

# AG Performance Assurance Study

## Report Summary

ICAPWG

November 6, 2017

- Purpose and context
- Performance topics
- Performance mechanisms considered by Northeast RTOs
- Options for NYISO and stakeholders to consider going forward

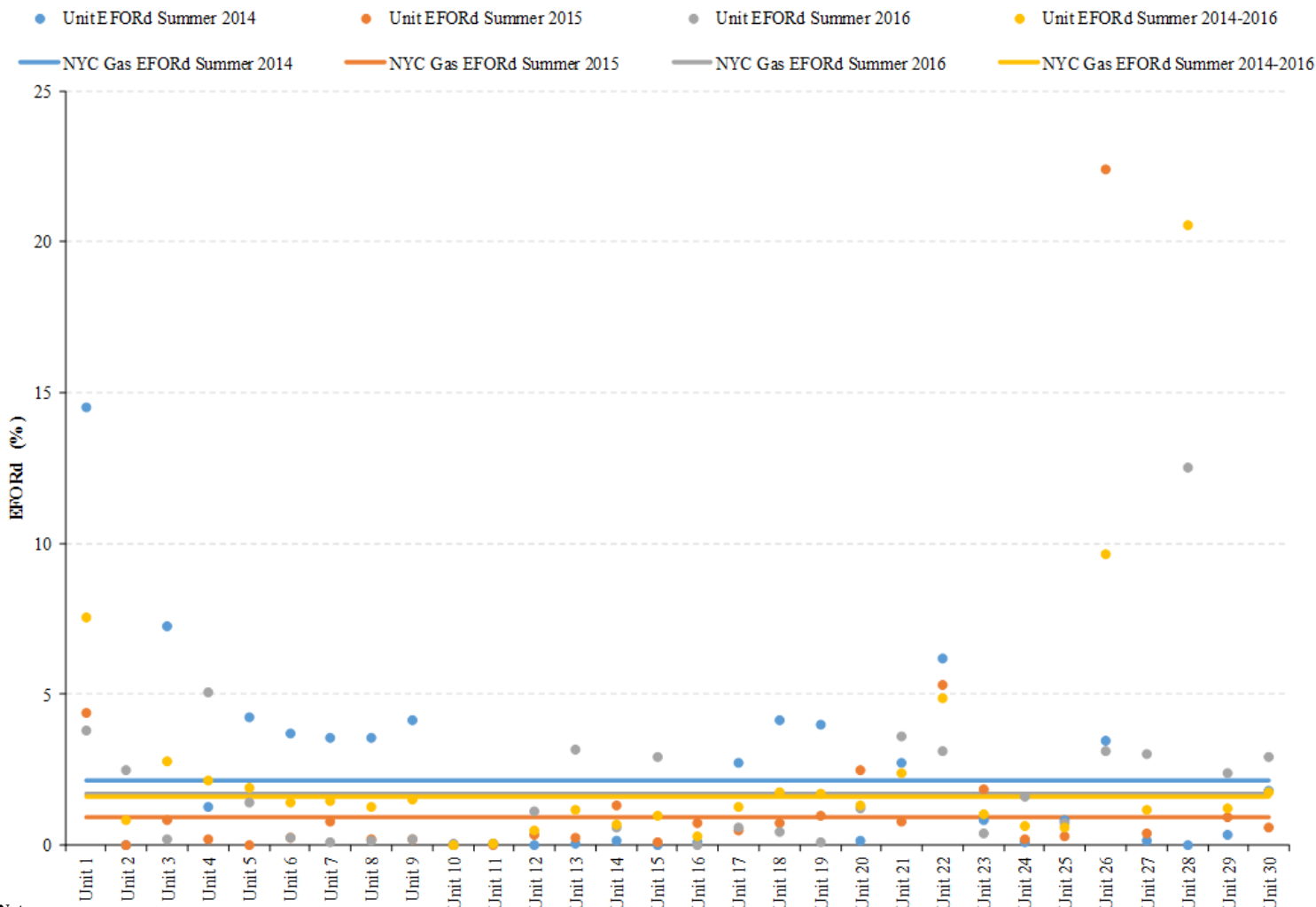
- **Reliability requires ensuring capacity resources perform as expected, particularly:**
  - Under stressed system conditions
  - When fuel supplies are tight
  - As load profile changes
- **NYISO has established numerous energy market incentives for resource performance under shortage/scarcity conditions**
- **NYISO continues to review potential market rule changes to help efficiently ensure power system reliability**
- **Useful inputs to deliberations:**
  - Changes underway in the industry that will affect reliability efforts
  - Considerations related to current and past market design and resource performance
- **Other RTOs/ISOs are implementing market design changes to provide incentives for performance**
- **Report: identify resource performance considerations and various market design options for review by NYISO & stakeholders**

