

1 SUMMARY

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3 EXECUTIVE SUMMARY, WRITE THIS LAST

4

5 The advanced inverter working group prepared this proposal for adoption of the most current IEEE 1547
6 standard and its associated equipment certification standards. The proposal was developed during Phase II
7 of the New Mexico PRC Interconnection stakeholder engagement efforts in 2022.

8

9 Summarize key points of each recommendation, perhaps in a table.

10

11 RECOMMENDATIONS

12

13 **RECOMMENDATION 1. Content recommended for Rule and content recommended for TIRs**

14 INSERT HERE

15 **RECOMMENDATION 2. Categories, Functions and Settings**

16 This three-part proposal addresses the definitions, activations and settings of the autonomous functions
17 required by IEEE 1547-2018 and its amendment 1547a-2020. A recommendation regarding the categories
18 for performance, specific functionalities, and settings are included, as these determinations are critical for
19 implementation of the IEEE 1547 requirements. Technical details of the proposal are included in Annex X
20 and background information is provided in Annex Y.¹ The proposal is intended to ensure that DER systems
21 shall be capable of actively regulating voltage, shall ride-through abnormal voltage/frequency, and are able
22 provide the greatest degree of grid support possible. In addition, this proposal provides an interconnection
23 framework that accommodates the largest amount of Distributed Energy Resources (DER) penetration while
24 preserving electric system reliability and safety. Finally, the proposal aims to make advanced inverter
25 settings transparent to all interested parties.

26 **Part 1 – Category Determination:** Rotating equipment-based systems (both induction and synchronous)
27 must meet Category A requirements for normal performance and Category I requirements for abnormal
28 performance. Inverter-based systems must meet Category B requirements for normal performance and
29 Category III requirements for abnormal performance.

30 **Part 2 – Function Activation:** Inverter and rotating equipment functions shall be activated according to the
31 table below. Note that the term “disabled” means that an advanced inverter is likely to have this capability,
32 but this function is initially disabled to comply with New Mexico interconnection requirements.

33

34 The recommendation for voltage regulation is to enable volt-var as the reactive power function and volt-
35 watt as the active power function. This combination of functions provides active adjustment of the DER as
36 conditions change on the circuit, thus allowing for better voltage regulation as DER penetration increases
37 over time. In addition, implementation of these two voltage regulation functions avoids the need to study
38 and determine a static control setting, thus possibly simplifying the interconnection application review
39 process. Selection of an alternative voltage regulation strategy, if warranted by a System Impact Study, may

¹ Additional background and context regarding adoption of IEEE 1547-2018 is available from the Interstate Renewable Energy Council. See *“Making the Grid Smarter, Primer on Adopting the New IEEE 1547™-2018 Standard for Distributed Energy Resources,”* January 2019.

40 be documented as by a system operator, submitted as a variance for commission approval, and if approved,
41 reflected in an operator's published interconnection requirements.

42 Default activation status may be modified

Function	Default Activation and Purpose
Reactive Power Functions. Only one of the four options below can be activated:	Voltage regulation
Voltage-Reactive Power Control (volt-var)	Enabled for Categories A & B. Modulates reactive power in relation to measured grid voltage.
Constant Power Factor	Disabled. No voltage support is realized when this function is enabled with its default setting.
Active Power-Reactive Power Control (watt-var)	Disabled. Modulates reactive power in relation to active power output (and absorption of active power for systems that can store energy). Watt-var does not respond directly to voltage and as such, in this mode, the DER might be injecting or absorbing reactive power when it is not needed.
Constant Reactive Power Control	Disabled. Does not allow reactive power to adjust as power output from DER fluctuates.
Active Power Function	Voltage regulation
Voltage-Active Power Control (volt-watt)	Enabled for Category B. Reduces active power to reduce voltage (normally only once voltage is outside of the normal range)
Voltage and Frequency Disturbance Functions	Supports bulk system stability and maximizes grid support from DERS
Voltage Disturbance Ride-Through and Trips	Required for both inverter-based & rotating DER systems
Frequency Disturbance Ride-Through and Trips	Required for both inverter-based & rotating DER systems
Enter Service Functions	Avoids abnormal voltages
Enter Service	Enabled
Enter Service Ramp Rate or Randomized Start Time, depending on system size	Enabled
Anti-Islanding Function	Avoids unintentional islanding
Anti-Islanding	Enabled

43
44 **Part 3 –Settings:** Default settings for the functions outlined in the table above are to be based on IEEE 1547-
45 2018 (as amended in IEEE 1547a-2020). Allowed settings also include site-specific settings as determined by
46 System Impact Study and documented in the Interconnection Agreement (assuming these are available for
47 inspection by the PRC).

