

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

2.6.2 Frequency Ride-Through Requirements for Generation Resources ~~Generators~~ and Energy Storage Resources

- (1) Except for Generation Resources and Energy Storage Resources (ESRs) subject to Sections 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs) or 2.6.2.12, Frequency Ride-Through Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs), if under-frequency relays are installed and activated to trip the Generation Resource or ESR, these relays shall be set perform such that the automatic removal of individual Generation ~~the~~ Resources or Energy Storage Resources (ESRs) from the ERCOT System meets or exceeds the following requirements:

Frequency Range	Delay to Trip
Above 59.4 Hz	No automatic tripping (C continuous operation)
Above 58.4 Hz up to <u>a</u> And including 59.4 Hz	Not less than 9 minutes
Above 58.0 Hz up to <u>a</u> And including 58.4 Hz	Not less than 30 seconds
Above 57.5 Hz up to <u>a</u> And including 58.0 Hz	Not less than 2 seconds
57.5 Hz or below	No time delay required

- (2) Except for Generation Resources subject to Sections 2.6.2.1 or 2.6.2.2, if over-frequency relays are installed and activated to trip the unit Resource, then the Resource ~~they~~ shall be set perform such that the automatic removal of the ~~individual~~ Generation Resources or ESRs from the ERCOT System meets or exceeds the following requirements:

Frequency Range	Delay to Trip
Below 60.6 Hz down to and including 60 Hz	No automatic tripping (c continuous operation)
Below 61.6 Hz down to and including 60.6 Hz	Not less than 9 minutes
Below 61.8 Hz down to and including 61.6 Hz	Not less than 30 seconds
61.8 Hz or above	No time delay required

- (3) If frequency protection schemes are installed and activated to trip a Generation Resource or ESR, they shall use filtered quantities or add sufficient time delays to prevent misoperations while providing the desired equipment protection. Protection schemes shall not trip a Generation Resource or ESR based on an instantaneous frequency

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

~~measurement. This Operating Guide is not intended to conflict with the plant operator's responsibility to protect Generation Resources and ESRs from potentially damaging operating conditions.~~

- (4) ~~This Section shall not affect the Resource Entity's responsibility to protect Generation Resources or ESRs from damaging operating conditions. The Resource Entity for a Generation Resource or ESR subject to paragraphs (1) and (2) above that is unable to remain reliably connected to the ERCOT System as set forth in paragraphs (1) and (2), shall provide to ERCOT the reason(s) for the Resource's limitation, including available study results or manufacturer recommendations, and the Resource's frequency ride-through capability in the format shown in the tables in paragraphs (1) and (2) above. The Resource Entity that owns Generation Resources that are unable to comply shall provide to ERCOT an explanation of the limitations including, but not limited to, study results or manufacturer's advice.~~

2.6.2.1 Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs)

- (1) ~~This Section applies to all IBRs and Type 1 and Type 2 Wind-powered Generation Resources (WGRs) interconnected to the ERCOT Transmission Grid. Such Resources shall ride through the frequency conditions at the Resource's Point of Interconnection Bus (POIB) specified in the following table:~~

<u>Frequency (f) in (Hz)</u>	<u>Minimum Ride-Through Time (seconds)</u>
<u>f > 61.8</u>	<u>May ride-through or trip</u>
<u>61.6 < f ≤ 61.8</u>	<u>299</u>
<u>61.2 < f ≤ 61.6</u>	<u>540</u>
<u>58.8 ≤ f ≤ 61.2</u>	<u>continuous</u>
<u>58.4 ≤ f < 58.8</u>	<u>540</u>
<u>57.0 ≤ f < 58.4</u>	<u>299</u>
<u>f < 57.0</u>	<u>May ride-through or trip</u>

- (2) ~~Nothing in paragraph (1) above shall be interpreted to require an IBR or Type 1 WGR or Type 2 WGR to trip for frequency conditions beyond those for which ride-through is required.~~
- (3) ~~If protection systems (including, but not limited to protection for over-/under-frequency, rate-of-change-of-frequency, anti-islanding, and phase angle jump) are installed and activated to trip the IBR or Type 1 WGR or Type 2 WGR, they shall enable the Resource to ride through frequency conditions beyond those defined in paragraph (1) above to the maximum extent equipment allows.~~

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (4) An IBR or Type 1 WGR or Type 2 WGR shall inject electric current when required to ride-through frequency conditions.
- (5) Plant controls or inverter controls of an IBR or Type 1 WGR or Type 2 WGR shall not disconnect the Resource from the ERCOT System or reduce the Resource’s output during frequency conditions where ride-through is required unless necessary for providing appropriate frequency response.
- (6) The Resource Entity or IE of an IBR or Type 1 WGR or Type 2 WGR with a Standard Generation Interconnection Agreement (SGIA) executed prior to June 1, 2024, shall ensure the Resource’s frequency ride-through capability is set to the maximum level the equipment allows to meet or exceed the requirements of paragraphs (1) through (5) above as soon as practicable with all available and known commercially reasonable upgrades as set forth in Section 2.11, Commercially Reasonable Efforts.
- (7) If an IBR or Type 1 WGR or Type 2 WGR with an SGIA executed prior to June 1, 2024 cannot comply with paragraphs (1) through (5) above by December 31, 2025, the Resource Entity or IE shall, by February 1, 2025 (or later as part of the interconnection process for any project not approved to energize as of February 1, 2025), request an exemption as set forth in Section 2.12, Ride-Through Reporting Requirements.
- (8) If an IBR or Type 1 WGR or Type 2 WGR fails to perform in accordance with the applicable frequency ride-through requirements the Resource Entity shall take actions described in Section 2.14, Actions Following an Apparent Failure to Ride-Through.

2.6.2.1.1 Temporary Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs)

- (1) This Section applies to IBRs and Type 1 and Type 2 WGRs with an SGIA executed prior to June 1, 2024 that have not implemented modifications to satisfy paragraphs (1) through (5) of Section 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs).
- (2) Such Resources shall ride through the frequency conditions at the POIB specified in the following table:

<u>Frequency Range</u>	<u>Delay to Trip</u>
<u>61.8 Hz or above</u>	<u>No time delay required</u>
<u>Below 61.8 Hz down to and including 61.6 Hz</u>	<u>Not less than 30 seconds</u>

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

<u>Below 61.6 Hz down to and including 60.6 Hz</u>	<u>Not less than 9 minutes</u>
<u>Above 59.4 Hz up to 60.6 Hz</u>	<u>No automatic tripping (continuous operation)</u>
<u>Above 58.4 Hz up to and including 59.4 Hz</u>	<u>Not less than 9 minutes</u>
<u>Above 58.0 Hz up to and including 58.4 Hz</u>	<u>Not less than 30 seconds</u>
<u>Above 57.5 Hz up to and including 58.0 Hz</u>	<u>Not less than 2 seconds</u>
<u>57.5 Hz or below</u>	<u>No time delay required</u>

- (3) This Section shall not affect the Resource Entity’s responsibility to protect equipment from damaging operating conditions. The Resource Entity for an IBR or Type 1 WGR or Type 2 WGR subject to paragraph (2) above that is unable to remain reliably connected to the ERCOT System as set forth in paragraph (2), shall provide to ERCOT the reason(s) for the Resource’s limitation, including available study results and equipment manufacturer recommendations, and the Resource’s frequency ride-through capability in the format shown in the table in paragraph (2) above.

