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NERC SPIDERWG: Addressing impacts of Distributed Generation

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RELIABILITY | RESILIENCE | SECURITY



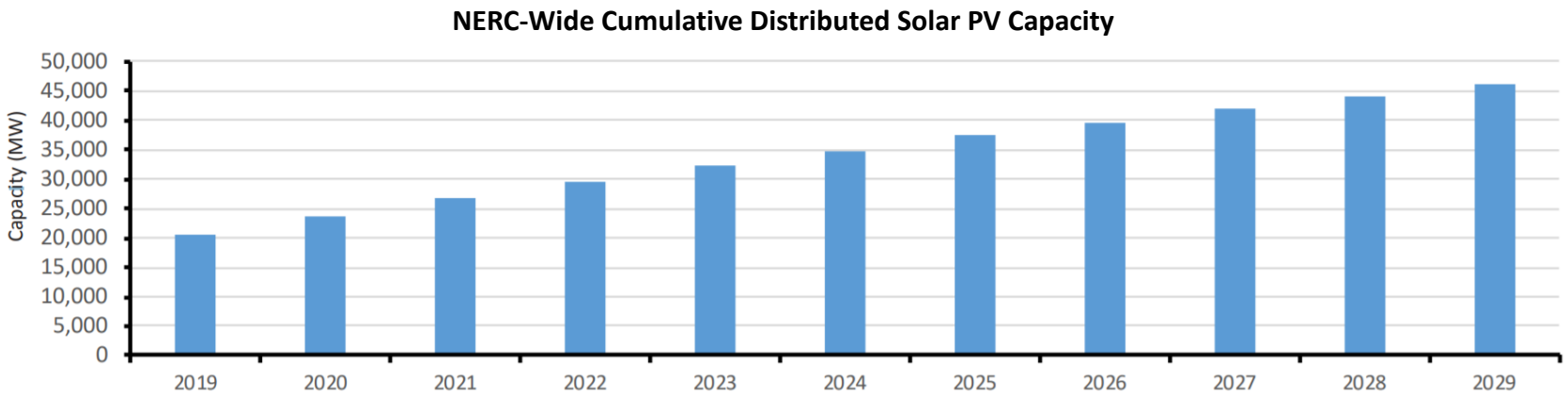

NERC System Planning Impacts of Distributed Energy Resources Working Group (SPIDERWG)

Aggregate Impacts of Distribution-Connected Energy Resources

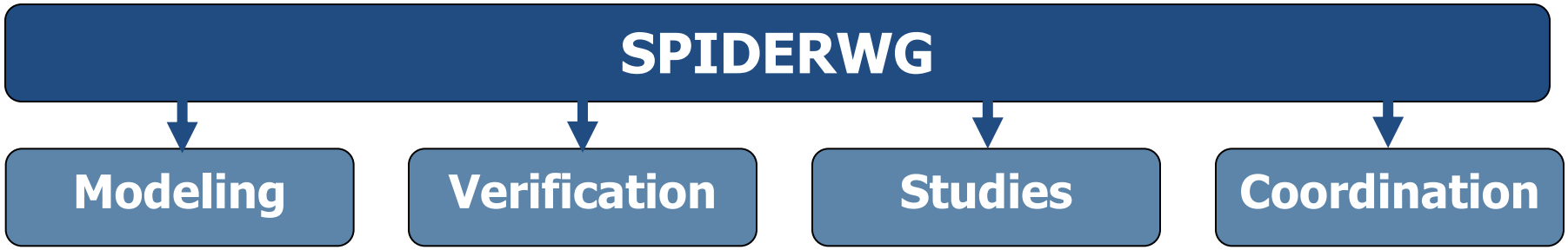


Continuing Trends in DERs

- Continued rapid growth of distributed solar PV
- Distributed energy storage entering market rapidly
- Public interest in DERs and microgrids for increased resilience
  - Example: hurricanes, heat storm, storms
- Green energy incentives
- Transportation electrification
- New market opportunities and regulations – e.g., FERC Order 2222



