Sensitivity Using GE MARS in Modeling ELRs

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ICS Discussion

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Background

- In the 2021-2022 IRM, the energy and duration limitations of the Energy Limited Resources ("ELR") units were reflected in the study via fixed output shapes
  - The simplified methodology of fixed output shapes was the only available methodology that had been tested using the IRM database

- Due to the lack of flexibility of these fixed output shapes, the NYISO engaged GE to improve the MARS functionality for modeling the ELRs
  - The output shapes were developed to have the maximum output from the ELRs scheduled during the Summer Peak Load Window (HB13 – HB18)
  - These output shapes do not change the dispatch in response to the system needs

- The development and testing of the GE MARS ELR model were documented in the ELR Whitepaper and approved by the EC in May 2021
  - https://www.nysrc.org/PDF/Reports/IRM%20White%20Papers/ELR%20Modeling%20White%20Paper%20May%202021%20FINAL.pdf

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ELR Whitepaper Results

- The ELR Whitepaper showed improved performance in the Loss-of-Load-Expectation ("LOLE") results and expected Emergency Operating Procedures ("EOP") usages using the enhanced MARS ELR model with defined output window

Whitepaper Results	LOLE		SCR Usage	
Fixed Shapes (BC-4)	0.113	-0.009	174	-22.42
Enhanced ELR (TC-4C)	0.104		151.58	

- The ELR Whitepaper recommended that in the 2022-2023 IRM study, ELRs are modeled using the fixed output shapes in the Final Base Case (FBC), and a sensitivity case using enhanced MARS ELR model with TC-4C configurations
  - The MARS ELR model requires further improvements, particularly with capturing unit outage rates and an alternative approach to the output window
  - Full adoption of the MARS ELR model is considered only if no other unintended consequences are identified

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ELR Sensitivity with PBC

- With the approved Preliminary Base Case ("PBC"), NYISO performed a sensitivity case using TC-4C configuration with MARS ELR model as recommended in the Whitepaper

- Results are compared with the PBC on Margins and SCR usages on a Tan45 basis

- NYISO also performed a Tan45 comparison using the test cases used in the ELR Whitepaper

Tan45 Results Comparison	PBC	ELR Sensitivity	Delta	ELR Whitepaper Test Cases		
				BC-4 Fixed Shapes	TC-4C ELR	Delta
IRM	18.6%	17.8%	- 0.8%	20.5%	20.0%	- 0.5%
Zone J	80.6%	80.7%	+ 0.1%	82.5%	82.5%	-
Zone K	96.1%	96.3%	+ 0.2%	95.1%	95.1%	-
SCR Usage (d/yr)	45.3	34.5	- 10.5	174	151.58	- 22.42

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Result Comparison and Conclusion

- Based on the results of the IRM, preliminary LCRs and SCR usage, the NYISO concludes that the GE MARS ELR model produces similar impacts to the IRM in the ELR Sensitivity Case as in the Whitepaper

IRM	• Comparing to the ELR Whitepaper test cases, the GE MARS ELR model provides incremental reduction on the IRM by <u>0.2% - 0.3%</u> • The ELR sensitivity case includes a 0.1% trade-off between the IRM and the preliminary LCRs due to the exercise of rounding
Preliminary LCRs	• There are minor incremental increases, <u>up to 0.1%</u>, in the preliminary LCRs compared to the ELR Whitepaper test cases
SCR Usage	• The GE MARS ELR model reduces the SCR usage by about 20%, while in the ELR Whitepaper test cases, the reduction is under 15% • Comparing to the previous test cases, the 2022-2023 IRM includes the reallocation of the reserves, which lowers the SCR usage

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Recommendations

- **The NYISO propose following the recommendations in the ELR Whitepaper for the 2022-2023 IRM FBC**
  - Model the ELRs using fixed output shapes in the FBC
  - Perform a sensitivity case of the FBC using the GE MARS ELR model with the recommended TC-4C configuration
- **Coordinate with GE to implement improvements to the GE MARS functionality in capturing unit outage rates in all unit types**
- **Prepare for full adoption of the GE MARS ELR model starting in the 2023-2024 IRM**
  - Determine that there are no other unintended consequences with the GE MARS ELR model
  - Confirm final modeling configuration, which includes combining TC-4C with unit outage rates and other possible improvements

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Questions?

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Roles of the NYISO

- **Reliable operation of the bulk electricity grid**
  - Managing the flow of power on 11,000 circuit-miles of transmission lines from hundreds of generating units

- **Administration of open and competitive wholesale electricity markets**
  - Bringing together buyers and sellers of energy and related products and services

- **Planning for New York's energy future**
  - Assessing reliability needs over a 10-year horizon and evaluating projects proposed to meet those needs

- **Advancing the technological infrastructure of the electric system**
  - Developing and deploying information technology and tools to make the grid smarter

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit 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 policymakers, stakeholders and investors in the power system

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