Reliability and Market Considerations for a Grid in Transition

Overview of Draft and Next Steps

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Agenda

- Background
- Overview of Report
- Expected Schedule & Next Steps

Background

Background: A grid in transition

- The NYISO has been working to identify any gaps in the analyses needed in the context of the State's more aggressive trajectory for transitioning to a cleaner and more sustainable energy future in New York.
- Various stakeholders have also asked the NYISO about market and reliability concerns related to the State's public policy actions.
- The outline of this report was provided for discussion at NYISO sector meetings and was also reviewed with stakeholders at the April 15 MIWG.
  - The goal was to bring together the analysis that has already been performed and to outline additional work that we recommend undertaking.
  - Comments from stakeholders, both verbal and written, were received and considered.

Background: A grid in transition

- The draft *Reliability and Market Considerations for a Grid in Transition* report was posted last Friday.
  - This presentation will provide an overview of the report and its conclusions
  - We are seeking stakeholder comments on the draft.
    - We request that written comments be provided by June 24
- We will be updating the *Reliability and Market Considerations for a Grid in Transition* report in late summer 2019.
- Ultimately the report will drive updates to the long-term Market Design Master Plan and project prioritization discussions in 2019 and beyond.
  - The report will also inform the Board Strategic Planning session in September 2019.

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Background: A grid in transition

- **The report:**
  1. describes the emerging reliability and economic challenges;
  2. presents our initial identification of gaps to address; and
  3. proposes next steps.
- **The report focuses on market design improvements, but also identifies the need for changes to operations and planning processes necessary for maintaining reliability.**

Review of Findings and Conclusions

New York's electricity industry is transforming rapidly

How can the wholesale energy market in New York continue to provide pricing and investment signals necessary to reflect system needs and to attract and retain enough controllable and flexible resources to balance the electric system and provide grid services necessary for reliability?

