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Independent System Operator

Improve Duct-Firing Modeling: Consumer Impact Analysis Methodology

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Market Structures

ICAPWG/MIWG

March 4, 2024

Agenda

- **Background**
- **Proposed Market Design Concept**
- **Consumer Impact Analysis Methodology**
  - Cost Impact/Market Efficiency Analysis Methodology and Assumptions
  - Reliability, Environment/New Technology, and Transparency Methodology
- **Next Steps**

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Prior Presentations

Date	Working Group	Discussion Points and Links to Materials
02-07-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling Kickoff https://www.nyiso.com/documents/20142/42807168/Improve%20Duct%20Firing%20Modeling%20MDC_Kickoff_02072024.pdf/ebc1c317-a42f-669e-1f3e-26ccd5e80b44
08-30-2023	BPWG	Market Project Descriptions: Improve Duct-Firing Modeling (Page 13) https://www.nyiso.com/documents/20142/39653286/August%2030%20BPWG%20Market%20Project%20Descriptions.pdf/7ade6560-c017-c29a-7ab9-769cd3a4c01e
03-07-2023	ICAPWG/MIWG	Improve Duct-Firing Modeling Update https://www.nyiso.com/documents/20142/36639552/Improve%20Duct%20Firing%20Modeling%20Update_MIWG_03072023_final.pdf/2f5af6b8-11b5-f1c2-e0ce-59585dfc1f00
10-27-2022	ICAPWG/MIWG	Improve Duct-Firing Modeling: Market Design Concept Proposed https://www.nyiso.com/documents/20142/34087499/Improve%20Duct%20Firing%20Modeling%20MDCP_MIWG_10272022.pdf/8e18e862-1ba0-513b-bc18-1573fb55f1dc
09-30-2022	ICAPWG/MIWG	Improve Duct-Firing Modeling Update https://www.nyiso.com/documents/20142/33520089/Improve%20Duct%20Firing%20Modeling_MIWG_09302022_final%20(002).pdf/1dd9e83a-a2f2-bac4-b8ed-f3e3d97a9461
08-24-2022	ICAPWG/MIWG	Improve Duct-Firing Modeling Update https://www.nyiso.com/documents/20142/32941988/DBimprove_MIWG_08242022_final.pdf/862020d9-faa1-ab30-9f02-e9aa8604d43f
04-05-2022	ICAPWG/MIWG	Improve Duct-Firing Modeling – Update https://www.nyiso.com/documents/20142/29688278/DBimprove_MIWG_040522_final.pdf/fe5ca5ce-d999-7609-a671-6311d06c573a
02-08-2022	ICAPWG/MIWG	Improve Duct-Firing Modeling – Kick-off https://www.nyiso.com/documents/20142/28305948/DBimprove_MIWG_020822_r2.pdf/cd34412c-cce6-5f84-230e-511b0f00e4cc

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Background

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Project Background

- The Improve Duct-Firing Modeling Project is considering market enhancements to better accommodate combined-cycle gas turbine generators (“CCGTs”) equipped with duct-firing.
- 2024 project commitment is to complete the Functional Requirement Specifications (FRS).
- As per NYISO’s 2023 Market Vision Report, the project deployment is scheduled for 2025.

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Proposed Market Design Concept

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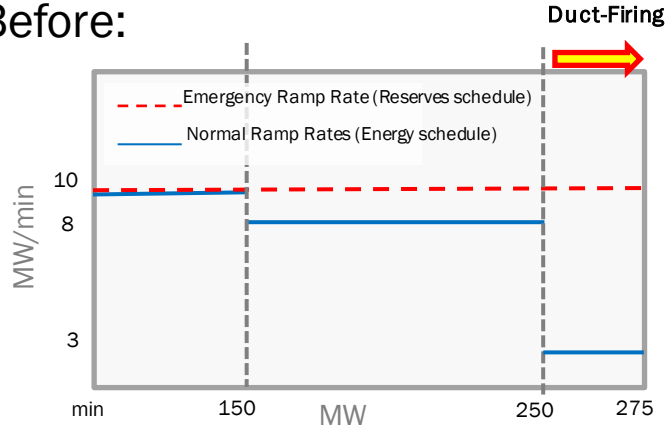
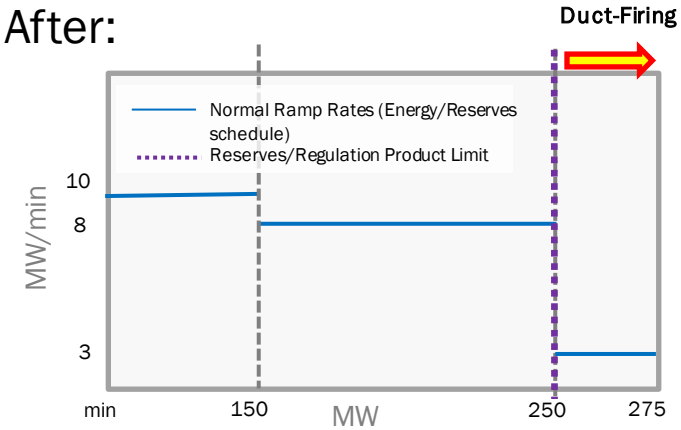
Proposed Market Design