2.6.2.12 Frequency Ride-Through Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs)

- (1) For any short-circuit fault or open-phase condition that occurs on the circuit to which the DGR or DESR is connected, the DGR or DESR will cease to energize and trip offline, and this will take priority over the frequency ride-through function.
- (2) DGRs and DESRs must have over-/under-frequency relays set to ride through frequency conditions as specified in the following table:

Frequency (Hz)	Ride-Through Mode	Minimum Ride-through Time (seconds)
$f > 61.8$	No ride-through requirements	
$61.2 < f \leq 61.8$	Mandatory Operation	299
$58.8 \leq f \leq 61.2$	Continuous Operation	continuous
$57.0 \leq f < 58.8$	Mandatory Operation	299
$f < 57.0$	No ride-through requirements	

- (3) Any Resource Entity with a DGR or DESR utilizing inverter-based generation that achieved Initial Synchronization before April 1, 2020 that is not capable of complying with the requirements of paragraph (2) above may request an exemption from those requirements. Such a request shall be submitted by November 2, 2020 and shall include documentation that demonstrates the DGR’s or DESR’s frequency ride-through capability to ERCOT’s satisfaction. If, after reviewing the request and documentation,

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

ERCOT determines the DGR or DESR is not capable of complying with the requirements of paragraph (2), then the DGR or DESR shall be exempt from those requirements, but shall be required to comply with those requirements to the greatest degree possible within its capability, as determined in writing by ERCOT. Upon replacement or retirement of the inverter, the DGR or DESR shall no longer be exempt and shall at that time be required to comply with the requirements of paragraph (2) or other applicable requirement.

(4) Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals, does not apply to exemptions to frequency ride-through requirements for DGRs and DESRs.

2.9 Voltage Ride-Through Requirements for Generation Resources and Energy Storage Resources

- (1) Except for Generation Resources and Energy Storage Resources (ESRs) subject to Sections 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs)~~Intermittent Renewable Resources and Energy Storage Resources~~ Connected to the ERCOT Transmission Grid, and/or 2.9.2, Voltage Ride-Through Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs), each Generation Resource and/or Energy Storage Resource (ESR) ~~must be designed, and its voltage relays must be set, to remain reliably~~ connected to the ERCOT Transmission system~~Grid~~ during the following ~~operating conditions~~:
 - (a) Generator or inverter terminal voltages are within 5% of the rated design voltage and volts per hertz are less than 105% of generator rated design voltage and frequency;
 - (b) Generator or inverter terminal voltage deviations exceed 5% but are within 10% of the rated design voltage and persist for less than ten seconds;
 - (c) Generator or inverter volts per hertz conditions are less than 116% of rated design voltage and frequency and last for less than 1.5 seconds; and
 - (d) A transmission system fault (three-phase, single-phase or phase-to-phase), but not a unit bus fault, is cleared by the protection scheme coordinated between the Resource Entity and the Transmission Service Provider (TSP) on any line connected to the Resource's Point of Interconnection (POI), provided such lines are not connected to induction generators described in paragraph (12) of Protocol Section 3.15, Voltage Support.
- (2) In the case of a unit bus fault or a primary transmission system relay failure, the unit protective relaying may clear the unit independent of the operation of any transmission protective relaying.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

(3) During operating conditions listed in paragraph (1) above, each Generation Resource ~~and/or~~ ESR subject to paragraph (1) shall not, during and following a transient voltage disturbance, cease providing real or reactive ~~power~~current except to the extent needed to provide frequency support or aid in voltage recovery. Each ESR, if it is consuming active power from the ERCOT System when operating in the charging mode, shall reduce or cease power consumption as necessary to aid in voltage recovery during and following transient voltage disturbances.

(4) Synchronous Generation Resources required to provide Voltage Support Service (VSS) shall have and maintain the following capability:

(a) Over-excitation limiters shall be provided and coordinated with the thermal capability of the generator field winding and protective relays in order to permit short-term reactive capability that allows at least 80% of the unit design standard (ANSI C50.13-1989), as follows:

Time (seconds)	10	30	60	120
Field Voltage %	208	146	125	112

After allowing temporary field current overload, the limiter shall operate through the automatic AC voltage regulator to reduce field current to the continuous rating. Return to normal AC voltage regulation after current reduction shall be automatic. The over-excitation limiter shall be coordinated with the over-excitation protection so ~~that~~ over-excitation protection ~~only~~ operates only for failure of the voltage regulator/limiter.

(b) Under-excitation limiters shall be provided and coordinated with loss-of-field protection to eliminate unnecessary generating unit disconnection as a result of operator error or equipment malfunction.

(5) Generation Resources and ESRs shall have protective relaying necessary to protect ~~their~~ equipment from abnormal conditions ~~and as well as to~~ be consistent with protective relaying criteria described in Section 6.2.6.3.4, Generation and Energy Storage Resource Protection and Relay Requirements.

(6) The voltage ride-through requirements, including Section 2.9.1, do not apply to faults ~~that occur~~ at or behind the Point of Interconnection (POI), ~~or~~ when clearing the fault effectively disconnects the Generation Resource from the ERCOT System.

(7) A Generation Resource or ESR may be tripped Off-Line or curtailed after the fault clearing period if part of an approved Remedial Action Scheme (RAS).

(8) The Resource Entity of each Generation Resource or ESR shall provide to ERCOT technical documentation of voltage ride-through capability upon request.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

2.9.1 Voltage Ride-Through Requirements for *Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-powered Generation Resources (WGRs) Intermittent Renewable Resources and Energy Storage Resources Connected to the ERCOT Transmission Grid*

(1) All Inverter-Based Resources (IBRs) and Type 1 Wind-powered Generation Resources (WGRs) and Type 2 WGRs interconnected to the ERCOT Transmission Grid shall comply with voltage ride-through requirements as follows:

(a) Section 2.9.1.1, Preferred Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) shall apply to:

(i) An IBR with a Standard Generation Interconnection Agreement (SGIA) executed on or after June 1, 2024.

(ii) An IBR that implement any modification, as described in paragraph (1)(c) of Planning Guide Section 5.2.1, Applicability, for which upgrades or facilities under a Generator Interconnection or Modification (GIM) was initiated on or after June 1, 2024 unless the modification was fully implemented prior to January 1, 2028.

(b) Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs), shall apply to IBRs not subject to Section 2.9.1.1, and Type 1 WGRs and Type 2 WGRs.

(2) An IBR with an SGIA executed on or after June 1, 2024 or that implements a modification, as described in paragraph (1)(c) of Planning Guide Section 5.2.1 for which a GIM was initiated on or after June 1, 2024, shall meet or exceed the capability and performance requirements in the following sections of Institute of Electrical and Electronics Engineers (IEEE) 2800-2022, Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems “IEEE 2800-2022 standard”, including any intra-standard cross references or definitions, unless otherwise clarified, modified, or exempted in the Protocols, these Operating Guides, or the Planning Guide:

(a) Section 5, Reactive power-voltage control requirements within the continuous operation region;

(b) Section 7, Response to TS abnormal conditions; and

(c) Section 9, Protection.

(3) All IBR plant requirements and all IBR unit requirements described in the IEEE 2800-2022 standard apply at the Point of Interconnection Bus (POIB) and the individual IBR

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

unit terminal, respectively, unless otherwise clarified, modified, or exempted in the Protocols these Operating Guides, or the Planning Guide.

- (4) An IBR, Type 1 WGR or Type 2 WGR with an original SGIA executed before June 1, 2024, that implements modifications complying with Section 2.9.1.2 prior to January 1, 2028, is not required to meet or exceed the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022. Any IBR modifications implemented on after January 1, 2028 do not qualify for this exception.
- (5) If a Type 3 WGR with an original SGIA executed before June 1, 2024, cannot fully meet Table 11 of the IEEE 2800-2022 standard and implements a modification as described in paragraph (1)(c) of Planning Guide Section 5.2.1, for which upgrades to equipment or facilities under a GIM are completed, the Resource Entity may request an exemption from meeting the voltage ride-through requirements in Table 11 of the IEEE 2800-2022 standard consistent with Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals.
- (6) If an IBR with an SGIA executed on or after June 1, 2024, cannot meet or exceed the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022 standard by its synchronization date, the Resource Entity or IE may request a temporary extension to meet or exceed the capability and performance requirements in sections 5, 7, and 9 of the IEEE 2800-2022 standard by submitting an extension request as described by Section 2.13.. During any temporary extension, the Resource Entity or IE shall maximize its ride-through capability within its known equipment limitations as soon as practicable. Any temporary extensions shall be minimized and not extend beyond December 31, 2028 or 24 months after the Commercial Operations Date, whichever is earlier.
- (7) An IBR with an SGIA executed on or after June 1, 2024 with a Commercial Operations Date prior to January 1, 2026 may request an exemption from meeting the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022 standard if the Resource Entity or IE submits an exemption request as described by Section 2.13. ERCOT will not grant an exemption as described by this paragraph that substantially lowers the frequency or voltage ride-through requirements below those in effect on June 1, 2024.
- (8) Type 1 and Type 2 WGRs are not required to meet or exceed the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022 standard but must meet or exceed the capability and performance requirements in Section 2.9.1.2 unless an extension or exemption applies under this Section or Section 2.13.
- (9) The addition of co-located Load as a modification, as described in paragraph (1)(c) of Planning Guide Section 5.2.1, for which a GIM was initiated, shall not trigger a change in ride-through requirements so long as the IBR or Type 1 WGR or Type 2 WGR has an original SGIA executed prior to June 1, 2024 unless the converters, inverters, supplemental dynamic reactive devices, or any other equipment that alters frequency or

