



Review of Recommendations in the 2019 State of the Market Report for the NYISO Markets

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Introduction

- The 2019 State of the Market (SOM) report published on May 19, 2020 recommends various market design improvements
 - ✓ These include outstanding or continuing recommendations from prior years' reports as well as new recommendations
- Stakeholders will complete scoring survey for NYISO's 2021 Market Project Candidates by June 26
- This presentation reviews market enhancements recommended in the SOM and discusses associated 2021 Market Project Candidates
 - ✓ Details of recommendations are available in Section XI of the [2019 SOM Report](#)
 - ✓ Details of 2021 Market projects are available in [2021 Market Project Candidates](#) and [2020 Draft Master Plan](#)



Principles for Evaluating Market Performance and Future Market Needs

- Energy, ancillary services, & capacity markets together should reward the resources needed today and in the future.
- With greater renewable penetration, the market must reflect the value of critical resource attributes:
 - ✓ Flexibility
 - ✓ Local congestion and reliability impacts
 - ✓ Winter fuel security
 - ✓ Summer resource adequacy
- Public policy additions and retirements tend to reduce the availability of resources with these attributes.
 - ✓ The value of these attributes will rise in the future.
- Most of our recommendations are intended to remedy concerns with these market incentives.



Overview

- This presentation discusses SOM recommendations and is divided into three sections:
 - ✓ Energy Market – Pricing & Performance Incentives
 - ✓ Energy Market – Mitigation and Operations
 - ✓ Capacity Market
- Each section reviews:
 - ✓ SOM recommendations
 - ✓ Any related NYISO 2021 Market Project Candidates



