

Improve Duct Firing Modeling: Development Update

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November 4, 2025

ICAPWG/MIWG Presentations

Date	Working Group	Discussion Points and Links to Materials
10-31-2024	MC	Improve Duct-Firing Modeling https://www.nyiso.com/documents/20142/47773760/Improve%20Duct-Firing%20Modeling_MC_10312024_v1.pdf/bc437d32-707d-1798-ad6d-6be06118f1eb
10-16-2024	BIC	Improve Duct-Firing Modeling https://www.nyiso.com/documents/20142/47460232/07%20Improve%20Duct%20Firing%20Modeling.pdf/32ba0313-cce0-e9d5-c344-6cee69669585
09-10-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: Market Design and Tariff Review https://www.nyiso.com/documents/20142/46865072/Improve%20Duct-Firing%20Modeling_MIWG_09102024.pdf/513d11ea-10a7-5345-01ea-c3a801f098ff
08-29-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: Consumer Impact Analysis https://www.nyiso.com/documents/20142/46679593/Improve%20Duct%20Firing%20Modeling_CIA%20Analysis%20FOR%20POSTING.pdf/80c6bd60-4f10-f29c-f450-4c8aa2fd9b1b
08-22-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: Final Tariff Revisions https://www.nyiso.com/documents/20142/46549955/3%20Improve%20Duct%20Firing%20Modeling_08222024_MIWG.pdf/a01ab96c-b109-e3c0-213d-5563d5d8bb1b
06-25-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: 2024 Proposed Market Design Details https://www.nyiso.com/documents/20142/45442995/Improve%20Duct-Firing%20Modeling_MIWG_06252024.pdf/35f61fb0-92a6-ee7b-63c7-89eb428fe1c0
05-30-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: 2024 Proposed Project Scope https://www.nyiso.com/documents/20142/44935892/Improve%20Duct-Firing%20Modeling_MIWG_05302024_draft.pdf/cb406062-ab9f-c972-bc7f-a7709f184fd5
05-02-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: Implementation Plan and Proposed Tariff Revisions https://www.nyiso.com/documents/20142/44469922/Improve%20Duct%20Firing%20Modeling_05022024_MIWG.pdf/fdac1cd3-dba6-74e3-c97d-015925462795

ICAPWG/MIWG Presentations

Date	Working Group	Discussion Points and Links to Materials
02-29-2024	ICAPWG/MIWG	Improve Duct-Firing Modeling: Market Design Update https://www.nyiso.com/documents/20142/43275262/Improve%20Duct%20Firing%20Modeling_02292024_final.pdf/1512a290-02ec-afb8-92e3-9aa8bf9e9c07
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

Background

Project Background

- The Improve Duct-Firing Modeling Project is better accommodating combined-cycle gas turbine generators (“CCGTs”) that are equipped with duct-firing.
- 2025 project commitment is Development Complete.
- The tariff was filed with FERC, and FERC approved the tariff revisions in July.
- As per NYISO’s prioritization process, the project deployment is scheduled for 2026.

Approved Market Design

Limiting Participation

- **Opt-In Limiting Participation flag for CCGTs based on their ramp rate breakpoint pertaining to the duct-firing range.**
- **Opting in would prevent the duct-firing range from being used for:**
 - 10-min reserve and regulation products in DAM, RTD, and RTC.
 - 10-min reserve, regulation, and energy products in RTD-CAM.

Limiting Participation– Details

- The participation limit will not apply for 30-min reserves and energy in SCUC, RTC, RTD and will not apply for 30-min reserves in RTD-CAM.
- The participation limit will be a registration parameter that has to be opted in by the unit and would have to be validated by MMA before the participation limit is activated for the unit.
- If these units are already present within the duct-firing range before the activation of any RTD-CAM mode, then these units will be held at the physical basepoint in effect prior to the activation.
- Limiting Participation option can be used by the unit to alleviate the transition time issue.

RTD-CAM: Prior Normal Response Rate

- This design applies to all the combined cycle units with duct-burners (including the units that have opted for Limiting Participation option).
- These units will be moved using the normal response rate of the operating region that the unit was in prior to the activation of any of the RTD-CAM modes.
- This alleviates the concern of utilizing the emergency response rate to move these units into the duct-firing range and within the duct-firing range.

2025 Development Update

Development Update

- **The NYISO has identified aspects of the duct-firing design that are not compatible within our current production systems**
 - During the Market Design phase, a prototype was developed to demonstrate the feasibility of the Limiting Participation. The full development of production level software involves additional software and logic interactions, some of which conflict with the duct-firing design
- **The upcoming slides will describe these aspects.**

Limiting Participation in RTD-CAM

- As per the 2024 Market Design, Combined Cycle Gas Turbines (CCGTs) with duct-firing capability that opt for Limited Participation would be held at their physical basepoint prior to RTD-CAM activation — if the unit was already operating within the duct-firing region.
- NYISO has identified that RTD-CAM is unable to hold the basepoints of CCGTs with duct-firing capability that opt for Limiting Participation fixed within the existing dispatch framework.
- NYISO is currently evaluating how to effectuate the design intent while remaining compatible with the existing dispatch framework, which may require tariff revisions.