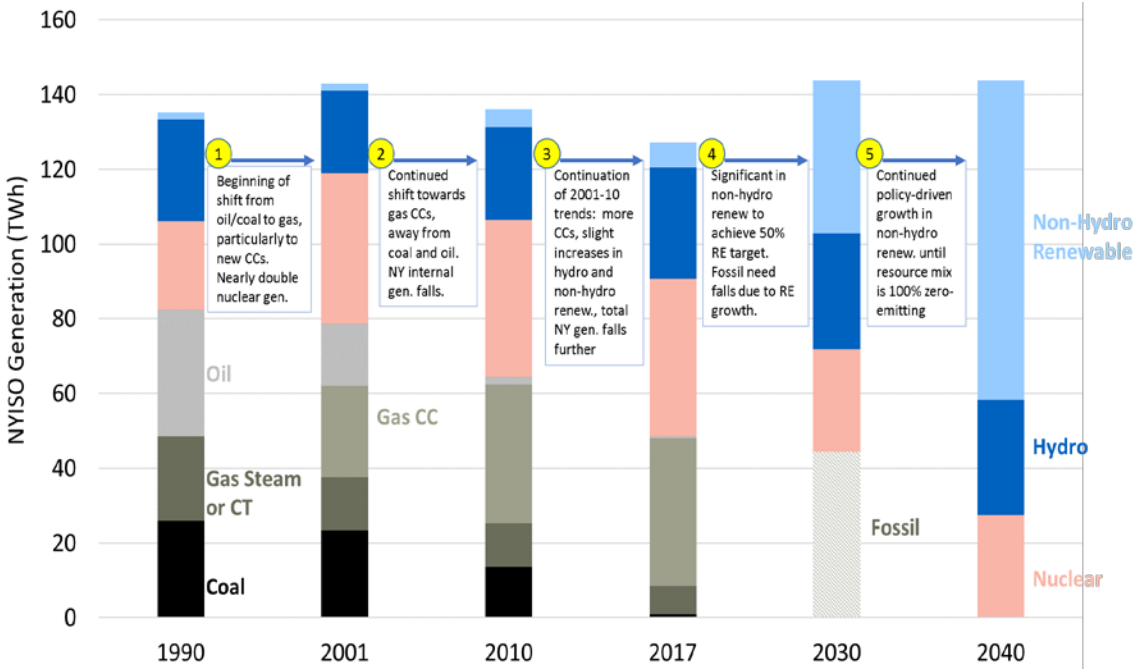

Figure 4
Sources and Notes: 2001, 2010 and 2017 data from SNL Energy. 2030 data is adapted from 2030 MAPS modeling (offshore wind scenario). 2040 shows assumed resource mix needed to achieve 100% zero-emissions goal.

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Approach

- We approach these questions with two guiding principles:
  1. all aspects of grid reliability must be maintained; and
  2. competitive markets should continue to maximize economic efficiency and minimize the cost of maintaining reliability.
- The key is to anticipate the needs for existing and new grid reliability services and proactively evolve the wholesale market design to accomplish those needs.
- Wholesale markets must continue to reflect all grid reliability services needed through defined products, with product pricing the reflects the marginal, cost to serve or forego (when supply is scarce) the reliability need.
- **Prices can serve as a powerful control signal: they rise where and when necessary to attract and make available essential grid services.**

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Initial Assessment of emerging reliability challenges

- **The primary future challenges arise from the variability and unpredictability of large and distributed wind and solar generation.**
  - As the penetration of those technologies increases, the grid will likely need more load-following capability, and possibly more fast-response and flexible resources that provide operating reserves to address expected and unexpected changes in net load.
  - The grid will also need a substantial amount of installed reserve capacity that is available to serve load when wind and/or solar generation output is insufficient for periods that may range from minutes to several days.
  - It will be important to examine the need for strategic transmission investments that enhance the operational flexibility of the grid and accommodate the integration of high levels of intermittent renewable generation.

Combined cycle revenues under different scenarios

- In a future without market design enhancements, the wholesale market revenues will not support the investment of new flexible generation needed to maintain grid reliability.

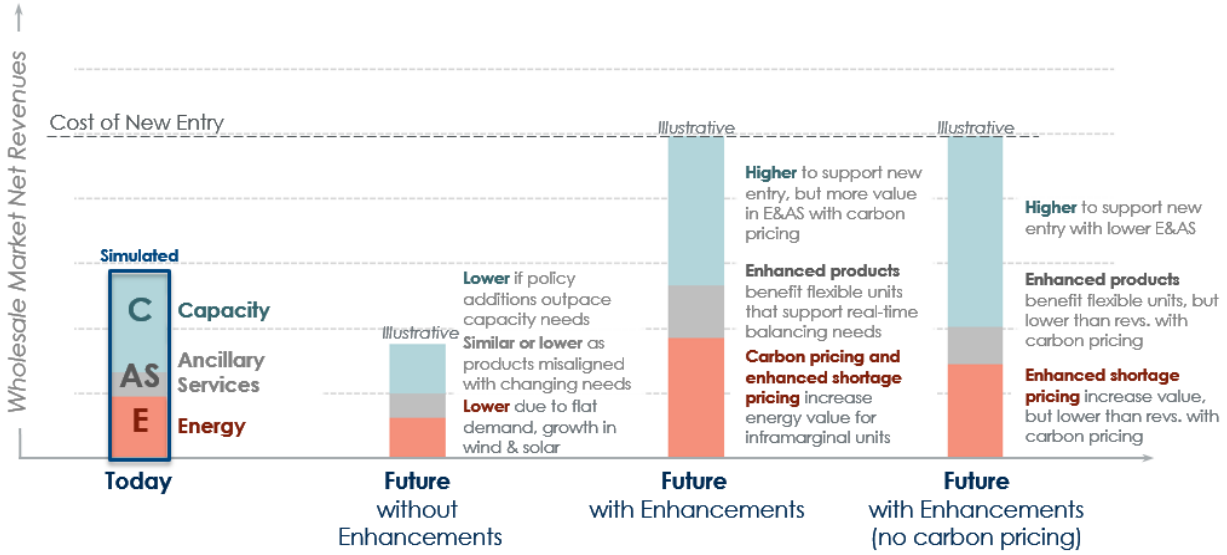

Figure 2: Illustrative Change in Revenues, 1x1 Gas Combined-Cycle (Assuming New Entry is Needed)

