

Joint Commenters on NOGRR 245

Presented by



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Summary

- Pass the TAC recommendation today
- TAC's proposal supports reliability and imposes new requirements on existing generators in a balanced way
- Remanding will delay implementation of this critical issue
- The TAC approved version solves the issues ERCOT identified
- ERCOT staff's latest proposal is more restrictive than what they asked TAC to pass



- ~15 GW of IBRs in operation in ERCOT
 - ~23% of installed operational IBR capacity on the ERCOT system
- ~5 GW of IBRs under development/in construction in ERCOT

IBR ride through is a critical issue

- The industry acknowledges the importance of this issue and the need for collaboration across OEMs, owner-operators, and ERCOT staff.
- This should not be an ERCOT vs. Industry debate.
- Industry participants helped to write the IEEE 2800 standard, participated in the development of FERC Order 901, participate in the ERCOT IBR Working Group, and have been heavily involved with NOGRR 245.
- This isn't the end of the conversation; we expect future NOGRRs will work on related issues and hope the Board will participate in this important work.

Pass the TAC approved version

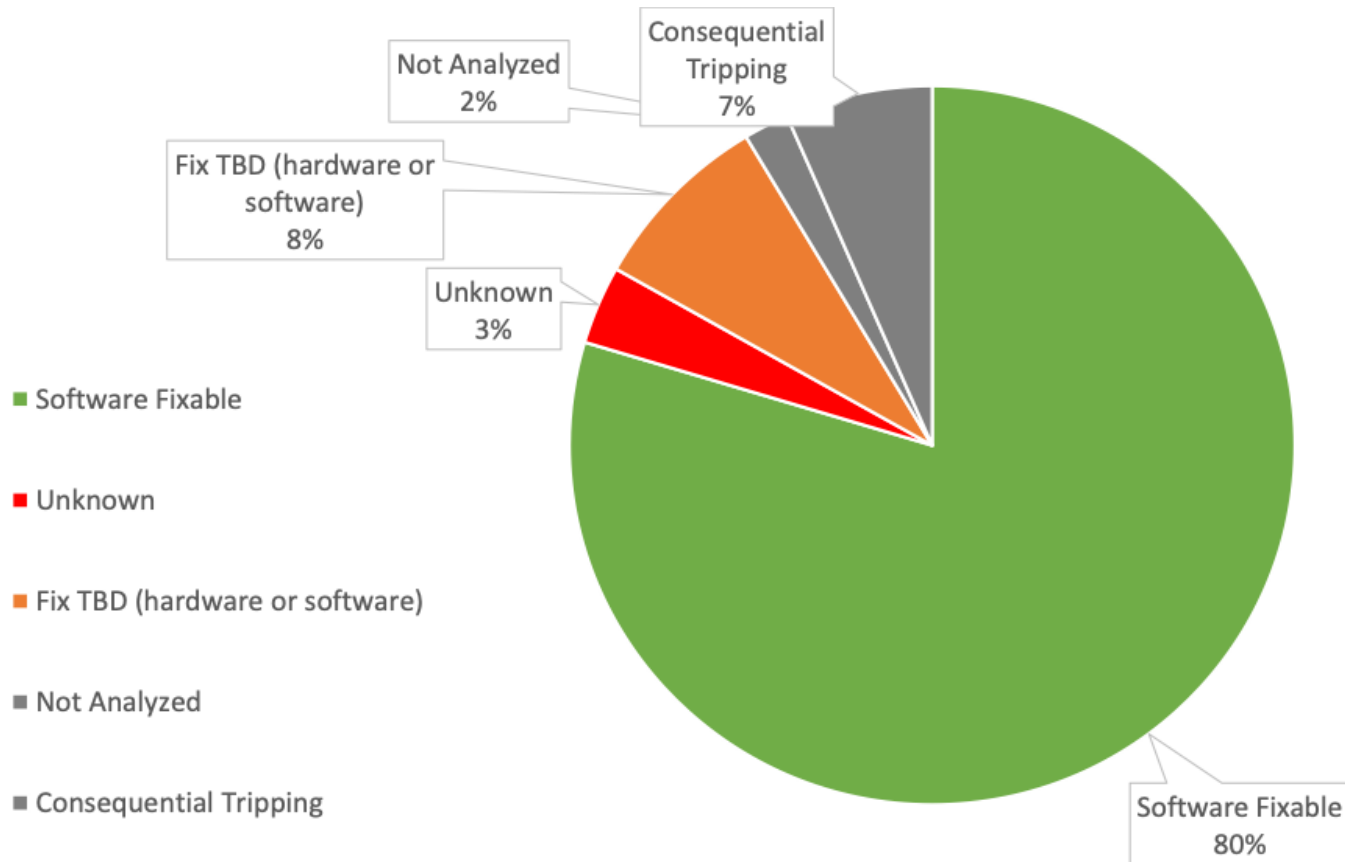
Approving TAC's recommendation will:

- Avoid burdensome retroactive requirements;
- Avoid the need to set the effective date for new resources later than the June 2024 recommendation in the TAC proposal;
- Finalize ride-through rules will enable OEMs to develop and improve products that will increase capabilities by clearly establishing the design standard;
- Recognize and protect the private property and due process rights of ERCOT investors; and
- Support and encourage a deliberative ERCOT stakeholder process.

