



Fuel & Energy Security Initiative – Study Overview

**A Report by the
New York Independent System Operator**

November 2018

DRAFT FOR DISCUSSION PURPOSES ONLY

Introduction

The mix of fuels used to generate electricity affects both the reliability and resilience of the bulk electric system. A balanced array of resources enables the system to better address issues such as price volatility, fuel availability and stressed/abnormal operating conditions. New York's electric generation fleet has historically been comprised of a relatively diverse mix of fuel types including hydro, nuclear, oil, coal, natural gas, and other renewable resources. Currently, more than 80% of the gas fired generating units have (had) dual fuel capability with natural gas serving as a primary fuel and oil as an alternate fuel. This gas fired generation is also served by a relatively diverse array of natural gas pipelines and local gas distribution company (LDC) systems. The current fuel diversity in New York provides significant reliability and resilience benefits by affording operational flexibility and resource availability during periods of natural gas supply and/or transportation constraints.

Technological developments, economic and environmental considerations, and public policies are transforming the grid and driving changes in the resource mix. For example, technological advancements have resulted in materially altering the cost of natural gas through the extraction of gas from the Marcellus and Utica Shale reserves. The current price advantage of natural gas is driving significant development of gas fired generation and placing economic pressure on generation using more expensive fuels and resources that have higher costs to produce energy. These factors have resulted in an increased level of production by gas fired generation in New York and, consequently, greater reliance on production from gas fired facilities to meet load requirements.

To serve the needs of retail gas customers, LDCs have purchased long-term firm gas transportation service equivalent to nearly 100% of the gas pipeline capability in New York. During milder and hot weather conditions, when retail gas demand is lower, some of the gas pipeline capacity is either sold, released, or becomes available as interruptible gas service. During cold weather conditions, however, when retail gas demand peaks, gas pipeline capability becomes scarce, especially in the eastern and southeastern portions of the State, including New York City and Long Island.

Furthermore, a growing amount of New York's gas turbine and fossil fuel fired steam turbine capacity is reaching an age at which, nationally, a majority of similar type capacity has been deactivated. Currently, more than 3,200 MW of such capacity within New York has reached an age at which, nationally, 95% of such capacity has ceased operation. By 2028, this amount will increase to more than 8,300 MW.

Environmental regulations and public policies have accelerated the development of clean energy resources in New York, including wind and solar generation. For example, the State's Clean Energy Standard requires that 50% of the energy consumed in New York be generated from renewable resources by 2030. Environmental regulations also affect the generation mix as emissions caps and pollution control standards require fossil fuel

fired generators to limit production, procure allowances to cover emissions, and/or install new emissions control technologies. Evolving environmental constraints and public policies are expected to continue the acceleration of the transition from higher-emitting to lower-emitting resources through a continued transformation of the mix of generation resources in New York. This shift will place the downstate region – where fossil fuel fired generation serves nearly 70% of the load in this region – at increased risk of potential energy supply disruption. The transition to greater reliance on clean energy technologies will also require greater operational flexibility to more quickly adapt to real-time changes in how energy is produced and delivered.

The NYISO has a history of success in evolving its markets in a responsive and complementary manner to changes in the electric industry. The NYISO has already taken steps to evolve its markets and operational practices in response to the ongoing transformation of the grid in New York.

For example, during the 2013-2014 Winter, New York experienced much colder conditions in the early winter period followed by a significant Polar Vortex throughout much of January 2014. As a result, high levels of firm gas pipeline nominations left very little residual pipeline available to the electric generation sector. The lack of pipeline availability combined with significant generation forced outages and derates led to periods of particularly challenging electric transmission system operations. In response to the experiences of the 2013-2014 Winter, the NYISO implemented certain market enhancements and operational improvements, including:

Market Enhancements

- Implementation of shortage pricing enhancements
- Increasing the quantity of 30-minute operating reserves procured statewide
- Implementing a new 30-minute reserve requirement for Southeastern New York (SENY)
- Implementation of improved ability for generators to reflect day-ahead and intra-day fuel costs within their offers
- Implementation of scarcity pricing enhancements

