

SPIDERWG Activities:

FERC Order No. 2222 and NERC Standards Review

Operating Committee

June 17, 2021

vermont electric power company

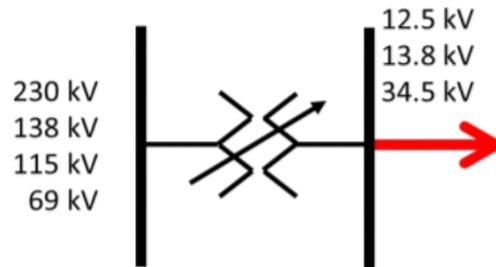


Agenda

1. SPIDERWG Scope
2. Whitepaper – FERC Order No. 2222 (01/19/2021)
3. Whitepaper – NERC Standards Review (03/19/2021)
4. Summary

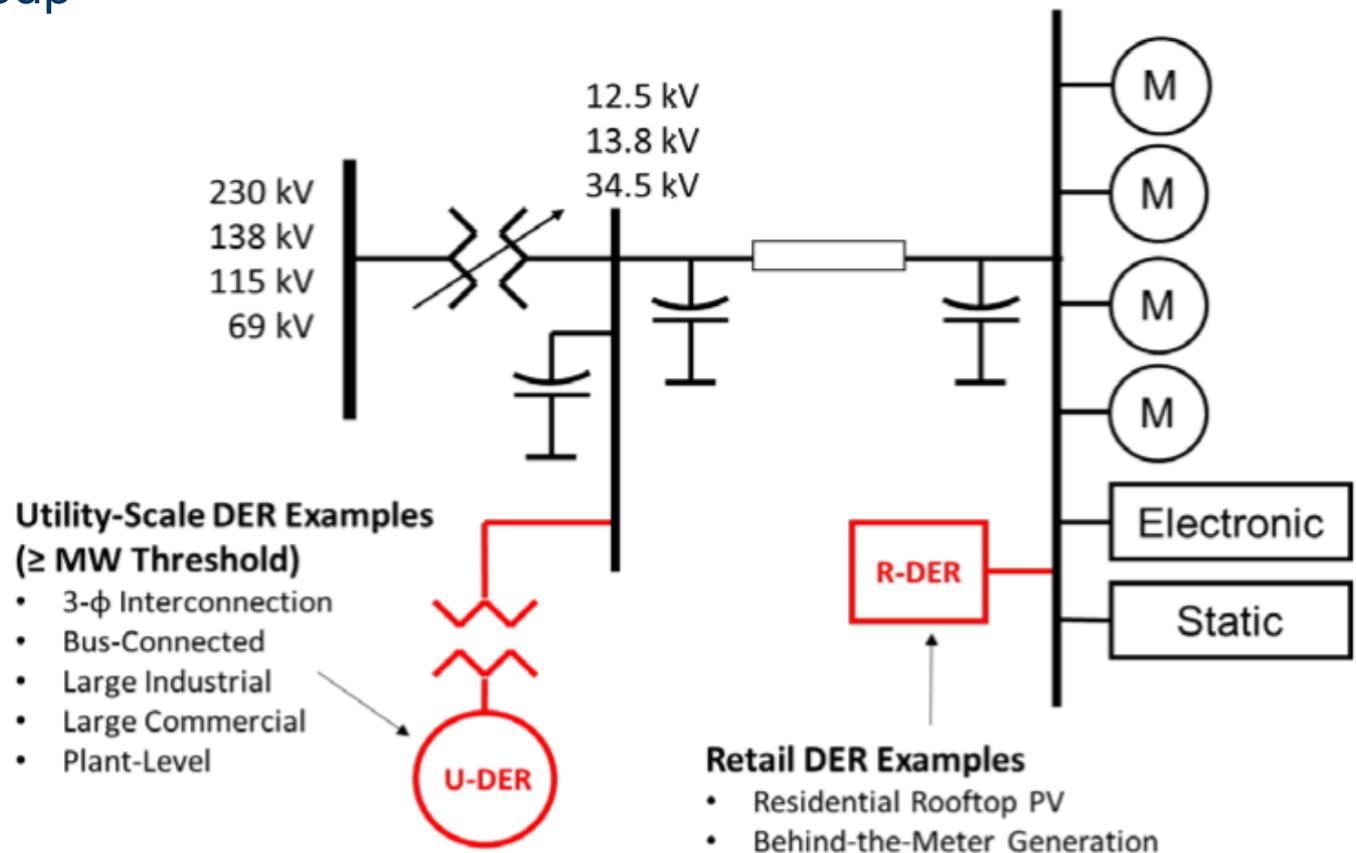
SPIDERWG Scope

System Planning Impacts from
Distributed Energy Resources
Working Group



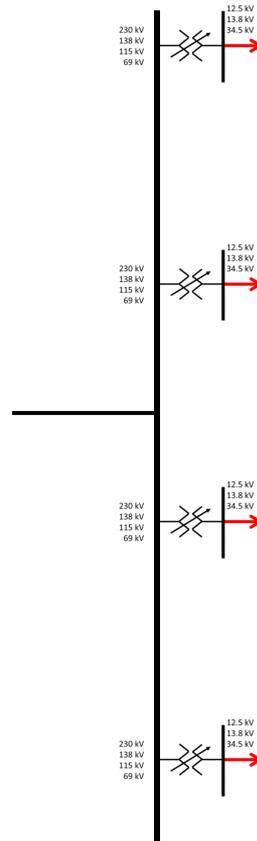
SPIDERWG Scope

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NERC stakeholder forum for focusing on DER from
transmission planning and **system analysis** perspectives.

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transmission planning and **system analysis** perspectives.



Whitepaper – FERC Order No. 2222 (01/19/21)

SPIDERWG's Purpose:

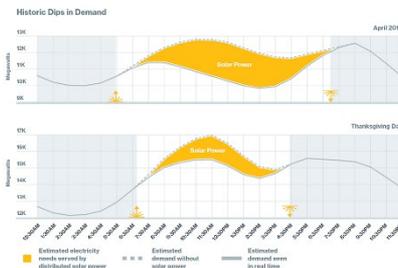