Energy Market Recommendations Pricing and Performance Incentives

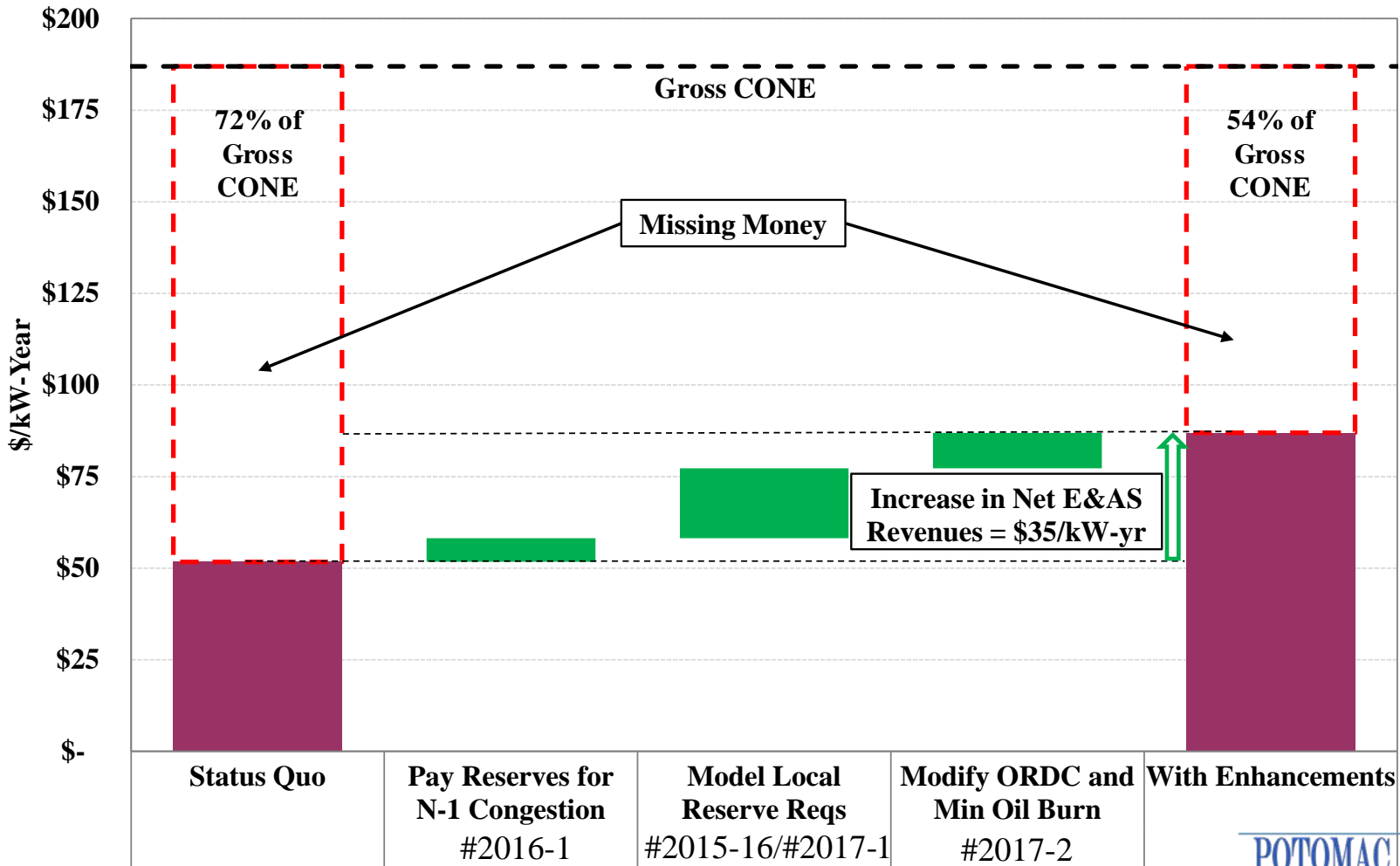


Investment Signals: Enhancing Incentives for Key Attributes

- Increasing E&AS net revenues for flexible units would:
 - ✓ Reduce reliance on capacity prices
 - ✓ Shift incentives toward retiring older units or repowering with:
 - Newer more flexible & fuel-efficient generation
 - Battery storage
- Recommendations for improving New York’s shortage pricing and other aspects of its Energy and AS Markets:
 - ✓ 2015-16: Dynamic reserve requirements
 - ✓ 2017-1: NYC locational reserve requirements
 - ✓ 2017-2: Reserve demand curve increases
 - ✓ 2016-1: Compensate reserves that increase transfer capability
 - ✓ 2018-1: Long Island congestion on low voltage system
 - ✓ 2019-1: Reserve constraints on Long Island

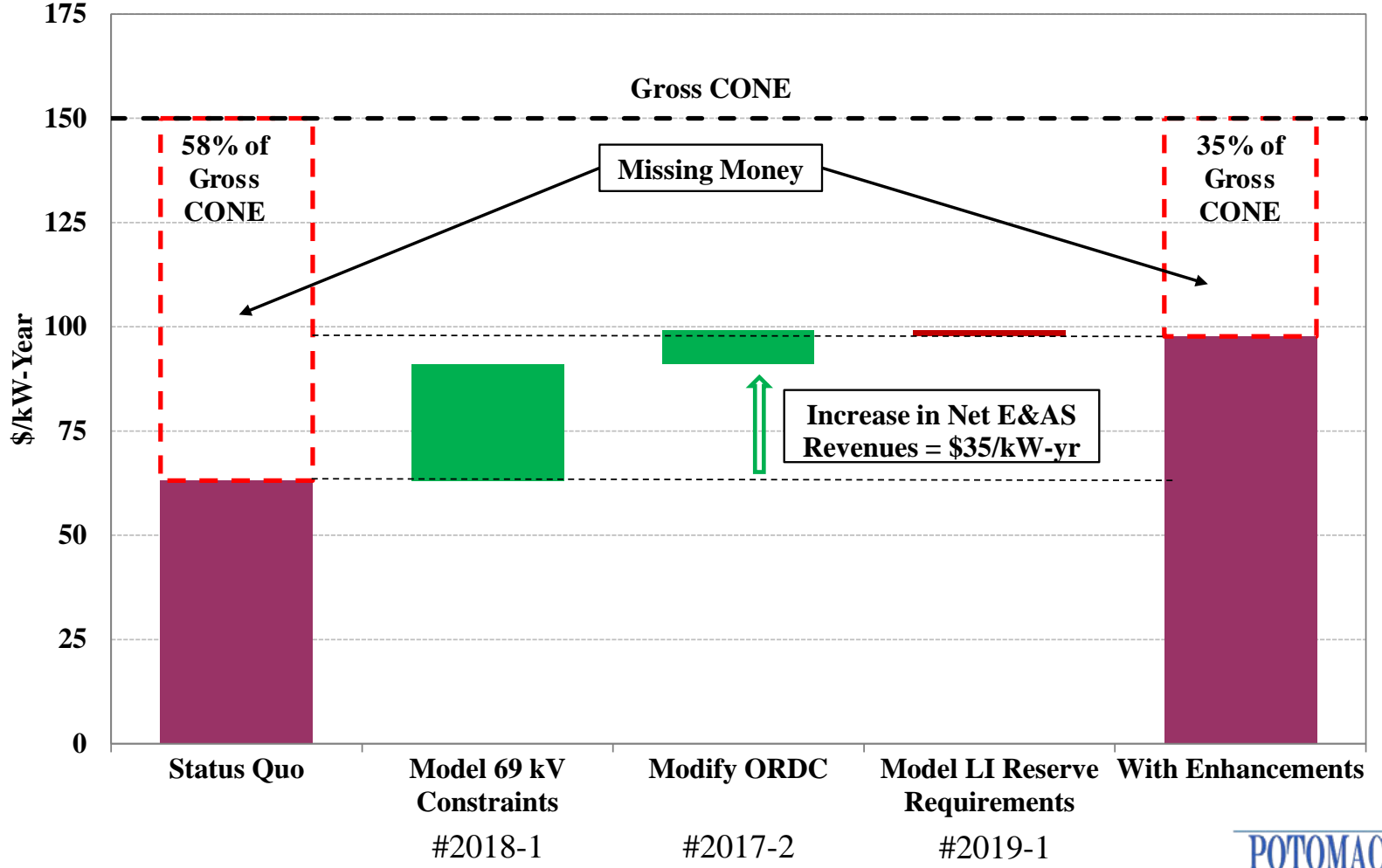


Investment Signals: Enhancing Incentives for Key Attributes (NYC)