Operational Enhancements

- Increased gas pipeline visibility, and enhanced awareness of operational flow order (OFO) conditions on pipelines and LDC systems
- Establishment of the NY State Agency Coordination protocol
- Implementation of the fuel inventory application and enhanced fuel reporting requirements
- Implementation of additional testing requirements for certain dual fuel units located within New York City

The enhancements implemented to date have been successful and provide a solid foundation from which future market evolution can occur. Despite these prior actions, the circumstances and trends described above highlight the need for: (1) continued assessment of the ongoing transformation of the fuel and energy security of New York's generation mix; and (2) determining whether additional market and/or operational enhancements related to fuel and energy security may be necessary to maintain and improve future reliability and resilience of bulk power system.

Fuel & Energy Security Initiative

As described above, the confluence of technological advancements, environmental and economic considerations, and public policies are driving significant changes to the portfolio of supply resources in New York. These conditions highlight the potential for future challenges to arise in meeting electric system demands under certain stressed conditions such as prolonged cold weather events and/or natural gas supply or transportation availability constraints or disruptions. This assessment is intended to examine the fuel and energy security of the New York electric grid for a forward-looking period and identify any potential problems or concerns. The assessment will also provide information regarding similar fuel and energy security initiatives underway in neighboring markets. The results of the assessment are intended to help facilitate and inform the development of recommendations for any necessary market or operational enhancements related to fuel and energy security.

The NYISO will engage a consultant to assist with conducting this assessment. The primary objectives of the assessment are as follows:

- Evaluate potential vulnerabilities and reliability gaps for a future study period through evaluating a wide range of fuel related risks during projected extreme weather and other stressed operating conditions.
- Provide information regarding similar fuel and energy security initiatives underway by other ISOs/RTOs.
- If the fuel and energy security assessment identifies reliability risks, develop recommendations for potential market and/or operational enhancements necessary to achieve desired improvements in grid resilience.

Fuel Security Study Approach

The fuel security study will be an hourly, deterministic evaluation considering the scheduling of resources across a period of extended cold weather conditions during the winter for the purposes of evaluating the sufficiency of fuel available for New York's generating fleet to meet load requirements. The study will dispatch generation to serve NYCA load requirements. The load requirements will be based on hourly demand levels of previously observed cold weather patterns adjusted with 2023-2024 Winter assumptions.

The study is not an economic analysis that directly considers fuel costs. Instead, generation will be dispatched to meet these demand levels dispatching all non-oil fired and non-natural gas generation first, followed by natural gas fired units (gas-only and dual fuel) based on gas availability assumptions, then dual fuel units operating on oil based on alternative fuel inventory and replenishment capability assumptions, and lastly oil fired generation. It will model minimum, projected starting fuel inventories, projected fuel burn rates, and different assumed replenishment rates to determine whether adequate fuel is available to meet load requirements based on the conditions specified for the particular case being analyzed.

The assessment will consider fuel adequacy on a statewide basis, as well as on a locational basis for Eastern NY, Southeastern NY, and New York City. The assessment will reflect transmission capability, modeling N-1-1 transmission limits for UPNY-SENY and UPNY-Con Ed interfaces. The assessment is not a resource adequacy evaluation reflective of probability distributions or loss of load expectation (LOLE) criteria nor is it a full transmission security evaluation.

Base Case Assumptions

The NYISO proposes to conduct the fuel and energy security assessment for the 2023-2024 Winter. The selection of this study period was determined by the timing of various key factors, including the planned retirement of the Indian Point nuclear units, the State's targeted timeframe for retiring or converting the remaining coal fired generation in New York, and the expected implementation of new NOx emissions requirements for older gas turbines. The fuel and energy security assessment will primarily be focused on an extended period of consecutive days of cold weather conditions. The consultant will review cold weather history in New York and recommend the appropriate duration(s) of the extended cold weather event.

