

FERC NOPR on Reliability Standards to Address Inverter-Based Distributed Energy Resources

vermont electric power company



Vermont System
Planning Committee

January 25, 2023

Outline

- Refresh on reliability responsibilities
- Refresh on NY outage event
- FERC notice of proposed rulemaking
- ISO-NE developments
- Next steps

Refresh on reliability responsibilities

Responsibilities	FERC	NERC	ISO-NE	VELCO
Oversee bulk power system reliability	Yes	Yes		
Perform analysis and investigations	Yes	Yes		
Order development of Reliability Standards	Yes			
Develop Reliability Standards		Yes		
Approve Reliability Standards	Yes			
Audit adherence to Reliability Standards		Yes		
Serve as Reliability Coordinator and Balancing Authority			Yes	
Serve as Transmission Planner and Transmission Operator			Yes	Yes

Refresh on reliability responsibilities

Responsibilities	FERC	NERC	ISO-NE	VELCO
Oversee bulk power system reliability	Yes	Yes		
Perform analysis and investigations	Yes	Yes		
Order development of Reliability Standards	Yes			
Develop Reliability Standards		Yes		
Approve Reliability Standards	Yes			
Audit adherence to Reliability Standards		Yes		
Serve as Reliability Coordinator and Balancing Authority			Yes	
Serve as Transmission Planner and Transmission Operator			Yes	Yes

Refresh on reliability responsibilities

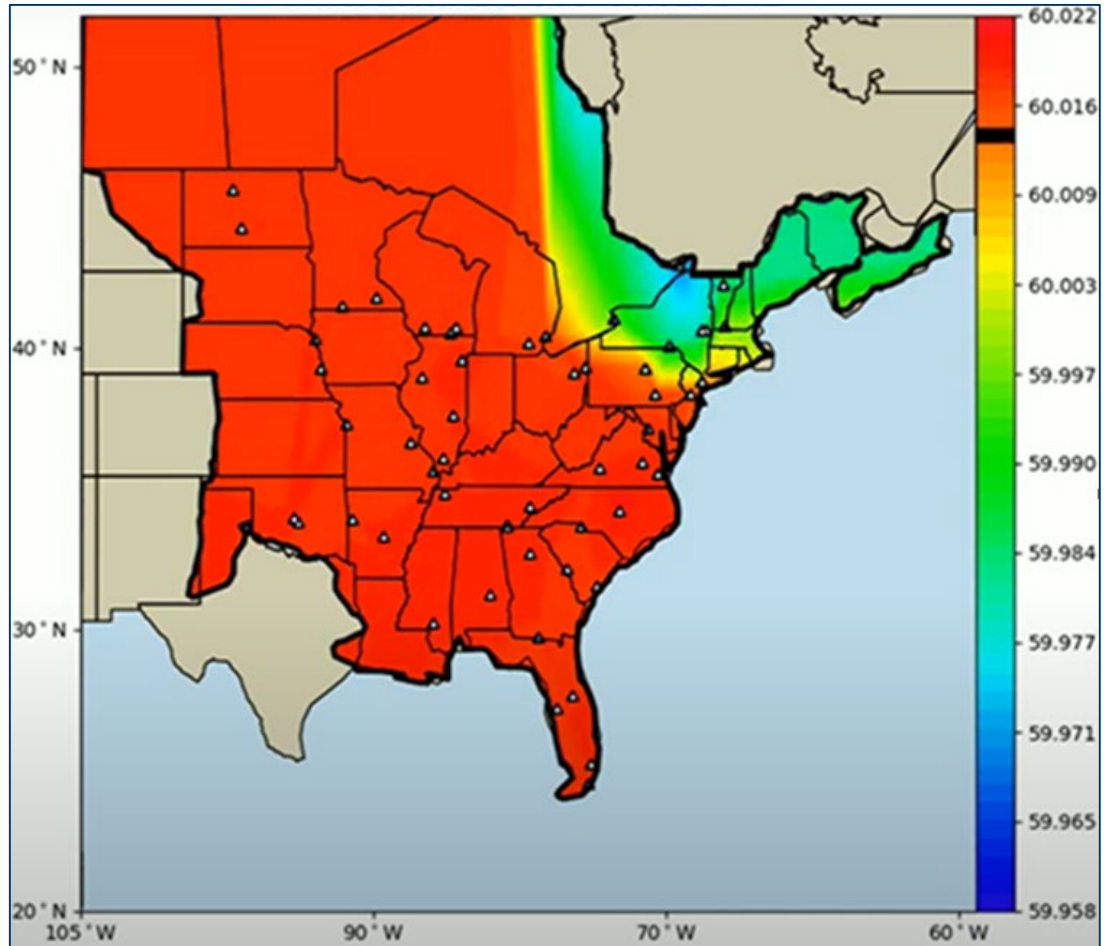
- Transmission Planners plan the bulk power system to withstand contingencies years into the future.
- Transmission Operators operate the bulk power system to withstand contingencies day-ahead and in real-time.
- Reliability Standards require Transmission Planners and Transmission Operators to study and prepare for contingencies.



