List





Schedule for Review of 2016 SOM Report

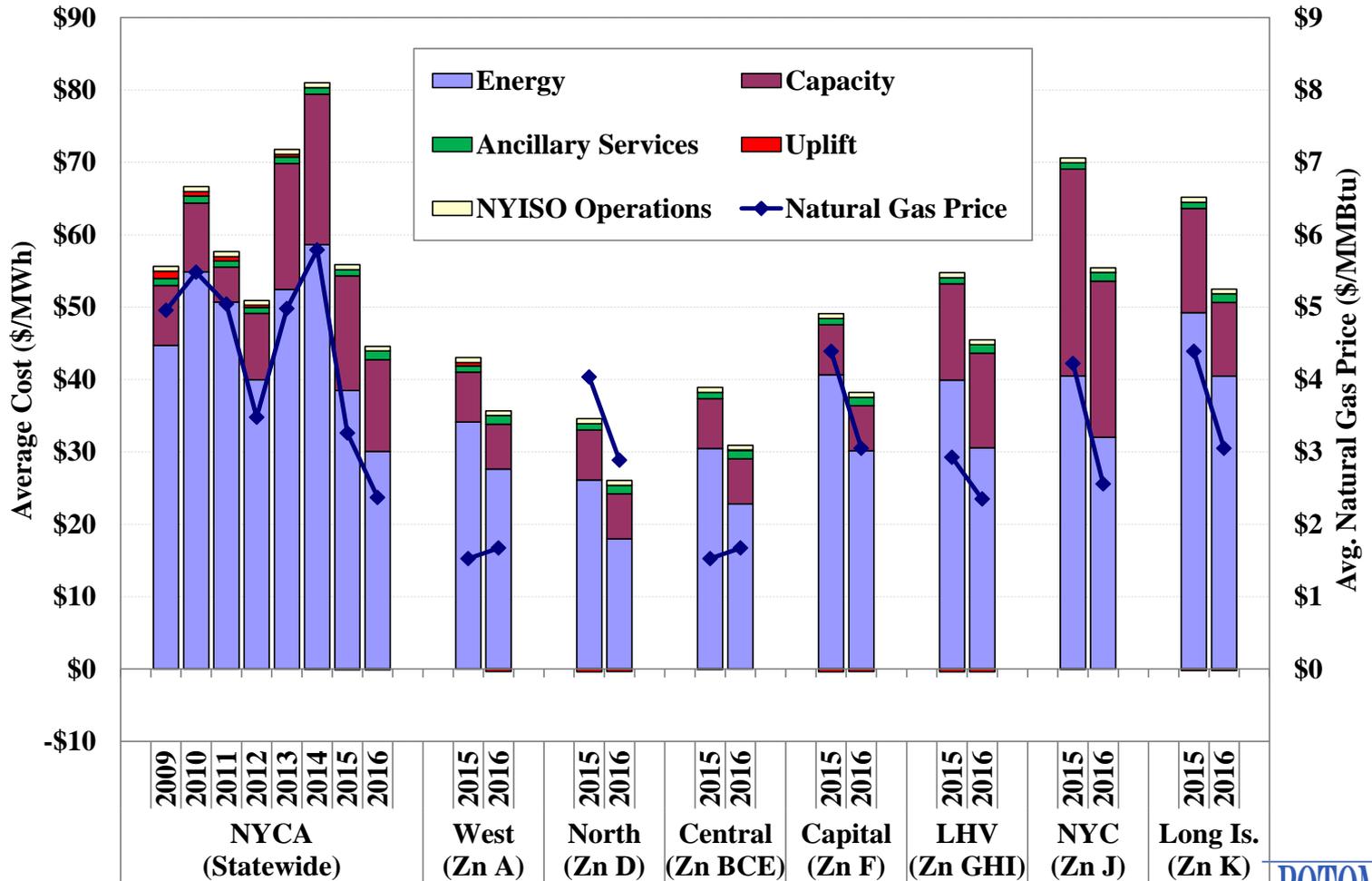
- On May 10: Report posted on NYISO website
- Presentation schedule:
 - ✓ May 17 BIC: Overview of Report & Recommendations
 - ✓ June 1 ICAPWG: Capacity Results & Recommendations
 - ✓ June 6 MIWG: Energy & AS Results & Recommendations
- Comments/questions submitted by May 30 will be posted and addressed at June 1 & 6 meetings.
 - ✓ To: deckels@nyiso.com, pallas@potomaceconomics.com, & jchen@potomaceconomics.com
- Comments/questions received after May 30 will be addressed case by case.



