Continued RRS Discussion DRAFT Large Load Impacts to Bulk Power System Reliability

RRS Meeting

July 10, 2025

Introduction

- Wes Yeomans provided a presentation at the June 15, 2025 RRS providing industry background on reliability concerns associated with integration of large loads, status update on UFLS WG development of a white paper, and potential other concerns
- The June 15 presentation is attached to this presentation as Appendix A
- The NYSRC is still discussing the exact assignment for RRS
- This presentation describes some current large load concerns currently in discussion amongst NYSRC executive committee members

Reliability Concerns with Large Loads – Interconnection Impacts

- Steep ramp rates of large loads or short circuits may result in transient fluctuations of frequency and/or voltages resulting large load customer self-disconnections creating reliability violations.
  - There may be an oppertunitty to consider the potential reliability impacts resulting from the self-disconnection (customer protected) of large loads in the planning horizon
  - Additionally, there may be an oppertunitty to develop new rules requiring potential reliability impacts be evaluated and mitigated prior to the interconnection of large loads
- Interconnection of large loads may affect Under Frequency Load Shed (UFLS) programs and associated studies
  - While Transmission Owner UFLS programs and Planning Coordinator studies evaluate and demonstrate that synchronism is predicted to be maintained during a significant frequency disturbance, there may be a new need to better understand what large load customers will self-disconnect during a frequency disturbance event in addition to the loads designated to disconnect per the UFLS programs. In theory a higher-than-expected voltages and frequencies could result in unexpected loss of additional generation
  - There may be an oppertunitty to require large loads to provide their ramping and customer protection information as part of the interconnection process.

Reliability Concerns with Large Loads – Industry Response

- NYSRC Executive Committee members are well aware of NERC reporting of actual loss of large loads events, NERC and FERC industry discussions, technical conferences and formal comments. Much of this is described in Appendix A
- In addition to Appendix A, NERC has formed a Large Load Task Force to produce two white papers and a guideline documents:

1. White Paper – Characterization & Risks of Emerging Large Loads (June 2025)
2. White Paper - Need for new Reliability Standards (end 2025)
3. Guidance Document – Planning and operations of systems with large loads (2026)

Reliability Concerns with Large Loads – Industry Response - NPCC

- NPCC held a reliability forum on large loads on May 15, 2025
  - Discussed new unique risks posed by large data centers including
    - Price Response – Crypto mining operations can increase or decrease load by almost 100%. Cumulative effects may be challenging to manage. Not all computing operations are sensitive to electricity prices
    - “Ride Through” – Some large loads customers chose to self-disconnect
    - Normal Operations – Some AI process simply may have a wide range of variability consumption

Next Steps for RRS

- Waiting for specific direction from the NYSRC EC
- It is well within RRS's scope to always be considering and identifying reliability concerns, discussing concerns across the RRS, and developing solutions for NYSRC EC consideration
- Large Load Reliability Concerns will remain a "standing" agenda item for RRS going forward

Appendix A
Presentation Provided at June 5, 2025 RRS

Working Paper to Facilitate RRS Discussion
of
Large Load Impacts to Bulk Power System Reliability
RRS Meeting
June 5, 2025

Introduction

- The RRS has been charged by the NYSRC EC to review and consider reliability concerns associated with the connection of potential, new large loads in NY.
  - **Automatic UFLS Program Concerns** - Action Item: In October 2024, the EC charged the RRS to review existing UFSL criteria, TO UFSF Programs, and consider the need for more frequent Automatic UFLS Studies “in light” of rapid integration of BTM renewable resources and the likelihood of additional of large load additions.
  - **System Impact Concerns** – Action Item: In February 2025, the EC charged the RRS to review existing system interconnection criteria for large loads to identify concerns in planning criteria.

Agenda

- Timeline of past (2024 & 2025) NYSRC large load reliability comments to NERC & FERC and a description of the July 10, 2024 “NERC Incident Report - Simultaneous Voltage-Sensitive Load Reductions”
- Status of RRS work on Large Load Automatic UFLS Program Concerns
- Status of RRS work on Large Load System Impact Concerns

February 2024 NYSRC Comments on PRC-006 Standard Authorization Request (SAR)

- In early 2024 the SPIDER WG PRC-6-5 SAR primary objective was to address the imbalance equation is regards to consideration of behind the meter distributed generation (primarily BTM solar) in Transmission Owner UFLS Programs
- On February 23,2024 the NYSRC EC provided comments stating the PRC-006 SAR should consider including a review by the drafting team of R4 which requires a five years study interval for Automatic UFLS Studies by Planning Coordinators. NYSRC offered that the current interval of five years is too long in light of rapid changes to the power system and should be performed more frequently than five years; NYSRC suggesting considering 1-2 years
- The NYSRC did support the objective to address the imbalance equation related changes.
- In 2024 due to other priorities this SAR has not moved forward in NERC