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

voltage ride-through capability are materially modified or replaced to meet any reliability requirements because of the co-located Load, in which case the Resource Entity shall continue to be subject to Section 2.9.1.2.

- (1) — ~~All Intermittent Renewable Resources (IRRs) and ESRs that interconnect to the ERCOT Transmission Grid shall also comply with the requirements of this Section, except as follows:~~
 - (a) — ~~An IRR that interconnects to the ERCOT Transmission Grid pursuant to a Standard Generation Interconnection Agreement (SGIA) (i) executed on or before January 16, 2014 and (ii) under which the IRR provided all required financial security to the TSP on or before January 16, 2014, is not required to meet any high voltage ride-through requirement greater than 1.1 per unit voltage unless the interconnected IRR includes one or more turbines that differ from the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014. Notwithstanding the foregoing, if the Resource Entity that owns or operates an IRR that was interconnected pursuant to an SGIA executed before January 16, 2014, under which the IRR provided all required financial security to the TSP on or before January 16, 2014, demonstrates to ERCOT's satisfaction that the high voltage ride-through capability of the IRR is not lower than the capability of the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014 that IRR is not required to meet the high voltage ride-through requirement in this Section.~~
 - (b) — ~~An IRR that interconnects to the ERCOT System pursuant to an SGIA executed prior to November 1, 2008 is not required to meet voltage ride-through requirements presented in this Section. However, any Wind-powered Generation Resource (WGR) that is installed on or after November 1, 2008 and that initially synchronizes with the ERCOT System, pursuant to an SGIA (i) executed on or before January 16, 2014, and (ii) under which the IRR provided all required financial security to the TSP on or before January 16, 2014 (except for an IRR installed pursuant to an SGIA executed before November 1, 2008) shall be voltage ride-through capable in accordance with the low voltage ride-through requirements in this Section and high voltage requirements in this Section up to 1.1 per unit voltage unless the interconnected IRR includes one or more turbines that differ from the turbine model(s) described in the SGIA (including any attachment thereto), as that agreement existed on January 16, 2014 in which case the IRR shall also be required to comply with the high voltage ride-through requirements of this Section, subject to the exemption described in paragraph (a), above.~~
 - (c) — ~~An IRR that is not technically capable of complying with a 1.2 per unit voltage high voltage ride-through requirement and that is not subject to either of the exemptions described in paragraphs (a) or (b), above, is not required to meet any~~

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

~~high voltage ride-through requirement greater than 1.1 per unit voltage until January 16, 2016.~~

- ~~(d) Notwithstanding any of the foregoing provisions, an IRR's voltage ride-through capability shall not be reduced over time.~~
- ~~(2) Each IRR or ESR shall provide technical documentation of voltage ride-through capability to ERCOT upon request.~~
- ~~(3) Each IRR or ESR is required to set its voltage relays to remain in service for at least 0.15 seconds during all transmission faults and to allow the system to recover as illustrated in Figure 1, Default Voltage Ride Through Boundaries for IRRs and ESRs Connected to the ERCOT Transmission Grid, below. Recovery time to 90% of per unit voltage should be within 1.75 seconds. Faults on individual phases with delayed clearing (zone 2) may result in phase voltages outside this boundary but if the phase voltages remain inside this boundary, then Resource voltage relays are required to be set to remain connected and recover as illustrated in Figure 1.~~
- ~~(4) Each IRR or ESR shall remain interconnected during three phase faults on the ERCOT System for a voltage level as low as zero volts with a duration of 0.15 seconds as measured at the Point of Interconnection Bus (POIB) unless a shorter clearing time requirement for a three phase fault specific to the POIB is determined by and documented by the TSP in conjunction with the SGIA. The clearing time requirement shall not exceed nine cycles.~~
- ~~(5) Each IRR or ESR shall set its voltage relays to remain interconnected to the ERCOT System during the following high voltage conditions, as illustrated in Figure 1: any per-unit voltage equal to or greater than 1.175 but less than 1.2 for up to 0.2 seconds, any per-unit voltage equal to or greater than 1.15 but less than 1.175 per unit voltage for up to 0.5 seconds, and any per-unit voltage equal to or greater than 1.1 but less than 1.15 for up to 1.0 seconds. The indicated voltages are measured at the POIB.~~
- ~~(6) An IRR or ESR may be tripped Off-Line or curtailed after the fault clearing period if this action is part of an approved Remedial Action Scheme (RAS).~~
- ~~(7) Voltage ride-through requirements may be met by the performance of the Resource; by installing additional reactive equipment behind the POI; or by a combination of Resource performance and additional equipment behind the POI. Voltage ride-through requirements may be met by equipment outside the POI if documented in the SGIA.~~
- ~~(8) If an IRR or ESR fails to comply with the clearing time or recovery voltage ride-through requirement, then the Resource Entity and the interconnecting TSP shall be required to investigate and report to ERCOT on the cause of the Resource's trip, identifying a reasonable mitigation plan and timeline.~~

