

Improve Duct-Firing Modeling – Update

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Installed Capacity Working Group / Market Issues Working Group

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Agenda

- Background
- Problem Statement
- Proposal Update
- Next Steps

Previous Presentations

Date	Working Group	Discussion Points and Links to Materials
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

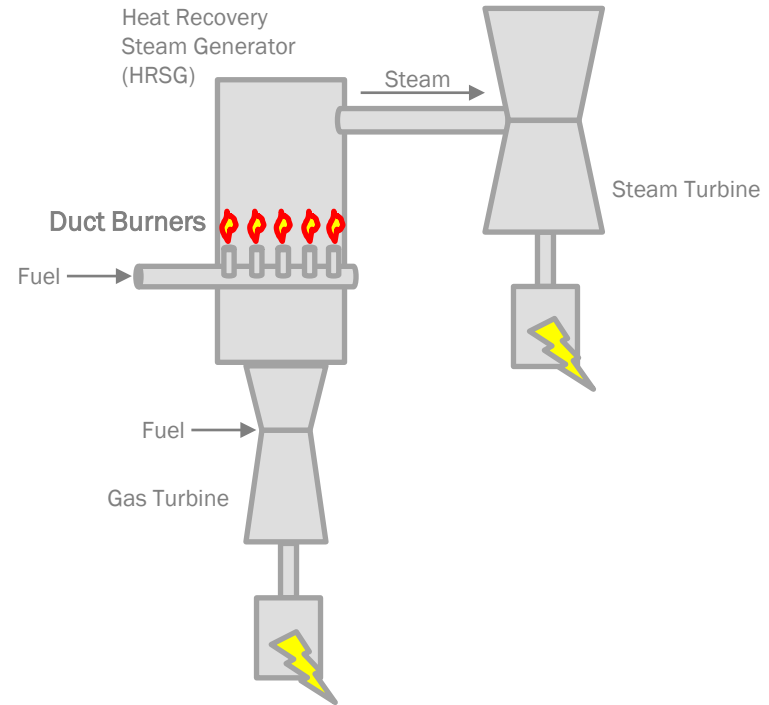
Background

Project Background

- The Improve Duct-Firing Modeling Project seeks to enhance the Operating Reserves product to better accommodate combined-cycle gas turbine generators (“CCGTs”) equipped with duct-firing.
- The project will also explore modifications to the Regulation product if necessary to integrate the changes to Operating Reserves market structure.
- We are targeting Q3 of 2022 for a Market Design Concept Proposed (MDCP).

What is Duct-Firing?

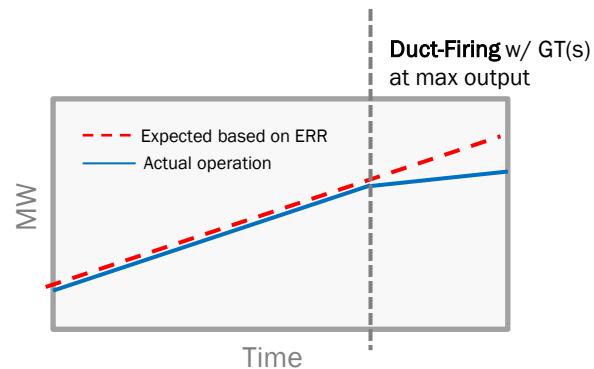
- In some combined cycle power stations, the Heat Recovery Steam Generators (HRSGs) are equipped with duct burners, which add additional heat to the steam cycle by burning fuel directly in the exhaust duct.
- The additional heat from the duct burners increases steam flow to the steam turbine, and results in power increase from the steam turbine only.
- Typically, the operation of duct burners is limited to the last 1-10% of combined cycle output and requires the gas turbine to be near (or at) maximum output prior to use.