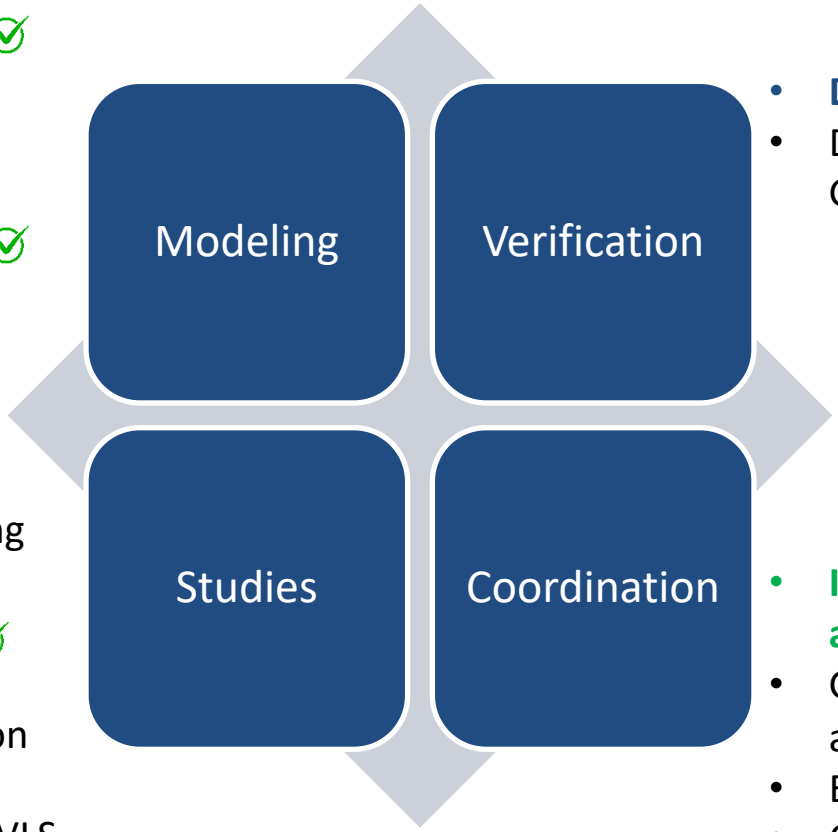
SPIDERWG Leadership Team



	MODELING	VERIFICATION	STUDIES	COORDINATION
Coordination	Kun Zhu, MISO (Chair) Bill Quaintance, Duke (Vice Chair) Ryan Quint, NERC (Coordinator) JP Skeath, NERC (Coordinator)			
Sub-Group Leads	Irina Green (CAISO) Vacant	Michael Lombardi (NPCC) Mike Tabrizi (DNV GL)	Mohab Elnashar (IESO) Pengwei Du (ERCOT)	Clayton Stice (ERCOT) Jimmy Zhang (AESO)

What Else is SPIDERWG Up To?

- DER Modeling Survey
- **DER_A Parameterization Guideline**
- **DER Data Collection Guideline**
- **MOD-032-1 Review/SAR**
- **Modeling Notification**



- **DER Verification Guideline**
- DER Forecasting Practices Guideline

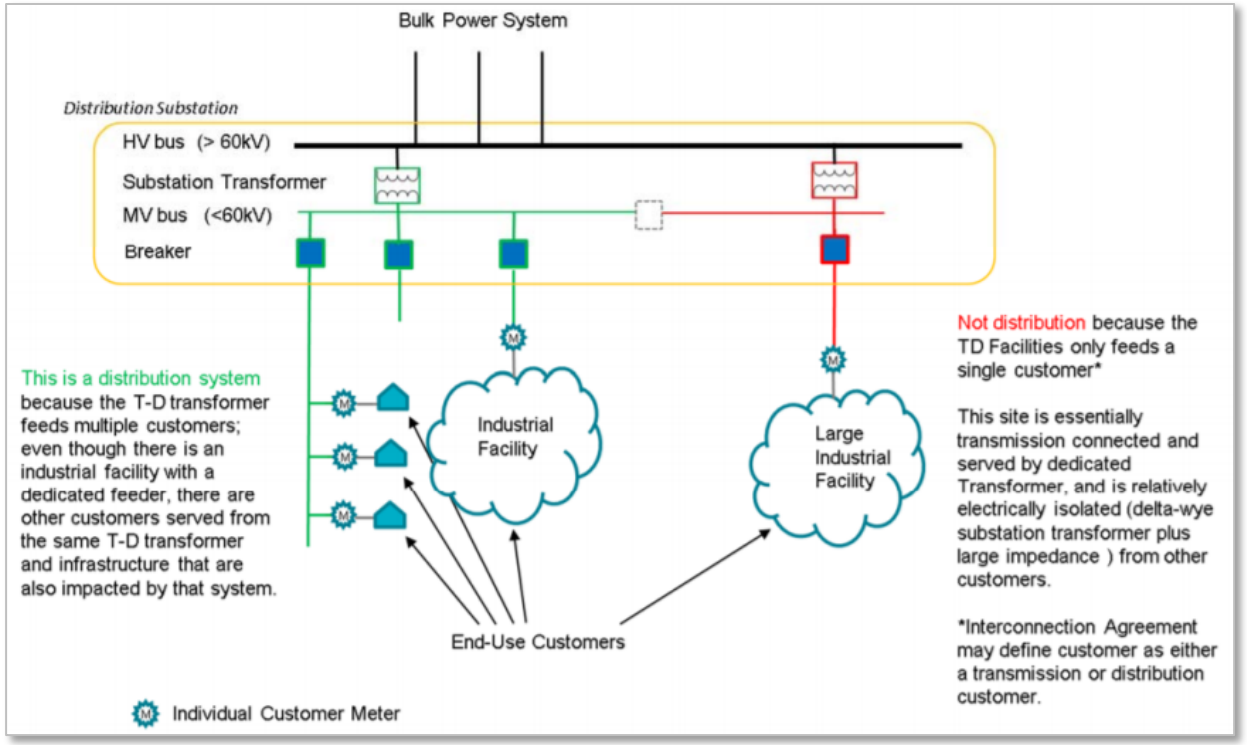
- Guideline on BPS Planning Practices with DER
- **White Paper: TPL-001 Standard Review**
- Recommended Simulation Improvements
- Guidance on UFLS and UVLS
- White Paper: Beyond Positive Sequence