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

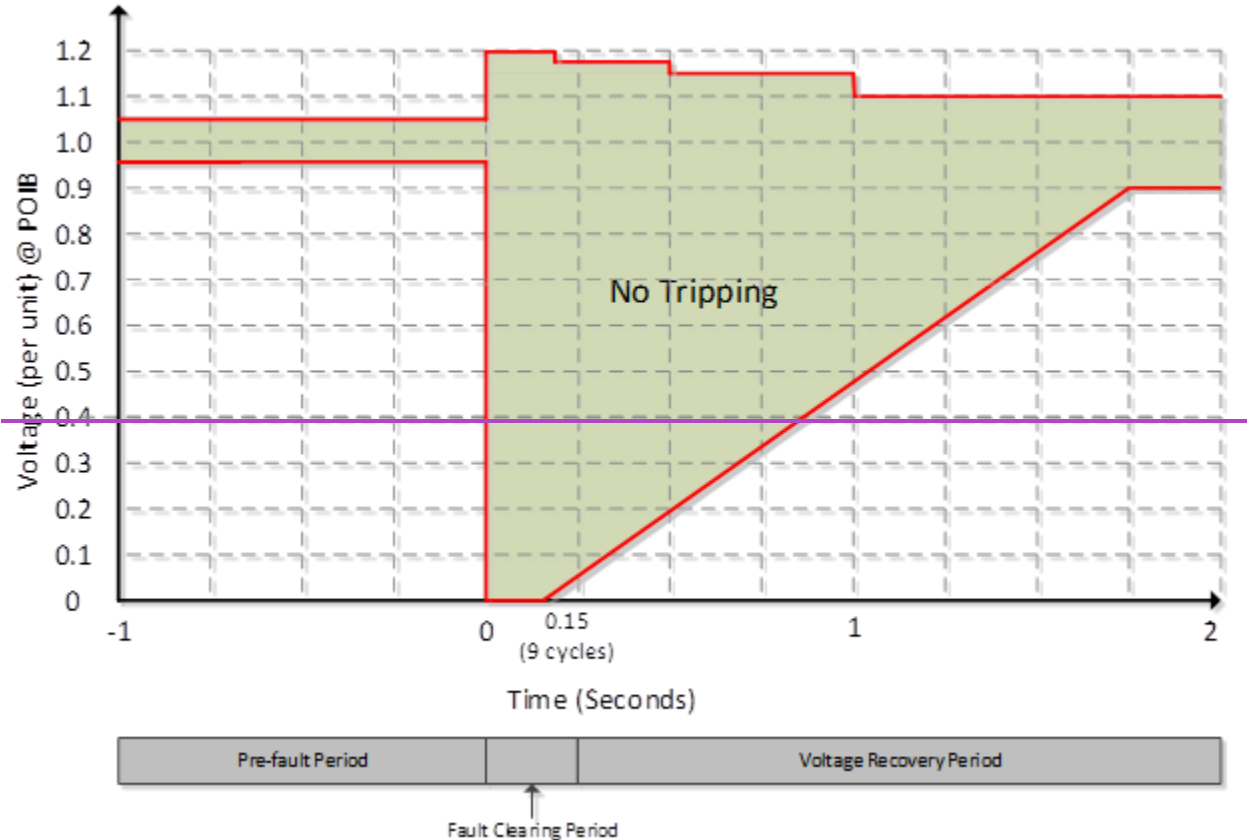


Figure 1: Default Voltage Ride-Through Boundaries for IRRs and ESRs Connected to the ERCOT Transmission Grid

2.9.1.1 Preferred Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs)

- (1) This Section applies to all IBRs in accordance with paragraph (1) of Section 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-powered Generation Resources (WGRs). All IBRs and WGRs shall ride through the root-mean-square voltage conditions in Tables A or B below, as applicable, and the instantaneous phase voltage conditions in Table C below, as measured at the IBR's POIB:

Table A: Applicable to WGR IBRs

<u>Root-Mean-Square Voltage (p.u. of nominal)</u>	<u>Minimum Ride-Through Time (seconds)</u>
<u>$V > 1.20$</u>	<u>May ride-through or trip</u>
<u>$1.10 < V \leq 1.20$</u>	<u>1.0</u>
<u>$0.90 \leq V \leq 1.10$</u>	<u>continuous</u>

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

$0.70 \leq V < 0.90$	<u>3.0</u>
$0.50 \leq V < 0.70$	<u>2.5</u>
$0.25 \leq V < 0.50$	<u>1.2</u>
$V < 0.25$	<u>0.16</u>

Table B: Applicable to PhotoVoltaic Generation Resources (PVGRs) and ESR IBRs

<u>Root-Mean-Square Voltage (p.u. of nominal)</u>	<u>Minimum Ride-Through Time (seconds)</u>
$V > 1.20$	<u>May ride-through or trip</u>
$1.10 < V \leq 1.20$	<u>1.0</u>
$0.90 \leq V \leq 1.10$	<u>continuous</u>
$0.70 \leq V < 0.90$	<u>6.0</u>
$0.50 \leq V < 0.70$	<u>3.0</u>
$0.25 \leq V < 0.50$	<u>1.2</u>
$V < 0.25$	<u>0.32</u>

In the event of multiple excursions, the minimum ride-through time in Tables A or B is a cumulative time over a ten-second time window.

Table C: Applicable to all IBRs

<u>Instantaneous Peak Phase-to-Phase or Phase-to-Ground Voltage (p.u. of nominal instantaneous peak voltage)</u>	<u>Minimum Ride-Through Time (milliseconds)</u>
$V > 1.80$	<u>May ride-through or trip</u>
$1.70 < V \leq 1.80$	<u>0.2</u>
$1.60 < V \leq 1.70$	<u>1.0</u>
$1.40 < V \leq 1.60$	<u>3.0</u>
$1.20 < V \leq 1.40$	<u>15.0</u>

The instantaneous voltages in Table C above are the residual voltages with surge arrestors, if applied. During the conditions identified in Table C, an IBR should continue injecting current, but need not respond to the sub-cycle transient overvoltage. If required by equipment limitations, the IBR may operate in current blocking mode when instantaneous voltage exceeds 1.20 p.u. at the POIB. If the IBR operates in current blocking mode, it shall restart current exchange in less than or equal to five cycles following instantaneous voltage falling below, and remaining below, 1.2 p.u. at the POIB. In the event of multiple excursions, the minimum ride through time in Table C is a cumulative time over a one-minute time window.

- (2) Nothing in paragraph (1) above shall be interpreted to require an IBR to trip for voltage conditions beyond those for which ride-through is required.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (3) If protection systems (including, but not limited to protection for over-/under-voltage, rate-of-change-of-frequency, anti-islanding, and phase angle jump) are installed and activated to trip the IBR, they shall enable the IBR to ride through voltage conditions beyond those defined in paragraph (1) above to the maximum extent equipment allows.
- (4) An IBR shall inject electric current when required to ride-through voltage conditions. When the POIB voltage is outside the continuous operating voltage range, an IBR shall continue to deliver pre-disturbance active current unless reduction is needed to allow for voltage support or otherwise specified by ERCOT or the interconnecting TSP. Any necessary reductions in active current to prioritize reactive current shall be relative to the voltage change at the POIB. Typically, more aggressive reductions in active current to allow for additional reactive current (if needed to stay within its current limitations) will occur at lower voltages (e.g., 0.4 p.u. or lower) but settings should be made based on the local needs of the ERCOT System where the IBR interconnects and ensures sufficient active current is available for protection system sensing. An IBR shall return to its pre-disturbance level of real power injection as soon as possible but no more than one second after POIB voltage recovers to normal operating range. ERCOT, in its reasonable discretion, may allow slower real power injection recovery rates if necessary for reliability as determined by the impacted TSP or ERCOT, or if required based on physical limitations of the IBR.
- (5) IBR plant controls or inverter controls shall not disconnect the IBR from the ERCOT System or reduce IBR output during voltage conditions where ride-through is required unless necessary to provide appropriate frequency response.
- (6) If instantaneous over-current or over-voltage protection systems are installed and activated to trip the IBR, they shall use filtered quantities or time delays to prevent misoperation while providing the desired equipment protection. Any instantaneous over-voltage protection that could disrupt IBR power output shall use a measurement window of at least one cycle of fundamental frequency.
- (7) The IBR shall ride through multiple excursions outside the continuous operation range in Tables A or B in paragraph (1) above as applicable, unless the conditions and situations specified below exist, in which case the IBR may trip to protect equipment from the cumulative effect of successive voltage deviations:
 - (a) More than four voltage deviations at the POIB outside the continuous operation range within any ten second period;
 - (b) More than six voltage deviations at the POIB outside the continuous operation range within any 120 second period;
 - (c) More than ten voltage deviations at the POIB outside the continuous operation range within any 1,800 second period;

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (d) Voltage deviations outside of continuous operation range following the end of a previous deviation outside of continuous operation range by less than 20 cycles of system fundamental frequency;
- (e) More than two individual voltage deviations at the POIB below 50% of the nominal voltage (including zero voltage) within any ten second period;
- (f) More than three individual voltage deviations at the POIB below 50% of the nominal voltage (including zero voltage) within any 120 second period; or
- (g) A WGR may trip for consecutive voltage deviations resulting in stimulation of mechanical resonances exceeding equipment limits.

Individual voltage deviations begin when the voltage at the POIB drops below the lower limit of the continuous operation range or exceeds the upper limit of the continuous operation range. Individual voltage deviations end when the root-mean-square voltage magnitude at the POIB, for the previous one-cycle period of fundamental frequency, returns to the continuous operation region.