Problem Statement

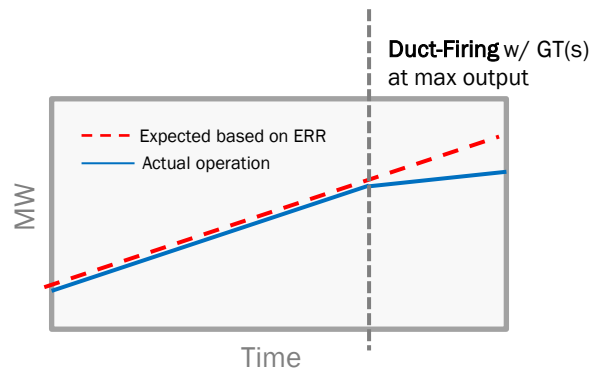
Problem Statement

- For Energy market participation, up to three normal response rates (NRRs) may be used to characterize the MW/minute ramp rate of a generator with respect to MW output. The NRR values and breakpoints can be tailored to best fit the specific generator's operating characteristics, for example, reduced ramp rate capability in a certain range of operation (*e.g.*, ramping on duct burners alone). However, NRRs only apply to normal energy dispatch.
- For Operating Reserves scheduling, the emergency response rate (ERR) is used. ERR is a single value required to be greater than or equal to all NRRs, thus it may not appropriately capture the variable ramp rate over the complete range of operation of some units.



Problem Statement

- It has been observed that CCGTs equipped with duct-firing systems may not be able to physically achieve their registered ERR when ramping through the region where duct burners are used.
- This project will explore changes to accommodate the operating capability of CCGTs when they are in the duct-firing region and called upon to provide reserves.

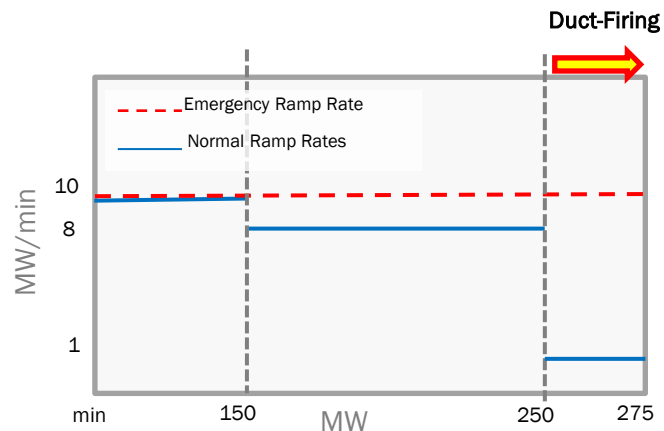


Proposal Update

Proposal Update

Multiple ramp rates

- → **The current project focus**
- Comparable to scheduling energy today, leverage the concept of multiple ramp rate 'segments' (instead of a singular rate) to schedule reserves.
- Optional use of the original single Emergency Response Rate (ERR) method may be retained.



*example values

Proposal Update

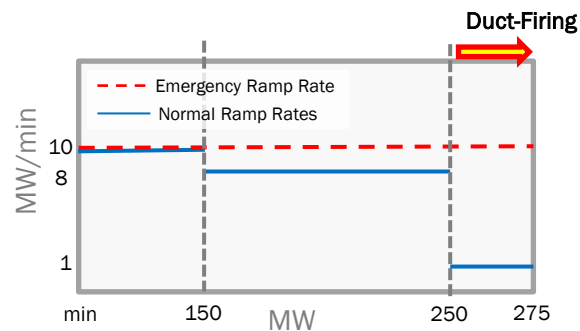
Other approaches considered:

■ Duct-firing as a separate ‘linked’ unit

- In this approach, the duct burner range is treated as a separate unit (with its own commitment parameters), that is linked in operation to the unit representing the lower range of operation.

■ Limit participation

- Limit the participation of reserves up to an upper limit (i.e. the transition point to duct firing), beyond which participation is excluded.



*example values

Next Steps

Additional Market Design Considerations

- Implications on generator dispatch and reserves procurement
- Settlement impacts
- Expected performance considerations
- Operating Reserves Testing procedures

Next Steps

- **Q2 2022 – ICAPWG/MIWG**
 - Provide update on the proposals being considered
- **Q3 2022 – ICAPWG/MIWG**
 - Consumer Impact Study
 - Market Design Concept Proposed - complete

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

Questions?