



2020 Project:
Locational Marginal Pricing of Capacity
Kickoff Discussion

Pallas LeeVanSchaick
Potomac Economics
Market Monitoring Unit

Installed Capacity Working Group
January 21, 2020



Overview of the Presentation

- Background – Concerns with current market design:
 - ✓ How the market values resources at each location, and
 - ✓ How it adapts to evolving technologies and shifting transmission bottlenecks.
- Scope and deliverables for the 2020 Project: *Locational Marginal Pricing of Capacity*
- Locational pricing concept to address concerns with current market design
- Model used to simulate effects of the locational pricing concept
- Key questions to be addressed as part of this project
- Project schedule and feedback



Background: Concerns with Current Design



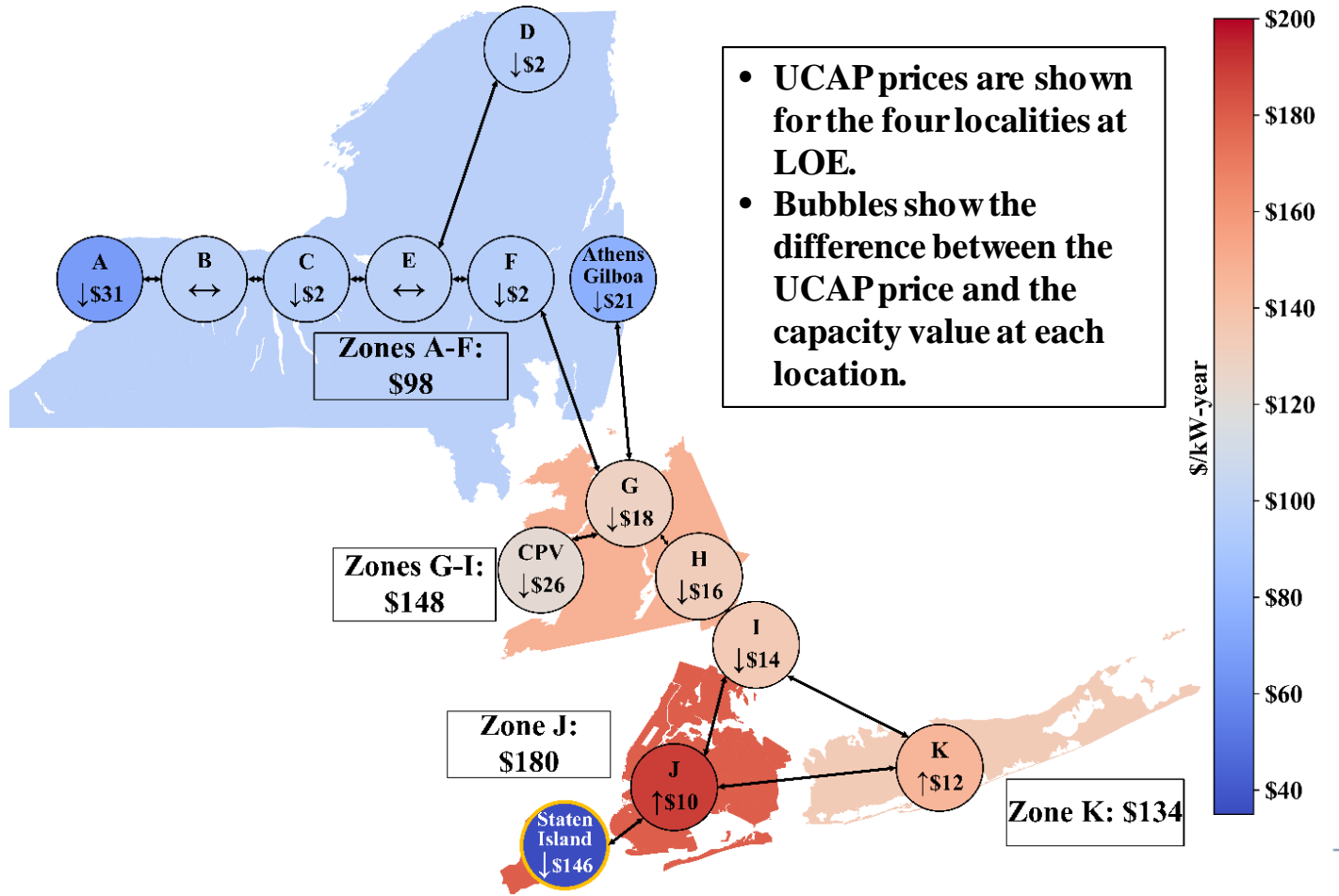
Background: Concerns with Current Design

