Highlights from the 2020 State of the Market Report for the NYISO Markets: Capacity Market Issues

Presented by:

Pallas LeeVanSchaick
NYISO Market Monitoring Unit
Potomac Economics

June 17, 2021

POTOMAC ECONOMICS

Introduction

- As the Market Monitoring Unit for NYISO, we produce an annual State of the Market (SOM) Report to:
  - ✓ Evaluate the performance of the markets;
  - ✓ Identify market flaws or market power concerns; and
  - ✓ Recommend improvements in the market design.
- Given the breadth of the report, this presentation covers only capacity market highlights from our 2020 SOM Report, including:
  - ✓ Review of Market Outcomes
  - ✓ Evaluation of Market Performance
  - ✓ Capacity-related Recommendations

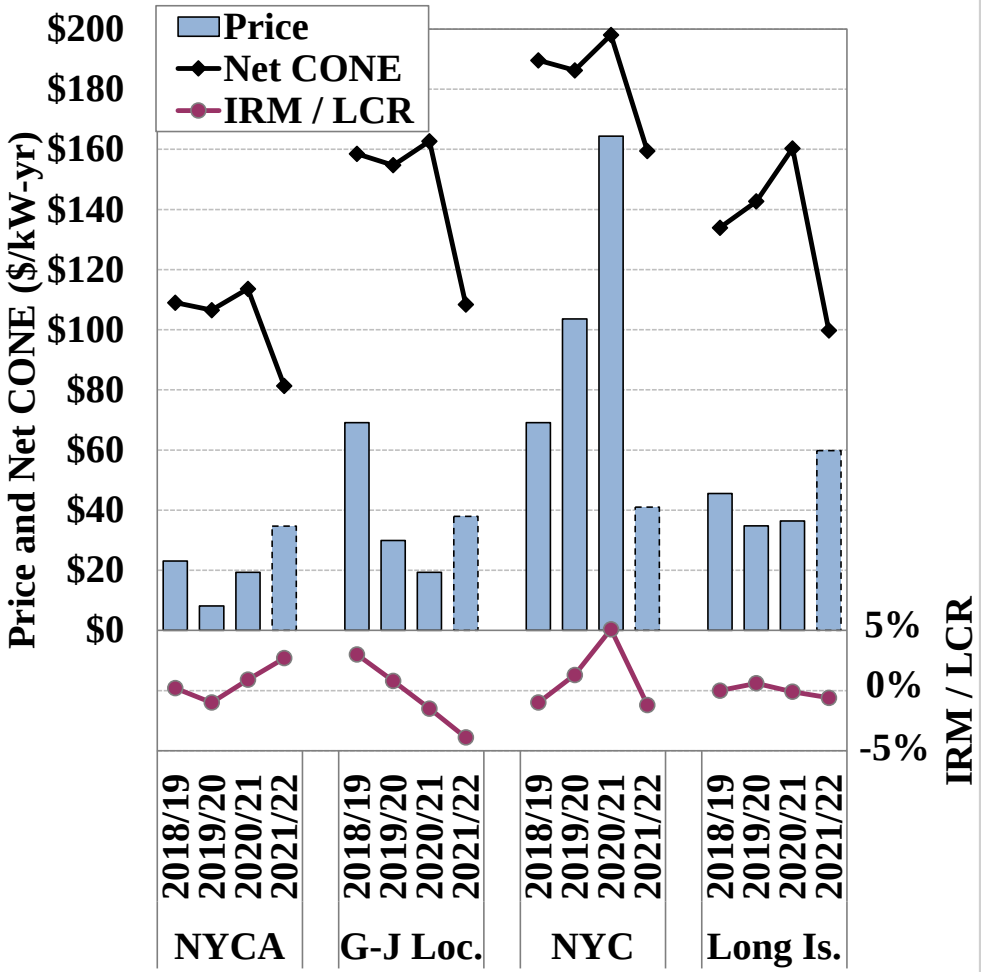
Schedule

- The 2020 SOM is being presented at several meetings:
  - ✓ May 26: Management Committee
    - Overview – 1 hour
  - ✓ June 9: MIWG/ICAPWG
    - Public Policy focus – 1 hour
  - ✓ June 17: MIWG/ICAPWG
    - Capacity Market focus – 1 hour
  - ✓ June 25: MIWG/ICAPWG
    - Energy and Ancillary Services focus – 1 hour
  - ✓ TBD: Details on the capacity accreditation recommendation
  - ✓ Additional slots can be scheduled if there is interest.

