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Independent System Operator

Modeling Improvements for Capacity Accreditation: Natural Gas Constraints

Nikolai Tubbs, Associate Market Design Specialist,
Capacity Market Design

ICAPWG/MIWG

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Agenda

- Previous Discussions
- Background
- Project Tasks
- Constraint Identification
- Modeling Considerations
- Next Steps

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Previous Discussions

Previous Discussions

Date	Working Group	Discussion Points and Links to Materials
January 23, 2023	ICAPWG	Modeling Improvements for Capacity Accreditation: Project Kick Off: https://www.nyiso.com/documents/20142/35880057/2023-01-26%20ICAPWG%20Modeling%20Improvements%20-%20Kick%20Off.pdf/c7ac6b6e-c90b-54b4-832d-ec6ecfc8f7ff

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Background

Background

- Capacity accreditation reflects resources' contribution to resource adequacy with the goal of producing more efficient ICAP Market outcomes
- Recent winter reliability concerns has raised questions of the availability of generation utilizing natural gas as a primary fuel source on a non-firm basis due to pipeline and/or other constraints
  - The Appendix to this presentation includes recent literature on winter reliability/natural gas issues
- For this portion of the Modeling Improvements for Capacity Accreditation project, the NYISO is looking to develop methodologies to identify and quantify natural gas constraints and resources impacted by such constraints in addition to corresponding methodologies for implementation in GE MARS.
  - The Special Case Resource modeling and Correlated Derates portions of Modeling Improvements for Capacity Accreditation will be covered in separate discussions.
- The 2023 Project deliverable is Q4 – Functional Requirements

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Background

Ongoing Activities

- The Capacity team is monitoring and coordinating with various ongoing activities at the NYISO related to natural gas constraints including:
  - 2023 Enhancing Fuel and Energy Security[1]
    - Intended to refresh the 2019 study assumptions to assess emerging operational and grid reliability concerns and specifically look at issues such as prolonged cold weather events and/or natural gas supply/transportation issues
      - » This project will aid in informing how natural gas constrained units overall affect, and are affected by the changing electrical grid and reliability standards, especially under adverse weather conditions where capacity margins are strained
  - NYSRC-ICS whitepaper on natural gas constraints[2]
    - Aims to enhance the Resource Adequacy model to incorporate characteristics of winter gas constraints, reasonable levels of constraints to be reflected in the IRM study, and best modeling approaches
      - » This project will aid in comprehensively identifying constraints and affected units in addition to the individual characteristics which may be impacting reliability

[1]Link to previous study: https://www.nyiso.com/documents/20142/9312827/Analysis%20Group%20Fuel%20Security%20Final%20Report%2020191111%20Text.pdf/cbecabaf-806b-d554-ad32-12cfd5a86d9e
[2]Link to NYSRC-ICS whitepaper scope presentation: https://nysrc.org/PDF/MeetingMaterial/ICSMeetingMaterial/ICS%20Agenda%20273/Gas%20Constraints%20Whitepaper_Scope_2023.02.01_revised[13443].pdf

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Project Tasks

Project Tasks

- **Constraint Identification**
  - Identify constraints on the natural gas system as impacting generator availability by identifying the times/duration, location, system conditions and magnitude of such constraints
  - Identify the units impacted by the constraints and the individual characteristics which should be reflected in Capacity Accreditation
- **Modeling in GE MARS**
  - Develop a methodology to incorporate both system level constraints and those impacting resources' ability to meet Resource Adequacy needs
    - Developing these changes looks to reduce the current resource adequacy modeling limitations
  - It is expected that these additional constraints could impact both the IRM/LCRs and Capacity Accreditation Factors