Contingency: “An unplanned event creating an outage of a critical system component such as a transmission line, transformer, or generator.”

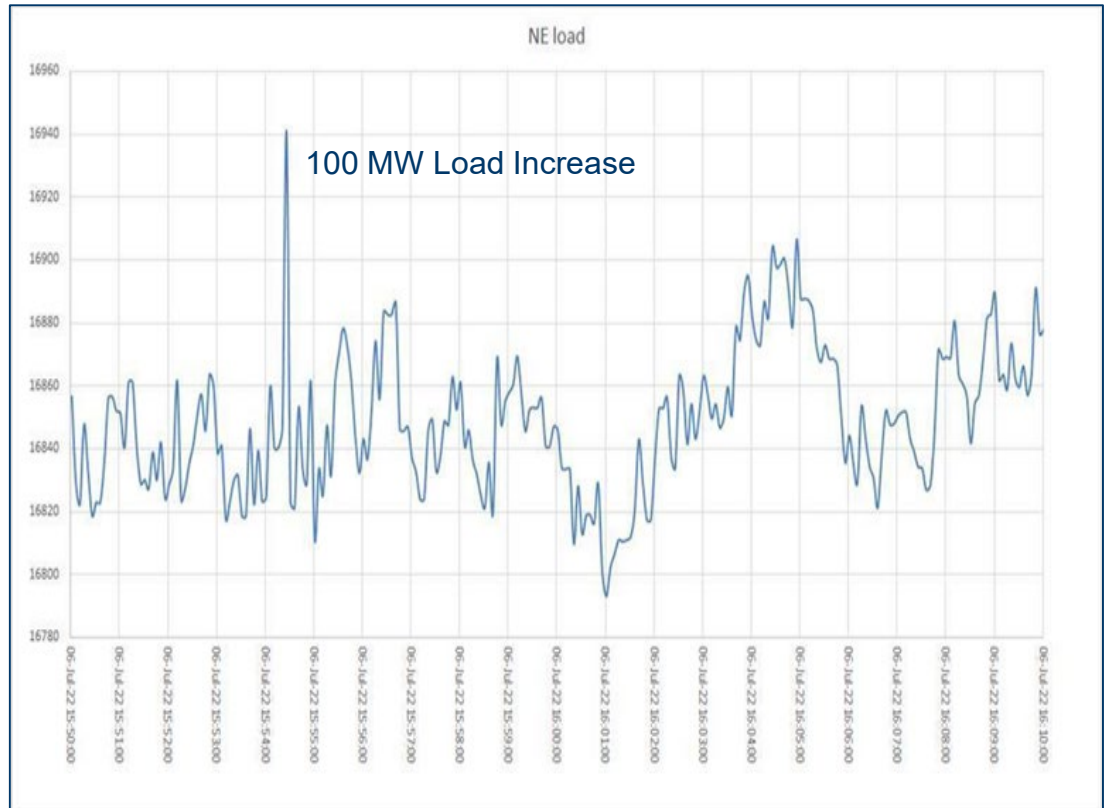
Refresh on NY outage event

- In July 2022, a NYISO connection to Quebec (1200 MW) tripped offline, an example of a contingency.