- (8) An IBR shall ride-through any fault disturbance where the POIB voltage remains within the ride-through profiles specified in paragraph (1) above. Measurements of quantities such as phase angle jump and rate-of-change-of-frequency during fault conditions are not meaningful and shall not be used to trip or reduce the output of the IBR during fault conditions.
- (9) A Resource Entity or IE may request an extension for upgrades or retrofits to confirm capability specified in paragraph (7) above by following the extension process set forth in Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals. The Resource Entity or IE shall maximize the rate-of-change-of-frequency, phase angle jump and multiple excursion ride-through capability within known equipment limitations as soon as practicable. Any temporary extensions under this paragraph shall be minimized and not extend beyond December 31, 2028.
- (10) A Resource Entity of a Type 3 WGR may seek an extension from meeting the voltage ride-through performance Tables A and C in paragraph (1) above by following the extension process set forth in Section 2.13. During any such extension, the Resource Entity shall ensure the WGR's voltage ride-through capability is set to the maximum level the equipment allows as soon as practicable.
- (11) Any temporary extensions for IBRs with SGIAAs on or after June 1, 2024 shall be minimized and not extend beyond December 31, 2028. Temporary extensions for performance that do not meet the voltage ride-through performance in Table A in paragraph (1) of Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs), are not allowed.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

(12) If an IBR fails to perform in accordance with the applicable voltage ride-through requirements, the Resource Entity for the IBR shall take actions described in Section 2.14, Actions Following an Apparent Failure to Ride-Through.

2.9.1.2 Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs)

(1) All IBRs and Type 1 and Type 2 WGRs subject to this Section in accordance with paragraph (1) of Section 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-powered Generation Resources (WGRs), shall ride through the root-mean-square voltage conditions in Table A below as measured at the IBR, Type 1 WGR or Type 2 WGR POIB:

Table A

<u>Root-Mean-Square Voltage (p.u. of nominal)</u>	<u>Minimum Ride-Through Time (seconds)</u>
<u>$V > 1.20$</u>	<u>May ride-through or may trip</u>
<u>$1.175 < V \leq 1.2$</u>	<u>0.2</u>
<u>$1.15 < V \leq 1.175$</u>	<u>0.5</u>
<u>$1.10 < V \leq 1.15$</u>	<u>1.0</u>
<u>$0.90 \leq V \leq 1.10$</u>	<u>continuous</u>
<u>$0.0 < V < 0.90$</u>	<u>$(V+0.084375)/0.5625$</u>
<u>$V = 0.0$</u>	<u>0.15</u>

For voltage between zero and 0.9 p.u. the minimum ride-through time in Table A above is defined by a straight line mathematical function where the duration is 0.15 seconds at zero voltage and 1.75 seconds at 0.9 p.u. voltage.

(2) Nothing in paragraph (1) above shall be interpreted to require an IBR or Type 1 WGR or Type 2 WGR to trip for voltage conditions beyond those for which ride-through is required.

(3) If protection systems (including, but not limited to protection for over-/under-voltage, rate-of-change of frequency, anti-islanding, and phase angle jump) are installed and activated to trip the IBR or Type 1 WGR or Type 2 WGR, they shall enable the IBR or Type 1 WGR or Type 2 WGR to ride through voltage conditions beyond those defined in paragraph (1) above to the maximum extent the equipment allows.

(4) An IBR or Type 1 WGR or Type 2 WGR shall inject electric current when required to ride-through voltage conditions. When the POIB voltage is outside the continuous operating voltage range, an IBR shall continue to deliver pre-disturbance active current unless reduction is needed for voltage support or otherwise specified by ERCOT or the

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

interconnecting TSP. Any necessary reductions in active current to prioritize reactive current shall be relative to the voltage change at the POIB. Typically, more aggressive reductions in active current to allow for additional reactive current (if needed to stay within its current limitations) will occur at lower voltages (e.g., 0.4 p.u. or lower) but settings shall be based on the local needs of the area of the ERCOT System to which the IBR interconnects and ensure sufficient active current is available for protection system sensing. An IBR or Type 1 WGR or Type 2 WGR shall return to its pre-disturbance level of real power injection as soon as possible but no more than one second after POIB voltage recovers to normal operating range. Slower real power injection recovery rates may be allowed if necessary for reliability as documented by the impacted TSP or ERCOT, or if required based on physical limitations of the IBR.

- (5) Plant controls, turbine controls, or inverter controls of an IBR or Type 1 WGR or Type 2 WGR shall not disconnect the Resource from the ERCOT System or reduce its output during voltage conditions where ride-through is required unless necessary for providing appropriate frequency response.
- (6) If instantaneous over-current or over-voltage protection systems are installed and activated to trip the IBR or Type 1 WGR or Type 2 WGR, they shall use filtered quantities or sufficient time delays to prevent misoperation while providing the desired equipment protection. Any instantaneous over-voltage protection that could disrupt power output shall use a measurement period of at least one cycle (of fundamental frequency).
- (7) Any IBR or Type 1 WGR or Type 2 WGR that monitors and actively protects against multiple excursions shall ensure its parameters to ride-through multiple voltage excursions are set to the maximum level the equipment allows to meet or exceed the requirements in paragraph (7) of Section 2.9.1.1, Preferred Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs).
- (8) An IBR or Type 1 WGR or Type 2 WGR shall not use measurements of quantities such as phase angle jump and rate-of-change-of-frequency to trip or reduce the output of the Resource during fault conditions where the POIB voltage remains within the ride-through profiles specified in paragraph (1) above, unless the Resource has an approved exemption or extension under Section 2.13.
- (9) The Resource Entity for each IBR or Type 1 WGR or Type 2 WGR with an SGIA executed prior to June 1, 2024, shall ensure its voltage ride-through capability is set to the maximum level the equipment allows to meet or exceed the requirements of paragraphs (1) through (8) above as soon as practicable with all available and known commercially reasonable upgrades as set forth in Section 2.11, Commercially Reasonable Efforts.
- (10) If an IBR or Type 1 WGR or Type 2 WGR with an SGIA executed prior to June 1, 2024 cannot comply with paragraphs (1) through (8) above by December 31, 2025, the Resource Entity shall, by February 1, 2025 (or later as part of the interconnection process

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

for any project not approved to energize as of February 1, 2025), request an exemption under Section 2.13.

- (11) If an IBR or Type 1 WGR or Type 2 WGR fails to perform in accordance with the applicable voltage ride-through requirements, the Resource Entity shall take actions described in Section 2.14, Actions Following an Apparent Failure to Ride-Through.

2.11 Commercially Reasonable Efforts

- (1) “Commercially reasonable efforts” means that the Resource Entity must evaluate its facilities and available modifications it can make to its equipment, if any, to maximize its frequency and/or voltage ride-through capability up to the frequency and voltage ride-through requirements set forth in Section 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs) and Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs).

(a) Technically feasible modifications involving only software, firmware, settings or parameterization changes are presumed to be commercially reasonable unless ERCOT and the Resource Entity agree the pricing is unreasonable for the modification. The Resource Entity shall implement any technically feasible modifications as soon as practicable but no longer than 12 months from the date on which the modification becomes commercially available to be installed and is available to be deployed on the subject equipment, unless a longer timeline is required by an impacted Transmission Service Provider (TSP), or as mutually agreed upon by the Resource Entity and ERCOT. The Resource Entity may request extensions beyond 12 months for circumstances beyond the Resource Entity’s reasonable control and shall provide ERCOT with an updated schedule for when the applicable changes are expected to be completed.

(b) The Resource Entity shall use best efforts to determine if any technically feasible equipment upgrades or improvements that require physical modification are commercially reasonable for the subject equipment. The Resource Entity shall implement any such changes as soon as practicable but no later than 24 months after the modification becomes commercially available to be installed and is available to be deployed on the subject equipment unless a longer timeline is mutually agreed upon by the Resource Entity and ERCOT. The Resource Entity may request extensions beyond 24 months for circumstances beyond the Resource Entity’s reasonable control and shall provide ERCOT with an updated schedule for when the applicable changes are expected to be completed.

- (2) In determining whether any equipment upgrades or improvements that require physical modification are commercially reasonable, the Resource Entity may consider factors such as: (i) availability and/or cost of hardware; (ii) whether the improvements are technically feasible; (iii) facility’s depreciated value; (iv) cost of capital; (v) facility’s expected profitability for the remainder of its expected operational life; (vi) whether the

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

improvement would materially enhance its ride through capabilities; and (vii) any other relevant factor.