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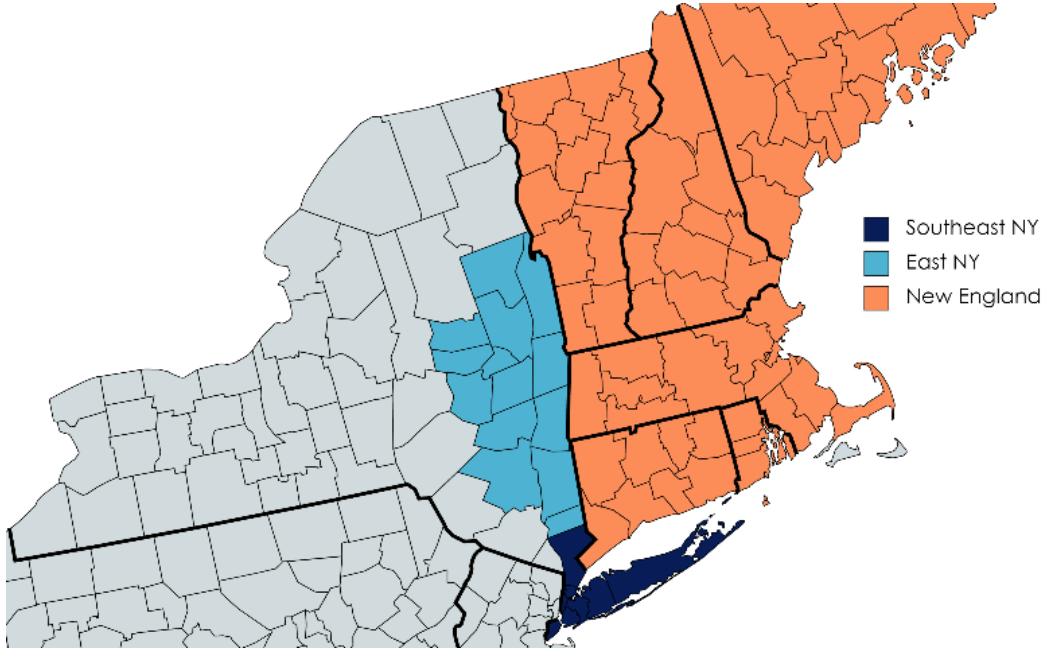
Constraint Identification

Constraint Identification

- **Where and why are gas constraints occurring?**
  - MMU has pointed out that the constraints are occurring in the Eastern part of the State (Zones F-K) due to pipeline bottlenecks
    - There may be multiple levels of constraints that are impactful and should be considered
  - On very cold winter days LDC demand is expected to exceed pipeline capacity into the region
  - Excess gas capacity is only available to non-firm gas fired generators once LDC firm commitments are satisfied
    - Gas-Only MWs (MMU) include:[3]
      - G,H,I – 1,411 MW
      - J – 1,917 MW
      - K – 343 MW

[3]Link to MMU Presentation: https://www.nyiso.com/documents/20142/33916814/MMU%20Gas%20Availability%20Presentation_20221020.pdf/bf599ef4-eb0f-a436-8b1c-33eb129319fc

Constraint Identification



Pipeline	Relevant Points/Bottlenecks
Transco	Endpoints in NYC and Long Island
TETCO	Endpoints in NYC
Tennessee (TPG)	200 Leg: Segment 245 entering Capital region 300 Leg: Segment 324 entering Westchester
Algonquin	Stony Point station (Rockland/Westchester border)
Iroquois	Deliveries at/south of Wright (Capital region)
Eastern Natural Gas Transmission (EGTS)	Endpoints in Capital region, deliveries to Iroquois and TGP
Portland Nat. Gas Transmission System	Receipts from Canada border into New England
Maritime and Northeast	Receipts from Canada border into New England (LNG imports from Saint John terminal)

Link to MMU Presentation: https://www.nyiso.com/documents/20142/33916814/MMU%20Gas%20Availability%20Presentation__20221020.pdf/bf599ef4-eb0f-a436-8b1c-33eb129319fc

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Constraint Identification

- **Individual Unit Characteristics affecting Capacity Accreditation Resource Class (CARC) designation**
  - Fuel Secure vs. Fuel Insecure Units
    - Does a gas-only unit have a firm fuel contract from receipt to delivery point?
      - Is all or part of its fuel supply firm?
    - Does a unit have dual fuel capability?
      - Has the unit shown that its dual fuel is available?
        - » Potential further considerations include characteristics like replenishment rate, fuel delivery method, etc..