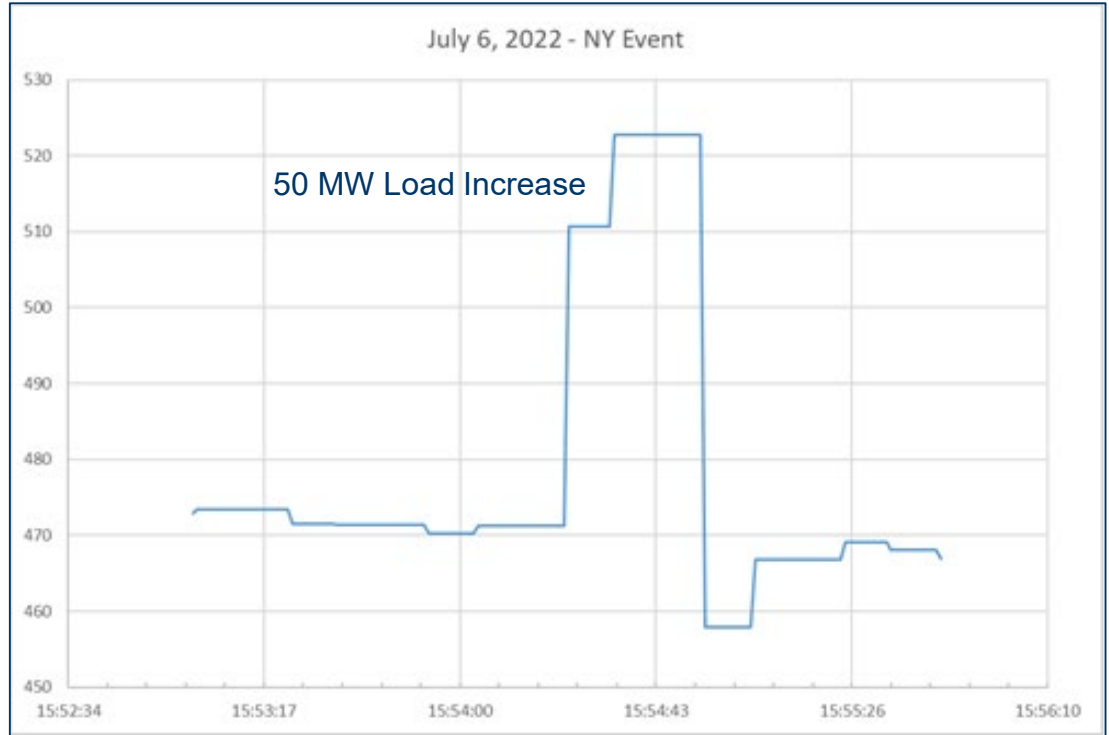
Refresh on NY outage event

- In July 2022, a NYISO connection to Quebec (1200 MW) tripped offline, an example of a contingency.
- This contingency resulted in New England load increasing by 100 MW.



Refresh on NY outage event

- In July 2022, a NYISO connection to Quebec (1200 MW) tripped offline, an example of a contingency.
- This contingency resulted in New England load increasing by 100 MW.
- Half of the increase, 50 MW, was in VT.



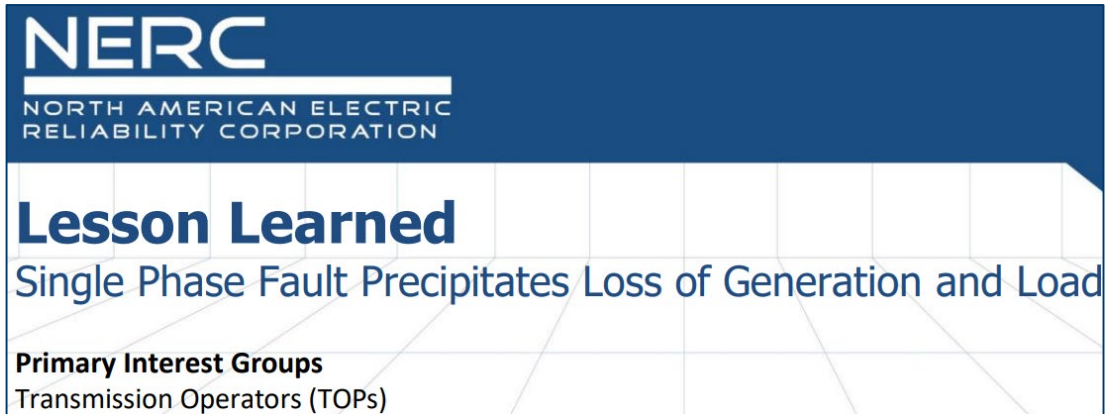
Refresh on NY outage event

- In July 2022, a NYISO connection to Quebec (1200 MW) tripped offline, an example of a contingency.
- This contingency resulted in New England load increasing by 100 MW.
- Half of the increase, 50 MW, was in VT.
- Distribution-level inverter trip settings are likely the cause.

