



2019 Fuel & Energy Analysis Findings

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Background: Electric Resiliency

- **Beginning in early 2018 there was a lot of industry discussion on Electric Resiliency at DOE, FERC, NERC**
 - Resilience is the flexibility & capability to withstand extreme events including weather, cyber attacks, physical security, storms, generation and transmission contingencies, and fuel contingency scenarios
- **Clearly one large element of Electric Resiliency is Fuel Security**

Background: ISO-NE & PJM

- **In 2018 both ISO-NE & PJM produced and presented fuel security analyses to their stakeholders**
 - ISO-NE's results indicated a “dire” situation for near term extreme winter conditions. In light of the Mystic retirement notice, ISO-NE subsequently modified its tariffs to allow execution of RMR contracts for reliability fuel security purposes and began working on enhanced market designs to incent (encourage) fuel secure resources
 - PJM identified reliability issues for multiple fuel security contingency scenarios and began working with its stakeholders on enhanced market designs

Background NYISO

- In 2018, the NYISO proposed a 2019 Project, “Fuel & Energy Security,” for the purposes of evaluating New York generation capability during sustained, extreme cold winter conditions for future time periods after the retirement of Indian Point 2 & 3 and all remaining New York coal generation, along with increased demands on the gas pipeline system.
- In early 2019, the NYISO executed a contract for consulting services from the Analysis Group to perform fuel and energy security evaluations
- Completed collaboration on initial conditions and possible fuel security contingencies in April 2019

Scope

- **Simulate various conditions for Winter 2024 assuming a significant two-week cold snap. Key focus on burn rates of stored fuel exceeding replacement rates. Simulations to closely monitor fuel inventories, fuel replenishment, and projected burn rates over 336 hours**
- **Superimpose low probability, high impact fuel scenarios**
- **If reliability issues are identified, develop a list of recommendations to pursue**

Initial Conditions Starting Assumptions

- **Loads: 2019 Gold Book**
- **Amount of Renewables: 2017 CARIS Resource Shift Case**
- **Generation Fleet:**
 - Indian Point retirements (2,000 MW)
 - Somerset & Cayuga retirements (1,000 MW)
- **Oil storage and replenishment capability**
- **Gas pipeline capability available to electric generation**
- **Status of new transmission**

Reminder: Scenarios

- 8 Scenarios were identified to represent different potential future system conditions
- AC and WNY Public Policy Transmission Needs (PPTN) transmission projects are assumed in-service in all case runs

Scenario Type	Infrastructure	Imports	Oil	Natural Gas
Description	REN: delayed construction of new renewables, such that solar capacity is reduced to 38.5% and wind capacity is reduced to 48% of 2017 CARIS Phase 1 “System Resource Shift” case assumed levels	IM900: 900 MW capacity imports IMO: 0 MW capacity imports	PK: potential retirements in response to the requirements for 2023 set forth in the proposed “peaker rule”	NGR: Reduced non-firm gas availability to support ~2,000 MW of gas-fired generation in Zones A-F, ~1,000 MW of gas-fired generation in Zones G-I, and no non-firm gas to support generation in Zones J and K
Scenario 1		IM900		
Scenario 2		IM900	PK	
Scenario 3		IMO		
Scenario 4		IMO	PK	
Scenario 5		IM900	PK	NGR
Scenario 6	REN	IMO	PK	
Scenario 7		IMO	PK	NGR
Scenario 8	REN	IMO	PK	NGR