Market Highlights

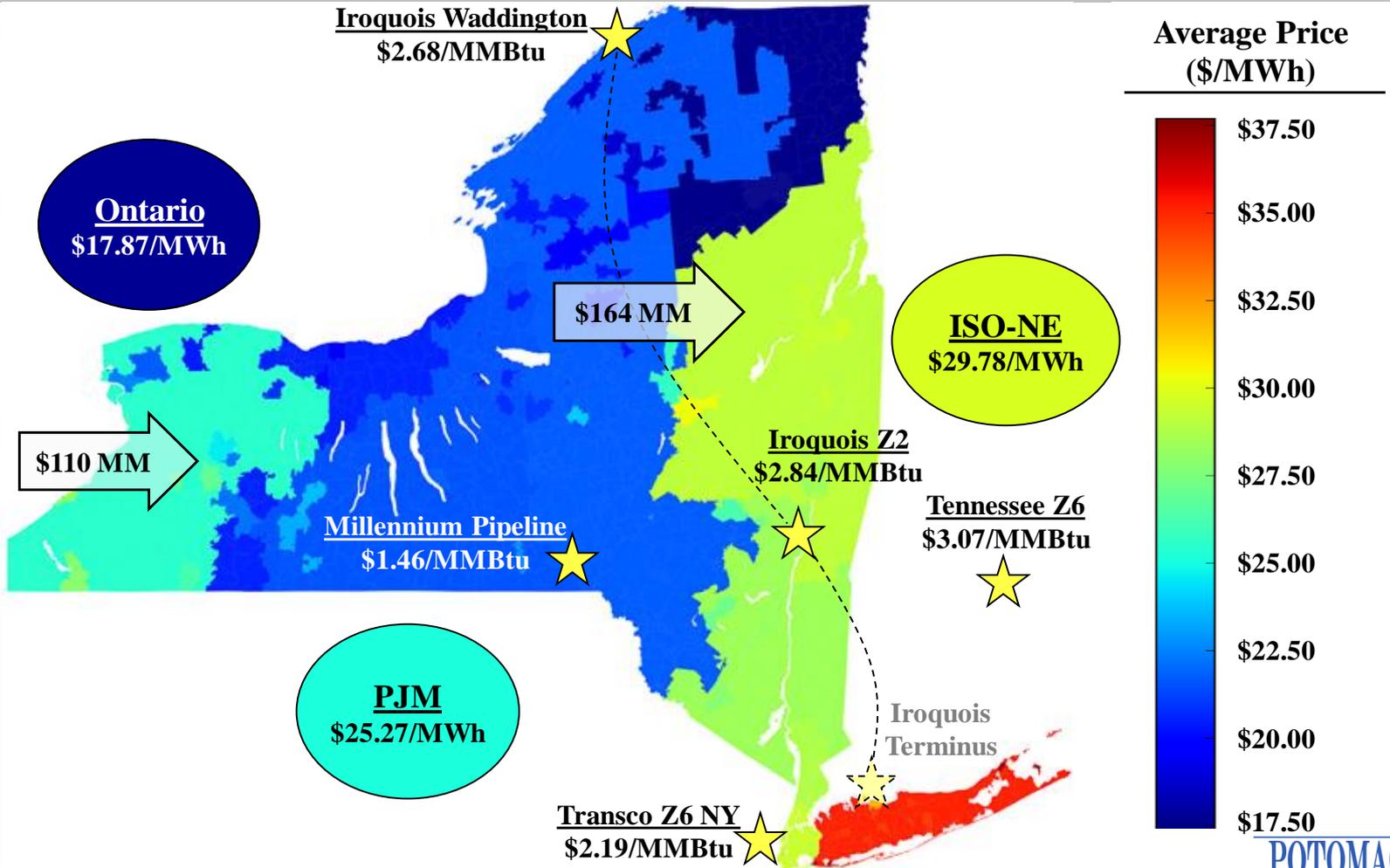


Market Outcomes: Average All-In Price by Region



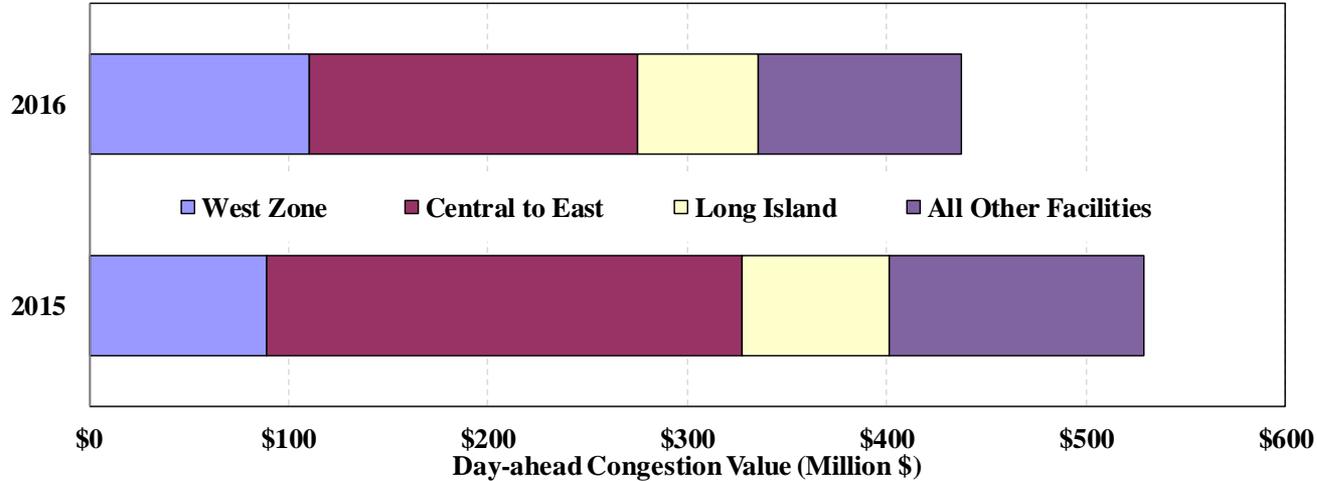


Market Highlights: Day-Ahead Prices and Congestion Values

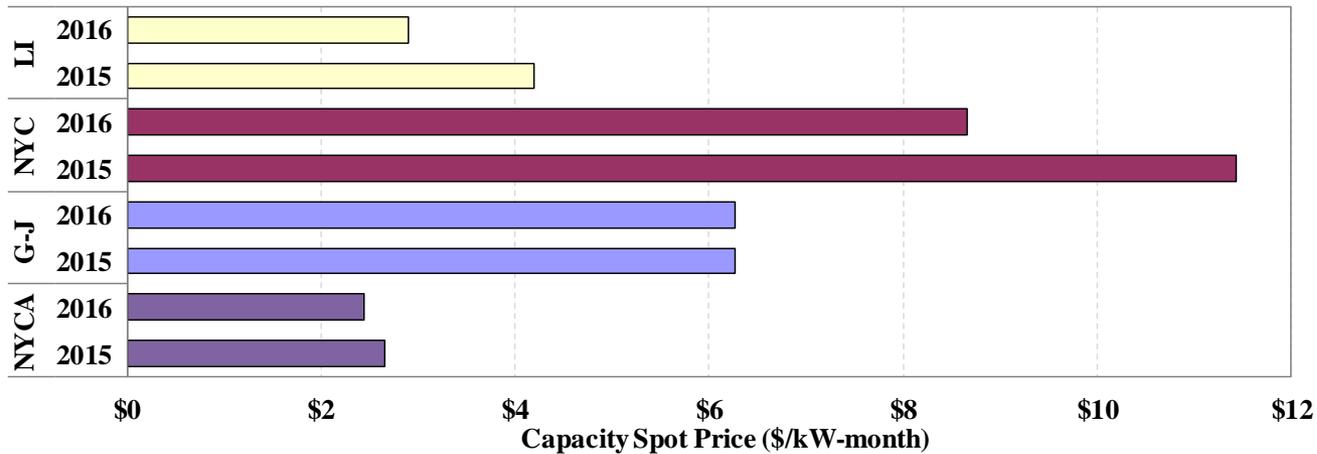




Market Outcomes: Congestion Value and Capacity Price



**Day-Ahead
Congestion
Value**