October 2022 VSPC Presentation

https://www.vermontspc.com/library/document/download/7632/VSPC_Event_tripping_DG.pdf

- Distributed generation (DG) tripping due to rate of change of frequency (ROCOF) protection setting
- And/or DG tripping due to angle shift protection setting
- Known exposure – happened before



NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

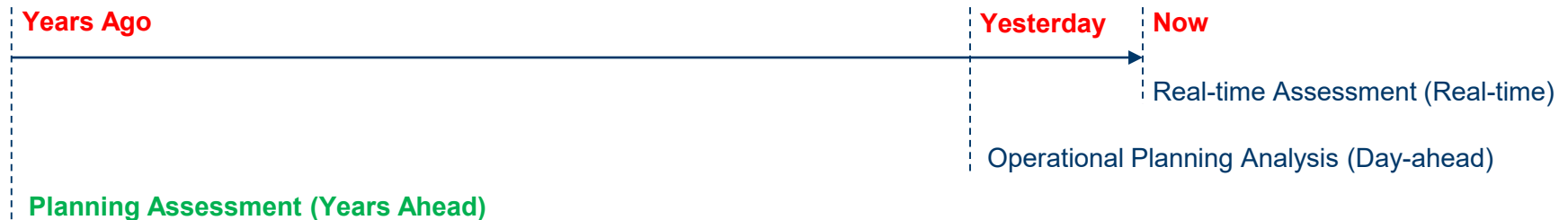
Lesson Learned

Single Phase Fault Precipitates Loss of Generation and Load

Primary Interest Groups
Transmission Operators (TOPs)

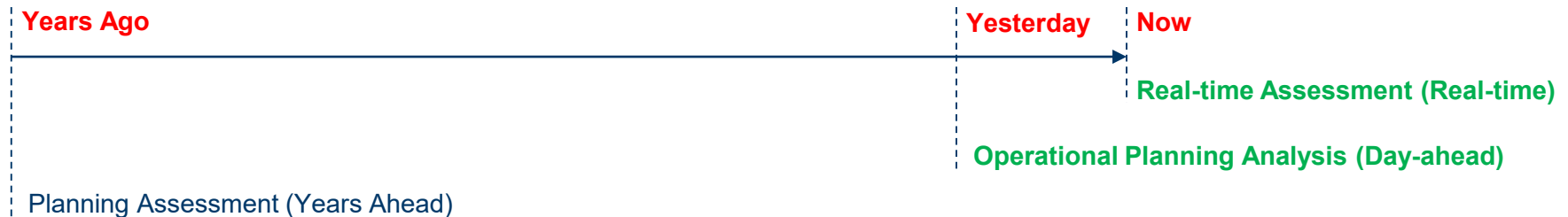
FERC notice of proposed rulemaking

- **November 2022 Finding:** “Inaccurate planning assessments may lead to false expectations that system performance requirements are met and may inadvertently mask potential reliability risks in planning and operations.” P88
- **Transmission Planners:** “We therefore propose to direct NERC to submit to the Commission for approval one or more new or modified Reliability Standards that would require planning coordinators and transmission planners to include in their **planning assessments** the study and evaluation of performance and behavior of individual and aggregate registered IBRs and unregistered IBRs, as well as IBR-DERs in the aggregate, under normal and contingency system conditions in their planning area.”



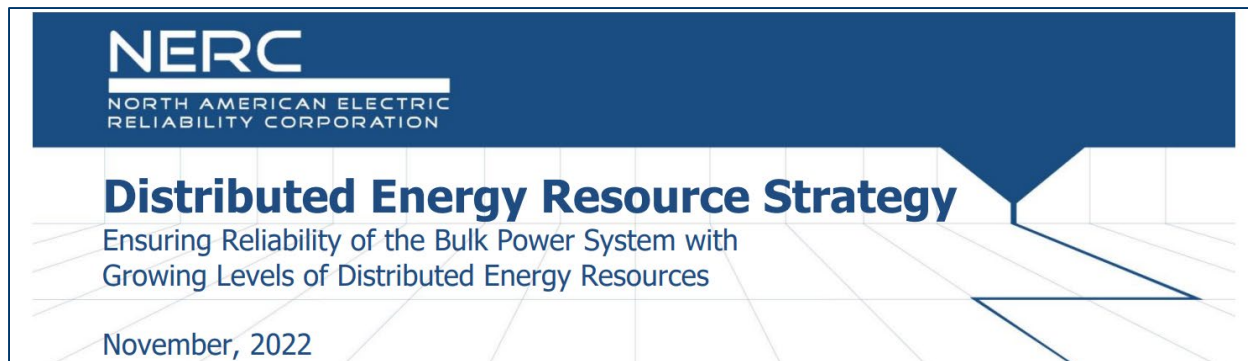
FERC notice of proposed rulemaking

- **November 2022 Finding** : “Neighboring operators may be unaware that faults in one operator’s area can trigger controls actions and trip [inverter-based distributed energy resources] in another operator’s area.” P89
- **Transmission Operators**: “We therefore propose to direct NERC to submit to the Commission for approval one or more new or modified Reliability Standards that would require reliability coordinators and transmission operators to include the performance and behavior of both individual and aggregate registered IBRs and unregistered IBRs, as well as IBR-DERs in the aggregate (e.g., IBRs tripping or entering momentary cessation individually or in the aggregate) in their **operational planning analysis**, real-time monitoring, and **real-time assessments** including non-bulk electric system data and external power system network data identified in their data specifications.”