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Revenue Sufficiency With and Without Carbon Pricing

- Revenue sufficiency – whether market incentives are lucrative enough to attract or retain investment when needed – is a necessary condition for reliable and economically efficient wholesale markets.
- Thus far, NYISO's markets have provided sufficient revenues to attract new merchant investment when needed. However, absent enhancements to NYISO's markets, policy-driven changes in the supply mix could depress prices in NYISO's markets, threatening the investability of the markets and, therefore, threatening reliability.
- To provide a vision of how revenues may evolve in the future, we evaluate market revenues to several resource types under today's market design.
- We then *qualitatively* estimate how these revenues may change in the future with and without market design changes, including carbon pricing and additional market enhancements.
- A quantitative assessment of future market revenues and revenue sufficiency through modeling is being considered.

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Estimated Market Revenues by Resource and Service, 2015-2018 average.

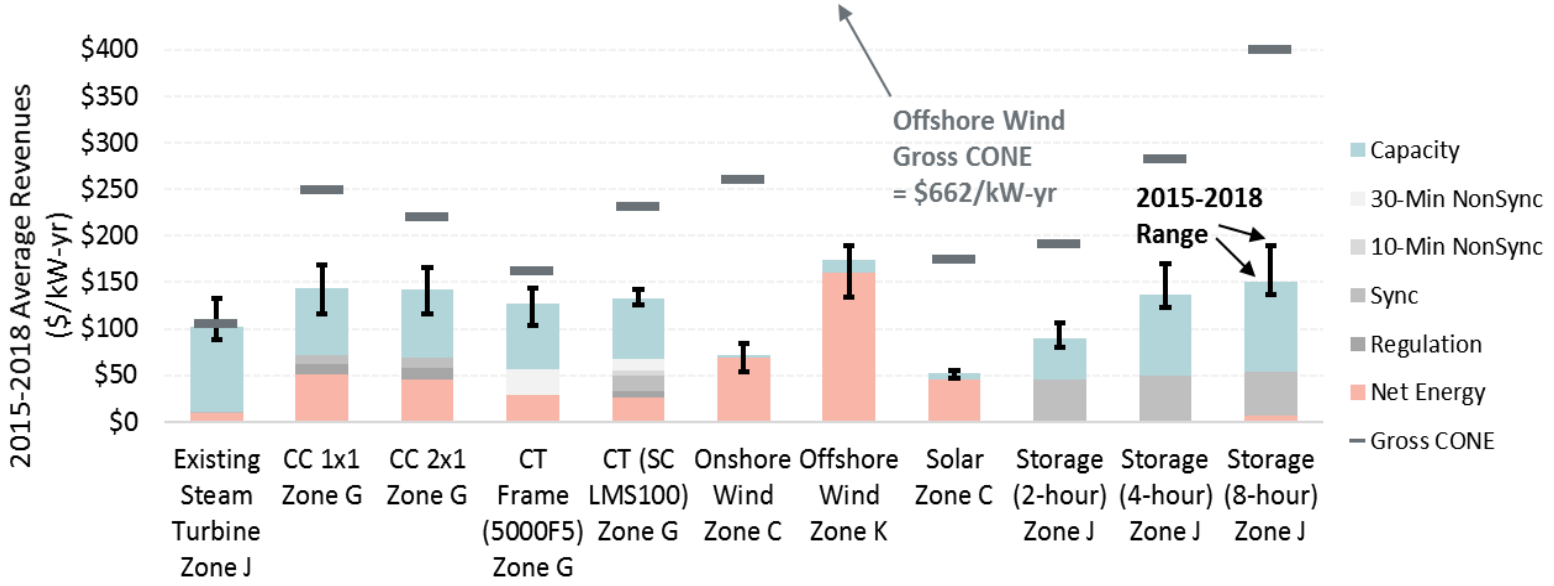

Figure 8

Sources & Notes: stacked bars show simple average of market revenues across 2015, 2016, 2017, and 2018. Gross CONE for fossil units (except for the steam turbine and 2x1 CC) from Tables 17 and 22 of NYISO (2016a). 2x1 CC Gross CONE and steam turbine going forward costs (shown as Gross CONE) are from Potomac Economics (2018) Figure 14. Renewable CONE are from Potomac Economics (2018), Figure 14 and Figure A-106. Storage CONE calculated from capital costs in the 2018 New York State Energy Storage Roadmap, Figure 15 (applying levelized fixed charge rate from Table 23). Energy and ancillary revenues are shown net of variable costs of providing each service.

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Potential NYISO Market Design Enhancements

- The report identified potential market design enhancements, currently at various stages from investigation to development.
  - Many are ongoing ("Ongoing Effort"), some are new efforts in prioritization ("Under Consideration"), and others would require further study and discussion with stakeholders before proposing any specific enhancements ("Investigate").
- The market design enhancement opportunities are consistent with the long-term Market Design Master Plan and project prioritization discussions for 2020 projects.
- The next two slides provide an overview of the Energy & Ancillary Services markets and the Installed Capacity market opportunities identified.

Market Enhancement Opportunity: Energy & Ancillary Services Market