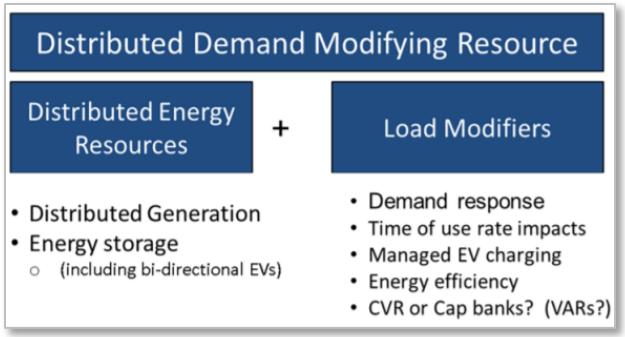
- **IEEE Std. 1547-2018 Review and BPS Recommendations**
- Guideline on Communicating across T-D Interface
- Education Materials
- Coordination of Terminology
- NERC Standards Review
- Tracking DER Growth

Building off of Existing NERC Guidelines and Reports

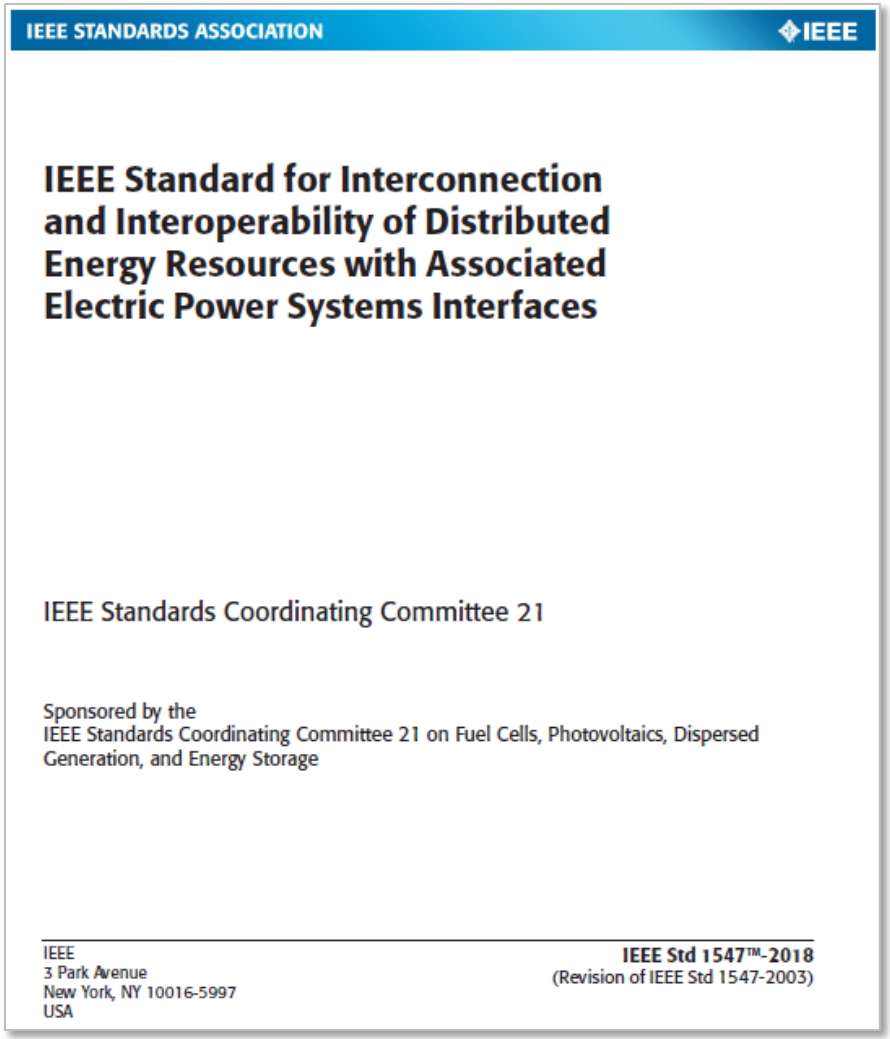
SPIDERWG Working Definition of DER

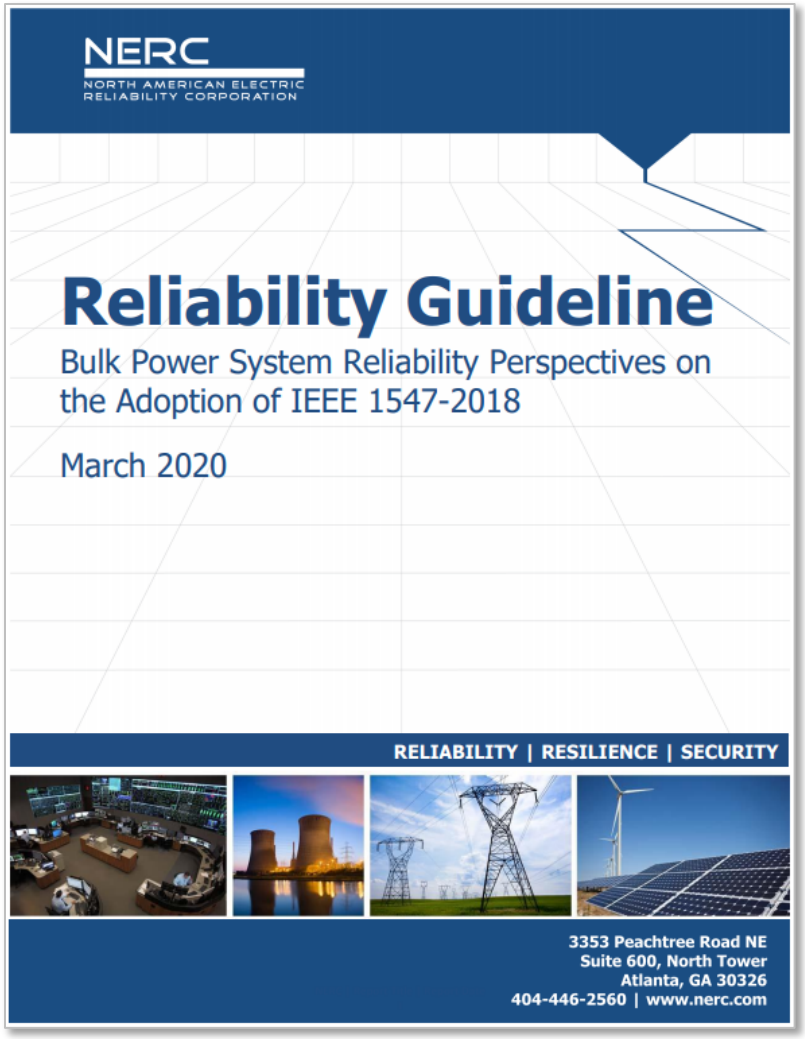
- **DER:** Any source of electric power located on the distribution system.