- (3) If ERCOT has a reasonable expectation that other commercially reasonable modifications are available for a particular Resource other than those identified by the Resource Entity, it may provide such information to the Resource Entity unless the information is considered Protected Information, confidential, or ERCOT Critical Energy Infrastructure Information (ECEII). Evidence may include but is not limited to: (i) information obtained about other, similar Resources; (ii) data provided by equipment manufacturers; or (iii) any other information indicating a commercially reasonable compliance solution exists. Nothing herein requires ERCOT to perform a financial analysis regarding what is considered commercially reasonable.

2.12 Ride-Through Reporting Requirements

2.12.1 Initial Frequency Ride-Through Capability Documentation and Reporting Requirements

- (1) The Resource Entity of an Inverter-Based Resource (IBR), Type 1 Wind-powered Generation Resource (WGR), or Type 2 WGR with a Standard Generation Interconnection Agreement (SGIA) executed prior to June 1, 2024 that cannot comply with paragraphs (1) through (5) of 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs), by December 31, 2025, shall, by February 1, 2025 (or later for any project that has not been approved to energize as of February 1, 2025), submit to ERCOT via the Resource Integration and Ongoing Operations (RIOO) system, or as otherwise directed by ERCOT, submit a report with supporting information or documentation and request an exemption containing the following, in each case as is available or can be reasonably obtained:
- (a) Current frequency ride-through capability in a format similar to the table in paragraph (1) of Section 2.6.2.1;
 - (b) Known frequency ride-through limitations of the IBR, Type 1 WGR or Type 2 WGR as compared to the requirements in paragraphs (1) through (5) of Section 2.6.2.1;
 - (c) For known and available technically feasible modifications evaluated by the Resource Entity to meet the applicable ride-through requirements but found commercially unreasonable, the basis for such conclusion. ERCOT will treat all financial and proprietary information provided under this Section or Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals, as Protected Information;
 - (d) Commercially reasonable modifications that the Resource Entity will implement to maximize the frequency ride-through capability of the IBR, Type 1 WGR or

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

Type 2 WGR to approach or meet the frequency ride-through requirements in paragraphs (1) through (5) of Section 2.6.2.1 to the greatest extent possible;

- (e) Expected post-modification capability in a format similar to the table in paragraph (1) of Section 2.6.2.1 and documentation of any expected remaining limitations following implementation of such modifications;
- (f) A schedule for implementing the modifications;
- (g) For any documented technical limitation that can be accurately represented in a model: (i) a model accurately representing all technical limitations, or (ii) where such model is not available or reasonably obtainable by the time the report is submitted, a schedule for providing such a model as soon as practicable; and
- (h) A description of any limitation that cannot be accurately represented in a model.

2.12.2 Initial Voltage Ride-Through Capability Documentation and Reporting Requirements

- (1) The Resource Entity of an IBR or Type 1 WGR or Type 2 WGR with an SGIA executed prior to June 1, 2024, that cannot comply with paragraphs (1) through (8) of Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs), by December 31, 2025, shall, by February 1, 2025 (or later as part of the interconnection process for any project that has not been approved to energize as of February 1, 2025), submit to ERCOT via the RIOO system, or as otherwise directed by ERCOT, submit a report with supporting information or documentation and request an exemption containing the following, in each case as is available or can be reasonably obtained:
 - (a) Current voltage ride-through capability in a format similar to the table in paragraph (1) of Section 2.9.1.2;
 - (b) Known voltage ride-through limitations of the IBR, Type 1 WGR or Type 2 WGR as compared to the requirements in paragraphs (1) through (8) of Section 2.9.1.2;
 - (c) For known and available technically feasible modifications evaluated by the Resource Entity to meet the applicable ride-through requirements but found commercially unreasonable, the basis for such conclusion. ERCOT will treat all financial and proprietary information provided under this Section or Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals, as Protected Information;
 - (d) Commercially reasonable modifications that the Resource Entity will implement to maximize the voltage ride-through capability of the IBR, Type 1 WGR or Type

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

2 WGR to approach or meet the voltage ride-through requirements in paragraphs (1) through (8) of Section 2.9.1.2, to the greatest extent possible;

- (e) Expected post-modification capability in a format similar to the table in paragraph (1) of Section 2.9.1.2 and documentation of any expected remaining limitations following implementation of such modifications;
- (f) A schedule for implementing the modifications;
- (g) For any documented technical limitation can be accurately represented in a model: (i) a model accurately representing all technical limitations, or (ii) where such model is not available or reasonably obtainable by the time the report is submitted, a schedule for providing such a model as soon as practicable; and
- (h) A description of any limitation that cannot be accurately represented in a model.

2.12.3 Use of Initial Reports and Requirements for Recurring Ride-Through Reports

- (1) The initial reports in Section 2.12.1, Initial Frequency Ride-Through Capability Documentation and Reporting Requirements and 2.12.2, Initial Voltage Ride-Through Capability Documentation and Reporting Requirements, satisfy the requirements for exemption and extension requests in accordance with Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals.
- (2) No later than February 1 of each year beginning with February 1, 2026, each Resource Entity of an IBR or Type 1 WGR or Type 2 WGR with an exemption under Section 2.13, as Protected Information, must submit a detailed report as described in paragraph (1) of Section 2.12.1 or paragraph (1) of Section 2.12.2, as applicable, or an attestation signed by an officer or executive with authority to bind the Resource Entity affirming that no material changes have occurred since the Resource Entity's last report.

2.13 Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals

2.13.1 Exemptions and Extensions

- (1) If an Inverter-Based Resource (IBR) or Type 1 Wind-Powered Generation Resource (WGR) or Type 2 WGR has a technical limitation preventing it from fully meeting the frequency ride-through requirements in paragraphs (1) through (5) of Section 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs), or the voltage ride-through requirements in paragraphs (1) through (8) of Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs); or as otherwise specified in paragraphs (5) through (7) of Section 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs)

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

and Type 1 and Type 2 Wind-powered Generation Resources (WGRs), or paragraph (10) of Section 2.9.1.1, Preferred Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs), the Resource Entity or Interconnecting (IE) (“Requesting Entity”) may request from ERCOT, under this Section, an exemption from meeting, or extension to meet, such applicable requirements.