- Low energy market prices
- Potential retirement of older assets; increase in region's dependence on natural gas-fired generating capacity
  - Challenging conditions for the siting of natural gas infrastructure
- Rapid growth in grid-connected and distributed variable resources, DR; movement towards DER platform
  - Increase in the variability and uncertainty of bulk power system net load
- Contributions from resources outside the NYCA
- Weather-related events - particularly during the winter season - that introduce severe-weather operational and/or fuel supply challenges
- Changes to better reflect public policy goals in the market design while continuing to ensure meeting reliability needs – e.g., flexibility, ramping, fuel certainty, low-CO<sub>2</sub> generation

- Availability
- Fuel assurance
- Operational parameters
- Comparability
- Demand response

- EFORd equally weights all hours - monthly EFORd calculations do not accurately capture unit availability at times when resources have their highest reliability value
- EFORd does not account for correlated risks - average availability does not account for unit outages that are linked to common factors that affect multiple resources at the same time (natural gas transportation, severe weather conditions)
- Rolling average availability does not account for temporal variation in reliability need

**Unit EFORd vs. Capacity Weighted Average EFORd by Fuel Type  
N.Y.C., Gas, 2014 - 2016**



**Notes:**

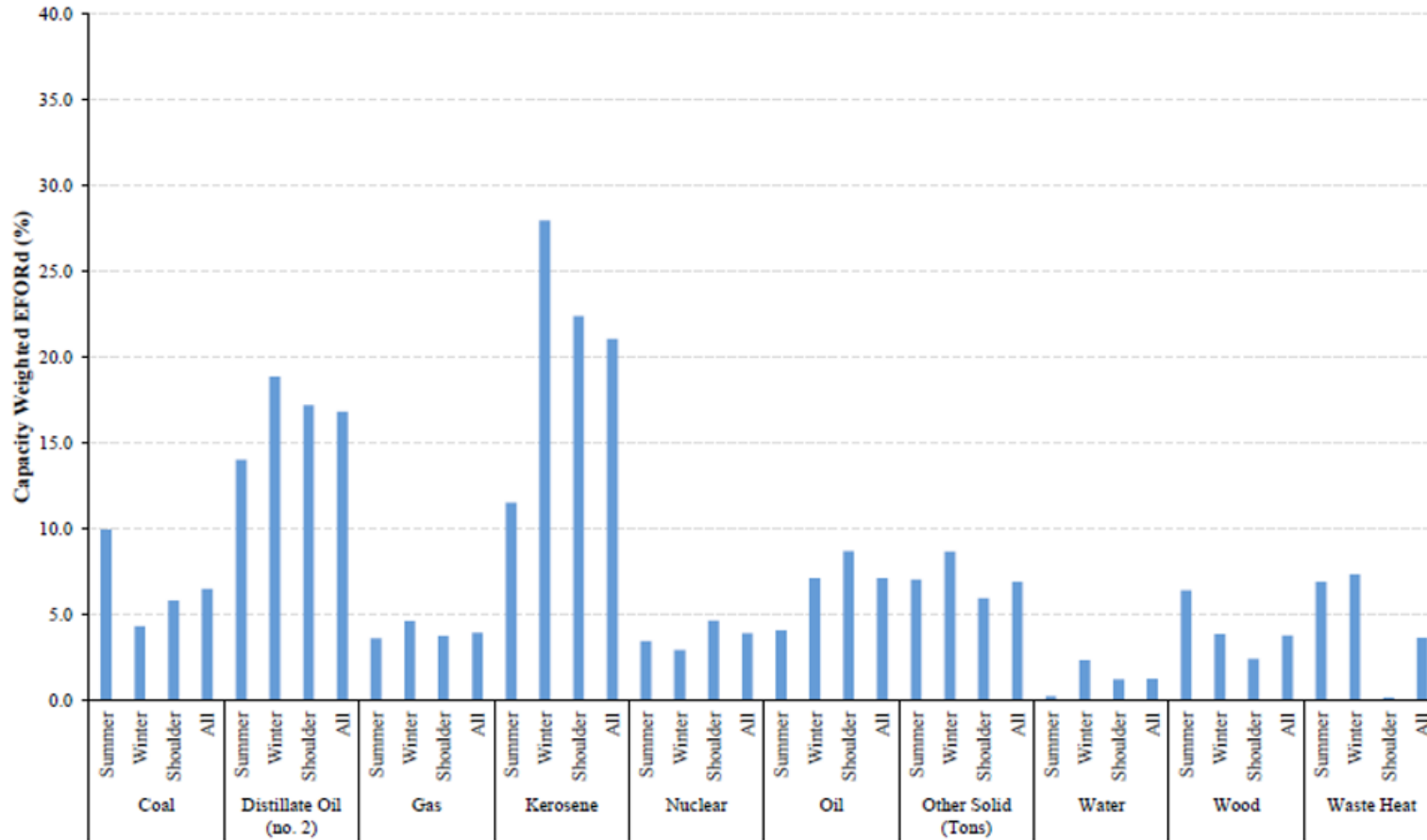
[1] EFORd is weighted for each technology type by Net Dependable Capacity (MW).