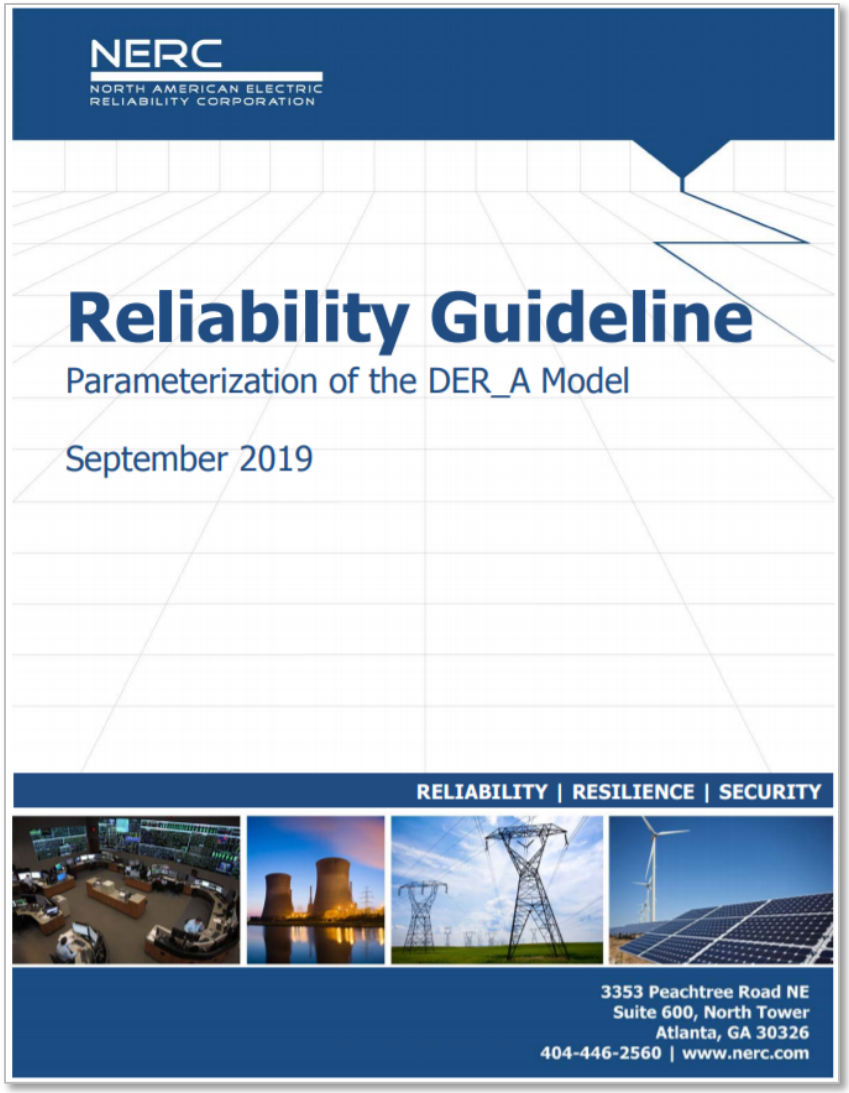
IEEE 1547-2018 and BPS Reliability Perspectives