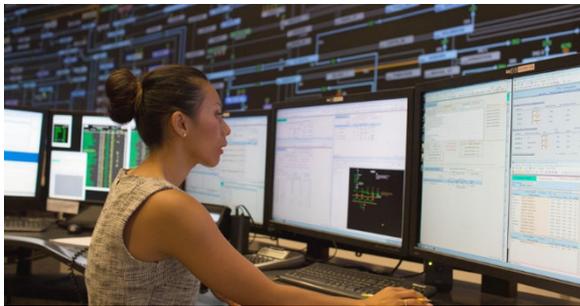
- Provide a bulk power system (BPS) reliability perspective on aspects of FERC Order No. 2222
- Discuss ways that FERC-jurisdictional RTOs/ISOs may consider leveraging SPIDERWG guidelines
- Highlight that all FERC-jurisdictional RTOs/ISOs are registered with NERC as Balancing Authorities, Planning Coordinators, and Reliability Coordinators

“...market-related activities can and will have an impact on BPS reliability, and vice versa.”

Whitepaper – FERC Order No. 2222 (01/19/21)

SPIDERWG's high-level questions for proposed tariff revisions:

- How will BPS **models and simulations** remain accurate as DER proliferate?
- How will the BPS **planning studies** appropriately reflect the behavior of DER?
- How will BPS **System Operating Limits (SOLs)** reflect pre- and post-contingency behavior of aggregate DER?