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Constraint Identification

- **Firm vs. Non-firm gas**
  - A core piece of constraint identification is determining which units depend on the supply of non-firm gas.
    - The NYISO administers the annual and weekly Generator Fuel and Emissions Reporting (GFER) which allows generators to describe their fuel supplies, though it has been pointed out that generators have relatively wide discretion, complicating their classification.
    - The NYISO will work to determine which of these designations are firm vs. non-firm

- **By the numbers (2022-23 Winter Assessment & Winter Preparedness)[4]**
  - 6,214 MW non-firm gas-only
  - 2,848 MW firm gas

[4]https://www.nyiso.com/documents/20142/34647738/4%202022-2023%20Winter%20Assessment%20and%20Winter%20Preparedness%20MC%20Presentation%2011172022%20final.pdf/00143bec-bdaa-d967-b8b6-a0e133779d8f

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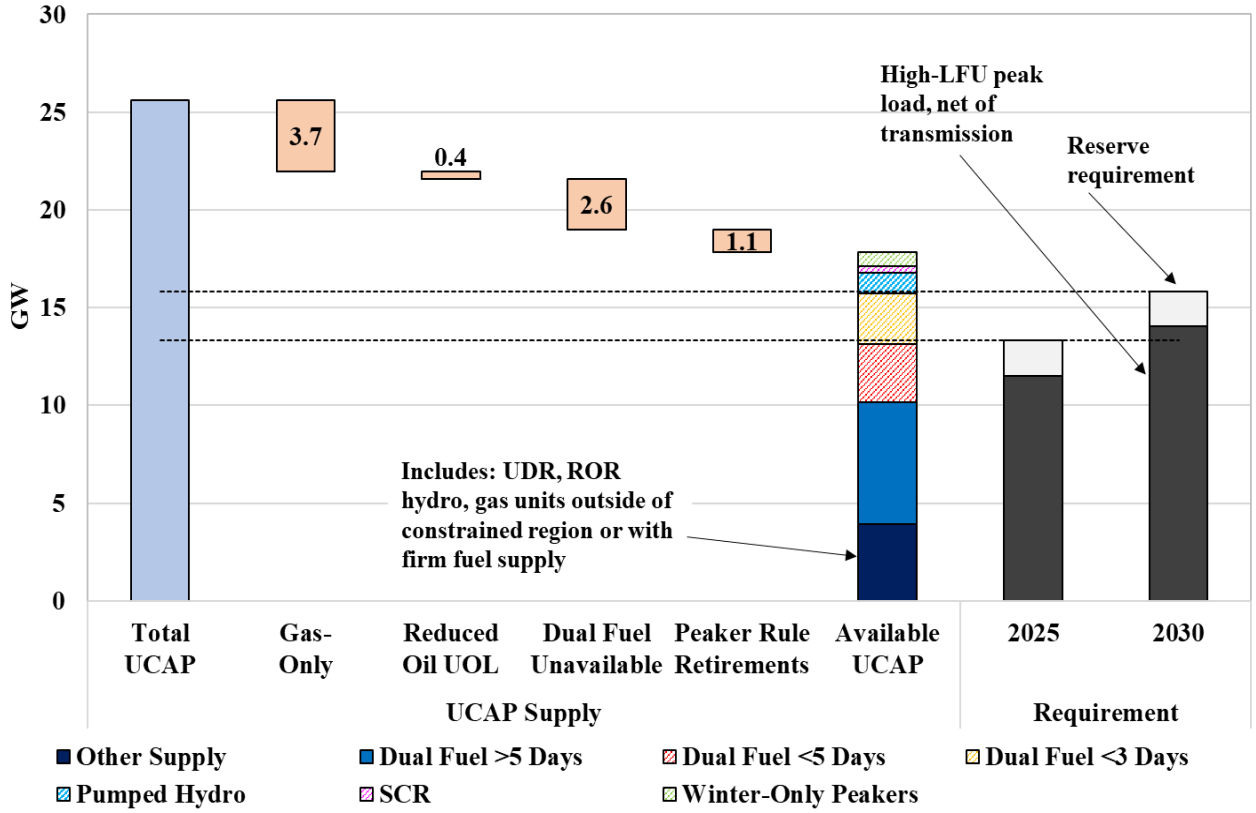
Dual Fuel Capability