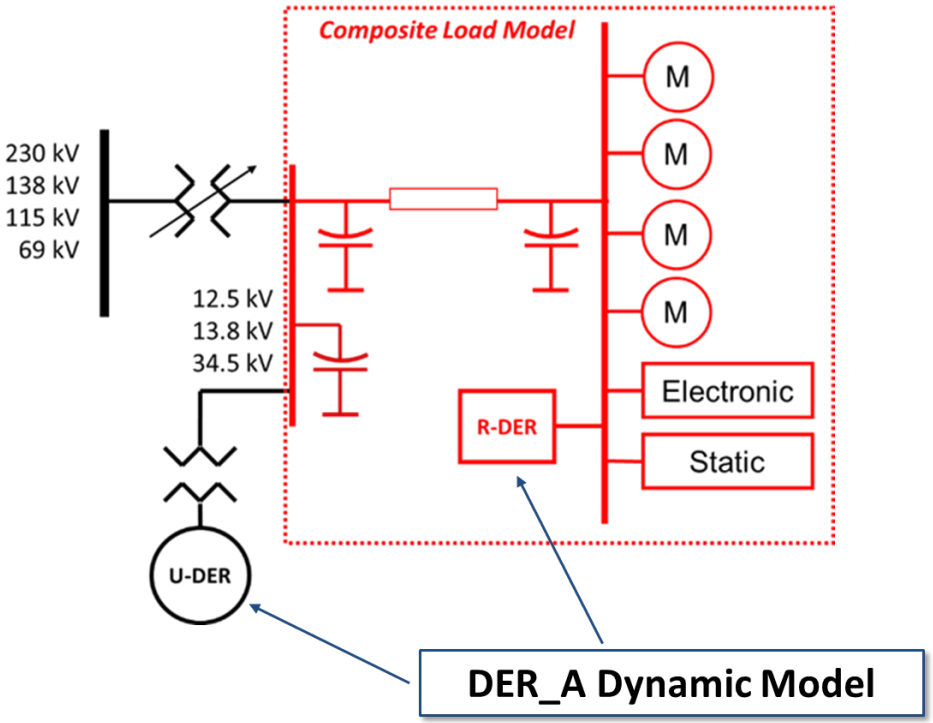




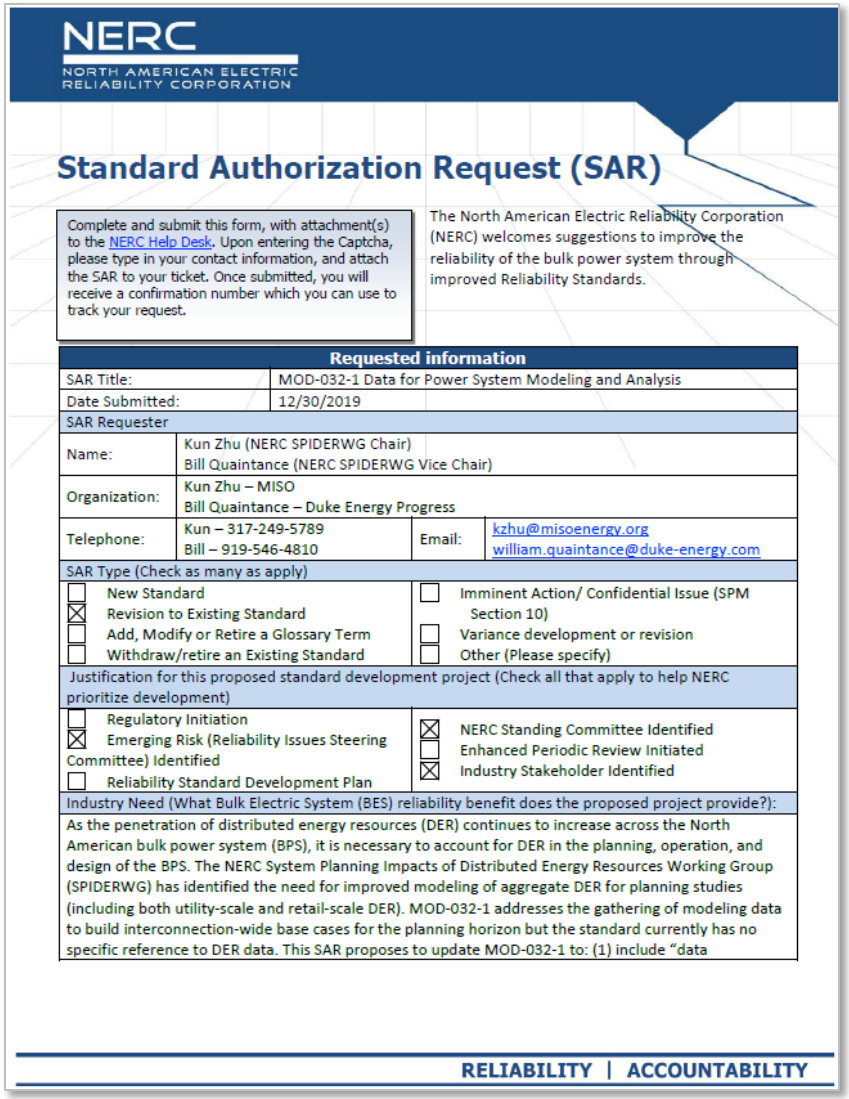
Source: IEEE SA

Reliability Guideline: Parameterization of the DER_A Model





SAR for Improvements to MOD-032-1 for Aggregate Modeling of DERs



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Standard Authorization Request (SAR)

Complete and submit this form, with attachment(s) to the NERC Help Desk. Upon entering the Captcha, please type in your contact information, and attach the SAR to your ticket. Once submitted, you will receive a confirmation number which you can use to track your request.

The North American Electric Reliability Corporation (NERC) welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards.

