Alternative Methods for Determining LCRs

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Agenda

- **Phase 1: Proof of Concept**
- **Phase 2: Refining Methodology**
  - Phase 1 Follow-up
  - Cost curves
  - Transmission Security
- **Next Steps**
- **Questions**

Phase 1: Proof of Concept

Optimized Base Case

Scenario	Zone J LCR (%)	Zone K LCR (%)	G-J LCR (%)	Cost (million)
Optimized Base Case (Updated)	77.5	107.0	91.0	$4,366.4
Base Case (Current LCR)	81.4	103.2	91.3	$4,407.7

- The NYISO final 2017-2018 Capability Year LCR base case was solved to a LOLE of 0.1 days/year with the NYSRC approved IRM of 18.0%
- The resulting base case will be used in order to compare the optimized methodology and the simplified version of the current LCR methodology

Initial Sensitivities

- **Entry/exit of Capacity**
  - Capacity addition/subtraction in Zone GHIJ
  - Capacity addition/subtraction in Zone J
  - Capacity addition/subtraction in Zone K
  - Capacity addition/subtraction in Rest of State
  - Capacity addition/subtraction in G with Lower Bound on Zone J
- **Changes in Net CONE**
  - Increase and decrease GHIJ Net CONE
  - Increase and decrease Zone J Net CONE
  - Increase and decrease Zone K Net CONE
  - Increase and decrease NYCA Net CONE
  - Increase in all Locality Net CONE
- **Changes in Transmission Capability**
  - Increase UPNY-SENY

Changes in Capacity: Conclusions

- The optimized methodology reduces volatility in comparison to the current LCR methodology when there are changes in capacity
- Secondary effects observed in the optimization will be investigated in Phase 2

Changes in Transmission: Conclusions of Simple Analysis

- There are limitations to this simple analysis since changes in UPNY-SENY transmission would likely result in a change in the IRM
- The conclusions based on the simple analysis presently are:
  - UPNY-SENY reduces amount of optimal capacity required in GHIJ, but does not impact the amount for Zone J
  - The Zone J LCR is minimized to its optimal level in the Base Case (as a result of constraints south of UPNY-SENY)
  - Future sensitivity will seek to confirm that the optimal Zone J LCR is dependent on the downstream constraints by increasing Dunwoodie South limit to observe if the optimal Zone J LCR decreases

Changes in Net CONE: Conclusions

- The sensitivities tested extreme changes (i.e., between 30% and 55% change in Net CONE)
- The optimized LCR responded intuitively to the changes in Net CONE (i.e., increase in Net CONE in most instances causes a reduction in LCR)
- The Net CONE can have an impact on the final optimized LCRs
- This places an emphasis on developing robust methodology for determining the cost curves

Phase 1: Conclusions and Next Steps

- Perform sensitivities to assist in the understanding of any secondary effects observed in changes in generation sensitivities
- Work to potentially refine methodology to address these secondary effects
- Develop a robust methodology for determining cost curves that minimizes volatility
- Run a full Tan45 process for a few specific sensitivities to increase the understanding of how the current process and optimization responds
- While cost savings are only 1-2%, the process has numerous other benefits
  - Stability, more robust, intuitive, etc.

Phase 2: Refining the Methodology

Phase 2: Refining Methodology

- **Follow-up on Phase 1**
  - Seek to analyze and understand questions raised in Phase 1 and not yet addressed
- **Cost curves**
  - Seek to evaluate and understand how the cost curve shape impacts the optimization
  - Identify candidate cost curve methods and shapes
- **Transmission Security**
  - Incorporate transmission security limits into the optimization

Phase 1 Follow-up

Phase 1 Follow-up

- **Following the May 11th ICAPWG, GE:**
  - Finished remaining Phase 1 sensitivities
  - Reran specific cases in which the results had appeared to be potentially anomalous
  - Performed new sensitivities aimed at answering certain questions raised in Phase 1 (e.g., increase in transmission capability of Dunwoodie South)
  - Perform a complete Tan45 on select sensitivities