The "starting point" base case assumptions for supply resource mix and energy load forecasts will come from the 2017 CARIS Phase 1 System Resource Shift case. The NYISO will work with the consultant to develop appropriate, incremental changes to that set of resource assumptions and load forecast. The NYISO will also work with the consultant to develop other required assumptions such as cold weather availability of pipeline service capability to natural gas fired generation, expected starting oil inventory and replenishment capabilities, potential generation emissions restrictions or other limitations on operations, and regional energy market interchange assumptions. All assumptions will be presented to stakeholders prior to the commencement of the fuel and energy security evaluation.

Fuel Security Scenarios

In addition to the base case evaluation, the NYISO will work with the consultant to establish single fuel and energy security risk scenarios such as the examples listed below, along with simultaneous, multiple risk scenarios reflective of worse case cold weather operations and/or possible impacts resulting from

physical/cyber-attacks timed to occur during already stressed cold weather operating conditions. The final, defined set of scenarios will be presented to stakeholders prior to the commencement of the fuel and energy security evaluation.

Potential scenarios for consideration include:

- Loss of the most significant interstate natural gas pipeline.
- Loss of the most significant, single internal LDC pipeline.
- Loss of the most significant, single gas pipeline “city-gate” connection to the New York Facilities System.
- Scenarios assuming different starting oil inventories and replenishment capability.
 - Potential scenarios could include consideration of the following levels of alternative fuel to support operation: (1) starting quantities with no replenishment (e.g., 7-day oil operating capability); (2) starting quantities plus 1 full replenishment (e.g., 14-day oil operating capability); and (3) starting quantities plus 2 full replenishments (e.g., 21-day oil operating capability)
- A scenario assuming “no dual fuel capability”
- A scenario assuming natural gas is completely unavailable to support generation
- A scenario assuming reduced availability of hydroelectric generation due to river ice jams
- A scenario reflective of implementing upgrades in response to the AC transmission public policy need and assuming certain levels of incremental resource deactivations in the Lower Hudson Valley
- Scenarios that assume various levels of interchange with neighboring control areas

Definition of a Fuel Security Reliability Problem

A fuel and energy security risk refers to the possibility that a generator will not have or will be unable to obtain the fuel necessary to operate. A significant operational risk would represent either of the following conditions identified in the base case or any of the evaluated scenarios:

- Any level/duration of an inability to fully serve load; and/or
- Any level/duration of an inability to maintain reserve requirements without emergency actions.

Deliverables from the Consultant

The consultant selected by the NYISO would be expected to provide certain periodic updates to stakeholders regarding the status and results of the fuel and energy security assessment. In addition, the consultant will

provide a report describing the study assumptions and assessment results that, at a minimum, addresses the following requirements:

- Describe any reliability risks, concerns, deficiencies identified by the fuel and energy security assessment.
 - Determine and report for the base case and all scenarios any inability for load and/or reserve requirements to be met, including the quantity and duration of such deficiencies
 - Determine and report the amount of “fuel secure capacity” that would be needed to mitigate the risks of unserved load and reserves for all evaluated cases.
- Provide an overview of similar fuel and energy security initiatives underway by other ISOs/RTOs, including the status and/or results of any studies conducted, key findings, and recommended market, operational, or other enhancements being considered as part of such initiatives.
- To the extent that risks of unserved load and/or inability to meet reserves are identified in the fuel and energy security evaluation, develop recommendations for potential market and/or operational enhancements necessary to minimize reliability concerns and help ensure adequate quantities of “fuel secure capacity” are available and being maintained.

The current projected timeline for the fuel and energy security study work is as follows:

- December 2018: Execute a contract with a consultant
- January 2019: Consultant to present study assumptions and selected scenarios to stakeholders
- March 2019: Consultant to present preliminary findings to stakeholders
- June 2019: Consultant to provide and present final report to stakeholders