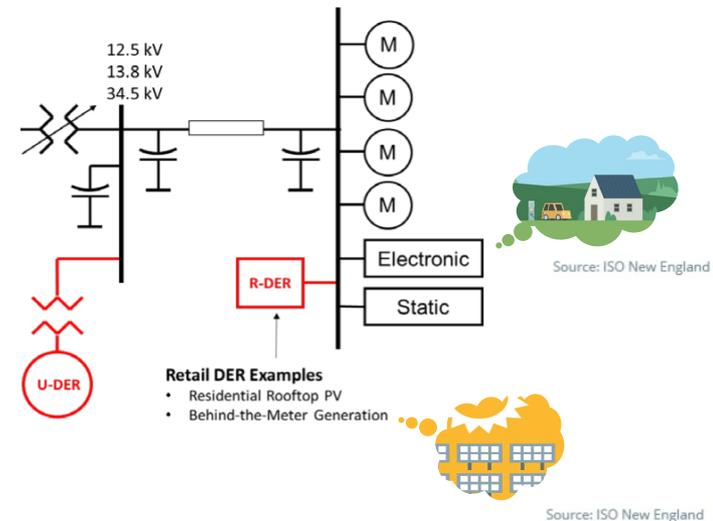


Source: ISO New England

Whitepaper – FERC Order No. 2222 (01/19/21)

Modeling – SPIDERWG’s Key Messages:

- View DER aggregators as a key source of data
- Consider that heterogeneous DER aggregations may include behavior of both residential DER (inverter) and electric vehicles (electronic load)
- Model DERs in aggregate at the BPS bus
- Leverage the list of **physical parameters** for modeling DERs in the Reliability Guideline: [DER Data Collection for Modeling in Transmission Planning Studies \(September 2020\)](#)



Whitepaper – FERC Order No. 2222 (01/19/21)

Verification – SPIDERWG’s Key Messages:

- Verify models of aggregate DER behavior with **metering and telemetry**
- Leverage the Reliability Guideline: [Model Verification of Aggregate DER Models used in Planning Studies \(March 2021\)](#)

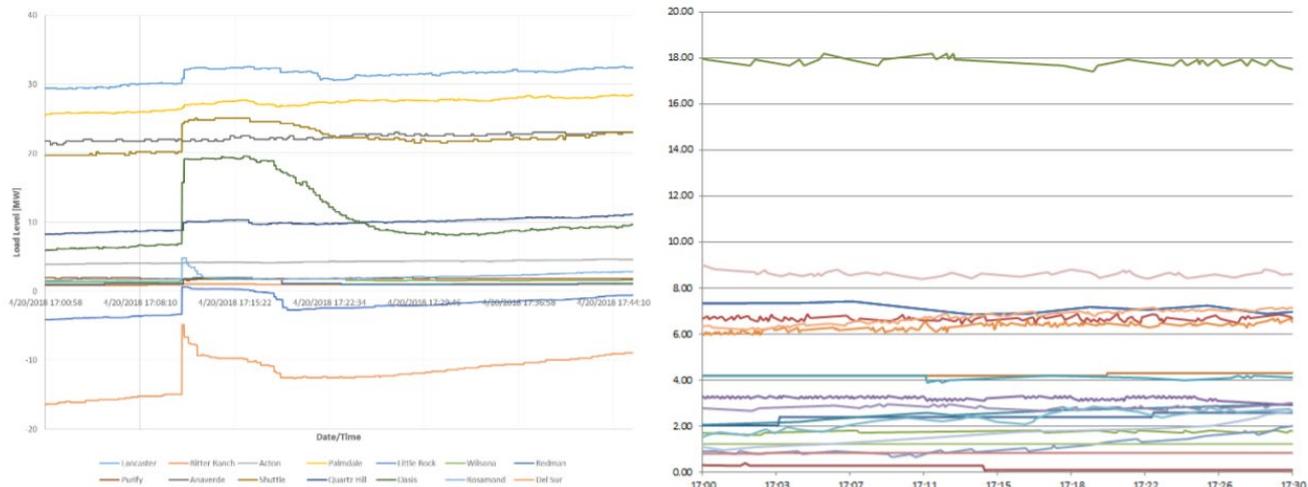


Figure 2.13: SCE (left) and PG&E (right) Individual Load SCADA Points

[April and May 2018 Fault Induced Solar Photovoltaic Resource Interruption Disturbances Report \(January 2019\)](#)