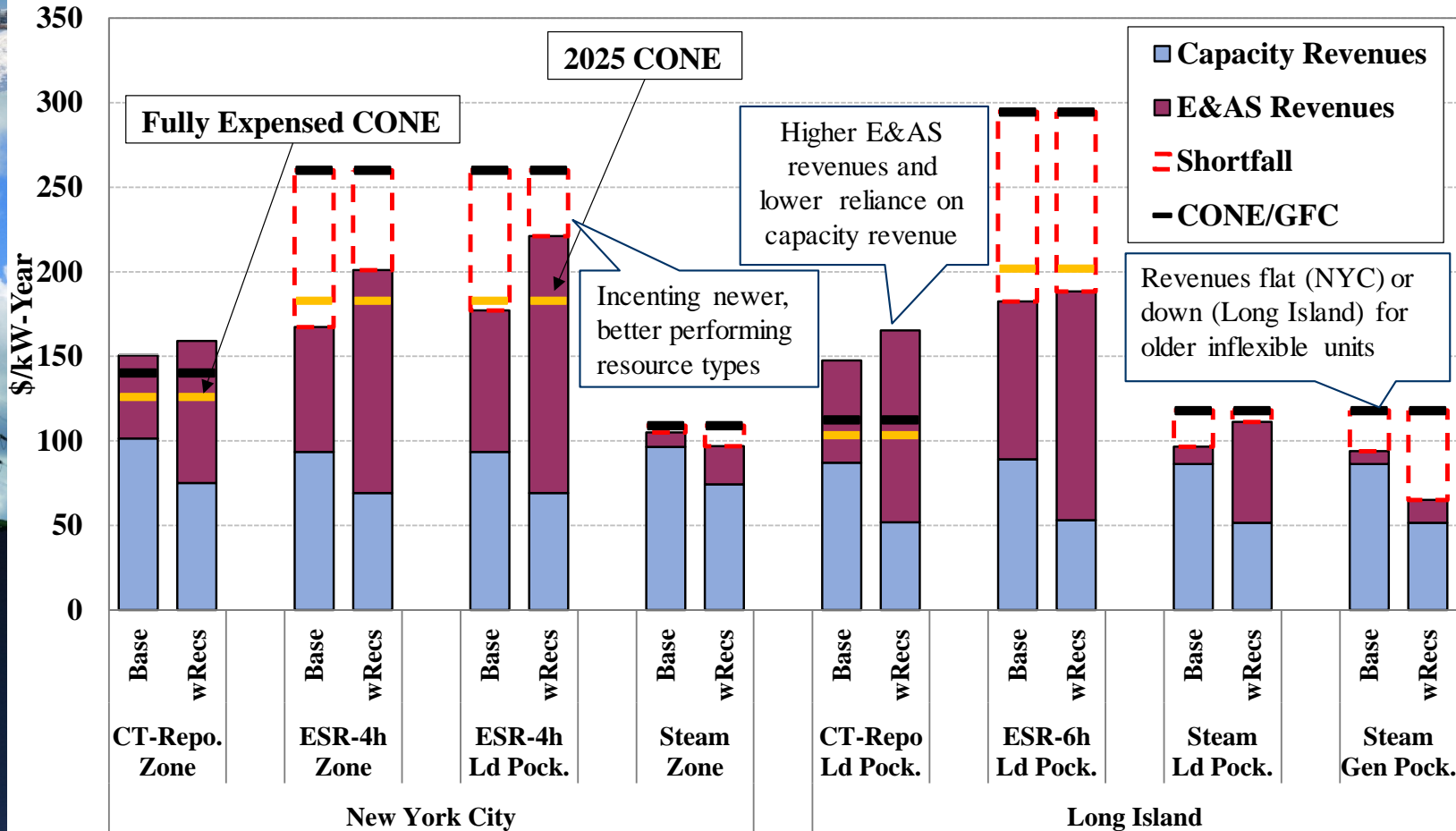


Investment Signals: Enhancing Incentives for Key Attributes (LI)