Requested information			
SAR Title:	MOD-032-1 Data for Power System Modeling and Analysis		
Date Submitted:	12/30/2019		
SAR Requester			
Name:	Kun Zhu (NERC SPIDERWG Chair) Bill Quaintance (NERC SPIDERWG Vice Chair)		
Organization:	Kun Zhu – MISO Bill Quaintance – Duke Energy Progress		
Telephone:	Kun – 317-249-5789 Bill – 919-546-4810	Email:	kzhu@misoenergy.org william.quaintance@duke-energy.com

SAR Type (Check as many as apply)

- ☐ New Standard
- ☒ Revision to Existing Standard
- ☐ Add, Modify or Retire a Glossary Term
- ☐ Withdraw/retire an Existing Standard
- ☐ Imminent Action/ Confidential Issue (SPM Section 10)
- ☐ Variance development or revision
- ☐ Other (Please specify)

Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)

- ☐ Regulatory Initiation
- ☒ Emerging Risk (Reliability Issues Steering Committee) Identified
- ☐ Reliability Standard Development Plan
- ☒ NERC Standing Committee Identified
- ☐ Enhanced Periodic Review Initiated
- ☒ Industry Stakeholder Identified

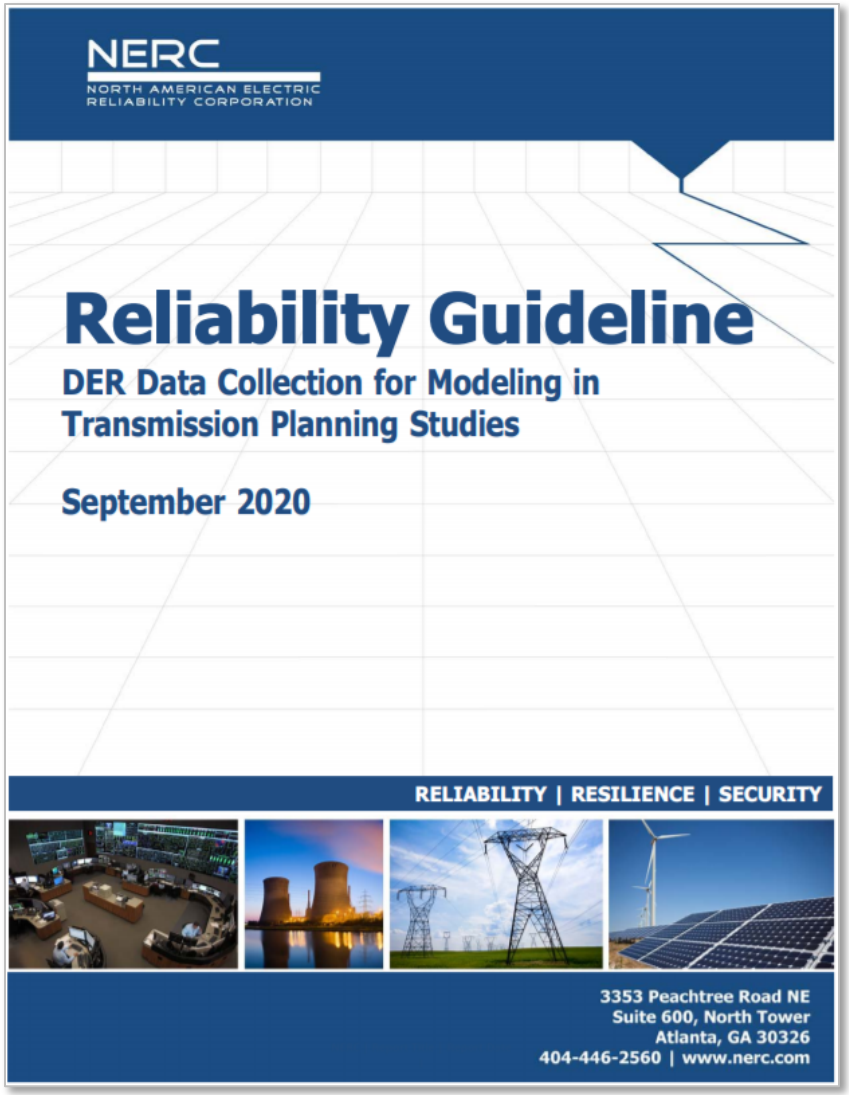
Industry Need (What Bulk Electric System (BES) reliability benefit does the proposed project provide?):

As the penetration of distributed energy resources (DER) continues to increase across the North American bulk power system (BPS), it is necessary to account for DER in the planning, operation, and design of the BPS. The NERC System Planning Impacts of Distributed Energy Resources Working Group (SPIDERWG) has identified the need for improved modeling of aggregate DER for planning studies (including both utility-scale and retail-scale DER). MOD-032-1 addresses the gathering of modeling data to build interconnection-wide base cases for the planning horizon but the standard currently has no specific reference to DER data. This SAR proposes to update MOD-032-1 to: (1) include "data