July 10, 2024: NERC Incident Report Summary of Incident

- A 230 kV transmission line experienced a lightning arrestor permeant fault. Protection properly cleared the fault
- Three auto-reclose attempts from both ends of the line for a total of six reclose efforts.
- 1,500 MW of total **customer-initiated** simultaneous load loss of load occurred. These were primarily data center customers loads with voltage sensitive protection system designed to “ride through” voltage disturbances by disconnecting from the utility and utilizing various UPS system design parameters and back up generation to keep their operations in-service

NERC Incident Report - Actions that TOP's and TPS' Should Start Taking to Avoid Significant Load Loss Issues in the Future

- Require dynamic response models from large loads in their facility interconnection requirements
- Perform studies to determine the potential magnitude of load loss for system disturbances (faults)
  - Study the impact that these large load losses would have on the system
- Take into consideration the potential for large voltage-sensitive load loss when configuring automatic reclosing schemes
- Actively monitor to detect load losses coincident with system faults
- TOPs: Ensure that operating agreements with large loads include ramp rates when connecting/reconnecting large loads to the system

NERC Incident Report Critical Questions That Must Be Resolved

- Should large loads be a NERC registered entity?
- Should NERC Reliability Standard modifications be developed for large load interconnection requirements?
- What studies should TOPs and TOs perform to “consider” the impacts of large load operation?
- What is the definition of a large load?

December 9, 2024: NYSRC comments to FERC in response in the November FERC Technical Conference to Discuss Issues Related to Co-Location of Large Loads at Generating Facilities

- NYSRC offered that Automatic UFLS programs should be evaluated as part of the interconnection studies under FAC-001 and FAC-002.
- NYSRC offered that it may not be possible for a utility to find enough additional load shedding to cover new large loads and that that this issue be identified and mitigated in the interconnection process
- NYSRC offered the current Requirement for a 5-Year UFLS Study should be modified to require annual Automatic UFLS program reviews as one potential solution.

January 29, 2025 NYSRC Comments to NERC MRC's Request for Input on Large Load Reliability Risks

- **NERC MRC Question #1**: Question what Risks to Reliability do you see with increasing integration of large loads?

NYSRC Response:

- Repeated its December 9 (Technical Conference) reliability concerns to FERC
- Emphasized that the current PRC-006-5 requirement for five-year UFLS Study requirement is not adequate to preserve reliability given the present pace of accelerating connection of large loads
- Emphasized need for new interconnection process for large loads to ensure that when studied under TPL Standards (including a PRC-006 review) and deficiencies are identified, they are not permitted to interconnect until deficiencies are addressed

January 29, 2025 NYSRC Comments to NERC MRC's Request for Input on Large Load Reliability Risks

- **NERC MRC Question #2:** What Should NERC Do To Address These Emerging Risks?

NYSRC Response:

- Shorten the time interval between Automatic UFLS Program Reviews from the five- year requirement
- Require that Automatic UFLS program reviews be undertaken as part of the large load interconnection study process
- Require that large loads offer a portion of proposed connected load to the utility Automatic UFLS program
- Harmonize the federal and state jurisdiction issues

May 2025: NYSRC Draft SAR for NERC Consideration – Still out for NYSRC EC Internal Comments

- On May 14 a draft SAR was distributed for EC review
  - In previous discussions with NERC leadership regarding the NYSRC EC comments, NYSRC was invited to submit a SAR for discussion.
  - In response, NYSRC EC is drafting a SAR to Modify PRC-006 design assessment to look ahead to future large load related system changes to increase the likelihood of Automatic UFLS programs working as designed
  - Modify PRC-006 to require Automatic UFLS planning studies more frequently than once very five years due to rapid of future large load connections

RRS: Status of UFLS Program Review

- The UFLS WG is considering whether RRS should proceed with a **new, NYSRC Rule** to require the NYISO to perform the 5-Year Automatic UFLS Study more frequently. Work is underway to draft a white paper with the following elements:
  - Fact Finding: Review "what TO's are doing during the year and annually to meet existing criteria"
  - Review NYISO Operations Engineering annual review of TO submitted automatic UFLS program data.
  - Review of the NYISO's process in its 5-Year Automatic UFLS Program Study process
  - Identify reliability risks to current Automatic UFLS programs due to large load additions
  - Develop Recommendations for RRS and ultimately EC consideration – **no decisions yet**
- Related and in parallel, the NYSRC EC is working on a **draft NERC SAR** for NERC to consider the need to modify NERC criteria for a more frequent review of the 5-year interval for review of Automatic UFLS programs.

RRS: Status of System Impacts Studies Review

- There may be three different system impact interconnection issues

1. There may be a need for consideration of Load under Automatic UFLS control at the time a new large load requests for interconnection are reviewed
   A. This issue will be captured by the UFLS WG work
2. Consideration of simultaneous loss of voltage-sensitive load reductions in the planning horizon.
3. In the form of a question, “Should RRS be considering reliability concerns for potential large, single loss load connections or is the current set of tariff and criteria sufficient…”