Investment Signals: Potential Impact of Incentives on Technologies

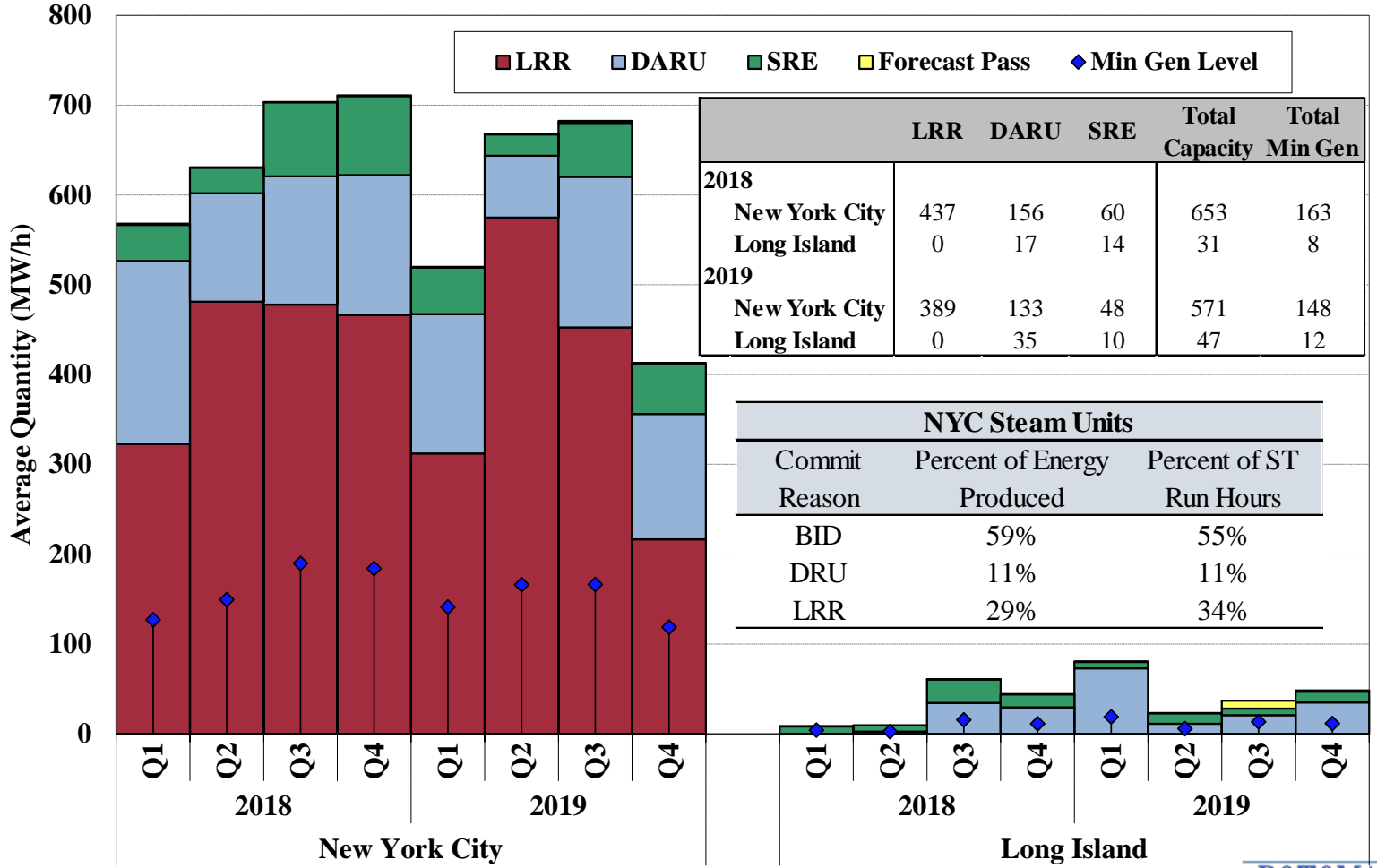


Energy Market Enhancements: Reserves for NYC Congestion Management

Transmission Facility		Average Constraint Limit (MW)		
		N-1 Limit Used	Seasonal LTE	Seasonal STE
345 kV	Gowanus-Farragut	1067	834	1303
	Motthavn-Rainey	1067	834	1298
	Dunwodie-Motthavn	1073	842	1302
	Sprnbrk-W49th ST	1292	1009	1575
	W49th ST-E13th ST	1251	961	1537
138 kV	Foxhills-Greenwd	312	247	377
	Willwbrk-Foxhills	351	262	439
	Gowanus-Greenwd	324	298	350
	Vernon-Greenwd	240	228	251

- In 2019, 47 percent (or \$29 million) of real-time congestion occurred on N-1 transmission constraints that would have been loaded above LTE after a single contingency.
- The additional transfer capability above LTE on New York City transmission facilities averaged:
 - ✓ 15 to 90 MW for 138 kV load-pockets
 - ✓ 200 to 300 MW for the 345 kV system during congested hours

Energy Market Enhancements: Supplemental Commitments for Reserves





Energy Market Enhancements: Dynamic Operating Reserves (#2015-16)

- We recommend that NYISO modify market models to dynamically determine optimal reserves. The following are requirements that could be set more efficiently:
 - ✓ Eastern NY reserve requirement given flows over Central East interface.
 - For Example: Eastern NY is 100 MW short of meeting its 1000 MW reserve requirement
 - Suppose: Central East has 400 MW of headroom
 - Inefficient actions that can occur with the current market: (a) allow GT to shutdown in eastern NY, (b) schedule ~\$700 import, (c) create reserves by ramping down low-cost eastern NY unit.

(cont'd)



Energy Market Enhancements: Dynamic Operating Reserves (#2015-16)

- ✓ The following requirements are subject to similar circumstances:
 - Southeast NY reserve requirement given flows over UPNY-SENY interface
 - Long Island requirements given constraints that limit deployment in response to a contingency outside Long Island
 - NYC load pockets considering unused import capability into pocket
- ✓ NYCA reserve requirement given imports across HVDC connection with Quebec
 - The HVDC connection can import up to 1800 MW
 - Import capability is limited by the NYCA 10-minute reserve requirement of 1310 MW

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Energy Market Enhancements: Dynamic Operating Reserves (#2015-16)

- ✓ DAM reserve requirements given the amount of:
 - Load under/over-scheduling,
 - Virtual supply scheduling, and
 - Any other non-physical resource scheduling.
- This recommendation would enhance the value of other reserve-related recommendations and reduce the cost of satisfying reliability needs in all areas