48

49 RECOMMENDATION 3. Communications Protocols

50 INSERT HERE, to be developed in July

51

52 [ANNEX A – Working Group Process Description and Participants List](#)

53

54 Number of meetings, Feb-Sept, 2022, number of individuals, number of organizations, types of
55 organizations.

56

57 [ANNEX B – Technical Details](#)

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59 INSERT HERE

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61 [ANNEX C – Suggested Topics for Utility Technical Interconnection and Interoperability
62 Requirements Documents](#)

63 INSERT HERE

64 Detailed settings info.

65 RPA content from IREC, received June 28, 2022.

66 Query working group members for this topic.

67

68 [ANNEX C - BACKGROUND](#)

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70 Interconnection of distributed energy resources into New Mexico’s electricity system is guided by many
71 laws, statutes, rules, and technical standards. One of these standards is IEEE Std 1547™. This standard for
72 interconnection and interoperability of distributed energy resources with associated electric power systems
73 interfaces, as amended by IEEE 1547a-2020, including use of IEEE 1547.1-2020 testing protocols to establish
74 conformity is substantially updated from IEEE 1547-2003, the standard referenced in New Mexico’s current
75 interconnection rule and manual.

76

77 **The Final Report of the New Mexico Interconnection Rules: Report and Recommendations, October 15,**
78 **2021, in 20-00171-UT, page 45-46, included the following language:**

79

80 Capability for the following three grid support functions provided by IEEE 1547-2018 shall be required for all
81 DER installed after December 31st, 2022.

82 1. Shall be capable of actively regulating voltage.

83 2. Shall be capable of frequency response. Frequency response is the capability to modulate power
84 output as a function of frequency. Mandatory capability for Categories II and III under high-
85 frequency conditions, mandatory for Categories II and III under low-frequency conditions, optional
86 for Category I.

87 3. Shall ride-through abnormal voltage/frequency.

88 In addition, capability for a fourth grid support function shall be optional:

89 4. May provide inertial response. Inertial response is the capability for DERs to modulate active
90 power in proportion to the rate of change of frequency.

91

92 While capabilities for functions (1) and (2) are mandatory, their utilization is at the discretion of the Area
93 Electric Power System (EPS) Operator.

94
95 For function (3), when determining ride-through requirements, the Area EPS Operator shall specify which of
96 abnormal operating performance Category I, Category II, or Category III performance is required. This may
97 be subject to regulatory requirements that are outside the scope of this standard and may consider DER
98 type, application purpose, future regional DER penetration, and the Area EPS characteristics.

99
100 The Area EPS Operator shall notify the DER owner of the need to modify ride-through settings. The request
101 for setting modification shall not exceed one per year.

102
103 Not specified as part of this proposal, but still needing determination are:
104 Ride-through settings for abnormal voltage/frequency and frequency response
105 Settings for active voltage regulation

106
107 **The NOPR under case 21-00266-UT, which replaced case 20-00171-UT, includes this language:**

108
109 17.9.568.11 IEEE 1547-2018 ADOPTION
110 A. Capability for the following three grid support functions provided by IEEE 1547-2018 shall be required for
111 all DER installed after March 28, 2023.
112 (1) Shall be capable of actively regulating voltage.
113 (2) Shall be capable of frequency response. Frequency response is the capability to modulate power
114 output as a function of frequency.
115 (3) Shall ride-through abnormal voltage/frequency.
116 (4) In addition, capability for a fourth grid support function shall be optional: may provide inertial
117 response. Inertial response is the capability for DERs to modulate active power in proportion to the
118 rate of change of frequency.
119 D. While capabilities for functions one and two are mandatory, their utilization is at the discretion of the
120 area electric utility. For function three, when determining ride-through requirements, the utility shall specify
121 which of abnormal operating performance is required. This may be subject to regulatory requirements that
122 are outside the scope of this standard and may consider DER type, application purpose, future regional DER
123 penetration, and the area characteristics.
124 E. The utility shall notify the DER owner of the need to modify ride-through settings. The request for setting
125 modification shall not exceed one per year.
126 F. Existing inverters are not required to conform to the standards adopted above in Subsection A., but upon
127 replacement due to end-of-life-cycle or other reasons, must be replaced with advanced inverters. G.
128 Replacement of existing inverters with those that conform to the standards adopted above in subsection A.
129 will not be considered a major modification of operations, so long as the total output of the generating
130 facility, or its export limits as previously approved remain unchanged.
131 [17.9.568.11 NMAC – Rp, 17.9.568.11 NMAC, xx/xx/2022]

132
133 **INSERT FINAL LANGUAGE from decision on 21-00266-UT, when available, and perhaps delete the previous**
134 **two sections.**

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