Market Enhancement Opportunity	Status
Carbon Pricing	Ongoing Effort
Define Reliability Challenges	Ongoing Effort
Enhance Energy and Shortage Pricing	Ongoing Effort
Evaluate Load Forecasting Approach	Ongoing Effort
Review Energy and Ancillary Services (E&AS) Product Design	Ongoing Effort
Improve Intertie Scheduling	Under Consideration
Improving Fuel and Energy Security	Under Consideration
Engaging the Demand-Side	Investigate
Evaluate Changes to the Energy Market Construct	Investigate

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Market Enhancement Opportunity: Installed Capacity Market

Market Enhancement Opportunity	Status
Enhancements to Resource Adequacy Models	Ongoing Effort
Revise Resource Capacity Ratings to Reflect Reliability Contribution	Ongoing Effort
Capacity Demand Curve Adjustments	Under Consideration
Comprehensive Mitigation Review	Under Consideration
Ensuring Year-round Resource Adequacy	Investigate
Enhance Capacity Market Pricing	Investigate

Conclusions

The NYISO recommends an approach that emphasizes Energy and Ancillary Services products and market pricing that are reflective of system conditions and operational needs.

- While each of the market design enhancement efforts reviewed in the report address the concerns and follow the principles outlined above, they must fit together coherently and efficiently satisfy New York's grid reliability needs.
- Shortage pricing is particularly important to provide incentives for generating units to respond to real-time needs and to signal investment. Real-time shortage pricing enhancements are preferable to Installed Capacity market enhancements because real-time prices can reflect varied and dynamic operational needs better than any products that might be procured as "capacity."
- The report also reviews the NYISO's existing capacity market Buyer Side Mitigation (BSM) rules and finds that they may require further development in order to provide a comprehensive structure for administering and maintaining competitive wholesale energy markets.

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Expected Schedule & Next Steps

Expected Schedule

- Stakeholders will have the opportunity to provide comments through June 24, 2019. Comments received after that date will be reviewed on a best effort basis.
- An updated report will be available in late summer 2019.
  - The report will inform the NYISO's September Board Strategic Planning session.

Next Steps

- We appreciate any and all feedback.
- Please send written comments to Debbie Eckels (DEckels@nyiso.com) by June 24, 2019.

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system

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