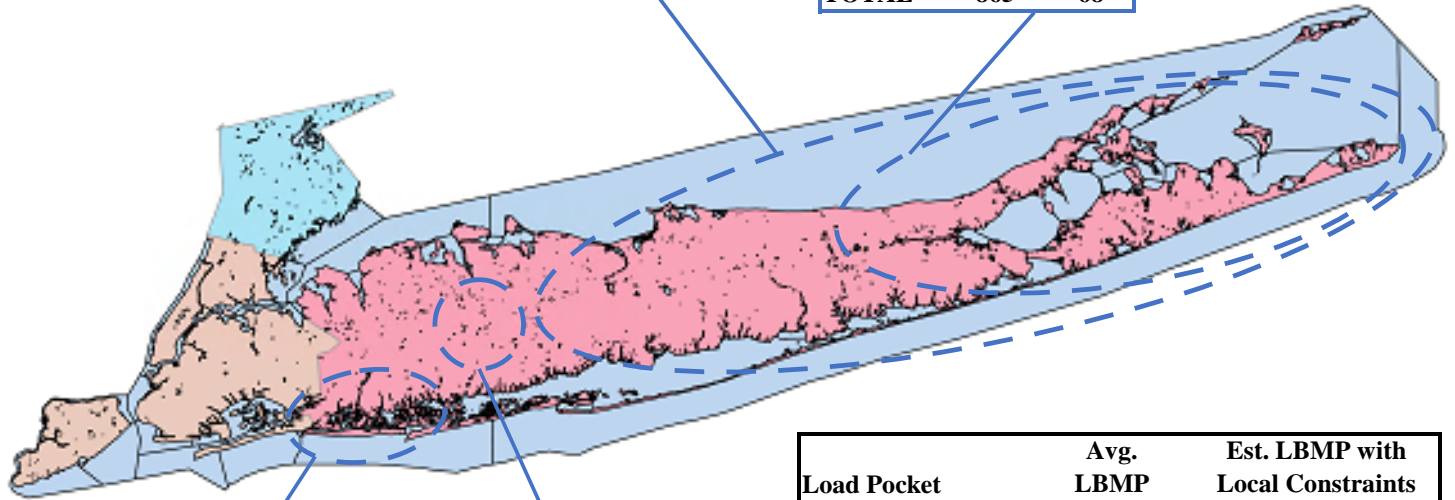
Energy Market Enhancements: Modeling Constraints on Long Island

- OOM actions:
 - ✓ Make transmission bottlenecks less transparent to investors
 - ✓ Suppress E&AS prices
- Modeling low-voltage constraints in the market software would:
 - ✓ Facilitate more efficient PAR operations
 - ✓ Reduce inefficient dispatch of oil-fired generation
- Congestion pricing would increase LBMPs:
 - ✓ 12 percent in East of Northport load pocket
 - ✓ 53 percent in East End load pocket
- Recommendation #2018-1 would provide better pricing signals, better investment signals, and reduced emissions.

Energy Market Enhancements: Modeling Constraints on Long Island

<u>East of Northport</u>	<u>#Hours</u>	<u>#Days</u>
69kV	754	48
138kV	1173	114
TOTAL	1860	145

<u>East End</u>	<u>#Hours</u>	<u>#Days</u>
69kV	71	8
138kV	71	13
TVR	813	61
TOTAL	865	68



<u>Valley Stream</u>	<u>#Hours</u>	<u>#Days</u>
69kV	624	53
138kV	6601	353
TOTAL	6780	354

<u>Brentwood</u>	<u>#Hours</u>	<u>#Days</u>
69kV	381	48
138kV	2	1
TOTAL	383	49

<u>Load Pocket</u>	<u>Avg. LBMP</u>	<u>Est. LBMP with Local Constraints</u>
Brentwood	\$32.69	\$33.68
East End	\$36.19	\$55.41
East of Northport	\$34.76	\$38.82
Valley Stream	\$36.84	\$39.39

High Priority Energy Market Enhancements and Related NYISO 2021 Market Projects

Number	Recommendation	Summary	2021 Market Project
2017-1	Model local reserve requirements in New York City load pockets.	Procure reserves in locations where they are needed through market mechanism instead of supplemental or OOM action.	Reserve Enhancements for Constrained Areas
2016-1	Consider rules for efficient pricing and settlement when operating reserve providers provide congestion relief.	Available reserve capacity in region can allow NYISO to more fully utilize transmission imports into region and reduce costs.	
2015-16	Dynamically adjust operating reserve requirements.	Available transmission capability into region can allow NYISO to reduce reserve procurement in region and reduce costs.	
2017-2	Modify operating reserve demand curves to improve shortage pricing and ensure NYISO reliability.	Increase reserve shortage prices and evaluate appropriate price curve steps so that clearing prices efficiently bring needed resources online during shortage events.	Ancillary Services Shortage Pricing

Other Pricing and Performance Recommendations

Number	Recommendation	2021 Market Project
2019-1	Set day-ahead and real-time reserve clearing prices considering reserve constraints for Long Island.	Long Island Reserve Constraint Pricing
2018-1	Model in the day-ahead and real-time markets Long Island transmission constraints that are currently managed by NYISO with OOM actions and develop associated mitigation measures.	N/A: <i>(No tariff change required)</i>
2015-9	Eliminate transaction fees for CTS transactions at the PJM-NYISO border.	Eliminate Fees for CTS Transactions with PJM <i>(Future)</i>
2015-17	Utilize constraint-specific graduated transmission demand curves to set constraint shadow prices during transmission shortages.	Constraint Specific Transmission Shortage Pricing



2021 Market Project 31: Reserve Enhancements for Constrained Areas

- Addresses SOM Recommendations 2015-16 (Dynamic Operating Reserves), 2016-1 (Compensate Operating Reserves for Congestion Relief), and 2017-1 (NYC Local Reserves)
- We agree with NYISO's characterization as High Benefit Project in 2020 Draft Master Plan. Benefits include:
 - ✓ More efficient scheduling of reserves and utilization of transmission network
 - ✓ Signal value of flexible capacity in key locations
 - ✓ Reduce reliance on capacity market
- Study envisioned for 2021 Project is a good step to address inter-dependencies. NYISO could make goals and milestones for each component of this multi-year effort clear and identify elements that could be deployed more quickly than others.



