Impacts of DERs on the BPS

Lessons from NERC SPIDERWG

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Aggregate Impacts of Distribution-Connected Energy Resources
Continuing Trends in DERs

NERC-Wide Cumulative Distributed Solar PV Capacity

DER penetrations are growing.
Mostly solar PV. Batteries likely to follow.
DER penetrations are growing quickly and steadily.
The BPS is dealing with its own challenges regarding the rapid transition toward renewables.
Growing DERs = dropping net demand levels
Lowest net demand levels during off-peak conditions
Coincident with renewables
Will multisector electrification outpace installation of DERs?
It’s not just a California issue
Your forecast is definitely wrong (they always are).
And likely underestimated.
Growing DERs are shifting peak load hour. Affects modeling and studies. Information sharing is key.
These events all involved DER tripping caused by transmission-level fault events.
Overview

3.30. Our lower bound for total estimated distributed generation lost across the event is 1,300MW, and the loss could be as high as 1,500MW. There is a significant possibility that this volume is in excess of the transmission connected generation lost during the event. This underscores the changes that Great Britain’s electricity system is facing and the importance of understanding the role of distributed generation in the energy mix and the control of the electricity system. Our findings on the causes of the distributed generation losses also highlight the importance of compliance with the Distribution Code, and the need to strengthen and clarify the regulatory framework for these generators to meet current and future electricity system needs.

Significant DER tripping – frequency and ROCOF protection. Not expected or well-studied previously.
Implementation of 1547-2018 is paramount.
Transmission planners perform studies to ensure reliability of the BPS

- Include all models of applicable elements (and aggregate facilities)

Being able to represent the aggregate amount of DERs in a planning study is critically important as penetrations grow.

We have models that are able to do this.

This guideline explains how those models work.
• Transmission planners need information and data to be able to populate those models of future penetration levels.
  ▪ Aggregate capacity
  ▪ Aggregated location information
  ▪ Vintage of installation
    o Tripping possibility
    o Sensitivity analyses

• Data flow from distribution to transmission entities – aggregate information
Requirements Flow

- Distribution-Level Regulation
- Distribution Interconnection Requirements
- Facility Interconnection Requirements
- Data and Monitoring Requirements
- Distribution Interconnection Requirements
- System Operations and Market Requirements
- NERC Reliability Standards (SGIP, LGIP, etc.)
DER Data Flow

- Interconnection Information
- In-Service Date
- End-of-Service Date
- DER kW Capacity
- Vintage of IEEE 1547
- Aggregate DER Data
- Installed Capacity by T-D Transformer
- Aggregate vintage information
- Requirements driving performance
- T-D Measurement Points
- Utility-Scale DER Measurements

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Considerations for Increasing DERs

• Is the flow of DER information clear for your jurisdiction?
  ▪ Is effective T-D coordination taking place to facilitate information sharing?

• Leverage guidance from across industry on DER integration successes, modeling, studies, data collection, etc.

• Planning considerations
  ▪ Modeling aggregate DERs in transmission planning
  ▪ Developing base case assumptions for penetration levels
  ▪ Sensitivity analyses
  ▪ Dispatch assumptions for DERs and aggregators

• Data sharing across regional bodies

• Are you prepared for implications of third-party DER aggregators?
Questions and Answers

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