Review of Capacity Market Outcomes

POTOMAC ECONOMICS

Capacity Price Trends



- Upstate prices low because of:
  - ✓ Long-term demand trends
  - ✓ Retention of upstate nuclear
  - ✓ New entry ahead of Indian Point retirement
- NYC prices affected by:
  - ✓ Volatile IRM & LCRs
  - ✓ Retirements influenced by DEC peaker rule

POTOMAC ECONOMICS

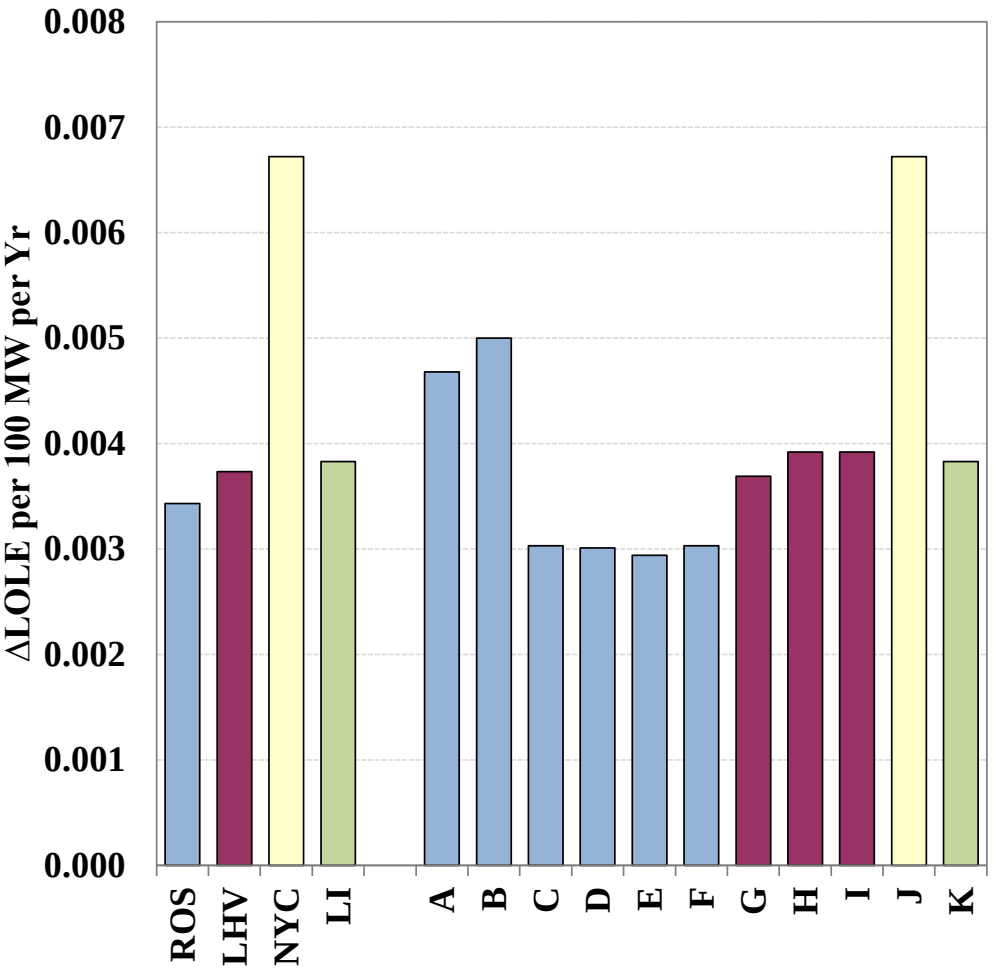
Evaluation of Capacity Market Performance

POTOMAC ECONOMICS

Capacity Market Performance

- The market has maintained reliability with minimal OOM investment for 20 years. However, the changing resource mix reveals major challenges:
  - ✓ Capacity prices do not provide adequate locational signals
  - ✓ The established Tan45 process and LCR Optimizer are poorly coordinated and have inefficient objectives.
  - ✓ These issues are illustrated in the following two slides.
- In addition, some resource types are under or over-compensated:
  - ✓ Duration-Limited & Intermittent Generation
  - ✓ Slow-start low-capacity factor units
  - ✓ These issues are discussed later in the presentation