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Studies – SPIDERWG's Key Messages:

- Assess whether software used to represent the behavior of DER aggregators in reliability studies and production cost models is adequate
- Consider impacts to regional and inter-regional planning practices, e.g. for **automatic load shedding, manual load shedding, and system restoration**
- Leverage the Reliability Guideline: [Recommended Approaches for UFLS Program Design with Increasing Penetrations of DERs \(June 2021\)](#)

Appendix D: Impacts of DERs on ISO-NE UFLS Islanding Study

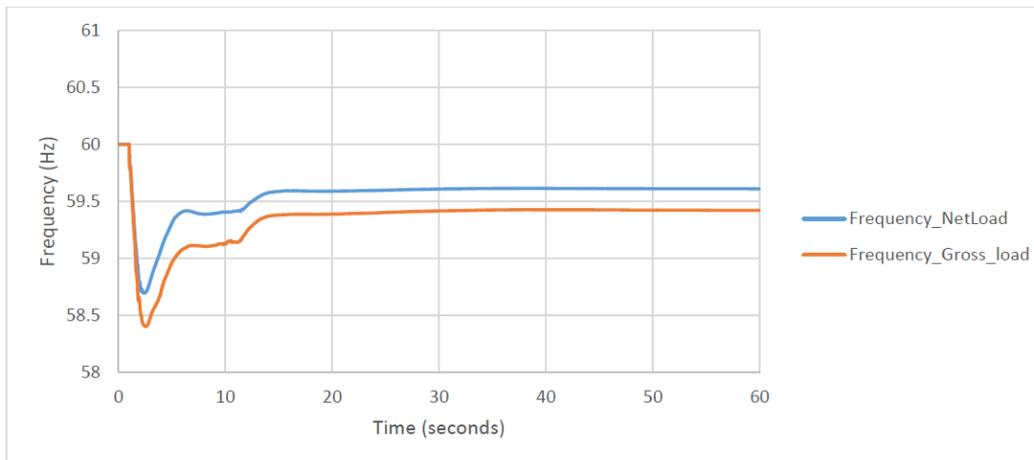


Figure D.7: Net Load versus Gross Load

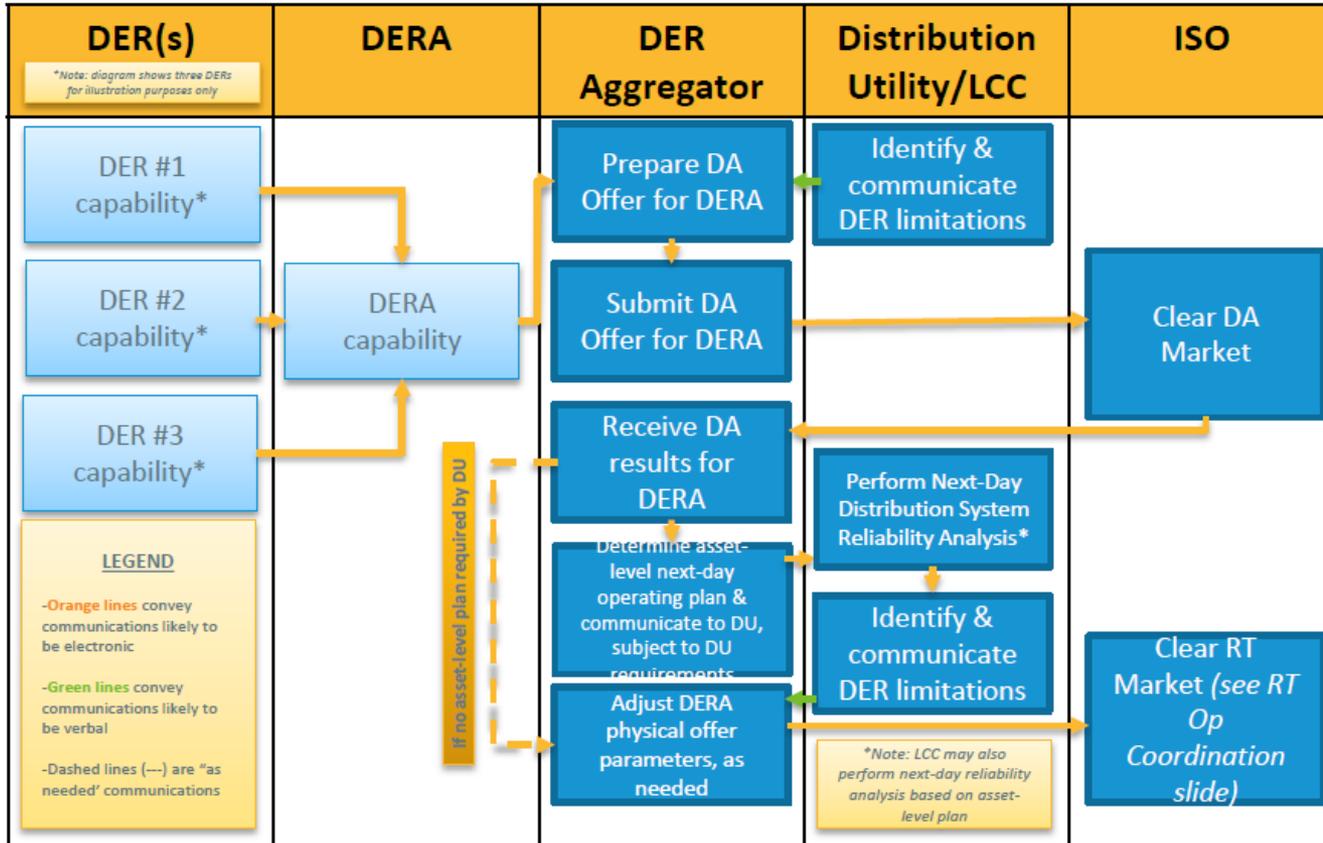
Whitepaper – FERC Order No. 2222 (01/19/21)

Coordination – SPIDERWG's Key Messages:

- Adopt market rules with coordination requirements necessary for reliably operating the bulk power system
- Focus on **real-time data exchange**, expected performance into future operating conditions (for studies), and data quality/exchange protocols (similar for Generator Operators)
- Consider developing **performance requirements** for DER aggregators to earn the confidence of System Operators