- **Use multiple ramp rates for scheduling reserves**
  - Consistent with scheduling of energy today, leverage normal ramp rate “segments” (instead of the single emergency rate) to schedule reserves.
  - The ramp rates utilized for operating reserve shall be the same as energy ramp rates which are registration parameters.
- **Allow limited participation for reserve and regulation products**
  - If necessary due to limitations of the plant’s configuration, the MP may set a participation limit for reserves that is lower than the unit’s operating capacity.
  - The existing ramp rate breakpoint for duct-firing range shall be used for setting the threshold limit when MP opts to limit participation in the 10-min reserve product.
  - Opting to use the participation limit shall be a registration parameter and eligibility for utilizing the participation limit will be validated by MMA.
  - The full range will continue to be used for energy when participation limit is employed for reserves and regulation.

Before:



After:



*example values

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Proposed Market Design (cont.)

- **Limiting Participation in RTD-CAM**
  - The RTD-CAM functions override the normal RTD executions, as determined by the NYISO Operators, to deal with “off-normal” power system conditions.
  - In DA SCUC, RTD, and RTC, Multiple Ramp Rates and Limiting participation would be enabled while in the RTD-CAM mode, the Limiting Participation flag would be used to limit the dispatch of the units that employ the flag until the start of the duct-firing range.
  - If the unit, which employs the Limiting Participation flag, is already within the duct-firing mode providing energy, then the unit will not be dispatched any higher or lower from this level.

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Consumer Impact Analysis Evaluation Areas

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Cost Impact/Market Efficiency Analysis Methodology and Assumptions

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Assumptions & Approach

- Energy Market
  - In the short run, the cost impact of this project on energy market prices will depend on the amount of additional MW that would become available for reserve scheduling (through Limiting Participation) and on the proper accounting of current and future available MWs for reserve scheduling (through Multiple Ramp Rates).
    - The proposed changes are not expected to change the energy supply but may increase or decrease the reserve supply and, if so, may increase or decrease reserve procurement costs.
      - Some units that are currently ineligible to provide reserves may become eligible (i.e., their baseload portion would become eligible) to provide reserves using the limiting participation option.
      - Other units that are currently eligible to provide reserves throughout their entire operating range may limit their duct-burner range reserve participation (due to transition time issues).
    - Note that changes in the reserve supply may change the commitment and dispatch which will likely impact energy and ancillary service prices
  - In the longer run, changes in revenues may lead to changes in the existing fleet which would change the suite of units capable of providing reserves (and therefore also the units providing energy). We will not attempt to quantify any such changes since they would be speculative.

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Assumptions & Approach (cont.)

- **Capacity Market**
  - In the short run, the cost impact of this project on capacity market prices will depend on the expected change in Net EAS revenues that the proxy unit would receive after the implementation of the design.
  - In the longer run there also may be changes in capacity procurement costs from changes in capacity supply but it is not possible to determine if any of the future capacity supply changes are from this market change or are exogenous. We will not attempt to quantify longer run changes since they would be purely speculative.

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Energy Markets Assumptions & Methodology

- **The focus of the quantitative analysis will be the Day-Ahead Market impacts.**
  - 95 to 100 percent of load is transacted in the DAM.
- **Real-time quantitative analysis is not possible because the real-time dispatch is based on the DAM commitment and we can not reflect changes in DAM commitments on the operation of resources in real-time.**
- **The analysis will implement the proposed duct firing model changes and their expected impact on individual units to evaluate changes in procurement and production costs. The study results will be compared to the DAM "production" procurement and production costs**
  - The market design proposal's Limiting Participation would allow additional MWs to become eligible and allow certain units to limit their duct-burner range's participation in the reserve and regulation markets.
  - The market design proposal's Multiple Ramp Rates would allow for proper accounting of MWs from CCGTs with Duct-Firing capability for reserve scheduling.
  - Based on a preliminary analysis, we expect the net impact to be more MWs of reserves in the market.
- **The Day-Ahead quantitative analysis will select a random sample of days to re-run the Day-Ahead Market with the proposed changes**
  - The analysis will cover both the procurement costs (and associated prices) and the production cost changes
  - We plan to sample three days a month in addition to the summer and winter peak days for a year

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Capacity Market Energy Markets Assumptions & Methodology

- The Capacity Market quantitative analysis methodology requires 8760 Real Time Integrated price data which we do not have.
  - The volatility of prices drives the EAS revenues which in turn drives the reference point value which would then allow the comparison to historical revenues.
- Therefore, the analysis will focus on a qualitative analysis based on the energy and ancillary service price changes from the energy market analysis.
- We will continue to explore if there are other quantitative approaches that could provide useful information.

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Reliability, Environment/New Technology, and Transparency Methodology

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Reliability, Environment/New Technology and Transparency

- The focus in these three CIA areas of analysis will be on qualitative assessments of the proposed changes

Next Steps

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Next Steps

- Review and consider stakeholder feedback on the proposed methodology
- Return to ICAPWG/MIWG in April 2024 to discuss analysis results

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Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

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