2021 Market Project 39: More Granular Operating Reserves

- Partially addresses SOM Recommendation 2017-1
- NYISO proposal under this project to model reserve requirement in three NYC load pockets is a positive step towards more efficient scheduling and pricing
 - ✓ However, there are dozens of local reserve constraints that can lead to supplemental commitments in NYC.
- Value of project is significantly greater when combined with Recommendation 2015-16 (Dynamic Reserve Requirements) and 2016-1 (Compensate Reserve Providers for Congestion Relief)
 - ✓ Allow more efficient scheduling of resources to satisfy load pocket reliability needs at lowest cost and signal reserve provider value
 - ✓ Recommendation 2017-1 is more fully addressed by the Reserve Enhancements for Constrained Areas market project and strongly support that effort



2021 Market Project 23: Ancillary Services Shortage Pricing

- Partially addresses SOM Recommendation 2017-2
- 2020 Market Project proposed higher ORDC values – useful step to reduce need for OOM dispatch
- NYISO can take further steps to fully address this recommendation:
 - ✓ Consider approach to quantities and prices in reserve demand curve steps based on value of lost load (VOLL) and likelihood of load-shedding given reserve shortage quantity
 - ✓ Consider if shortage prices are sufficient in light of PFP shortage pricing values in neighboring markets (i.e., >\$6,000/MWh)
- Market project also includes consideration of increased reserve procurement to account for future grid uncertainty
 - ✓ This will become important under much higher intermittent renewable penetration levels.



2021 Market Project 27: Constraint Specific Transmission Shortage Pricing

- Addresses Recommendation 2015-17 (Utilize Constraint-Specific Graduated Transmission Demand Curves)
- Current graduated transmission demand curves are uniform – don't prioritize transmission constraints by importance of facility or severity of violation
- NYISO project proposes more graduated transmission demand curve in which prices increase proportionally with severity of overloads
 - ✓ This project largely addresses the issues identified in our Recommendation 2015-17 and should be supported



2021 Market Project 34: Long Island Reserve Constraint Pricing

- Addresses SOM Recommendation 2019-1 (Set Reserve Prices Considering Long Island Reserve Constraints)
 - ✓ Compensate Long Island reserve providers based on constraints already observed by NYISO instead of SENY price
- Our analysis shows very small near-term net revenue impact due to presence of significant surplus reserve capacity on Long Island
 - ✓ Project will ensure that market sends appropriate signals for investment in flexible units on Long Island as supply mix changes
- This project does *not* address Recommendation 2018-1 (Model Long Island Transmission Constraints managed through OOM Actions)
 - ✓ We understand that a Market Project is not needed to address Recommendation 2018-1, since it would not require any tariff change or market design change.



Energy Market Recommendations Mitigation and RTM Operations

Energy Market Recommendations and NYISO 2021 Market Projects

Number	Recommendation	2021 Market Project
2017-3	Modify mitigation rules to address deficiencies in the current rule related to uneconomic over-production.	N/A
2017-4	Modify mitigation rules to deter the use of fuel cost adjustments by a supplier to economically withhold.	N/A
2019-2	Adjust offer/bid floor from negative \$1000/MWh to negative \$150/MWh.	Adjustment of Energy Offer/Bid Floor
2014-9	Consider enhancing modeling of loop flows and flows over PAR-controlled lines to reflect the effects of expected variations more accurately.	Enhanced PAR Modeling (<i>Future</i>)
2012-8	Operate PAR-controlled lines between New York City and Long Island to minimize production costs and create financial rights that compensate affected transmission owners.	Long Island PAR Optimization (<i>Future</i>)
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.	RTC-RTD Convergence Improvements (<i>Future</i>)



Energy Market Design: Real-Time Market Operations

- The NYISO Operators face significant challenges at times to respond to real-time events. These may require:
 - ✓ Reductions in external interface limits
 - ✓ Transaction curtailments
- These actions occasionally result in large BMCR uplift when:
 - ✓ An import scheduled at the DAM price
 - ✓ Is able (or forced) to buy out at an extreme negative price
 - This accounted for \$4 million of uplift in 2019.
- Recommendations aim to address inflated uplift charges that sometimes arise under extraordinary circumstances in real-time:
 - ✓ 2019-2: Raise offer floor for external transactions from - \$1000/MWh to -\$150/MWh.



Energy Market Design: Supply Side Mitigation Measures

- Evolving market conditions have revealed gaps in the existing mitigation rules. These have not been exploited significantly, but we recommend rule changes to address the gaps:
 - ✓ 2017-3: Deter generators from over-producing to benefit from negative real-time prices. To illustrate, suppose a generator:
 - DAM: 200 MW schedule at \$20/MWh
 - In RTM: Transmission outage or loop flows require generator to back down
 - Self-schedule 160 MW and LBMP = -\$300/MWh.
 - RT buy-back MWs at *cost* of -\$12,000/hour.
 - ✓ 2017-4: Deter generators from submitting inflated fuel cost estimates to drive up LBMPs.