- State of the Market Report recommendation #2013-1c states:
 - ✓ *Implement locational marginal pricing of capacity (C-LMP) that minimizes the cost of satisfying planning requirements.*
 - ✓ This recommendation has been based on a series of issues that have been identified over time, which are discussed below.
- SOM Reports have identified price inefficiencies under the current design.
 - ✓ For example, the 2019/20 IRM/LCRs exhibit areas that would be over- or under-priced relative to the value of resources in the area at LOE conditions. The following slide shows:
 - Over-priced areas: Staten Island, Zone G, & Athens/Gilboa
 - Under-priced areas: Zones J & K



Background: Concerns with Current Design

From 2018 SOM Report: UCAP Prices v. Capacity Value at LOE





Background: Concerns with Current Design

- The 2016 DCR filing showed that Zone C has a lower Net CONE than Zone F.
 - ✓ However, the Net CONE for Zone C could not be incorporated into prices west of the Central-East Interface (in Zones A-E) under the current market design because Zones A-F are a single pricing region.
- The Indian Point nuclear units are scheduled to retire in 2020 and 2021, which will shift some transmission bottlenecks from UPNY-SENY to the UPNY-ConEd interface (which is in the middle of the LHV capacity region).
 - ✓ However, UPNY-ConEd is not represented under the current market design because Zones GHI are a single pricing region.



Background: Concerns with Current Design

- The 2020/21 MARS topology shows that CPV Valley and Cricket Valley have very different impacts on reliability. (Cricket Valley is more effective than CPV Valley at relieving the UPNY-SENY interface.)
 - ✓ However, the current design compensates both at the price for Zones GHI.



Background: Concerns with Current Design

- Recent NYISO studies have shown that the capacity value of non-conventional capacity resources varies according to the penetration level and other variable conditions.
 - ✓ The processes of determining the capacity value of ESRs and other non-conventional resources has been controversial and administratively burdensome.
 - These processes will likely have to be repeated periodically as conditions change.
 - ✓ Consequently, it will be difficult for the current capacity market design to quickly adapt to an evolving resource mix and shifting transmission bottlenecks.



Background: Concerns with Current Design

- The current design provides inefficient investment incentives in some cases where deliverability issues are likely.
 - ✓ Example 1:
 - Unit A with a NetCONE of \$60 wants to interconnect in an export-limited area with a capacity price of \$100.
 - Unit B is an older generator in the area with a GFC of \$70.
 - Suppose Unit A would have to bear a \$50 SDU to interconnect.
 - Unit A does not enter because $\text{NetCONE} + \text{SDU} > \text{Price}$
 - However, the efficient outcome would be for Unit A to interconnect and for Unit B to retire.




Background: Concerns with Current Design

✓ Example 2:

- Unit A with a NetCONE of \$50 wants to interconnect in an area with a capacity price of \$100.
- The unit is not fully deliverable, so it has a reduced capacity value which is estimated to be \$70.
- Suppose Unit A would have to bear a \$60 SDU to interconnect.
- Unit A does not enter because $\text{NetCONE} + \text{SDU} > \text{Price}$
- However, the efficient outcome would be for Unit A to interconnect without making the upgrade.



Scope and Deliverables of 2020 Project: *Locational Marginal Pricing of Capacity*



Scope and Deliverables of 2020 Project: *Locational Marginal Pricing of Capacity*

The NYISO defined the *Locational Marginal Pricing of Capacity* project as part of the 2020 Market Project Candidate list. The following slides show the scope and deliverables that were defined for this project, which is scheduled for completion in Q1.

