

Identification and Integration of Future Climate System Impacts and Resilience Attributes Into the NYISO's System Planning and Markets

A confluence of factors, including recent weather events and future climate shifts, and the changing generation resource mix - are combining to raise questions about the resilience of the electric grid. Accordingly, the FERC has commenced a proceeding to examine the resilience of bulk power systems. This proposed project responds to this FERC proceeding and addresses current potential gaps in the NYISO's planning, forecasting, operational, and market considerations.

To inform the NYISO's planning, forecasting, and operations, as well as the development of wholesale market mechanisms to enhance grid resilience, the NYISO will undertake a three-phased project to examine issues associated with resilience and reliability and develop potential market solutions.

Generally, Phase I would identify and examine impacts to the bulk power system under different climate and extreme weather scenarios and other system events that impact resiliency and system stability, focusing specifically on the ability of the system to meet NYISO load and to facilitate prompt system restoration in the event of an outage or disruption. Presently, the NYISO does not consider the potential risks associated with changing climate conditions in its planning, forecasting or market products, while there is a growing body of scientific research on how future climate impacts may affect energy supply infrastructure and the demand for energy. Potential scenarios may include extreme duration temperature events (extended heat waves and/or cold snaps, including potential impacts on fuel security and gas pipeline capacity); coincident and/or consecutive major weather events (e.g., coastal hurricane followed by a heat wave; snowstorm with flooding followed by a cold snap; consecutive storms as experienced in March 2018); and weather variability affecting intermittent renewable generation. Precedent for a study of this type is demonstrated by numerous State and New York City initiatives, as well as Con Edison's Climate Change Vulnerability Study, which looks at the impact of projected climate risks to its electric, gas and steam systems.

The full suite of scenarios to be studied would be collaboratively developed by the NYISO and stakeholders. The purpose of Phase I is to identify the threshold at which NYISO system reliability is significantly threatened in a manner where swift recovery is jeopardized.

Phase II would identify the attributes and actions necessary to mitigate the reliability and resilience risks identified in Phase I.

In Phase III of the Project, stakeholders would develop market design concepts targeted to provide adequate compensation for attributes needed for resilience and system stability. This could include capacity market reforms, additional ancillary services and revisions to the planning process.

For purposes of quantifying potential costs associated with this proposed project, a more detailed description of Phase I, which informs the latter phases of the project, is included below.

Phase I: A study of extreme weather events and when the bulk power system breaks down under certain scenarios and attributes.

- Timeline: Proposed timeline for the study would be to examine attributes and scenarios from 2020 to 2040. Request consideration of studying 2020 to 2050 in the interest of aligning with State policy goals.
- Load/Supply: Analyze both load and supply side effects, with an emphasis on developing processes/approaches for integrating climate risk into load and supply side forecasts, including taking into account a potential different resource mix by 2040/2050.
 - Supply: Scenarios should consider potential reliability risks due to age of the generation unit, including looking at national-level FOR data that looks at age and type of unit; and reliability risks associated with relying on a different resource mix (e.g., one scenario that is dependent on renewables and a scenario that is dependent on natural gas). With respect to supply, the study should analyze the impacts of generation unit derating or equipment failure and other risk probability over time if the event is prolonged (e.g., extended heat wave or cold snap, etc.), as well as fuel security concerns (loss of a pipeline, impact of weather variability on intermittent renewables).
- Scenarios should be developed based upon:
 - Changing climate conditions, as well as scenarios that comprise NYS policy goals, such as decarbonization, that may result in thermal and vehicle electrification which may have impacts on grid load.
 - Outcomes should consider impact on reserve margin and how much reserve margin would be needed to maintain reliability. Outcomes may also consider the role of regional planning and interconnections.
 - Scenarios to study include:
 - Heat Wave
 - Extended Cold Snaps
 - Storm Surges and Flooding
 - Future Storm Surge
 - Tidal Flooding
 - Riverine Flooding
 - Thunderstorms
 - Wind
 - Coincident/Consecutive Events (e.g., impact of multiple scenarios at once)
- Use of Existing Data and Assumptions:
 - The City does have some assumptions and climate projections that are specific to NYC, and the 100 mile radius around it, that can be shared with the NYISO. The City has modeled 100-year coastal flood plains that take into account sea level rise projections, and by 2019 anticipate having improved models to evaluate key areas that are at risk for urban flooding.
 - NYS provided climate projections statewide as part of the “Responding to Climate Change in New York State (ClimAID) Report located here: <https://www.nyserda.ny.gov/About/Publications/Research%20and%20Development%20Technical%20Reports/Environmental%20Research%20and%20Development>

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- Inputs/outputs to Con Edison's climate change vulnerability study may also be available to share with the NYISO.
- NYSERDA and other State entities may also have relevant data and assumptions that could be leveraged, most notably the NYSERDA/EPRI study looking at energy system vulnerabilities associated with select climate risks.