[2] Summer months include June, July, and August. Winter months include December, January, and February. Shoulder months include March, April, May, September, October, and November.

**Source:**

[1] EFORd-2014-2016.xls.xlsx.

NYISO 2014 - 2016 Average Fuel Type Capacity Weighted EFORd by Season



**Notes:**

[1] EFORd is weighted for each technology type by Net Dependable Capacity (MW).

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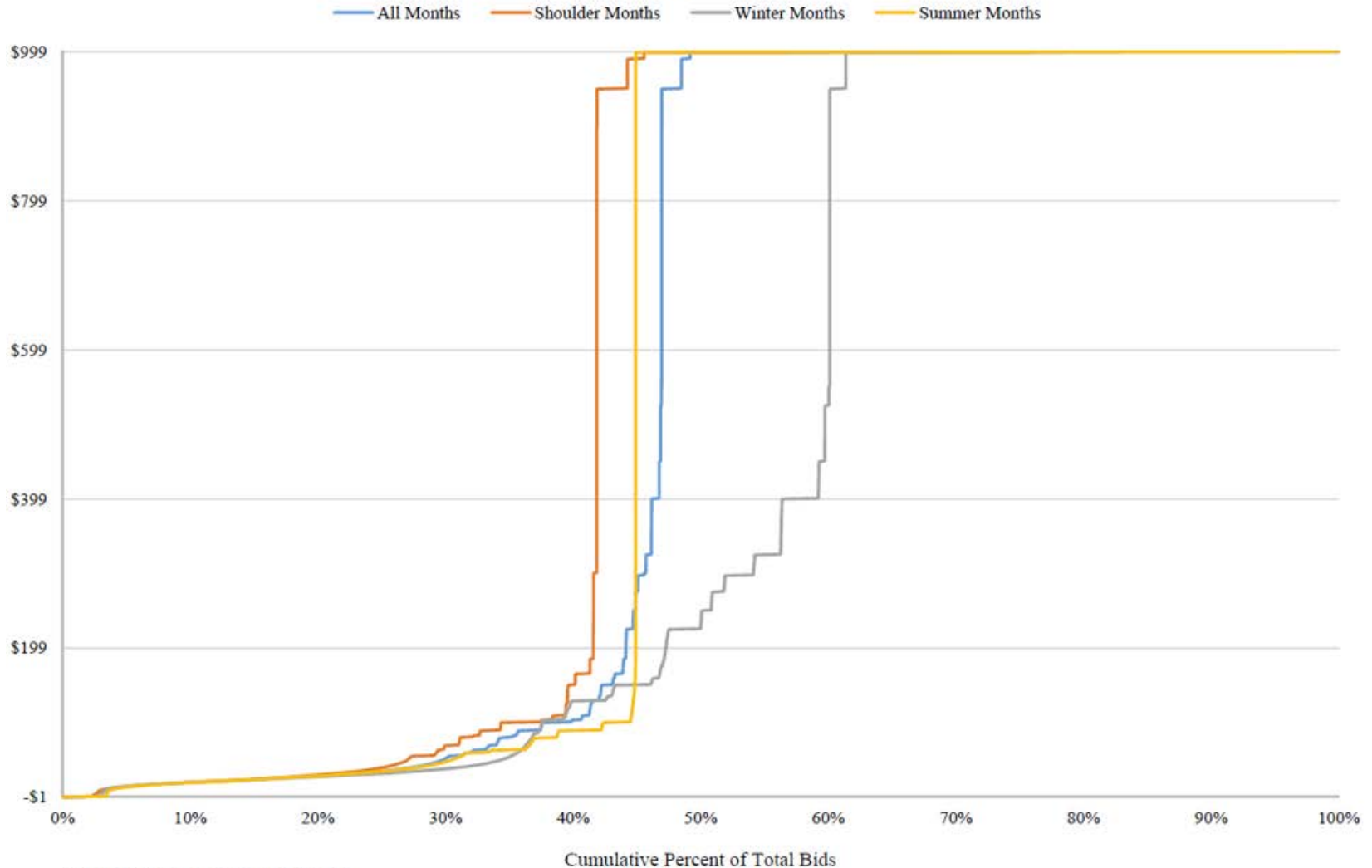
**Source:**