Increase in Transmission Capability

- Phase 1 sensitivity showed that increasing the transmission capability of UPNY-SENY reduced the optimal amount of capacity required in GHIJ, yet minimally impacted Zone J
- It was hypothesized that Zone J LCR is minimized to its optimal level as a result of constraints south of UPNY-SENY
- Two new sensitivities sought to test this:
  - Dunwoodie South +1000 MW
  - UPNY-SENY +1000MW & Dunwoodie South +1000MW

Changes in Transmission Sensitivities Conclusions

- The optimization limits Zone J capacity requirement subject to the constraints south of UPNY-SENY
- Transmission changes can have an impact on the tradeoffs between capacity within each Locality
  - Increase in Dunwoody South capability results in the optimal requirements for Zone K to increase while Zone J decreases

Cost Curves

Cost Curves

- **Phase 1 simple sensitivities only investigated how the magnitude of the cost curves impact the optimization**
- **Phase 2 will perform analysis and sensitivities to:**
  - Investigate the impact of cost curves' shape on optimization
  - Develop a robust methodology for generating the curves
  - Seek to reduce any unnecessary volatility from cost curves

Transmission Security

Transmission Security

- The NYISO continues to work to develop values for the lower bounds
- Sensitivities were performed to show how the optimization could incorporate lower bounds
  - Incorporated an arbitrary lower bound for Zone J of 80%

Lower Bound Conclusions

- The optimization with a lower bound still results in a lower cost when compared to the current methodology
- The optimization still reduces volatility when a lower bound is incorporated

Next Steps

Complete Tan45

- **Based upon stakeholder input, the following sensitivities were initialized using a complete Tan45**
  - Changes in capacity within G-J locality
  - Increase in the transmission capability of UPNY-SENY

Phase 3: Market Simulations

- **Goal:** Simulate additional market situations to demonstrate performance of methodology
  - Perform sensitivities with multiple changes to the system
  - Evaluate how the process would be performed with full Tan45 followed by optimization

Consumer Impact

- Consumer impact analysis will be provided for this project
- Methodology of the analysis will be provided and presented this summer
- Final analysis will be presented in the fall

Other Next Steps

- The NYISO will consider input received during today's ICAP Working Group meeting
- Additional comments sent to deckels@nyiso.com will be considered
- The NYISO will return to a future ICAPWG meeting to discuss its progress and adjustments to the plan after considering comments or results

2017 Project Development

Stage	Objective	Specific Topics:
Proof of Concept	Demonstrate alternative methodology in relation to guiding principles (*i.e.*, least cost, stability, robust, predictability)	Generation +/- Unit net CONE +/- Transmission +/-
Refine Methodology	Modify the alternative method to ensure that all aspects have a purpose and are being performed as a result of sound market and engineering principles	Unit net CONE curves Potential Bounds Modeling methodology
Market Simulations	Simulate realistic market situations to demonstrate performance of methodology	Changes in resources Topological changes Locality configurations
Defining Process	Develop a process for the methodology that ensures guiding principles are being achieved over time	Develop process of method Process timeline Transition methods
Demonstrating Market Benefits	Demonstrate the methodology results in market benefits and resolve any issues that arise from its implementation	LOLE Criterion Consumer impact Multiyear simulation Cost allocation
Final Market Design	Summarize all findings and develop a final market design for implementation	Develop final market design

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Questions?

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Appendix

ICAPWG Presentations

- May 11, 2017

  http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_icapwg/meeting_materials/2017-05-11/ICAPWG_5-11-17_AlternativeMethodsforLCRs_vFinal.pdf

- June 1, 2017

  http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_icapwg/meeting_materials/2017-06-01/ICAPWG_6-1-17_AlternativeMethodsforLCRs_Final.pdf