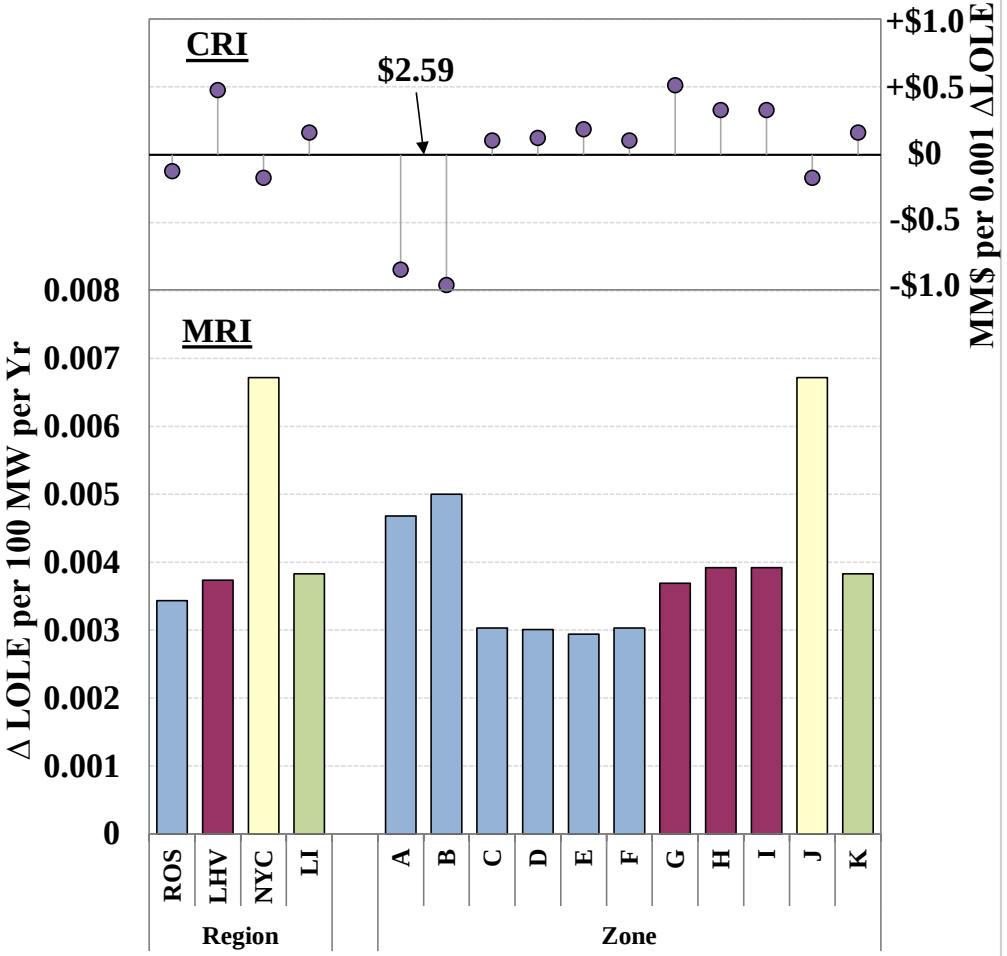
Capacity Market Performance:
MRI by Locality and Load Zone



- The marginal reliability impact (MRI) varies within capacity regions.
- MRI of Zones A and B much higher than rest of ROS
  - ✓ Current approach requires shifting large amounts of capacity from J and GHI to ACD for need in AB.
- Constraints from G to H exist
  - ✓ Could worsen with transfer capability reduction in 2023
- Intra-zonal constraints in Zn J and Zn K can be a barrier to efficient investment.

POTOMAC ECONOMICS

Capacity Market Performance:
CRI by Locality and Load Zone



- Efficient markets equalize CRI (Cost of Reliability Improvement) across regions.
  - ✓ Large discrepancies are observed across zones.
- MRI (and CRI) indicate need to break out:
  - ✓ Zones A & B from ROS
  - ✓ Zone G from H & I
- LCR for K increased by TSL.
- LCRs inflated for GHI and too low for Zone J
  - ✓ LCR optimizer biases requirements toward small areas and away from large areas.