NYISO's 2020 Market Project Candidates document:

- *Problem / Opportunity*—
 - ✓ *An opportunity exists to better align capacity market clearing prices with the marginal reliability value of capacity in each Locality.*
 - ✓ *Achieving this alignment would lower overall costs of satisfying capacity needs.*



Scope and Deliverables of 2020 Project: *Locational Marginal Pricing of Capacity*

NYISO's 2020 Market Project Candidates document:

- *Project Objective(s) & Anticipated Deliverable(s)*
 - ✓ *The objective for this project would be to consider a capacity pricing framework where the clearing price at each location is set in accordance with the **marginal reliability value of capacity at the location.***
 - ✓ *The deliverable for 2020 is Issue Discovery.*



Scope and Deliverables of 2020 Project: *Locational Marginal Pricing of Capacity*

NYISO's 2020 Market Project Candidates document:

- *Project Justification – This proposal could:*
 - ✓ *Reduce the costs of satisfying resource adequacy needs,*
 - ✓ *Facilitate more efficient investment and retirement decisions,*
 - ✓ *Be more adaptable to changes in resource mix (i.e., increasing penetration of wind, solar, and energy storage), and*
 - ✓ *Simplify market administration.*




Proposed Locational Pricing Concept



Proposed Locational Pricing Concept

- This concept has been discussed in:
 - ✓ 2018 SOM Report, Section VII.D
 - ✓ June 22, 2017 presentation to the ICAPWG titled *Concept for Locational Capacity Pricing Based on Marginal Reliability Impacts and Costs*
- The concept is based on the following fundamental principles:
 - ✓ The market should solve the “missing money problem”
 - ✓ The market should satisfy resource adequacy & other planning reliability and deliverability criteria to the extent possible
 - ✓ Efficient prices for different locations and technologies should be based on marginal reliability value



Proposed Locational Pricing Concept: Key Elements

- Cost of Reliability Improvement (“CRI”) –
 - ✓ The estimated capital investment cost of adding an amount of capacity to a zone that improves the LOLE by 0.001.
 - ✓ Based on estimated cost of new investment from DCR study and MRI of capacity in each area under LOE conditions.
- Marginal Reliability Impact (“MRI”) –
 - ✓ The estimated reliability benefit (i.e., reduction in the annual loss of load expectation (“LOLE”)) from adding 100 MW of UCAP to an area.
 - ✓ Measured by the MARS model for the As-Found system in each monthly auction.
- Clearing price = MRI*CRI for each zone and technology



Simulating Effects of the Concept




Simulating Effects of the Concept

- We have developed a model to simulate MARS.
- The model uses intermediate data from actual MARS runs and modifies certain assumptions to evaluate the effects of specific market design changes.
- We used this model to estimate the capacity value of ESRs. (see ICAPWG materials for Jan. 24 & Feb. 25, 2019.)
 - ✓ It allowed us to modify the availability of ESRs based on the state-of-charge while maintaining consistency with other aspects of MARS.
- This model allows us to consider potential pricing enhancements without modifying the GE MARS model.



Key Questions to Be Evaluated



Key Questions to Be Evaluated 2020-Q1

- This project seeks to answer basic questions about how the proposed concept would operate, including:
 - ✓ How prices and quantities are determined for generation, loads, transmission, and imports
 - ✓ How the market would be affected by the IRM and LCRs, including any transmission security limits
 - ✓ The list of NYISO processes that would be affected
- We will use our model to estimate how the design would change prices, consumer costs, and other market outcomes compared to the current rules:
 - ✓ Under LOE conditions
 - ✓ One-off scenarios (as time & resources permit)



Key Questions to Be Evaluated Future

- Future projects could estimate how the design would change prices, consumer costs, and other market outcomes:
 - ✓ Under high renewable penetration, high battery storage penetration, and other changes in resource mix
 - ✓ Under a broad set of conditions (e.g., capacity surplus, inaccurate Net CONE)
- Future efforts would be needed to assess:
 - ✓ The overall impact on the NYISO's administration of planning and market processes
 - ✓ Impact on the BSM process
 - ✓ Speed and efficiency of the Interconnection process



Project Schedule



Project Schedule

- January 21 – Kickoff presentation
- February 4 – Presentation of proposed conceptual design, which will draw heavily from June 22, 2017 presentation
- February 19 or March 6 – Present example of market impact analysis based on 2019/20 LCR case at LOE conditions, including estimated prices and consumer payments for:
 - ✓ Generation and load in each zone
 - ✓ Transmission interfaces
 - ✓ Capacity imports
 - ✓ Compared to the current market framework
- March 26 – Sum-up proposal, results, conclusions, answers to outstanding questions, and list of unanswered questions.
- Schedule is tentative and dependent on other higher priority capacity market design efforts.



Questions and Feedback?