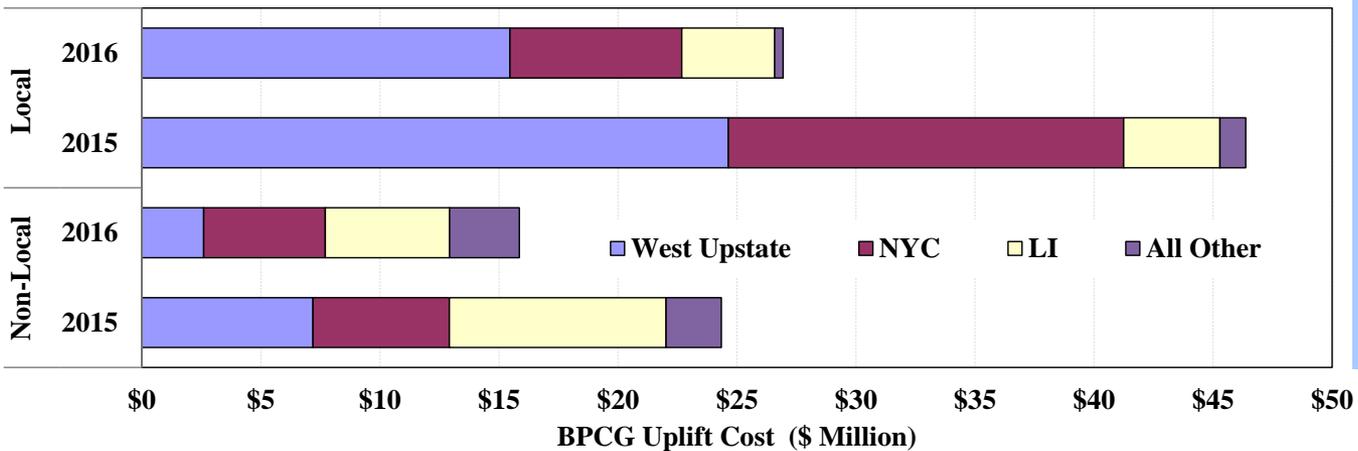
**Capacity
Spot Price**



Market Outcomes: Reserve Price and BPCG Uplift



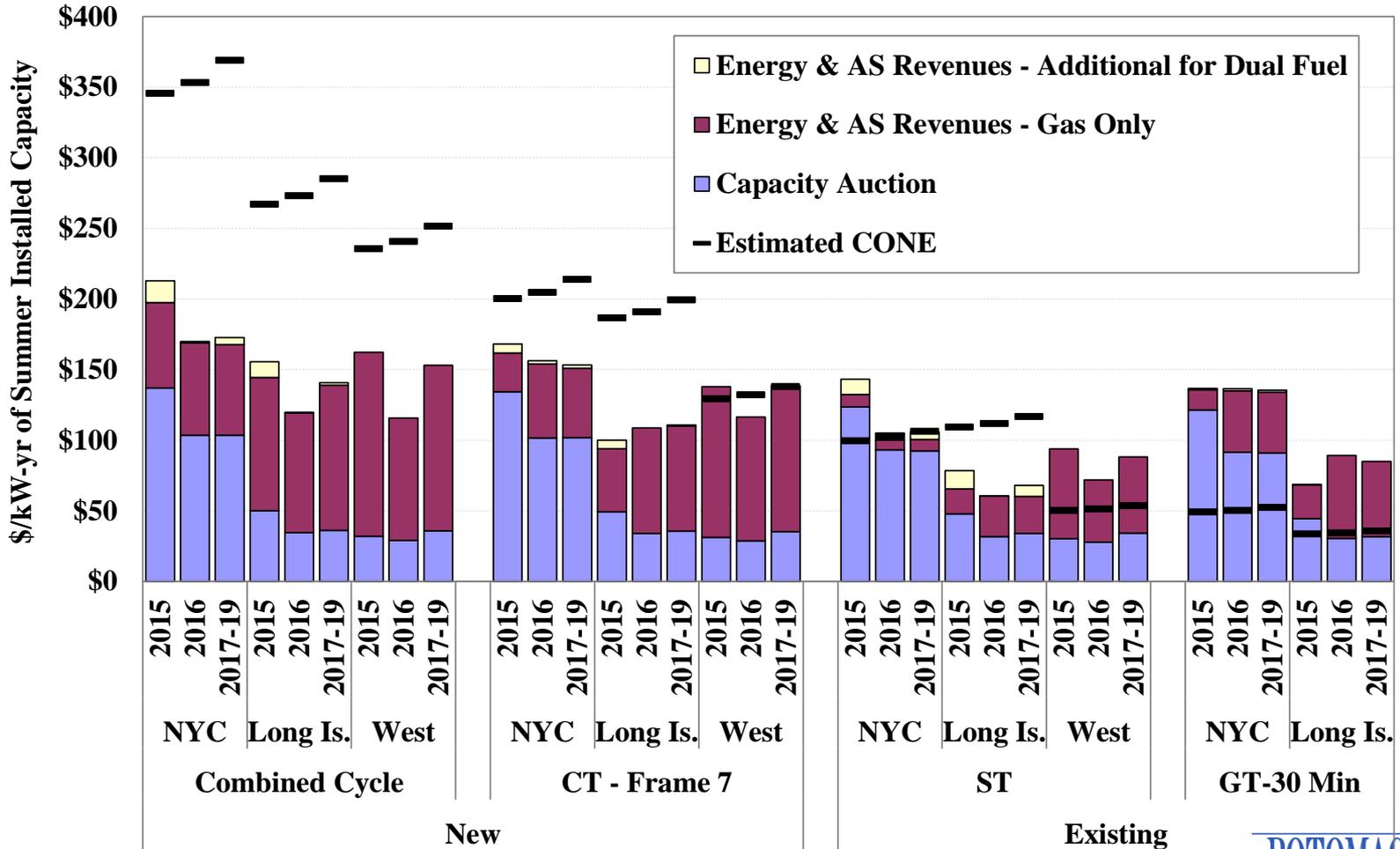
**Day-Ahead
Reserve
Price**



**BPCG
Uplift**

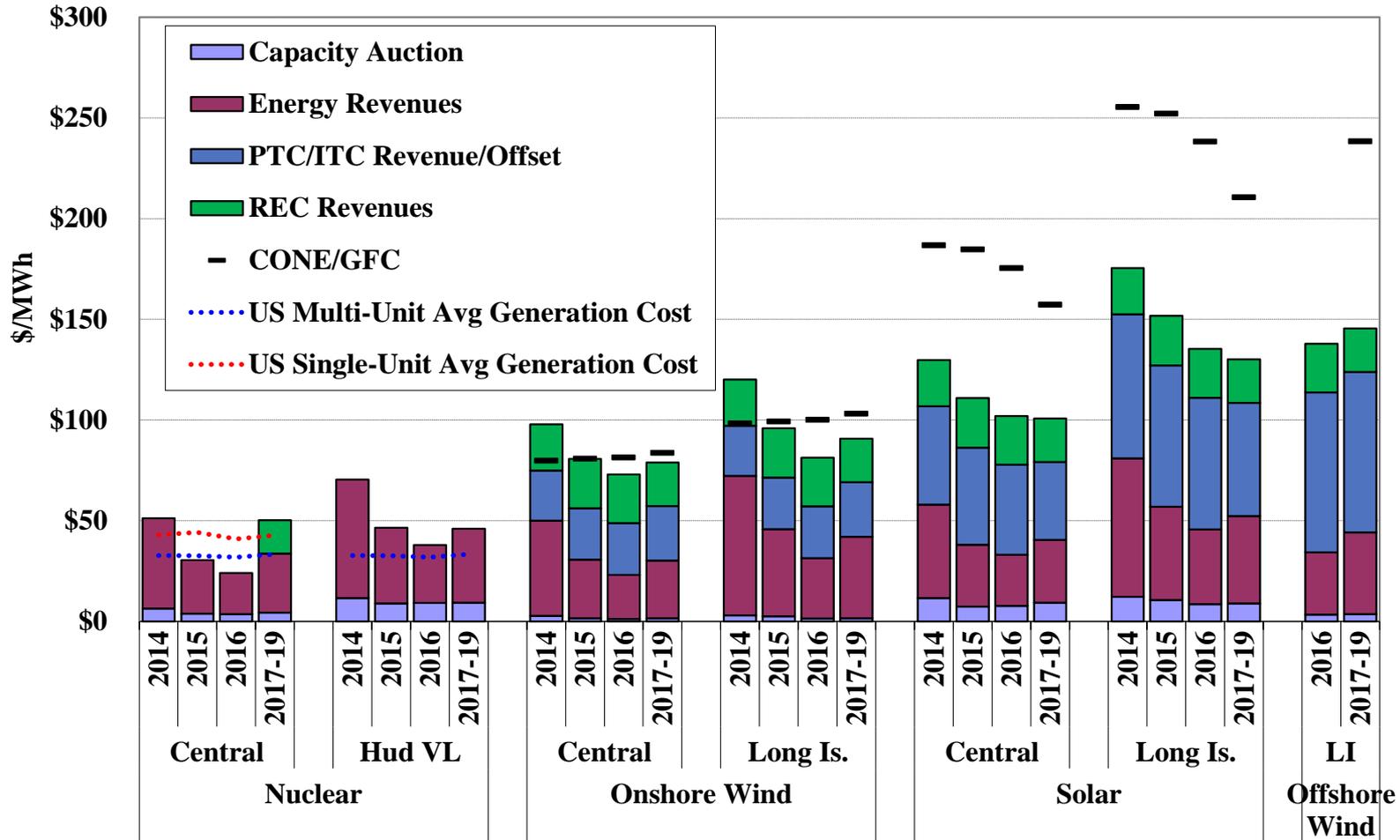


Long-Term Investment Signals: New and Existing Gas and Oil Units





Long-Term Investment Signals: Nuclear and Renewable Units





Recommendations for Market Enhancements



Real-Time Performance Incentives: Multiple Recommendations

Principle

- **Prices and compensation should reflect:**
 - ✓ Value of all resources that provide congestion relief;
 - ✓ Performance/reliability/flexibility of resources;
 - ✓ Marginal cost of maintaining reliability.
- **Market requirements should be consistent with operating requirements.**

Benefits

- **Efficient scheduling of imports and generation which reduces:**
 - ✓ Production costs
 - ✓ Emissions.
- **Better investment and performance incentives for:**
 - ✓ Reserve providers
 - ✓ Flexible resources
- **Less reliance on capacity market pricing signals.**