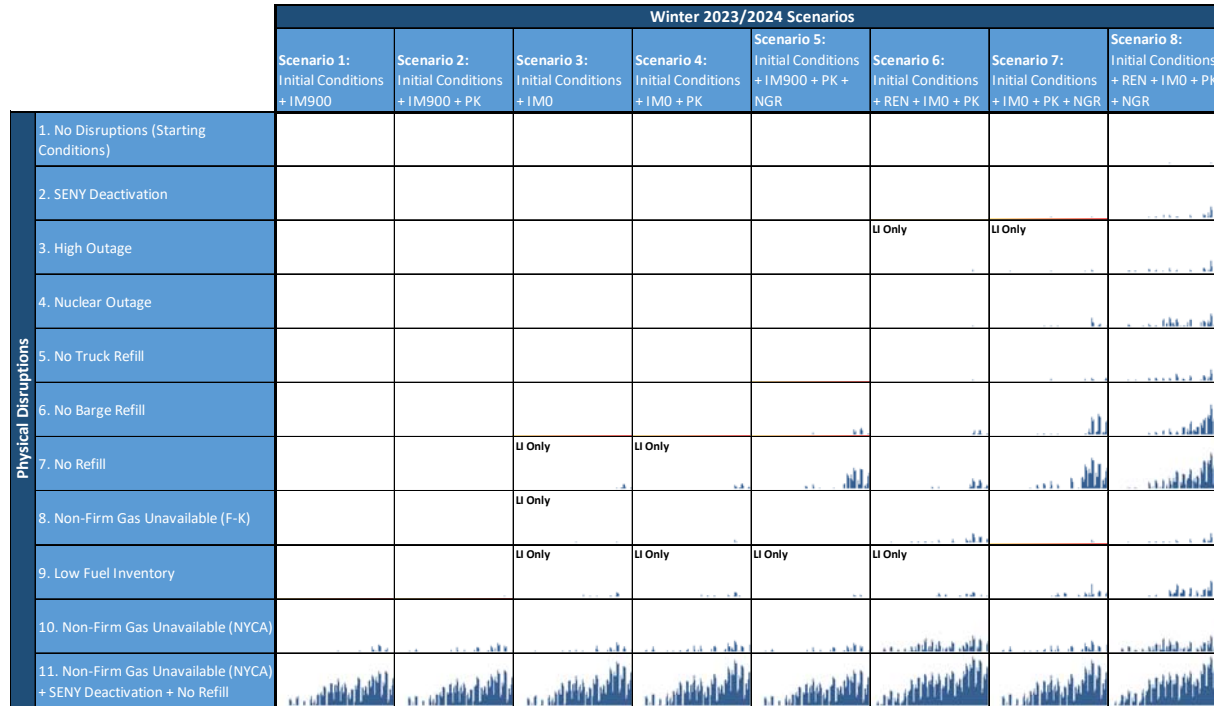
Physical Disruptions

- A “case” represents a combination of a scenario and a physical disruption
- Each physical disruption represents a single disruptive event (except #1 (no disruptions) and #11 (several disruptions combined))
- All physical disruptions were run for all 8 scenarios

#	Disruption Name	Description
1	Starting Conditions	No physical disruptions
2	SENY Deactivation	Loss of significant dual fuel capability (1,000 MW) in Zones G-I
3	High Outage	Double unit forced outage rate compared to historical averages
4	Nuclear Outage	Loss of major nuclear facility upstate
5	No Truck Oil Refill	Unavailability of truck oil fuel delivery based on historical events such as snow storms
6	No Barge Oil Refill	Unavailability of barge oil fuel delivery based on historical events such as rivers freezing
7	No Oil Refill	Unavailability of any oil fuel delivery due to severe fuel limitations affecting both barge and truck refueling
8	Non-Firm Gas Unavailable F-K	No gas-fired generation capability available in zones F-K
9	Low Fuel Inventory	Reduction of initial oil storage by unit and oil fill max tank quantity to half of historical averages
10	Non-Firm Gas Unavailable NYCA	No gas-fired generation capability available anywhere in NYCA
11	Extreme Disruption	Combination of no gas-fired generation capability available anywhere in NYCA, loss of significant dual fuel capability in Zones G-I, and unavailability of any oil refill capability

Qualitative Assessment and Categorization of Results

Key Cases for Consideration



Note: The scale of the axes are equal in all cells. The y-axis is set to have a maximum of 16,000 MW.

Combined Assessment: Based on qualitative assessments of Probability, Consequence, and ease of Mitigation, grouped as follows:

- Consequence 0-100 MW or probability extremely low (far outside normal operational assessments)
- Consequence 100 - 1,500 MW, of moderate duration/frequency, and probability low (meaningfully less likely than normal operational assessments)
- Consequence greater than 1,500 MW, and probability low (meaningfully less likely than normal operational assessments)
- Consequence greater than 1,500 MW, and probability on the order of normal operational assessments

Scenario Key

REN = Delayed construction of new renewables, such that solar capacity is reduced to 38.5% and wind capacity is reduced to 48% of System Resource Shift assumed levels.
 IM900 = 900 MW Capacity Imports.
 IM0 = 0 MW Capacity Imports.
 PK = NYSDEC "Peaker Rule" Retirements.
 NGR = Reduced non-firm gas availability to support ~2000 MW of gas generation in Zones A-F, ~1000 MW of gas generation in Zones G-I, and no non-firm gas generation in Zones J and K.

AG Observations

1. “Based on the resource fleet and operating capability assumed by the study, the New York power grid is well equipped to manage energy/fuel security risks”
2. “NYISO has already taken many steps to address potential risks associated with fuel and energy security concerns”
3. “Significant potential LOL events appear in cases involving reduced operation of oil-fired generating assets, particularly in the downstate regions”
4. “Significant interruptions or reductions in the availability of natural gas for power generation can introduce challenges for reliable operations”
5. “Dual fuel capability - with oil as a backup fuel to natural gas - is vital for maintaining reliability”

AG Observations (continued)

6. “A majority of circumstances leading to potential LOL events are constrained to Long Island”
7. “Meeting the state’s renewable and clean energy resource goals can provide valuable reliability support, and this may be particularly true with respect to offshore wind”
8. “Over the longer term, the potential magnitude and pace of change to the resource fleet stemming from requirements under the CLCPA may be of far greater importance for evaluation than the considerations, scenarios and physical disruptions evaluated in this fuel and energy security study with respect to winter operational risks”
9. “The results of the fuel and energy security assessment point to a number of options that may be considered by NYISO and stakeholders”

AG Options

1. “Continued and expanded monitoring and analysis”
2. “Focus on the possible impacts of potential retirements in response to the proposed “peaker rule””
3. “If continued monitoring indicates the potential for reliability risks related to fuel inventories in the future, further assess the adequacy of incentives for appropriate pre-season fuel oil inventory levels and/or replenishment arrangements”
4. “Review the potential for geographically-targeted development of new renewable and energy storage resources required or incentivized through implementation of the CLCPA”
5. “Proactive scenario analysis of the potential impacts of the CLCPA”
6. “Continuous updating and refinement of energy and fuel security modeling”

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



Questions?