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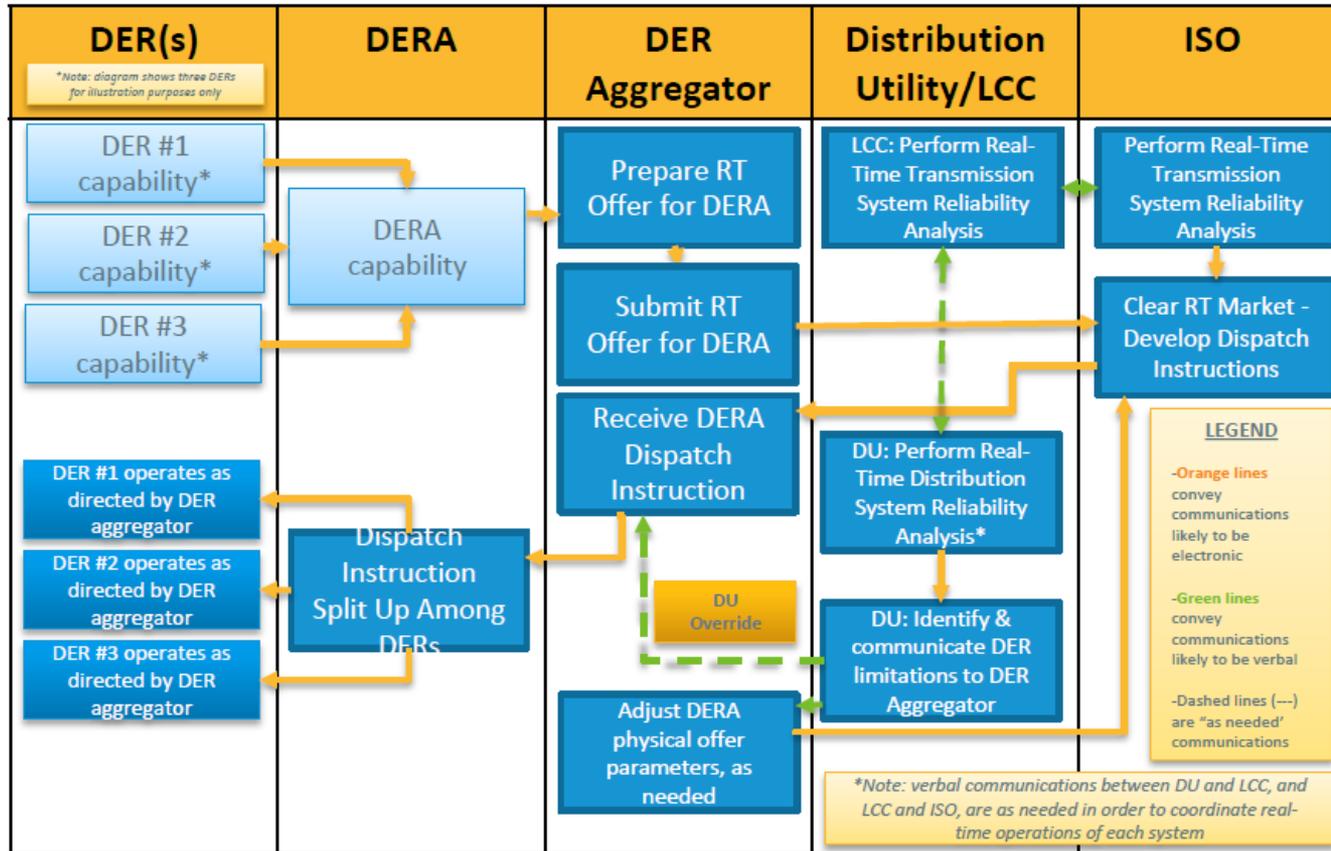
Example – ISO-NE Day-Ahead Operational Coordination (05/13/2021 Draft)



NERC Standards do not apply to DER(s) and DER Aggregators

Whitepaper – FERC Order No. 2222 (01/19/21)

Example – ISO-NE Real-Time Operational Coordination (05/13/2021 Draft)

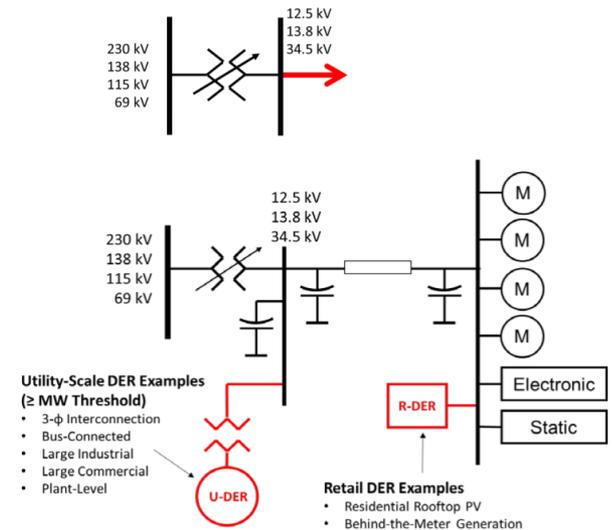


NERC Standards do not apply to DER(s) and DER Aggregators

Whitepaper – NERC Standards Review (03/19/2021)



- Methods: All NERC Standards (with the exception of CIP, COM, NUC, and PER Standards) were reviewed
 - Example: If the standard uses the terms "Load" or "Demand", are these terms still clear with the consideration of DERs...?
 - Example: Will the increasing penetration of DERs require entities to change the methods they use to implement the standard requirements?
- Total of fifty (50) contributors from across North America
- Disclaimer: “DER aggregators, DER management systems (DERMS), and other concepts introduced in FERC Order No. 2222 introduce additional considerations that need to be further analyzed by industry....”