- (2) Subject to the appeal process in this Section, ERCOT may deny a request for an exemption or extension if the Requesting Entity fails to demonstrate, to ERCOT’s reasonable satisfaction:
 - (a) For an IBR, Type 1 WGR or Type 2 WGR with a Standard Generation Interconnection Agreement (SGIA) executed prior to June 1, 2024, a Type 3 WGR with an original SGIA executed prior to June 1, 2024 that meets the criteria in paragraph (5) of Section 2.9.1, or an IBR, Type 1 WGR or Type 2 WGR seeking an exemption as described in paragraph (7) of Section 2.9.1, the Requesting Entity has:
 - (i) Maximized the ride-through capability of the IBR, Type 1 WGR or Type 2 WGR with all available commercially reasonable modifications; and
 - (ii) Represented the limitations of the IBR, Type 1 WGR or Type 2 WGR, which form the basis for the exemption, to the best of the Requesting Entity’s understanding and in accordance with Section 2.13.1.1 Submission of Exemption Requests and Section 2.13.1.2 Submission of Extension Requests.
 - (b) For an IBR with an SGIA executed on or after June 1, 2024, seeking extensions as contemplated in paragraph (6) of Section 2.9.1, or paragraphs (9) or (10) of Section 2.9.1.1, the Requesting Entity has:
 - (i) Made best efforts to meet the original required timelines;
 - (ii) Maximized the IBR’s ride-through capability during the extension period; and
 - (i) Accurately represented the IBR’s current ride-through capabilities in models provided to ERCOT.
- (3) ERCOT shall, in good faith, accept equipment manufacturer-documented limitations associated with an exemption or extension request.
- (4) Approved exemptions and extensions under this section shall apply only to the extent requested and approved.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (5) For any IBR, Type 1 WGR or Type 2 WGR with an approved exemption or extension, the documented maximum capabilities will become the new performance requirements until the exemption or extension has ended.
- (6) Exemptions and extensions under this Section take effect immediately upon approval by ERCOT.
- (7) Exemptions under Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals, continue until:
 - (i) The IBR, Type 1 WGR or Type 2 WGR fully implements a modification as described in paragraph (1)(c) of Planning Guide Section 5.2.1, Applicability, that is synchronized after January 1, 2028, except for exemptions that continue as contemplated in paragraph (9) of Section 2.9.1; or
 - (ii) ERCOT and the Requesting Entity learn that the technical limitation no longer exists due to a commercially reasonable modification and the Requesting Entity has had sufficient time to implement the solution in accordance with Section 2.11, Commercially Reasonable Efforts.
- (8) Extensions under Section 2.13 shall end in accordance with Section 2.13.1.2.
- (9) Except for the provisions of Section 2.13.1.1 and Section 2.13.1.2, the deadlines in Section 2.13 may be modified by mutual written agreement of ERCOT and the Requesting Entity (together, “Parties”).
- (10) During the pendency of an exemption, extension, or appeal process under Section 2.13, or a related proceeding before the Public Utility Commission of Texas (PUCT) or other Governmental Authority, the IBR, Type 1 WGR or Type 2 WGR that is the subject of the exemption or extension request is required to meet its documented maximum capabilities provided to ERCOT.
- (11) In the event the Requesting Entity has exhausted the appeal process or failed to timely appeal relief under Section 2.13, ERCOT may refer to the Reliability Monitor for investigation, any performance failure of the IBR, Type 1 WGR or Type 2 WGR as contemplated Section in 2.14, Actions Following an Apparent Failure to Ride-through relating to frequency or voltage ride-through requirements; provided, however, that no such referral shall occur until the Requesting Entity has exhausted the appeal process in Section 2.13.
- (12) All information submitted under Section 2.13 shall be considered Protected Information.

2.13.1.1 Submission of Exemption Requests

- (1) A Requesting Entity may seek an exemption for an IBR, Type 1 WGR or Type 2 WGR as follows:

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (a) A Requesting Entity for an IBR, Type 1 WGR or Type 2 WGR with an SGIA executed prior to June 1, 2024 may seek exemptions from ride-through requirements in paragraphs (1) through (5) of Section 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs) or Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs).
- (b) A Requesting Entity for a Type 3 WGR with an original SGIA executed prior to June 1, 2024, that meets the criteria in paragraph (5) of Section 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-powered Generation Resources (WGRs), may seek an exemption as described in that Section.
- (c) A Requesting Entity for an IBR with an SGIA executed after June 1, 2024, and with a Commercial Operations Date prior to December 31, 2026, may seek an exemption as described in paragraph (7) of Section 2.9.1.
- (2) A Requesting Entity, through its Authorized Representative, may initiate a request for an exemption under this Section by submitting written notice of the request to ERCOT through the Resource Integration and Ongoing Operations (RIOO) system (or as otherwise specified by ERCOT), with the following information as available or reasonably obtainable:

 - (a) Requesting Entity Name;
 - (b) Requesting Entity DUNS Number;
 - (c) IBR/WGR Site Name;
 - (d) IBR/WGR Unit Name(s);
 - (e) Nodal Operating Guide Section(s) under which the exemption is requested;
 - (f) A detailed description of the grounds for the exemption and the basis for each request;
 - (g) Documentation describing all known limitations associated with the exemption request; and
 - (h) Any remaining information required in the reports in Section 2.12, Ride-Through Reporting Requirements, applicable to the request.
- (3) A Requesting Entity that submitted a report pursuant to Section 2.12, the report shall also serve as the request for an exemption or extension, as applicable, satisfying the

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

requirements of the preceding paragraph. A Requesting Entity may use the same form of report for future requests.

- (4) If a commercially reasonable modification, as defined in Section 2.11, Commercially Reasonable Efforts, becomes available for an IBR, Type 1 WGR or Type 2 WGR with an exemption under Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals, the Resource Entity shall notify ERCOT and implement the modification in accordance with the timelines required by Section 2.11.

2.13.1.2 Submission of Extension Requests

- (1) A Requesting Entity may seek an extension for an IBR, Type 1 WGR or Type 2 WGR as follows:
- (a) A Requesting Entity for an IBR, Type 1 WGR or Type 2 WGR with an SGIA executed prior to June 1, 2024, may seek extensions for ride-through requirements in paragraphs (1) through (5) of Section 2.6.2.1, Frequency Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs) or Section 2.9.1.2, Legacy Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs).
- (b) A Requesting Entity for an IBR with an SGIA executed on or after June 1, 2024 may seek extensions as contemplated in paragraph (6) of Section 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-powered Generation Resources (WGRs), paragraphs (9) or (10) of Section 2.9.1.1, Preferred Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs).
- (2) A Requesting Entity, through its Authorized Representative, may initiate a request for an extension under this Section by submitting written notice of the request to ERCOT through the RIOO system (or as otherwise specified by ERCOT), with the following information as available or reasonably obtainable:
- (a) Requesting Entity Name;
- (b) Requesting Entity DUNS Number;
- (c) IBR/WGR Site Name;
- (d) IBR/WGR Unit Name(s);
- (e) Nodal Operating Guide Section(s) under which the extension is requested;

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (f) A detailed description of the grounds for the extension and the basis for each request;
- (g) Documentation from the equipment manufacturer describing any known limitations associated with the extension request, a description of proposed modifications, and a schedule for implementing modifications; and
- (h) Other information specified in this Section applicable to specific requests.
- (3) A Requesting Entity may submit a report pursuant to Section 2.12, Ride-Through Reporting Requirements with the information specified in paragraph (2) above, and such report shall also serve as the request for an extension. A Requesting Entity may use the same form of report for future extension requests.
- (4) The Requesting Entity for an IBR with an SGIA executed on or after June 1, 2024, seeking an extension contemplated in paragraph (6) of Section 2.9.1, or paragraphs (9) or (10) of Section 2.9.1.1, shall, at a minimum, submit the following information to ERCOT:

 - (a) Documentation describing the justification for granting the extension;
 - (b) A model accurately representing all technical limitations;
 - (c) A description of any limitation that cannot be accurately represented in a model;
 - (d) Data and information identified in paragraphs (5) through (7) below, as applicable; and
 - (e) Any other data or information ERCOT reasonably deems necessary to evaluate granting the extension.
- (5) If a Requesting Entity submits a request for an extension to meet the performance requirements in sections 5, 7, and 9 of the Institute of Electrical and Electronics Engineers (IEEE) 2800-2022, Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems “IEEE 2800-2022 standard” as described in paragraph (6) of Section 2.9.1, it must provide to ERCOT:

 - (a) Evidence from its original equipment manufacturer (or subsequent inverter/turbine vendor support company if the original equipment manufacturer is no longer in business) of technical infeasibility to comply with any of the performance requirements in sections 5, 7, and 9 of the IEEE 2800-2022 standard by its synchronization date;
 - (b) A description of proposed modifications; and

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (c) The schedule for implementing those modifications. Any temporary extension shall be minimized and not extend beyond December 31, 2028 or 24 months after the Resource's Commercial Operations Date, whichever is earlier.
- (6) If a Requesting Entity submits a request for an extension to meet the performance requirements in paragraph (7) as contemplated in paragraph (9) of Section 2.9.1.1, it must provide to ERCOT:
 - (a) Evidence from its equipment manufacturer of technical infeasibility to comply with the performance requirements in paragraph (7) of Section 2.9.1.1 by its synchronization date;
 - (b) A description of proposed modifications; and
 - (c) The schedule for implementing those modifications. Any extensions under this paragraph shall be minimized and not extend beyond December 31, 2028.
- (7) If a Requesting Entity submits a request for an extension to meeting the performance requirements in Tables A or C in paragraph (1) as contemplated in paragraph (10) of Section 2.9.1.1, it must provide to ERCOT:
 - (a) Documented evidence from its equipment manufacturer of technical infeasibility to comply with the performance requirements in paragraph (1) of Section 2.9.1.1 by the IBR's/WGR's synchronization date;
 - (b) A description of proposed modifications; and
 - (c) The schedule for implementing those modifications. Any extensions under this paragraph shall be minimized and not extend beyond December 31, 2028. ERCOT will not grant any temporary extensions for performance that do not meet the voltage ride-through performance requirements in Table A in paragraph (1) of Section 2.9.1.2.

