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Independent System Operator

Reserve Enhancements for Constrained Areas (Dynamic Reserves): Study Findings/Recommendations

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Previous Presentations

Date	Working Group	Links to materials
04-06-21	ICAPWG/MIWG	RECA(Dynamic Reserves): Study Scope
08-19-21	ICAPWG/MIWG	RECA(Dynamic Reserves): Formulation Phase
10-12-21	ICAPWG/MIWG	RECA(Dynamic Reserves): Prototyping Phase
11-08-21	ICAPWG/MIWG	Consumer Impact Methodology: RECA(Dynamic Reserves)

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Agenda

- Background
- Study Approach
- Study Findings
- Study Conclusion
- Study Recommendations
- Additional Considerations
- Next Steps

Background

Operating Reserves Overview

- **Protection against contingencies**
  - Sudden loss of a generator
  - Trip of a network equipment (e.g., transmission line or transformer)
- **Locational reserve requirements**
  - Requirements for EAST (Load Zones F-K), SENY (Load Zones G-K), NYC (Load Zone J) and Long Island (Load Zone K) help ensure reserves are located where needed due to limitations on the transmission system
- **Existing reserve requirements are essentially static**

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Project Background

- **The current static modeling of reserve regions and their associated requirements may not optimally reflect the varying needs of the grid to respond to changes in system conditions, such as considerations of the following:**
  - Scheduling economic energy above 1,310 MW from individual suppliers when sufficient reserves are available and/or
  - Shifting reserve procurements to lower-cost regions when sufficient transmission capability exists.
- **A more dynamic reserve procurement methodology could potentially improve market efficiency and better align market outcomes with how the power system is operated.**

Study Approach

Study Approach

- **The study was evaluating the feasibility of dynamically scheduling reserves in the SCUC, RTC and RTD intervals**
  - Studying the impact with current reserve products (10-minute spin, 10-minute total, 30-minute total)
  - Studying the ability to apply to all current reserve regions and potential future reserve regions (e.g., certain NYC load pockets)
- **The study comprised of two primary phases:**
  - Formulation phase
  - Prototyping phase

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Formulation Phase

- The NYISO started with a theoretical approach by developing a generalized mathematical formulation to facilitate solving the procurement of operating reserves dynamically.
  - The NYISO sought feedback from external consultants on the feasibility of the formulation

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Prototyping Phase

- The NYISO prototyped the mathematical formulation to study the feasibility of the prototype on the day-ahead market solution
- This prototype was stress tested under several scenarios to a) analyze the accuracy of the results; and b) test the effectiveness of incorporating it into the market software and its impacts on the market solution
    - These scenarios were used in performing the Consumer Impact Analysis (CIA) and are included in the study report

Study Findings

Study Findings

- The prototype proves that on a typical day the static requirement can be modeled dynamically, while considering the greater of the loss of source contingency and the loss of transmission contingency.
- The dynamic modeling is more flexible as it can adapt to different topologies.

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Study Findings

- **Prototype showed that it is feasible to dynamically set reserve requirements based upon:**
  - Largest scheduled unit(s) or proxy
  - Account for loss of scheduled reserves on the largest contingency
  - Transmission security
  - Available reserve import security

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Study Conclusion

- **Dynamically setting operating reserves requirements based on the single largest contingency system wide and using available transmission headroom is a feasible concept.**
  - This concept will need to be further developed and its applications to all reserve areas would need to be evaluated
  - Further testing will be needed to ensure the prototype continues to produce robust results under various grid conditions
- **Dynamic scheduling of reserve requirements has the potential to support the Climate Leadership and Community Protection Act (CLCPA) by allowing more economic clean energy to be imported into the New York control area from external control areas (such as HQ).**
- **This effort sets the stage for effectively accounting and securing the potential increased offshore wind generation on LI by improving the modeling of LI transmission interface.**

Study Recommendations

Recommendations

- Recommendation 1: Consider revising the approach for the determination of the single largest contingency from the current static requirement to a more dynamic methodology as demonstrated in the study formulation and prototype.
- Recommendation 2: Consider applying the dynamic reserves approach that is developed in the prototype to all reserve areas.
- Recommendation 3: The methodology to determine reserve requirements should be consistent between the Day-Ahead and Real-Time Markets to the extent practical.

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Recommendations

- Recommendation 4: Consider pursuing the *Long Island Reserve Constraint Pricing* project in future years. This project will evaluate whether revisions to current compensation rules are warranted to provide additional availability incentives for Long Island suppliers. This modeling enhancement is intended to better reflect the value of reserve capability on LI.
- Recommendation 5: Consider pursuing the *More Granular Operating Reserves* project by extending the dynamic reserves concept to load pockets in NYC
- Recommendation 6: Consider expanding the methodology definition of source contingency to ensure it includes correlated source contingencies, such as simultaneous reduction of offshore wind, as the largest source contingency.

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Additional Considerations for MDCP

- Interaction of the dynamic reserve requirements with the operating reserve demand curves (ORDCs) and transmission demand curves
- Consideration of the implications of pricing outcomes on the market incentives and market power concerns
- Impacts of the dynamic reserves prototype on the RTM (RTC and RTD) solution
- Interaction of dynamic reserves model with new resource models such as CSR and ESR
- Assessing interplay between dynamic reserves scheduling and additional reserve requirements (e.g., supplemental reserves)
- Disabling of the dynamic reserves requirements during Thunder Storm Alerts (TSAs)
- Interaction of dynamic reserve modeling with the intermittent resource contingencies, whether loss of single resource or the correlated loss of energy across multiple resources

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Next Steps

Next Steps

- Continue work on Prototype
- Market Design Concept Proposed
  - Current Target: December 2022

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- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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