POTOMAC ECONOMICS

Capacity Market Performance:
Conclusions

- The previous slides illustrate several market design concerns:
  - ✓ Inadequate locational signals
  - ✓ LCR Optimizer uses a flawed objective function
  - ✓ The Tan45 and LCR Optimizer are poorly coordinated
- Additional concerns are discussed in the report including:
  - ✓ LCRs overly sensitive to inaccuracies in estimating NetCONE
  - ✓ Inappropriate Derating Factor Applied to Net CONE Curves
    - – Will bias requirements away form areas with high intermittent penetration
  - ✓ Capacity costs are not allocated to beneficiaries
  - ✓ Imports not scheduled or priced efficiently

Capacity Accreditation

POTOMAC ECONOMICS

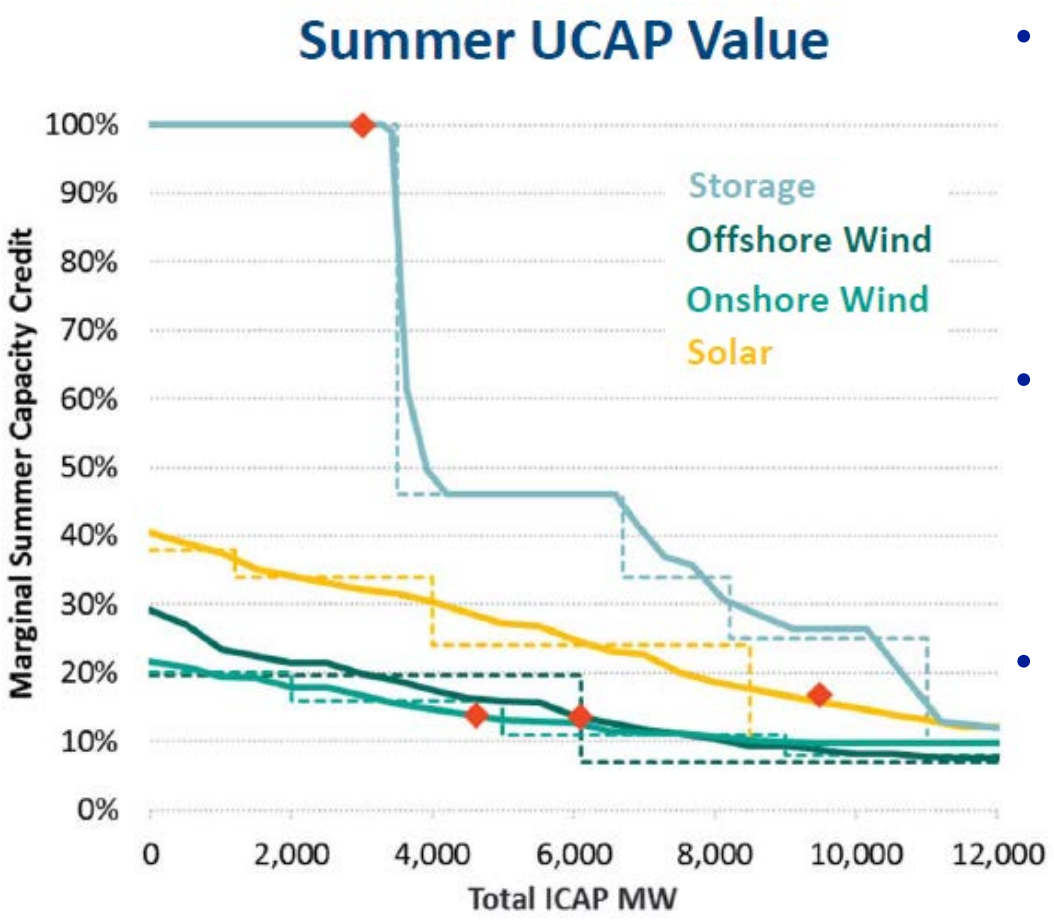
Principles of Capacity Accreditation

- **All resources that provide the same benefits should be compensated the same.**
  - ✓ Compensation in the capacity market should not arbitrarily discriminate based on technology or between new and old resources.
  - ✓ Distinctions based on technology are appropriate to the extent it affects the availability of a resource.
- **In the capacity market, the relevant benefit is resource adequacy, measured as reduction in loss-of-load expectation (LOLE).**
  - ✓ Resources that have greater expected availability in critical hours when capacity is needed provide greater resource adequacy value.

Problem with Existing Accreditation Methods

- Resources are accredited to sell in the capacity market based on Unforced Capacity (UCAP).
  - ✓ However, this is a proxy for the underlying value, which is the capability to reduce LOLE.
- NYISO's resource adequacy model GE-MARS is used to assess the system's reliability and determine IRM and LCRs.
  - ✓ MARS is probabilistic, considering characteristics like ICAP, EFORd, and intermittency that determine impact on LOLE.
- Methods to determine UCAP of some resources are misaligned from their impact on resource adequacy.
  - ✓ Their UCAP is inconsistent with impact on LOLE in MARS.
  - ✓ These resources are inappropriately compensated in the capacity market.