- The approved tariff explicitly states the physical basepoint will be held fixed

Limiting Participation in Ideal and Physical Passes

- To implement the FERC approved design, Limiting Participation needs to be applied to both Ideal and Physical Passes.
- It is feasible to apply Limited Participation in the Physical Pass because Physical pass ensures that the energy and ancillary products are scheduled sequentially based on ramp rate breakpoints.
- It is not feasible to apply Limited Participation in the Ideal Pass
 - This is similar to why Fast Start units are treated differently between the Physical and Ideal passes.
- NYISO is currently evaluating how to address this, which may require tariff revisions.

Next Steps

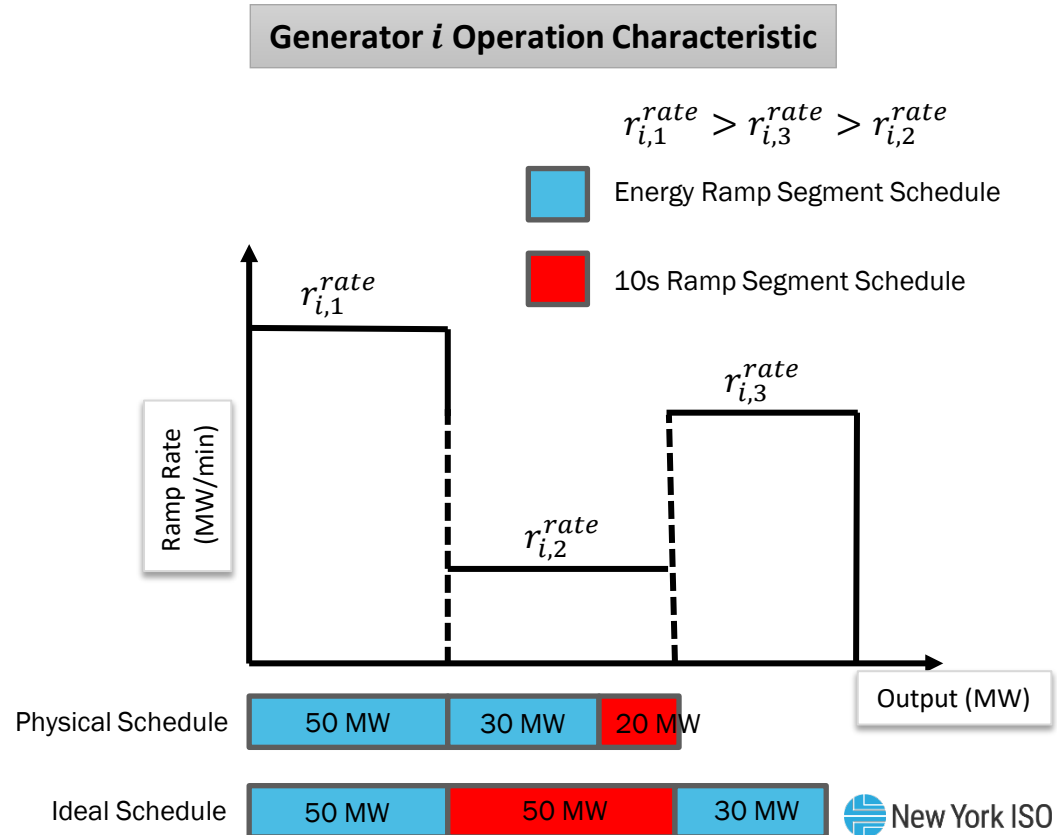
Next Steps

- **Evaluate solutions to software development challenges**
- **In parallel**
 - Present software solutions. If tariff revisions are necessary, present tariff changes to stakeholders followed by a vote.
 - Complete development activities.
- **Deploy (2026)**

Appendix

Illustrative Example – Impact of Segment Ordering

- The example generator has three ramp-rate segments with rates: Segment 1 > Segment 3 > Segment 2.
- In the Physical Pass, the software enforces sequential loading (Seg 1 → Seg 2 → Seg 3), producing a feasible and operable schedule.
- In the Ideal Pass, the software does not enforce segment order, allowing the optimizer to dispatch out of sequence (Seg 1 → Seg 3 → Seg 2).
- Although both passes yield the same 80 MW energy output, the resulting ancillary capability differs substantially:
 - Physical Pass: 20 MW of 10min Spin available (consistent with physical ramp and duct-firing constraints).
 - Ideal Pass: Incorrectly shows 50 MW of 10min Spin, due to mis-ordered segment loading.
- This discrepancy highlights how Limited Participation units in duct-firing regions can appear to provide reserves they cannot physically deliver when ramp-segment ordering is not enforced.



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