2.13.1.3 Timeline for Submission and Determination of Exemption and Extension Requests

- (1) Not later than ten Business Days of receiving a request for an exemption or extension, ERCOT shall provide the Requesting Entity with written confirmation of receipt and notification that either:
 - (a) The submission was complete and ERCOT is reviewing the request; or
 - (b) The submission was incomplete. For incomplete submissions, ERCOT will:
 - (i) Identify the missing information; and

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (ii) Provide instructions for the Requesting Entity to submit the missing information (e.g., to ERCOT Legal at MPRegistration@ercot.com or through the RIOO system).
- (2) Unless otherwise agreed by ERCOT, not later than ten Business Days of receiving a notice of an incomplete submission, the Requesting Entity shall submit the missing information to ERCOT through the RIOO system or as otherwise directed by ERCOT that it needs additional time to provide the additional information, along with an explanation for the delay.
- (3) Not later than 180 days of receiving a request for an exemption or extension or as otherwise agreed to in writing by the Parties, ERCOT shall provide the Requesting Entity with written notification that ERCOT has completed its review and ERCOT's determination that the exemption or extension is:
 - (a) Approved;
 - (b) Approved in part, along with details of the approved exemption or extension, and a detailed explanation for denying part of exemption or extension request; or
 - (c) Rejected, along with details explaining the grounds upon which ERCOT rejected the exemption or extension request.

2.13.1.4 Procedure for Appealing an ERCOT Decision to Reject an Exemption or Extension Request

- (1) Not later than ten Business Days of receiving written notification of ERCOT's decision to reject, in full or in part, an exemption or extension request, the Requesting Entity may challenge the rejection using the appeal process set forth herein.
- (2) For purposes of appealing an ERCOT decision to reject an exemption or extension request, the Requesting Entity is not required to comply with Protocol Section 20, Alternative Dispute Resolution. Nothing in this procedure for appealing an ERCOT determination to reject an exemption or extension request should limit or restrict the right of the Requesting Entity to file a petition seeking direct relief from the PUCT or other Governmental Authority without first exhausting this procedure or any other ERCOT dispute procedures where actual or threatened action by ERCOT could cause irreparable harm to the Requesting Entity or its impacted IBR(s)/WGR(s), and where such harm cannot be addressed within the time permitted under the process set forth in Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals.
- (3) A Requesting Entity that does not submit a notice of appeal to ERCOT within ten Business Days of receiving ERCOT's notice rejecting the exemption or extension request is deemed to have accepted ERCOT's decision.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

2.13.1.4.1 Appeal Process and Timeline

- (1) To initiate an appeal of ERCOT's rejection of an exemption or extension request, the Requesting Entity must submit the following information to the ERCOT Legal Department at MPRegistration@ercot.com:
 - (a) Requesting Entity Name;
 - (b) Requesting Entity DUNS Number;
 - (c) IBR/WGR Site Name;
 - (d) IBR/WGR Unit Name(s);
 - (e) A description of the relief sought;
 - (f) A detailed description of the grounds for the relief;
 - (g) Any information or documentation in support of the grounds for relief; and
 - (h) Designation of a primary dispute representative.
- (2) The date on which ERCOT receives the Requesting Entity's notice of appeal shall be the appeal initiation date.
- (3) Not later than three Business Days of the appeal initiation date, ERCOT shall provide the Requesting Entity with written confirmation of receipt and the designation of the ERCOT dispute representative. The ERCOT dispute representative should be an executive-level employee with decision making authority.
- (4) Within ten Business Days of the appeal initiation date, the Requesting Entity may request an appeal with ERCOT to provide the Requesting Entity an opportunity to provide any clarification or information supporting the appeal. The appeal must be scheduled to occur at a mutually convenient time within 30 days of the appeal initiation date. The appeal may be in-person or remote.
- (5) Within ten Business Days of the appeal meeting, or if an appeal meeting is not requested by the Requesting Entity, then within 30 days of the appeal initiation date, ERCOT will provide the Requesting Entity with notice of its appeal decision, including an explanation of the rationale if ERCOT denies the Requesting Entity's appeal in whole or part.
- (6) If ERCOT denies a Requesting Entity's appeal of ERCOT's decision to reject an exemption or extension request, in whole or in part, the Requesting Entity may seek relief from the PUCT pursuant to 16 Texas Administrative Code (TAC) § 22.251. For such an appeal, the Resource Entity or IE is not required to comply with Protocol Section 20, Alternative Dispute Resolution Procedure and Procedure for Return of Settlement Funds.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

2.14 Actions Following an Apparent Failure to Ride-through

- (1) Required ride-through performance is defined in Section 2.6.2.1, Frequency Ride-through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs), and Section 2.9.1, Voltage Ride-Through Requirements for Transmission-Connected Inverter-Based Resources (IBRs) and Type 1 and Type 2 Wind-Powered Generation Resources (WGRs). For any Inverter-Based Resource (IBR), Type 1 Wind-powered Generation Resource (WGR) or Type 2 WGR with an approved exemption or extension, the documented maximum ride-through capabilities are the ride-through performance requirements for the duration of the exemption or extension unless otherwise excused by Governmental Authority rules or regulations.
- (2) If an IBR, Type 1 WGR or Type 2 WGR does not ride-through in accordance with the applicable ride-through performance requirements (an “Apparent Performance Failure”), the Resource Entity shall, as soon as practicable and to the extent such information is available or can be reasonably obtained:
 - (a) Investigate the event;
 - (b) Report to ERCOT the cause of the Apparent Performance Failure via the Resource Integration and Ongoing Operations (RIOO) system (or as otherwise directed by ERCOT); and
 - (c) Perform model validation.
- (3) Following an Apparent Performance Failure, Transmission Service Providers (TSPs) directly impacted by the Apparent Performance Failure shall provide available information to ERCOT to assist with event analysis.
- (4) The Resource Entity for an IBR, Type 1 WGR, or Type 2 WGR with a Standard Generation Interconnection Agreement (SGIA) executed prior to June 1, 2024, and which experiences an Apparent Performance Failure shall:
 - (a) Submit to ERCOT a new exemption or extension request under Section 2.13, Procedures for Frequency and Voltage Ride-Through Exemptions, Extensions and Appeals, or update the information provided in any existing exemption or extension request to reflect new information arising from the Apparent Performance Failure, including, documented limitations that were previously unknown, and any known and available commercially reasonable modifications to mitigate the identified cause of such Apparent Performance Failure; and
 - (b) Make any such commercially reasonable modifications in accordance with the timelines in Section 2.11, Commercially Reasonable Efforts.

Simplified View of NOGRR245 Redlines from the 4/23/24 Board Report as Requested at the 5/10/24 Workshop

- (5) Unless approved by ERCOT, no existing IBR, Type 1 WGR, or Type 2 WGR with a documented exemption shall reduce the ride-through capability of the unit below its capability prior to the replacement or modification. Unless approved by ERCOT, no existing IBR, Type 1 WGR, or Type 2 WGR without a documented limited technical exemption to applicable requirements shall reduce the ride-through capability of the unit below the required ride-through capability.
- (6) The Resource Entity for an IBR, Type 1 WGR, or Type 2 WGR with an SGIA executed after June 1, 2024, shall provide ERCOT with a mitigation plan to meet the applicable ride-through requirements as soon as practicable but no later than 180 days, unless a longer timeline is mutually agreed upon by the Resource Entity and ERCOT.