Importance of Resource Correlation



- When all resources of a type are *correlated*, their marginal reliability value falls as penetration rises.
- By contrast, resources that are diverse / uncorrelated support each other's value.
- Current rules don't recognize this or only partially recognize it in UCAP ratings.

Source: estimated ELCC values by Brattle Group in NYPSC Case19-E-0530

POTOMAC ECONOMICS

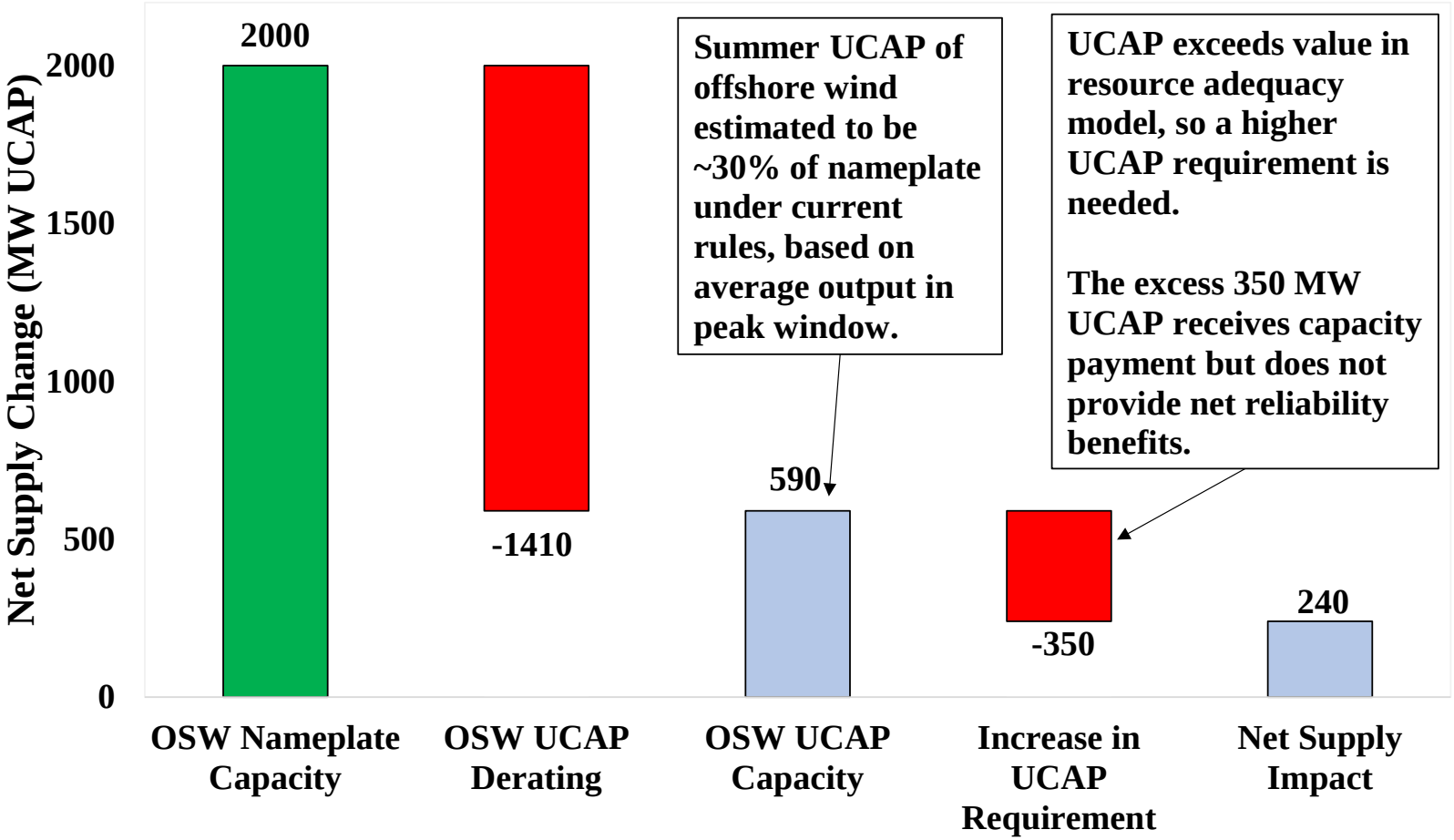
Resources with Overvalued UCAP: Intermittent and Energy-Limited Resources