Approach

- **Quantify congestion relief from reserve scheduling.**
- **Consider performance-based adjustments to reserve revenue.**
- **Incorporate start costs in GT pricing logic.**
- **Dynamically adjust reserve requirements based on conditions.**
- **Model 100+ kV constraints in DAM/RT.**
- **Utilize constraint-specific GTDCs.**



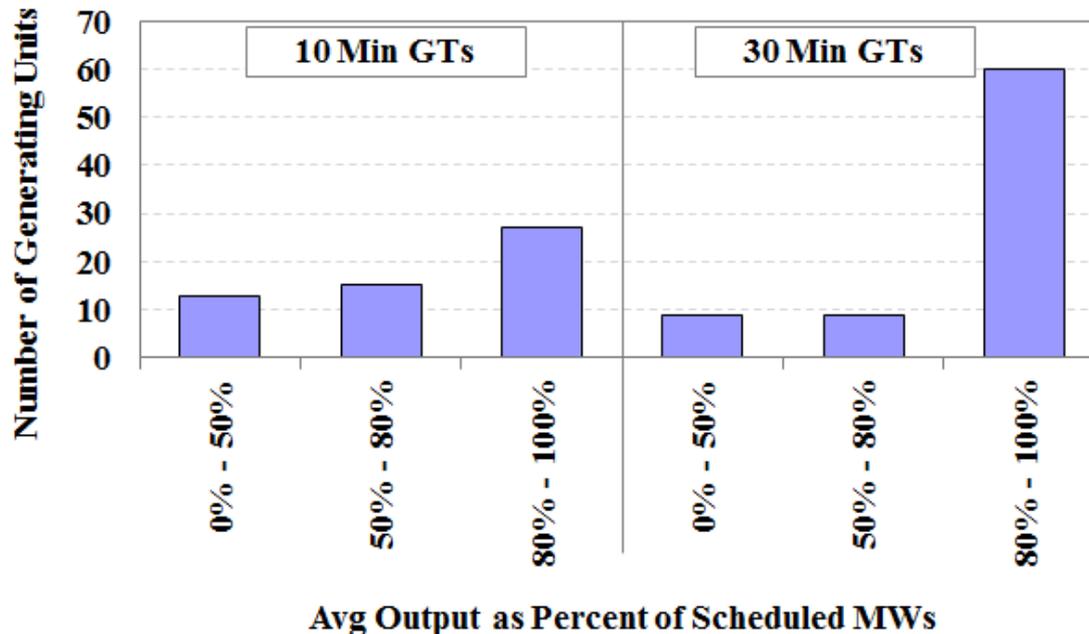
Real-Time Performance Incentives: New Recommendation 2016-1

- 2016-1: Consider rules for efficient pricing and settlement when operating reserves provide congestion management relief.
- Reserves in NYC allow higher transmission flows into NYC.
 - ✓ This is apparent when the transfer limit is reduced in RT, leading to high prices and uplift costs.
- In 2016, 92 percent of RT congestion on 345kV lines into NYC occurred when reserve units were not believed to be available.
 - ✓ Congestion management can be inefficient when it does not consider the value of reserve units.
 - ✓ Compensation for reserve units that relieve congestion would provide incentives for units to be available and reliable.
- More important after ConEd-PSEG Wheel expiration.

Real-Time Performance Incentives: New Recommendation 2016-2

2016-2: Consider means to allow reserve market compensation to reflect actual and/or expected performance.

Average Production by GTs after a Start-Up Instruction



- All reserves are paid the same for reserves regardless of performance.
- Reserve sales are the primary source of revenue for some poor performing units.



Real-Time Performance Incentives: Recommendations 2014-10 & 2014-12

- 2014-10: Modify criteria for gas turbines to set prices in the real-time market by incorporating start-up costs.
 - ✓ Excluding start-up costs from the price-setting logic leads RT prices to be understated during tight operating conditions.
- 2014-12: Model 100+ kV transmission constraints in the DA and RT markets and develop associated mitigation measures.
 - ✓ Actions used to manage these constraints: (a) OOM dispatch and commitment, (b) reduced imports from Ontario and Quebec, (c) use of simplified interface constraints, (d) reduced exports to PJM and opening PJM-NYISO lines, and (e) Saint Lawrence and Ramapo PAR taps.
 - ✓ Not modeling these constraints leads to under-scheduling of Western NY generation and PJM imports.