[1] NYISO EFORd-2014-2016.xls.xlsx.



- Fuel
  - Electricity and natural gas markets are not perfectly aligned
  - Not all gas-fired resources in New York are required to have dual-fuel capability, and all units can face fuel-related performance or contracting issues
  - Cold weather operations have included heightened generation derates due e.g. to fuel unavailability and draw-down, cold temperature, hydro ice dam-related outages
- Operational parameters
  - External resources (see next slide) – visibility, deliverability, offer parameters
  - Outage frequency and duration variations
  - Operating restrictions (emissions limits, common mode limitations)
  - Start time/notification (see slide 7)

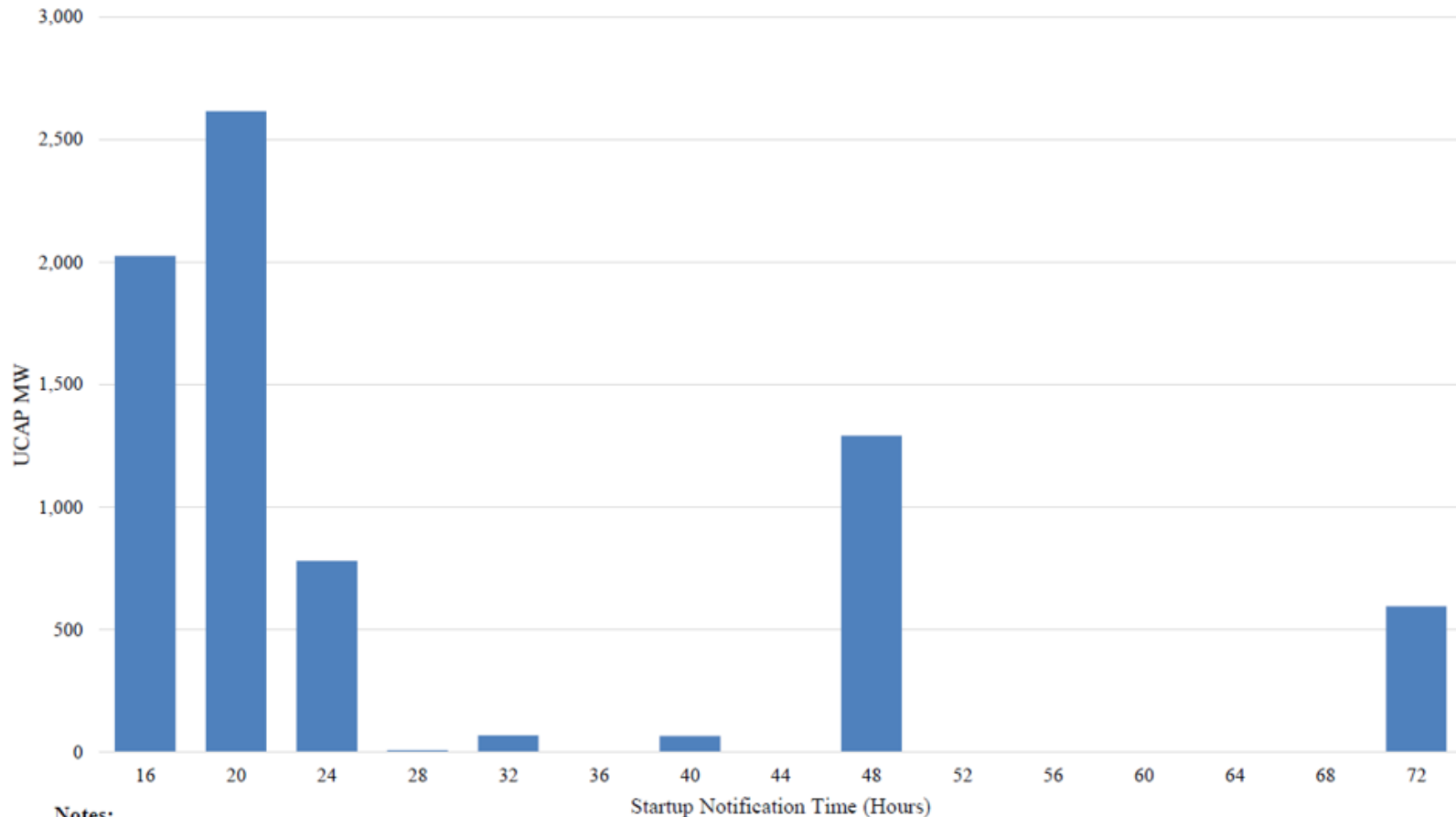
Cumulative Percent of External Capacity Bids  
*NYISO*