RELIABILITY | ACCOUNTABILITY

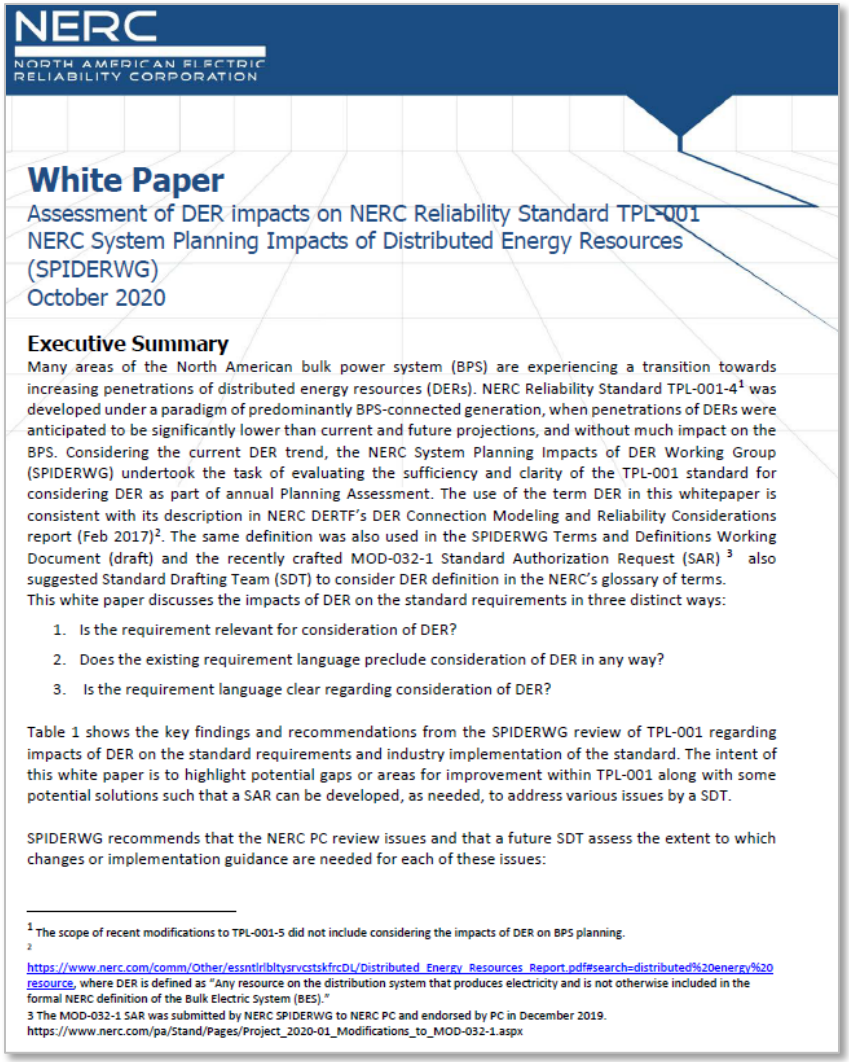
- Purpose:
  - Revise MOD-032-1 to address gaps in data collection for DERs in modeling and interconnection-wide case creation
- Scope:
  - Update Attachment 1 table
  - Consider Glossary definitions
  - Replace LSE with DP
  - Ensure no gaps with de-registration of LSE

Reliability Guideline: DER Data Collection for Modeling/Studies



- Data collection processes and modeling requirements per MOD-032
- Data collection recommendations for:
  - Steady-state power flow studies
  - Dynamics / stability studies
  - Short-circuit studies
  - Geomagnetic disturbance studies
  - Electromagnetic transient studies
- Considerations for DER energy storage

White Paper: Assessment of DER Impacts on NERC Standard TPL-001



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White Paper

Assessment of DER impacts on NERC Reliability Standard TPL-001
NERC System Planning Impacts of Distributed Energy Resources (SPIDERWG)
October 2020

Executive Summary

Many areas of the North American bulk power system (BPS) are experiencing a transition towards increasing penetrations of distributed energy resources (DERs). NERC Reliability Standard TPL-001-4[1] was developed under a paradigm of predominantly BPS-connected generation, when penetrations of DERs were anticipated to be significantly lower than current and future projections, and without much impact on the BPS. Considering the current DER trend, the NERC System Planning Impacts of DER Working Group (SPIDERWG) undertook the task of evaluating the sufficiency and clarity of the TPL-001 standard for considering DER as part of annual Planning Assessment. The use of the term DER in this whitepaper is consistent with its description in NERC DERTF's DER Connection Modeling and Reliability Considerations report (Feb 2017)[2]. The same definition was also used in the SPIDERWG Terms and Definitions Working Document (draft) and the recently crafted MOD-032-1 Standard Authorization Request (SAR) [3] also suggested Standard Drafting Team (SDT) to consider DER definition in the NERC's glossary of terms.
This white paper discusses the impacts of DER on the standard requirements in three distinct ways:

1. Is the requirement relevant for consideration of DER?
2. Does the existing requirement language preclude consideration of DER in any way?
3. Is the requirement language clear regarding consideration of DER?

Table 1 shows the key findings and recommendations from the SPIDERWG review of TPL-001 regarding impacts of DER on the standard requirements and industry implementation of the standard. The intent of this white paper is to highlight potential gaps or areas for improvement within TPL-001 along with some potential solutions such that a SAR can be developed, as needed, to address various issues by a SDT.

SPIDERWG recommends that the NERC PC review issues and that a future SDT assess the extent to which changes or implementation guidance are needed for each of these issues:

[1] The scope of recent modifications to TPL-001-5 did not include considering the impacts of DER on BPS planning.
[2] https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/Distributed_Energy_Resources_Report.pdf#search=distributed%20energy%20resource, where DER is defined as "Any resource on the distribution system that produces electricity and is not otherwise included in the formal NERC definition of the Bulk Electric System (BES)."
3 The MOD-032-1 SAR was submitted by NERC SPIDERWG to NERC PC and endorsed by PC in December 2019. https://www.nerc.com/pa/Stand/Pages/Project_2020-01_Modifications_to_MOD-032-1.aspx

