NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

NERC SPIDERWG Studies Sub-Group Kick-off

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RELIABILITY | ACCOUNTABILITY




Outline

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- New Challenges in Planning Studies
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Introduction

- With growing penetration of Distributed Energy Resources (DER), the SPIDERWG was established to tackle challenges related to system planning, modeling, and reliability impact on Bulk Power System (BPS). Within SPIDERWG, the Studies sub-group focuses on matters related to planning studies.
- Planning studies are essential to identifying transmission needs and developing solutions.
- Rising level of DER penetration is expected to bring many new changes and challenges to planning studies.

New Challenges in Planning Studies

Impact on bulk power system planning

- Traditional critical conditions may need to be refined due to changed dispatch and flow patterns with DER penetration, and there may be additional critical conditions for various needs.
- Increased complexity and uncertainties in coincidental DER and load forecast, as each has its intra- or inter-seasonal fluctuations
- Uncertainties in future DER penetration level and location might require additional sensitivity planning scenarios to be studied
- Different approaches needed to incorporate DER in different types of studies
- Reliability issues that tend to occur with rising level of DER penetration (e.g., different flow pattern, lower inertia and primary frequency response, voltage profile, short circuit, etc.).

New Challenges in Planning Studies (continued)

- Single-phase installation of DER introduces further complexity
  - Positive sequence may not be sufficient to study the new scenarios and complexities to ensure a reliable system
- Enhancements of simulation tools and techniques may be needed to allow sufficient representation of DER in different types of studies while consistent among vendors
- Effectiveness of UFLS and UVLS programs need to be studied with consideration of DER impact

Scope and Objectives

- Under the broader scope of SPIDERWG, the primary focus of Studies sub-group is to develop guidelines and recommendations on the assumptions, approaches, and tool**s** for performing planning studies, considering the impact of aggregate DER behaviours on BPS.
- Coordination with other sub-groups will be required such as inputs on data and model requirements, simulation tool requirements, ride-through capabilities, etc..
- The outcomes are expected to help lead and support the industry forward on DER study approaches.

Reliability Guideline: Bulk Power System Planning under Increasing Penetration of Distributed Energy Resources

- Guideline providing recommendations and industry practices for performing planning studies considering the impacts of aggregate DER behavior.
  - Review and documentation of existing study approaches currently used by industry, development of findings and recommendations from these studies incorporating DER.
  - Guidelines on how to incorporate and represent DER in planning studies for potential reliability issues, such as selection of study scenarios with system gen/load conditions, and different approaches to incorporate DER in different types of studies.

Studies Sub-Group Draft Work Plan S1 (Continued)

- Guidelines on study assumptions and approaches considering single-phase installation of DER; consideration of co-simulation tools and techniques.
- Guidelines on types of reliability issues encountered with high DER penetration and potential solutions to these issues.

Studies Sub-Group Draft Work Plan S2

Review of TPL-001 Standard for Incorporation of DER

- Technical review of NERC TPL-001-5, and development of any recommendations pertaining to consideration and study of DER impacts to the BPS.

Studies Sub-Group Draft Work Plan S3

Recommended Simulation Improvements and Techniques

- Guidance to software vendors on tools enhancements for improved accounting and study of aggregate DER.

Studies Sub-Group Draft Work Plan S4

Reliability Guideline: Recommended Approaches for Developing UFLS and UVLS Programs with Increasing DER Penetration

- Guidance on how to study UFLS and UVLS programs and ensure their effectiveness with increasing penetration of DER represented.

White Paper: Beyond Positive Sequence RMS Simulations for High DER Penetration Conditions

- Considerations for high penetration DER systems and the need for more advanced tools (e.g., co-simulation tools) for studying DER impacts on the BPS.

Technical Presentations

- Incorporating DER into Planning Assessments,
  - Binaya Shrestha, CAISO
- DER Implications for the Transmission System
  - Jameson Thornton, PG&E

Questions and Answers