- Current processes are inaccurate and too infrequent.
- *Intermittent Resources* – UCAP is based on average output in multiple-hour window each day, defined seasonally.
  - ✓ This does not consider that as penetration grows, shortages more likely at specific times when correlated output is low.
  - ✓ Revised every 4 years through Tailored Availability Metric, too infrequent to capture changing reliability value.
- *Energy-limited Resources* – UCAP is based on pre-defined curve that declines as penetration grows.
  - ✓ Revised every 4 years through Expanding Capacity Eligibility.
  - ✓ Informed by ELCC modeling, but final values differ from resources' marginal impact on LOLE in MARS.

Resources with Overvalued UCAP
Conventional Generators

- *Low Flexibility* – Units with long startup lead times provide less reliability than more flexible units.
  - ✓ If unit is not already committed, it may be unable to start fast enough to provide output during critical hours.
  - ✓ Only 30 percent of the 11 GW of fossil steam units were online in at least half of the NYCA and SENY reserve shortages in last three years.
- *Large Units* – Large units provide less reliability benefit than multiple smaller units with the same total capacity, because multiple units are less likely to be lost all at once.
- *Gas-Only Units* – Units with shared fuel supply and no backup provide less reliability because they could be lost in a single contingency.

Improper Capacity Accreditation Example Offshore Wind (OSW) in Zone J in NYSRC Study



Source: NYSRC study of intermittent resource impacts, March 31, 2020

POTOMAC ECONOMICS

Capacity Market Recommendations

POTOMAC ECONOMICS

Capacity Market Enhancements

- In the short-term: Recommendation #2020-3 – *Revise capacity accreditation rules to compensate resources in accordance with marginal reliability value*. This would:
  - ✓ Provide efficient sustainable rules to guide future investment
  - ✓ Recognize diminishing value as penetration rises
  - ✓ Increase compensation for complementary technologies
  - ✓ Encourage retirements of low-value units, creating room for entry
- In the long-term: Recommendation #2013-1c – C-LMP would provide appropriate incentives for investment in each area as transmission bottlenecks shift over time.
- Better alignment between the Reliability Council's IRM-setting process and other capacity market inputs would be beneficial.

Recommendation #2020-3
Proposed Capacity Accreditation Approach

- Establish capacity credit (UCAP) based on three factors:

1. **ICAP of individual resource (MW)**
2. **Individual Performance Factor (%)**
   - ✓ Performance relative to other resources of same type, e.g. (1 - EFORd) for dispatchable resource.
3. **Critical Period Availability Factor (%)**
   - ✓ Reflects expected availability of each resource type in hours when the system's need is greatest.
   - ✓ Considers impacts of technology, size and flexibility.

POTOMAC ECONOMICS

Recommendation #2020-3
Calculating Critical Period Availability Factor

- **Marginal Reliability Improvement (MRI)** – Yields similar results to the marginal ELCC method.
  - ✓ However, MRI is less computationally-intensive.
- MRI measures how much an incremental amount of a resource type reduces LOLE, compared to an incremental amount of 'perfect capacity' that is always available.
  - ✓ MRI can be calculated using NYISO's GE-MARS model.
  - ✓ MARS captures resource correlations at an hourly level.
  - ✓ Provides a value for each resource type between 0% and 100%, because no resource is more than perfectly available.
- MRI shows the relative effectiveness of every resource type at providing a common resource adequacy product.

Recommendation #2020-3
Advantages of Marginal Accreditation

- Recommended approach is based on marginal reliability value.
  - ✓ Sets capacity market incentives that correspond to the resource adequacy value a new resource or retirement would provide.
  - ✓ Reflects resource value *given the rest of the resource mix* – captures correlations and synergies between resources.
- Marginal accreditation provides efficient incentives to:
  - ✓ Invest in diverse resources and avoid oversaturated technologies
  - ✓ Pair storage with intermittent resources
  - ✓ Efficiently choose between storage project durations and augment duration of storage over time
  - ✓ Maintain flexible conventional resources if they are needed
  - ✓ And many others…

POTOMAC ECONOMICS

Recommendation #2020-3

- We will present additional detail on the proposed capacity accreditation methodology and comparison to other approaches in a forthcoming presentation.
  - ✓ Further discussion can be found in Section VII.E and Appendix Section VI.I of the 2020 State of the Market report.