Source: Transaction\_withMP.xlsx

Bid Startup Notification Time  
*ALL*  
*NYISO*

Number of Units: 357



**Notes:**

- [1] Bids with startup notification times less than 16 hours are not included.
- [2] Startup Notification Times are bucketed such that each bucket includes all bids between it and the next bucket. For example, the "16" bucket includes all bids with startup notification times between 16 and 19 hours.
- [3] Bids from units without an associated UCAP value are not included.

Sources: Gen\_Parameter\_IE.xlsx; Min Run Time and Startup Notification Time.xlsx.

- Demand response
  - Differences in measurement of eligible capacity
  - Different market offer, notification, availability requirements and timing/performance obligations
  - Unknown relationship between call frequency and performance of resource over time
  - Manual activation based on generation & load forecasts

- **Northeast RTOs have implemented numerous market design changes to better tailor capacity resource performance to reliability needs**
- **NYISO has already adopted many of these**

Market/Rule	
<b>Eligibility and Obligations</b>	
	Clarify the obligations of resources with respect to fuel availability when committed or dispatched
	Modify timing and notifications that trigger a DR event, and the procedures to establish and measure/verify baseline level
	Increase frequency and cost recovery for auditing of dual-fuel capability with respect to fuel swap time, start up, min/max gen levels, ramping
<b>Fuel Procurement, Delivery, and Inventory</b>	
	Require gas-fired units to have dual-fuel capability in certain zones
	Adjust start up notification times considering gas nomination cycles
<b>Energy and Reserve Market Modifications</b>	
	Shift day-ahead energy market timeline to align electricity and natural gas markets and nomination schedules
	Increase energy market offer cap (e.g., \$2,000 for LMP, with generator cost recovery in excess of this amount)
	Enhance shortage/scarcity pricing during tight operating conditions
	Establish energy market offer flexibility allowing offers to vary by hour of the day, and updating of offers in real-time (e.g., 30 minutes before operating hour) to reflect changing fuel costs
	Allow recovery of higher fuel costs (based on fuel oil prices) when oil is burned to mitigate natural gas delivery constraint
	Improve fast-start resource pricing and reflection of fast-start resource costs in LMPs
	Enact sub-hourly settlement for energy and reserve markets (5-minute pricing)
	Create multi-hour system ramp pricing product to convey the costs incurred when the system must be re-dispatched in advance of a sustained load ramp
	Fully integrate demand response in energy, reserve and capacity markets
	Improve ability of storage to provide frequency regulation services
	Increase price caps in reserve markets
<b>Capacity Market Performance Incentives</b>	
	Develop two-tiered capacity market that rewards or penalizes capacity market resources depending on actual performance during stressed system conditions ("Performance Incentive" or "PI" program)
	Tighten "shortage event trigger" used to define stressed system conditions for PI program