Whitepaper – NERC Standards Review (03/19/2021)

“The SPIDERWG recommends that Standards Authorization Requests (SARs) be developed to address each of the issues identified...”



Table ES.1: Standards Needing Revisions

| Standard | High-Level Description of Outcome | Priority |
|------------------------------|---|----------|
| BAL-003-1.1* | Revise to address counting of DERs consistently in the standard. | Low |
| PRC-006-3* | R3 of PRC-006-3 does not specify whether net or gross load is required for UFLS studies. | Low |
| TOP-001-4 | Revise the OPA and RTA definitions to explicitly enumerate aggregate DER or non-BES generation output levels | Low |
| TOP-002-4 | Revise the OPA definition to explicitly enumerate aggregate DER or non-BES generation output levels | Low |
| TOP-003-3 | Revise the OPA and RTA definitions to explicitly enumerate aggregate DER or non-BES generation output levels. | Low |
| TOP-010-1(i) | Revise the RTA definition to explicitly enumerate aggregate DER or non-BES generation output levels. | Low |

Note: * indicates that this standard also had a review outcome of Reliability Guideline

Whitepaper – NERC Standards Review (03/19/2021)

“The SPIDERWG recommends that Standards Authorization Requests (SARs) be developed to address each of the issues identified...”



Table ES.1: Standards Needing Revisions

| Standard | High-Level Description of Outcome | Priority |
|-----------------------------|--|----------|
| EOP-005-3 * | It was suggested that a requirement of telemetry from the DER/DP be established. | Medium |

*Note: * indicates that this standard also had a review outcome of Reliability Guideline*

Whitepaper – NERC Standards Review (03/19/2021)

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Table ES.1: Standards Needing Revisions

| Standard | High-Level Description of Outcome | Priority |
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| EOP-004-4* | Require reporting of the loss of aggregate DER to NERC with defined threshold. | High |
| FAC-001-3 | Revise to have DP included in the “Applicability” section. | High |
| FAC-002-2 | Revisions requiring the study of material modifications to electricity end-user Facilities made by DER aggregations. | High |
| MOD-031-2 | Revise language such as when the Planning Coordinator determines a need to obtain DER information from Distribution Providers or Transmission Planners that it be provided. Allow for the Transmission Planners to be an intermediary to provide data from DPs to the PC. | High |

Note: * indicates that this standard also had a review outcome of Reliability Guideline

Summary

- SPIDERWG Reliability Guidelines are available to RTOs/ISOs as references for developing tariff revisions in compliance with FERC Order No. 2222
- SPIDERWG recommends that RTOs/ISOs adopt market rules with coordination requirements necessary for reliably operating the bulk power system
- The impacts of grid transformation on the bulk power system are already resulting in proposals to revise Reliability Standards

Thank you!

Questions?

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Appendix – Definitions

FERC Order No. 2222 Terminology ≠ NERC Defined Terms:

- **Distributed energy resource:** “any resource located on the distribution system, any subsystem thereof or behind a customer meter.”
 - DER may include, but are not limited to “resources that are in front of and behind the customer meter, electric storage resources, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment.”
- **Distributed energy resource aggregator:** “the entity that aggregates one or more distributed energy resources for purposes of participation in the capacity, energy and/or ancillary service markets of the regional transmission organizations and/or independent system operators.”
- Note: neither term has been defined for NERC Reliability Standards, and SPIDERWG’s preferred definition of DER excludes flexible load and demand response: “Any Source of Electric Power located on the Distribution System”