- **An important part of the Firm vs. Non-firm fuel discussion focuses on dual fuel units**
  - Although listed as dual fuel, some units may not be available on their secondary fuel due to permitting, equipment, or inventory issues.[5]



[5]See MMU Slides 24 and 81: https://www.nyiso.com/documents/20142/35962715/NYISO-Quarterly-Report-2022-Q1.pdf/377140fc-5425-b6e9-b59a-fd42db38ea70
Link to chart source: https://www.nyiso.com/documents/20142/33916814/MMU%20Gas%20Availability%20Presentation__20221020.pdf/bf599ef4-eb0f-a436-8b1c-33eb129319fc

GE MARS Modeling Considerations

Existing Capability

- **GE MARS does not separately model natural gas constraints and fuel availability**
  - Unit Availability is reflected in unit outage transition matrix or production profiles, based on historical performance.
    - The historical performance may or may not capture fuel availability constraints, if such constraints exist in the past
- **Reflecting gas constraints was not expected to have significant impact in the past due to the loss of load risk being greatest during the summer peak load**

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Modeling Considerations

- **MMU Recommendations**
  - MMU has suggested different modeling approaches to capture the impact of natural gas constraints in GE MARS
    - Approach 1 - Incorporate fuel allocation logic before EOP steps
      - Modifies GE MARS to add a step where fuel is allocated to units with a common fuel constraints until the limit is reached
      - For units in different zones but under a common constraint, MMU proposes two rules for fuel allocation:
        - » In order of priority starting with K then G then F
        - » Proportionally based on the margin in each zone (i.e., generation minus load)
      - When there is not enough fuel to supply all units subject to a common constraint, units that are not allocated fuel would be treated as unavailable

*** MMU highlights that this method may require a new type of limit to be created in GE MARS**

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Modeling Considerations

- **MMU Recommendations**
  - Approach 2 – Modeling gas limits using topology changes
    - Create dummy bubbles in GE MARS for gas only generation in each zone
    - Dummy bubbles would be connected to each zone and subject to dynamic transmission limits based on daily peak load, reflecting gas availability

***MMU highlights the disadvantage of this method being the potential for added complexity in adjusting certain dynamic transmission limits based off generator status**

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Modeling Considerations

- The Resource Adequacy team is working on a NYSRC-ICS white paper on natural gas constraints

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Next Steps

Next Steps

- The NYISO is seeking stakeholder feedback on today's presentation and will return to a working group meeting in March 2023 to continue the discussions
- Please send any comments or questions to ntubbs@nyiso.com

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Questions?

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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Appendix

Recent Literature on Gas Constraints/Winter Reliability

- Analysis Group: Fuel and Energy Security in New York State Report (Nov. 2019):
  - https://www.nyiso.com/documents/20142/9312827/Analysis%20Group%20Fuel%20Security%20Final%20Report%2020191111%20Text.pdf
- Potomac Economics: MMU Analysis of Gas Availability in Eastern New York Report (Oct. 2022)
  - https://www.nyiso.com/documents/20142/33916814/MMU%20Gas%20Availability%20Presentation__20221020.pdf/bf599ef4-eb0f-a436-8b1c-33eb129319fc
- NYISO Winter Operations Study (Apr. 2022)
  - https://www.nyiso.com/documents/20142/30154429/05%202021%20-%202022%20MC%20Cold%20Weather%20Operating%20Conditions.pdf/e8b0d2d7-16d6-d019-173a-dda468b616d
- NYISO 2022-23 Winter Assessment and Winter Preparedness
  - https://www.nyiso.com/documents/20142/34647738/4%202022-2023%20Winter%20Assessment%20and%20Winter%20Preparedness%20MC%20Presentation%2011172022%20final.pdf/00143bec-bdaa-d967-b8b6-a0e133779d8f
- Resource Adequacy Whitepaper
  - https://nysrc.org/PDF/MeetingMaterial/ICSMeetingMaterial/ICS%20Agenda%20273/Gas%20Constraints%20Whitepaper_Scope_2023.02.01_revised[13443].pdf

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