- **Reliability:** Does the identified issue present a real risk with respect to the reliable operation of the NYCA bulk power system with a particular focus on stressed system conditions on summer and winter peak days? Do potential solutions have the potential to meaningfully reduce or eliminate the risk without introducing new or unintended operational risks or challenges?
- **Efficiency:** Does the issue reduce the competitiveness and/or efficiency of wholesale market operations, or have the potential to do so as the industry evolves over time? Do potential solutions provide transparent, effective and efficient incentives for improved performance and/or reduced reliability risks? Are potential solutions fair and not unduly discriminatory against any particular technology or fuel type?
- **Suitability:** There is diversity in the nature of consumer demand throughout the state and in the resources that are relied upon for meeting system need, and both are constantly changing over time. Is the issue reviewed a region-wide or localized concern? Is the proposed solution targeted appropriately to the nature of the risk in form, timing, and geography?
- **Feasibility:** Methods for addressing an identified issue must represent practical solutions that can be designed, processed and approved by required regulatory authorities, and administered over time without excessive costs or administrative burdens that do not correspond to the enhanced value provided.

- **ICAP to UCAP Availability Adjustments**

- Purpose: target payments to resources that provide greater reliability, based on availability during stressed system conditions
- Examples: increase weighting on certain peak hours during certain peak months or seasons; increase weighting of availability during periods of actual need not known in advance (e.g., based on actual reserve shortages or high loads occur)

- **External Resource Requirements**

- Purpose: address external resource eligibility requirements and offer obligations and terms
- Examples: require external resources to submit cost-based offers in the energy market and/or demonstrate reserved transmission capacity to the NYCA border

- **Energy Market Offer Requirements**

- Purpose: improve comparability in startup times for resources
- Examples: set maximum start/notification times

- **Fuel Security**

- Purpose: reduce risks associated with increasing dependence on natural gas
- Examples: fuel capability, fuel assurance requirements

- **Variable Resources, DR and Other Non-Traditional Resources**

- Purpose: improve comparability of DR and other capacity market resources
- Examples: develop broader DER retail/wholesale interaction mechanism (underway)

- **Compensation for Performance During Reserve Shortages**

- Purpose: increase revenues of units that perform well during shortage or scarcity conditions
- Examples: capacity market modifications, further increases in energy offer caps, and/or further increases in quantities of reserves procured and the price paid for such reserves

Options	Description	Benefits	Drawbacks
<b>Capacity Market</b>			
Critical period performance incentive ("CPPI")	Adopt a performance incentive mechanism in NYISO's ICAP market similar to that in ISO-NE ("Pay for Performance") and PJM ("Resource Performance"); define shortage hours consistent with NYISO determination of critical period hours	<ul style="list-style-type: none"> <li>• Incentives for resource performance tailored to period of performance need</li> <li>• Enhances incentives for investments to improve performance</li> <li>• Enhances incentives for retirement of poor-performing capacity</li> <li>• Can "borrow" design from other regions</li> </ul>	<ul style="list-style-type: none"> <li>• Requires determination of performance value/"rate"</li> <li>• May increase capacity market risks for some resources</li> <li>• Complicates resources offers and assessment by Market Monitor</li> <li>• Indirect route to higher shortage prices</li> </ul>
New Capacity Products	Create new capacity products to address reliability gap; e.g., a tranche of winter capacity with fuel-secure requirements	<ul style="list-style-type: none"> <li>• Can directly address an identified reliability gap (e.g., fuel-secure resources during winter periods)</li> </ul>	<ul style="list-style-type: none"> <li>• Defining product specifications is difficult</li> <li>• Complicates capacity market</li> <li>• Product tied to one identified reliability risk, not other known risks or risks yet to emerge</li> </ul>
Tailored availability mechanism	Changes to the current ICAP to UCAP conversions to better account for performance during periods of need (e.g., peak periods, seasonal variations)	<ul style="list-style-type: none"> <li>• Availability decrement to capacity market revenues would more closely reflect performance when resources are needed</li> <li>• Relatively simple calculation</li> <li>• Does not require setting of "rate"</li> </ul>	<ul style="list-style-type: none"> <li>• Data are less certain than observed operations</li> <li>• Availability is different than performance, not what matters during shortage conditions</li> </ul>
Separate winter fuel purchase	Institute a separate product purchase (e.g., fuel) for winter months	<ul style="list-style-type: none"> <li>• Can increase certainty of fuel (oil, gas) availability during critical winter period</li> </ul>	<ul style="list-style-type: none"> <li>• Requires determination of quantity to procure</li> <li>• Requires out-of-market purchase and collection of costs</li> <li>• Has not been used as a permanent design change</li> </ul>