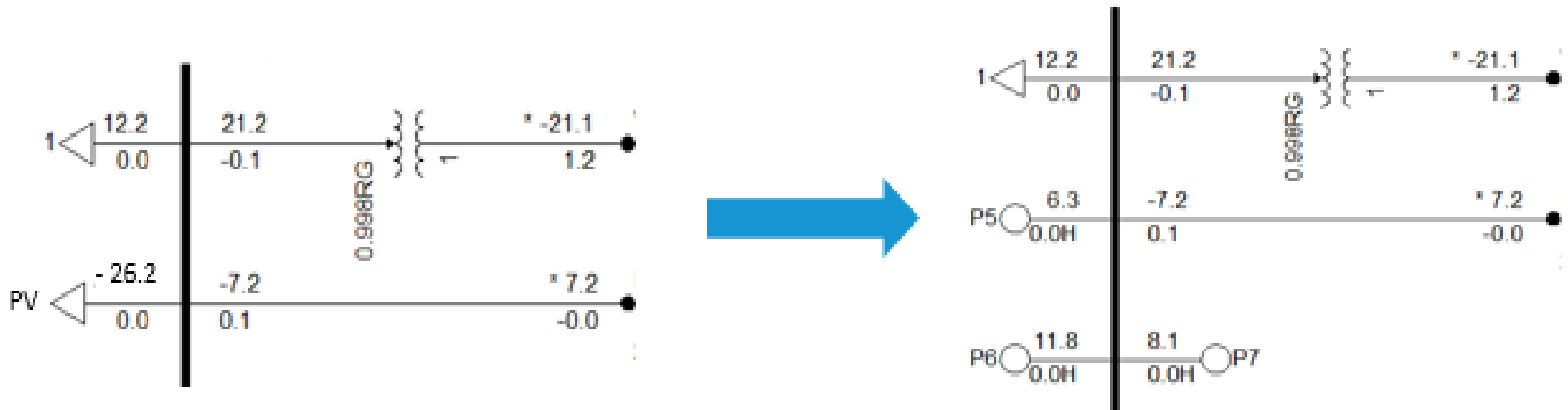
FERC notice of proposed rulemaking

- Requests comments by February 6, 2023
 - <https://www.federalregister.gov/documents/2022/12/06/2022-25599/reliability-standards-to-address-inverter-based-resources>
- Proposes that within 90 days of final rule, NERC submit a comprehensive plan to “address the IBR-related reliability gaps identified within this rule within 36 months”
- NERC considers projects mitigating risks of grid transformation due to inverter-based DER as high priority



ISO-NE developments

- ISO-NE has proposed significant changes to transmission planning technical guides, planning procedures, and criteria to represent the post-contingency behavior of distributed energy resources
 - Triangle: load reducer model with no inverter settings represented
 - Circle: generator model with inverter settings represented



ISO-NE developments

- Specifically, ISO-NE has proposed changes to the minimum design criteria for the bulk power system in New England (Planning Procedure 3)

ISO-NE proposes to maintain the current 1,200 MW loss of source limit, **but include** non-consequential legacy DER tripping in the loss of source calculation

- Current loss of source limit is derived from NY and PJM limits and cannot be exceeded
- Ensures that a source loss >1,200 MW that could adversely impact NY or PJM does not occur due to DER tripping
- Existing requirements in PP3 would continue to limit the amount of non-legacy DER allowed to trip

Consequential Generation Loss (MW)	Maximum Total Source Loss (MW)	Maximum Non-Consequential DER Tripping (MW)
1,200	1,200	0
800	1,200	400
0	1,200	1,200

Next steps

- Planners and operators require accurate network models and DER data to anticipate exposures
- VELCO is proactively preparing for FERC, NERC, and ISO-NE's new reliability requirements with no-regret investments to support planners and operators
- To realize our vision to create a sustainable Vermont, how VELCO fulfills our reliability responsibilities as a Transmission Planner and Transmission Operator will necessarily change as the grid continues to transform