Real-Time Performance Incentives: Recommendations 2015-17 & 2015-16

- 2015-16: Dynamically adjust operating reserve requirements to account for factors that increase or decrease the amount of reserves that must be held on internal resources.
 - ✓ Long Island reserve schedules should consider the amount of net imports flowing-in from other zones.
 - ✓ East NY reserve schedule should consider Central-East flow.
 - ✓ SENY reserve schedule should consider UPNY-SENY flow.
- 2015-17: Utilize constraint-specific GTDCs to set constraint shadow prices during transmission shortages.
 - ✓ NYISO has filed a short-term enhancement.
 - ✓ In the long-term, GTDCs should be set based on importance, severity, and/or duration of a constraint violation.



Enhance Scheduling of Imports and Peaking Units: Recommendations 2015-9 & 2012-13

Principle

- **Reduce unnecessary barriers to inter-market trading.**
- **Improve forecasting in scheduling models.**

Benefits

- **Improve performance of CTS-PJM, CTS-NE, and intraday scheduling processes.**
- **Lower overall dispatch cost by improving external scheduling.**
- **Optimize use of flexible resources.**

Approach

- **Use cost-causation approach when setting transaction fees.**
- **Eliminate structural differences between forecasted and actual market outcomes.**

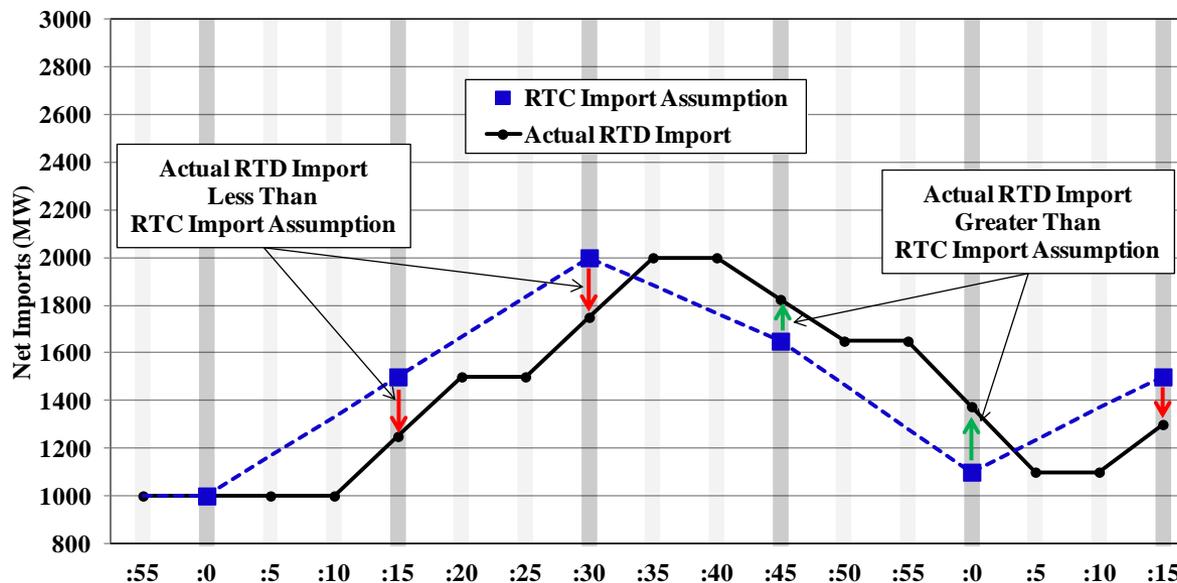
- **2015-9: Eliminate fees for CTS transactions at PJM-NY border.**
 - ✓ **At the NE-NY border (which does not have fees):**
 - ✓ **192 percent more price-sensitive offers are available.**
 - ✓ **202 percent more price-sensitive offers are cleared.**



Enhance Scheduling of Imports and Peaking Units: Recommendations 2015-9 & 2012-13

- 2012-13: Adjust look ahead evaluations of RTD and RTC to be more consistent with the timing of external transaction ramp and gas turbine commitment.

Illustration of External Transaction Ramp Profiles in RTS



Other Issues:

- RTC and RTD look aheads do not evaluate 5-minute ramp
- RTD cannot keep on a GT even to avoid a shortage.



Capacity Prices as a Signal of Reliability Value: Recommendations 2012-1a & 2013-1c

Principle

- **Prices and compensation should be aligned with the reliability value of a capacity resource.**

Benefits

- **Reduce cost of satisfying reliability criteria by tens of millions of dollars/year.**
- **Reduce volatility of prices and requirements for investors.**
- **Increase market response in future retirement scenarios.**

Approach

- **Define interfaces (and zones) consistent with ones studied in the RNA and other planning criteria.**
- **Optimize local capacity requirements while satisfying reliability criteria.**



2013-1c: Implement location-based marginal cost pricing of capacity that minimizes cost of satisfying planning requirements.