Options	Description	Benefits	Drawbacks
<b>Energy and Ancillary Services Markets</b>			
Increase energy offer cap	Increase current cap on energy market offers	<ul style="list-style-type: none"> <li>To some extent already in regulatory review</li> <li>Allows prices to increase, in particular during high-load periods</li> <li>Increases revenues to generators and incentives for operation during times of scarcity</li> </ul>	<ul style="list-style-type: none"> <li>Increased energy market prices not ideal from the viewpoint of some stakeholders</li> </ul>
Increase reserve quantities	Increase reserve quantities given NYISO operator needs (e.g., location-specific contingencies; actual reserve performance; etc.)	<ul style="list-style-type: none"> <li>Allows for sufficient reserves to meet contingencies given actual reserve performance</li> <li>Increased incentives for fast start and responsive resources</li> </ul>	<ul style="list-style-type: none"> <li>Requires establishing approach to account for other factors affecting appropriate reserve quantities (e.g., actual reserve performance)</li> <li>May not incentivize improved reserve performance</li> </ul>
Modify Reserve Requirement Locations	Modify Reserve Requirement Locations to better capture geographic variation in reserve needs	<ul style="list-style-type: none"> <li>Reserve requirements better matched to need in each geographic location</li> <li>Improve geographic specificity of price signal for fast-start and responsive resources</li> </ul>	<ul style="list-style-type: none"> <li>Locational definitions change as the system evolves; need to balance cost of frequent modifications with benefit of more accurate locations</li> <li>Complex process to modify locations or incorporate design in which locations adjust automatically</li> </ul>
Increase reserve pricing	Increase reserve prices	<ul style="list-style-type: none"> <li>Increases price signal and incentives to operate during high-load periods and times of resource scarcity</li> <li>Sends efficient price signal if shortage pricing set to expected value of lost load</li> </ul>	<ul style="list-style-type: none"> <li>Increased reserve market prices not ideal from the viewpoint of some stakeholders</li> </ul>
External resource energy offer requirements	Require cost-based energy offers for capacity market resource imports	<ul style="list-style-type: none"> <li>Opportunity for increased accountability and efficiency gain from external resources</li> <li>Improves comparability of obligations for internal and external resources</li> <li>Promote efficient price formation</li> </ul>	<ul style="list-style-type: none"> <li>Challenges associated with monitoring and verification</li> <li>Determining an offer's opportunity cost potentially challenging</li> </ul>

Options	Description	Benefits	Drawbacks
<b>Eligibility and Comparability Requirements</b>			
Fuel Assurance Program or Requirements	Rules or programs targeting fuel assurance, such as statewide dual-fuel capability requirement	<ul style="list-style-type: none"> <li>• Reduces risk of gas transportation constraints upstate</li> <li>• Improves consistency of locational demand curve calculations</li> </ul>	<ul style="list-style-type: none"> <li>• May require changes in existing reliability rules</li> <li>• May not be technology neutral</li> </ul>
Startup notice requirement	Minimum startup notice requirements for capacity market resources (e.g., resource must have 24 or less hour notice/start up notification)	<ul style="list-style-type: none"> <li>• Improve comparability across resources</li> <li>• Ensure all capacity resources can be called upon to meet demand on a day-ahead basis without out of market payments</li> </ul>	<ul style="list-style-type: none"> <li>• May not be technically possible for some resources that serve capacity/reliability functions</li> <li>• Could prompt resource retirements</li> </ul>
Outage scheduling requirements	Preclude outage maintenance during pre-defined periods and/or enable call back for units on outage under critical period conditions	<ul style="list-style-type: none"> <li>• Would augment existing scheduled maintenance expectations</li> <li>• Provide NYISO ability to add capacity in critical situations</li> </ul>	<ul style="list-style-type: none"> <li>• May not be worth the effort considering that NYISO can reject outage scheduling requests that would cause reliability risks</li> </ul>
External Resources Performance	Modify external resource requirements to ensure comparable level of service as internal resources when called upon by NY Operator	<ul style="list-style-type: none"> <li>• Able to respond to DARU/SRE</li> <li>• Better ensure external capacity is available and providing service comparable to internal resources during stressed conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Potential challenges with implementation given role of external resource's system operator</li> <li>• Might affect level of participation of imports</li> </ul>



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