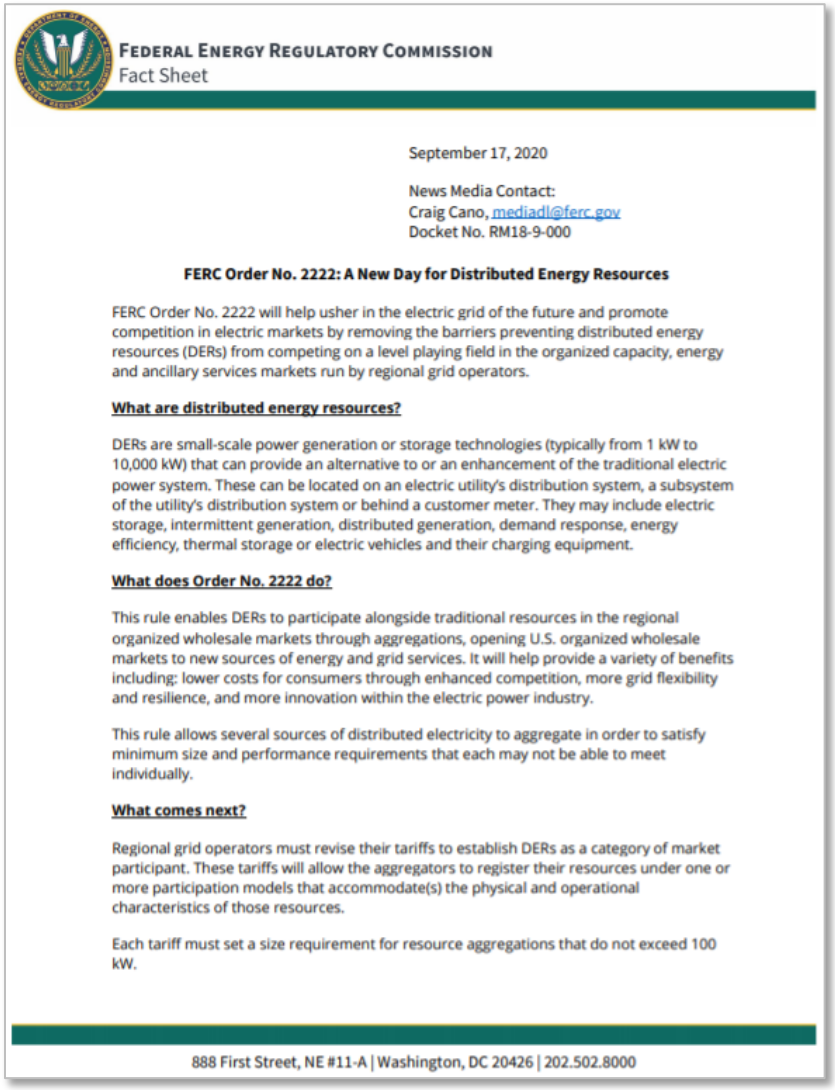
Recommends Standard Drafting Team assess topics including:

- Use of "System peak Load"
- Possible Glossary of Terms updates
- Dynamic behavior and tripping of DERs during BPS events
- Contingency considerations

SPIDERWG Standards Review Considering DER Growth

- SPIDERWG Coordination Sub-Group currently reviewing suite of (most) NERC Reliability Standards
- Focus on possible impacts that growing levels of DERs may have on standards applicability and effectiveness
- Planning for Q4 2021 completion of initial review
- Will go through NERC RSTC for commenting/feedback process
- Considering both overall comprehensive perspective of standards as well as individual requirements

BPS Reliability Considerations for FERC Order No. 2222



FEDERAL ENERGY REGULATORY COMMISSION
Fact Sheet

September 17, 2020

News Media Contact:
Craig Cano, mediadl@ferc.gov
Docket No. RM18-9-000

FERC Order No. 2222: A New Day for Distributed Energy Resources

FERC Order No. 2222 will help usher in the electric grid of the future and promote competition in electric markets by removing the barriers preventing distributed energy resources (DERs) from competing on a level playing field in the organized capacity, energy and ancillary services markets run by regional grid operators.

What are distributed energy resources?

DERs are small-scale power generation or storage technologies (typically from 1 kW to 10,000 kW) that can provide an alternative to or an enhancement of the traditional electric power system. These can be located on an electric utility's distribution system, a subsystem of the utility's distribution system or behind a customer meter. They may include electric storage, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage or electric vehicles and their charging equipment.

What does Order No. 2222 do?

This rule enables DERs to participate alongside traditional resources in the regional organized wholesale markets through aggregations, opening U.S. organized wholesale markets to new sources of energy and grid services. It will help provide a variety of benefits including: lower costs for consumers through enhanced competition, more grid flexibility and resilience, and more innovation within the electric power industry.

This rule allows several sources of distributed electricity to aggregate in order to satisfy minimum size and performance requirements that each may not be able to meet individually.

What comes next?

Regional grid operators must revise their tariffs to establish DERs as a category of market participant. These tariffs will allow the aggregators to register their resources under one or more participation models that accommodate(s) the physical and operational characteristics of those resources.

Each tariff must set a size requirement for resource aggregations that do not exceed 100 kW.

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- SPIDERWG identifying possible BPS reliability considerations as ISO/RTOs develop tariff revisions
  - Applicability and requirements for DER aggregators
  - Information and data requirements
  - Data exchange between aggregator, ISO/RTO, and distribution entities
  - Monitoring, operation, validation
  - Locational considerations
  - Modeling and study impacts and innovations needed
  - Coordination of all parties

Distributed Energy Storage

- Growing market of distributed energy storage technologies
- Opportunities with FERC Order No. 2222
- Reliability and resilience opportunities for the future
- Significant complexity w.r.t. planning and real-time operations considerations
  - Modeling
  - Study approaches
  - Data accounting
  - Assumption management
  - Operational flexibility use

Source: PV Magazine

Questions and Answers