Capacity Market Recommendations

Capacity Market Recommendations and NYISO 2021 Market Projects

Number	Recommendation	2021 Market Project
2019-3	Modify Part A test to allow public policy resources to obtain exemptions when it would not result in price suppression below competitive levels.	N/A: <i>(Tariff language filed with FERC in 2020)</i>
2018-3	Consider modifying the Part A test to exempt a New York City unit if the forecasted price of the G-J Locality is higher than its Part A test threshold.	
2013-2d	Enhance Buyer-Side Mitigation Forecast Assumptions to deter uneconomic entry while ensuring that economic entrants are not mitigated.	Enhanced BSM Forecast Assumptions (part of Comprehensive Mitigation Review)
2019-4	Modify translation of the annual revenue requirement for the demand curve unit into monthly demand curves that consider reliability value.	Monthly Demand Curves
2019-5	Translate demand curve reference point from ICAP to UCAP terms based on the demand curve unit technology.	Demand Curve Translation Enhancement
2013-1c	Implement locational marginal pricing of capacity (“C-LMP”) that minimizes the cost of satisfying planning requirements.	Locational Marginal Pricing of Capacity (<i>Future</i>)
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.	Capacity Transfer rights for Internal Transmission Upgrades (<i>Future</i>)

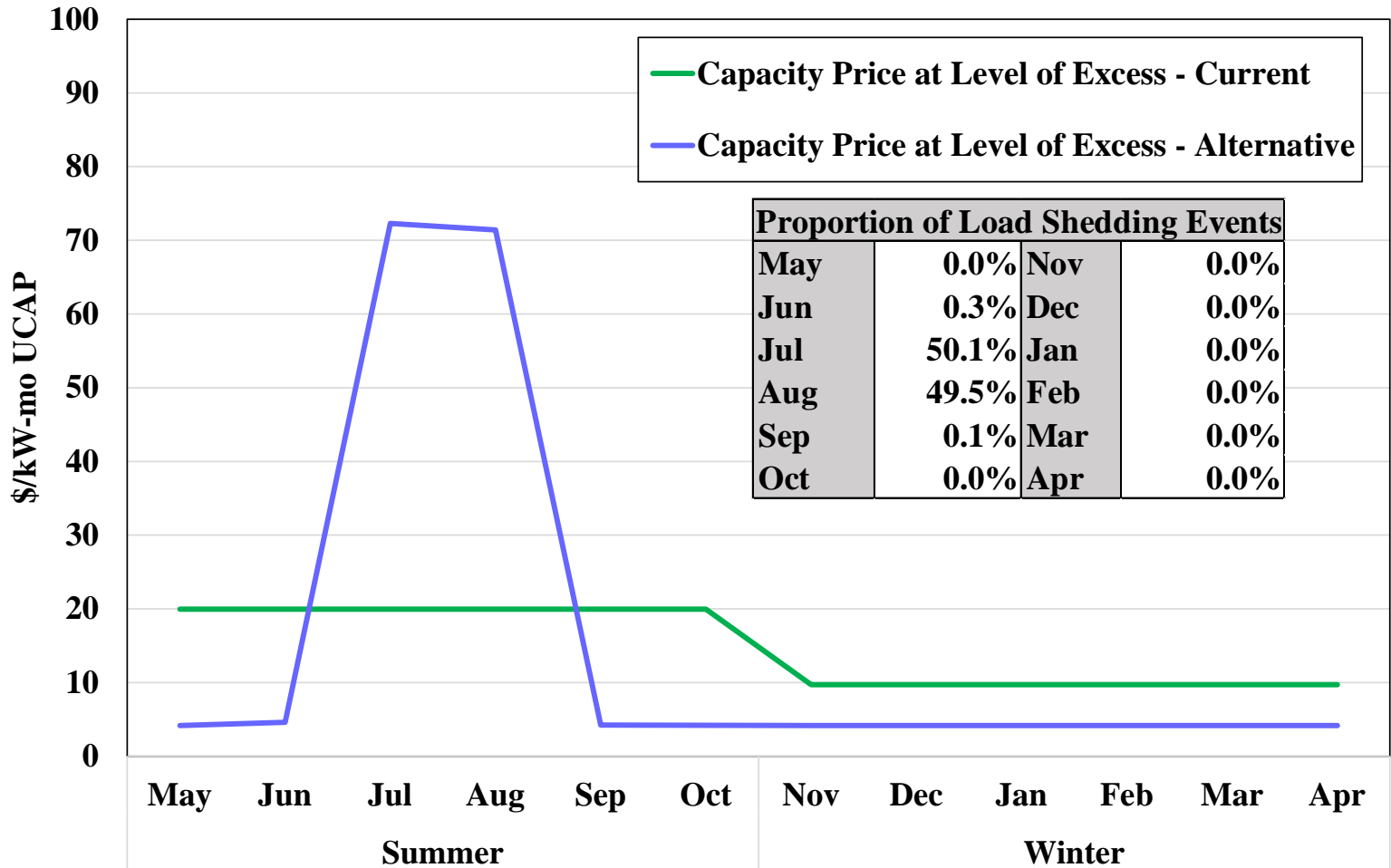


Capacity Market Design: Demand Curve Enhancements

- Capacity prices should be structured such that resources are compensated based on:
 - ✓ Reliability value when the unit is available.
 - ✓ Levelized CONE of new unit technology.
- As new technologies enter the market, variations in the availability of these technologies will exacerbate issues with the current market design.
- To provide for better planning incentives, we recommend:
 - ✓ 2019-4: Translate the annual demand curve requirement into monthly requirements reflecting likelihood of load shedding.
 - ✓ 2019-5: Use demand curve technology derating factor for ICAP to UCAP translation.