- ✓ Would save tens of millions annually.
- ✓ Would reduce volatility of prices and requirements.



Capacity Prices as a Signal of Reliability Value: Recommendations 2012-1a & 2013-1c

- 2012-1a: Establish a dynamic locational capacity framework that reflects potential deliverability constraints to allow prices to fully reflect the locational value of capacity.
 - ✓ Issues with the current NCZ process:
 - Deliverability Test inconsistent with reliability planning models
 - Limits capacity sales and inflates prices in western New York
 - Process is lengthy and uncertain for a new investor seeking to meet a reliability need.
 - ✓ Dynamic locational framework would allow for capacity price differentials to occur whenever reliability value of capacity differs between zones.



Enhance Transmission Development Incentives: Recommendations 2012-1c & 2015-7

Principle

- **Align valuation and compensation with the reliability value of proposed transmission projects.**

Benefits

- **Provide incentives for new investment that are technology-neutral.**
- **Reduce barriers to entry that favor generation and demand response.**

Approach

- **Measure value of transmission for satisfying planning criteria.**
- **Prevent participants from blocking efficient investments.**

2012-1c: Grant financial capacity transfer rights between zones when investors upgrade the transmission system and help satisfy planning reliability needs without receiving a cost-of-service rate.

2015-7: Reform the CARIS process to better identify and fund economically efficient transmission investments.

See Sections VII.D, VII.E

List of Recommendations

Energy Market Enhancements – Part I

RECOMMENDATION		Discussed in	Current Effort	High Priority	Scoping/Future
<u>Energy Market Enhancements - Real-Time Pricing and Performance Incentives</u>					
#2016-1	Consider rules for efficient pricing and settlement when operating reserve providers provide congestion management relief.	IX.C.2			X
#2016-2	Consider means allow reserve market compensation to reflect actual and/or expected performance.	IX.C.1			X
#2014-10	Modify criteria for gas turbines to set prices in the real-time market by incorporating start-up costs.	IX.B			
#2014-12	Model 100+ kV transmission constraints in the day-ahead and real-time markets and develop associated mitigation measures.	IX.F.3	X		
#2015-16	Dynamically adjust operating reserve requirements to account for factors that increase or decrease the amount of reserves that must be held on internal resources.	IX.A.1			X
#2015-17	Utilize constraint-specific graduated transmission demand curves to set constraint shadow prices during transmission shortages.	IX.A.2			X
#2015-9	Eliminate transaction fees for CTS transactions at the PJM-NYISO border.	VI.D			

List of Recommendations

Energy Market Enhancements – Part II

RECOMMENDATION		Discussed in	Current Effort	High Priority	Scoping/Future
<u>Energy Market Enhancements - Real-Time Market Operations</u>					
#2012-8	Operate certain PAR-controlled lines to minimize production costs and create financial rights that compensate affected transmission owners.	IX.D			
#2012-13	Adjust look ahead evaluations of RTD and RTC to be more consistent with the timing of external transaction ramp and gas turbine commitment.	VI.D IX.E	X	X	X
#2014-9	Consider enhancing modeling of loop flows to reflect the effects of expected variations more accurately.	IX.E.4			X
<u>Energy Market Enhancements - BPCG Eligibility Criteria</u>					
#2014-13	Work with generators in NOx bubbles to ensure their RACT compliance plans use the most economic compliance option available.	IX.F.2			
<u>Energy Market Enhancements - Fuel Assurance and Energy Storage</u>					
#2013-11	Consider allowing generators to submit offers that reflect certain energy storage and fuel supply constraints in the day-ahead market.	IX.B.2 (2015 SOM)	X		X

List of Recommendations

Capacity Market and Economic Transmission Planning

RECOMMENDATION	Discussed in	Current Effort	High Priority	Scoping/Future
<u>Capacity Market Enhancements</u>				
#2012-1a Establish a dynamic locational capacity framework that reflects potential deliverability constraints to allow prices to fully reflect the locational value of capacity.	VII.F	X	X	
#2012-1c Grant financial capacity transfer rights between zones when investors upgrade the transmission system and help satisfy planning reliability needs without receiving a cost-of-service rate.	VII.D			X
#2013-1c Implement location-based marginal cost pricing of capacity that minimizes the cost of satisfying planning requirements.	VII.C	X	X	
#2013-2d Enhance Buyer-Side Mitigation Forecast Assumptions to deter uneconomic entry while ensuring that economic entrants are not mitigated.	III.C	X		
#2015-8 Modify the capacity market and planning process to better account for imports from and exports to neighboring control areas from import-constrained capacity zones.	VII.B	X		
<u>Economic Transmission Planning Process</u>				
#2015-7 Reform the CARIS process to better identify and fund economically efficient transmission investments.	VII.E			X