Recommendation 2019-4: Monthly Demand Curves





Recommendation 2019-5: Demand Curve Derating Factor for ICAP/UCAP

- Prices on the capacity market demand curve are currently translated from ICAP to UCAP terms using the regional average derating factor for existing suppliers.
- Demand curve technology tends to have lower derating factor than fleet average, so revenues at Level-of-Excess conditions would exceed its revenue requirement (Net CONE)
 - ✓ Thus, the UCAP demand curve is biased upward
 - ✓ This will become more pronounced as intermittent resources drive up system average derating factor
- Recommend that NYISO use forced outage rate of the demand curve technology for translation of the demand curves
 - ✓ All actual capacity suppliers would continue to supply UCAP based on their own unit-specific derating factors



Capacity Market Design: Capacity Prices by Location & Technology

- The current capacity market's four-region framework:
 - ✓ Provides excessive incentives to import capacity,
 - ✓ Makes excessive payments to generators in export-constrained areas,
 - ✓ Gives insufficient incentives for investment in import-constrained areas and new transmission, and
 - ✓ Places inefficient deliverability requirements on new investments.
- The current market design will not adapt compensation efficiently to:
 - ✓ Shifting transmission bottlenecks, and
 - ✓ An evolving resource mix with more non-conventional resources.
- In the long-term, we have recommended that the NYISO implement locational marginal pricing for capacity or "C-LMP" (#2013-1c)
 - ✓ We presented high-level findings on market design considerations and impacts of this long-term proposal in 2020



Capacity Market Design: Modifying Buyer-Side Mitigation Rules

- BSM rules should strike a reasonable balance between preventing capacity price suppression and facilitating state policies
- Recently, the NYISO filed enhancements to the BSM rules that will facilitate new renewable generation and battery storage:
 - ✓ Filed Part A enhancements addressed our Recommendations 2018-3 and 2019-3
 - ✓ Recommendation 2013-2d (Improve BSM Test Forecast Assumptions) may be addressed as part of NYISO’s Comprehensive Mitigation Review market project
- To avoid mitigation of public policy resources in the long-term, other initiatives should also be considered:
 - ✓ Energy, ancillary services, and capacity market enhancements that reward flexibility (and reduce revenues to inflexible units)
 - ✓ Public policy initiatives that effect retirements (e.g., the DEC “peaker rule”).



Full List of Recommendations for Market Enhancements



Market Recommendations: Energy Market Enhancements

Number	Section	Recommendations	Current Effort	High Priority
Energy Market Enhancements – Pricing and Performance Incentives				
2019-1	VIII.C	Set day-ahead and real-time reserve clearing prices considering reserve constraints for Long Island.		
2018-1	V.B, VIII.C	Model in the day-ahead and real-time markets Long Island transmission constraints that are currently managed by NYISO with OOM actions and develop associated mitigation measures.		
2017-1	VIII.C, IX.G	Model local reserve requirements in New York City load pockets.	✓	✓
2017-2	VIII.C, IX.A	Modify operating reserve demand curves to improve shortage pricing and ensure NYISO reliability.	✓	✓
2016-1	VIII.C, IX.C	Consider rules for efficient pricing and settlement when operating reserve providers provide congestion relief.		✓
2015-9	VI.D	Eliminate transaction fees for CTS transactions at the PJM-NYISO border.		
2015-16	IX.A	Dynamically adjust operating reserve requirements to account for factors that increase or decrease the amount of reserves that must be held on internal resources.	✓	✓
2015-17	IX.A	Utilize constraint-specific graduated transmission demand curves to set constraint shadow prices during transmission shortages.	✓	



Market Recommendations: Energy Market Enhancements

Number	Section	Recommendations	Current Effort	High Priority
Energy Market Enhancements – Market Power Mitigation Measures				
2017-3	IX.B	Modify mitigation rules to address deficiencies in the current rule related to uneconomic over-production.		
2017-4	III.B	Modify mitigation rules to deter the use of fuel cost adjustments by a supplier to economically withhold.		
Energy Market Enhancements – Real-Time Market Operations				
2019-2	V.A	Adjust offer/bid floor from negative \$1000/MWh to negative \$150/MWh.		
2014-9	VI.D, IX.G	Consider enhancing modeling of loop flows and flows over PAR-controlled lines to reflect the effects of expected variations more accurately.		
2012-8	IX.D	Operate PAR-controlled lines between New York City and Long Island to minimize production costs and create financial rights that compensate affected transmission owners.		
2012-13	VI.D, IX.F	Adjust look ahead evaluations of RTD and RTC to be more consistent with the timing of external transaction ramp and gas turbine commitment.		

Market Recommendations: Capacity Market and Planning Enhancements

Number	Section	Recommendations	Current Effort	High Priority
Capacity Market – Market Power Mitigation Measures				
2019-3	III.C	Modify the Part A test to allow public policy resources to obtain exemptions when it would not result in price suppression below competitive levels.	✓	✓
2018-3	III.C	Consider modifying the Part A test to exempt a New York City unit if the forecasted price of the G-J Locality is higher than its Part A test threshold.	✓	
2013-2d	III.C	Enhance Buyer-Side Mitigation Forecast Assumptions to deter uneconomic entry while ensuring that economic entrants are not mitigated.		
Capacity Market – Design Enhancements				
2019-4	VII.B	Modify translation of the annual revenue requirement for the demand curve unit into monthly demand curves that consider reliability value.		
2019-5	VII.B	Translate demand curve reference point from ICAP to UCAP terms based on the demand curve unit technology.		
2013-1c	VII.D	Implement locational marginal pricing of capacity (“C-LMP”) that minimizes the cost of satisfying planning requirements.		✓
2012-1c	VII.E	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.		
Planning Process Enhancements				
2015-7	VII.F	Reform the transmission planning process to better identify and fund economically efficient transmission investments.		