TAC proposal aggressively supports reliability

- Imposes new requirements on formerly grandfathered projects
- Requires all software and commercially reasonable hardware modifications.
- Imposes new requirements on generators with SGIAs after 6/1/24, that are aligned with IEEE 2800-2022, even while the testing and verification standard is still being developed.
- Creates a continuous improvement process that requires identification of issues, analysis of commercially reasonable fixes, and corrective action deployments.
- Creates a clearly defined process for requesting exemptions and extensions
- Requires ongoing communication with ERCOT.

TAC's recommendation solves ERCOT's concerns



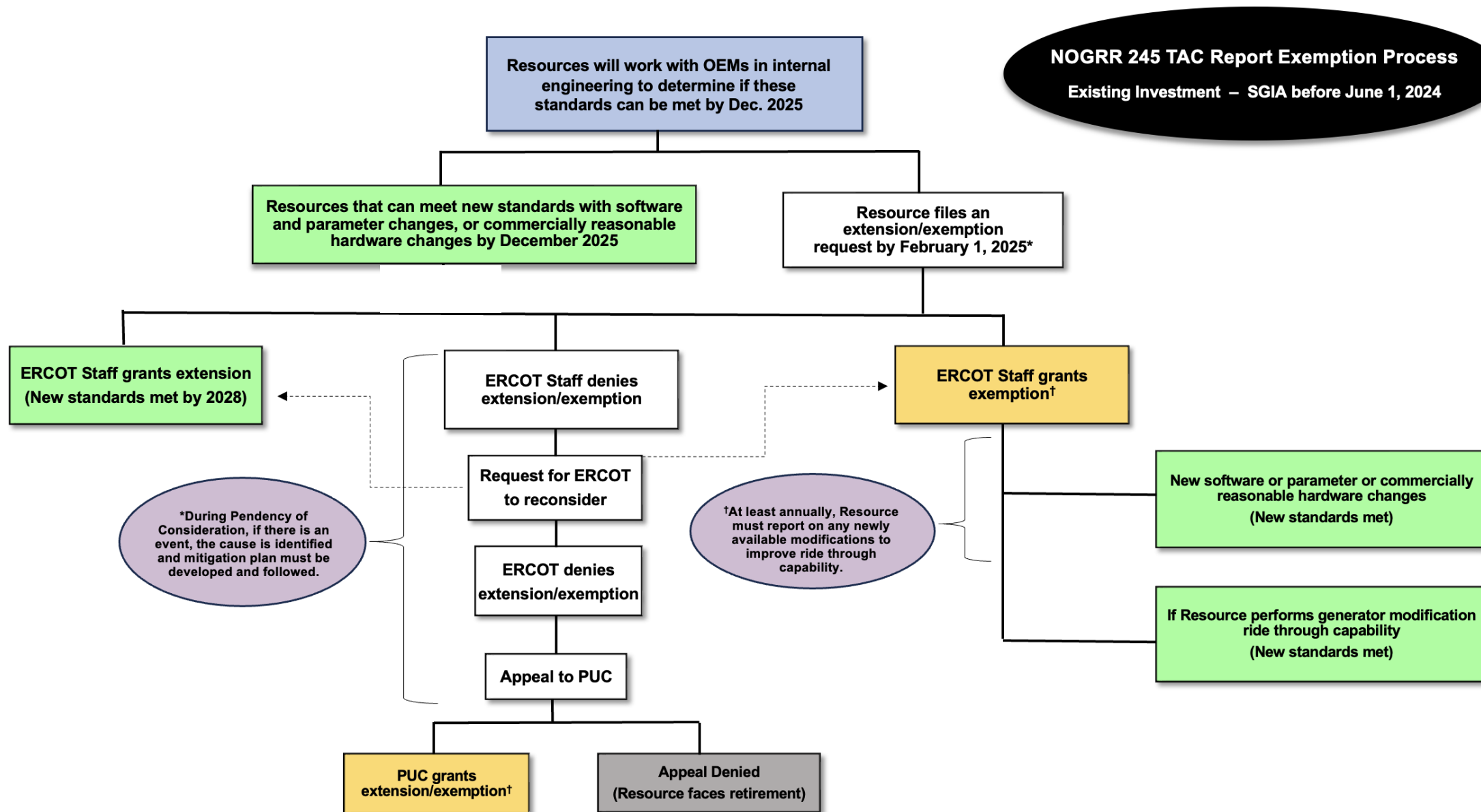
The vast majority of ride-through issues that have occurred are fixable with software updates, eliminating systemic risk.

*Consequential tripping is not a ride through failure

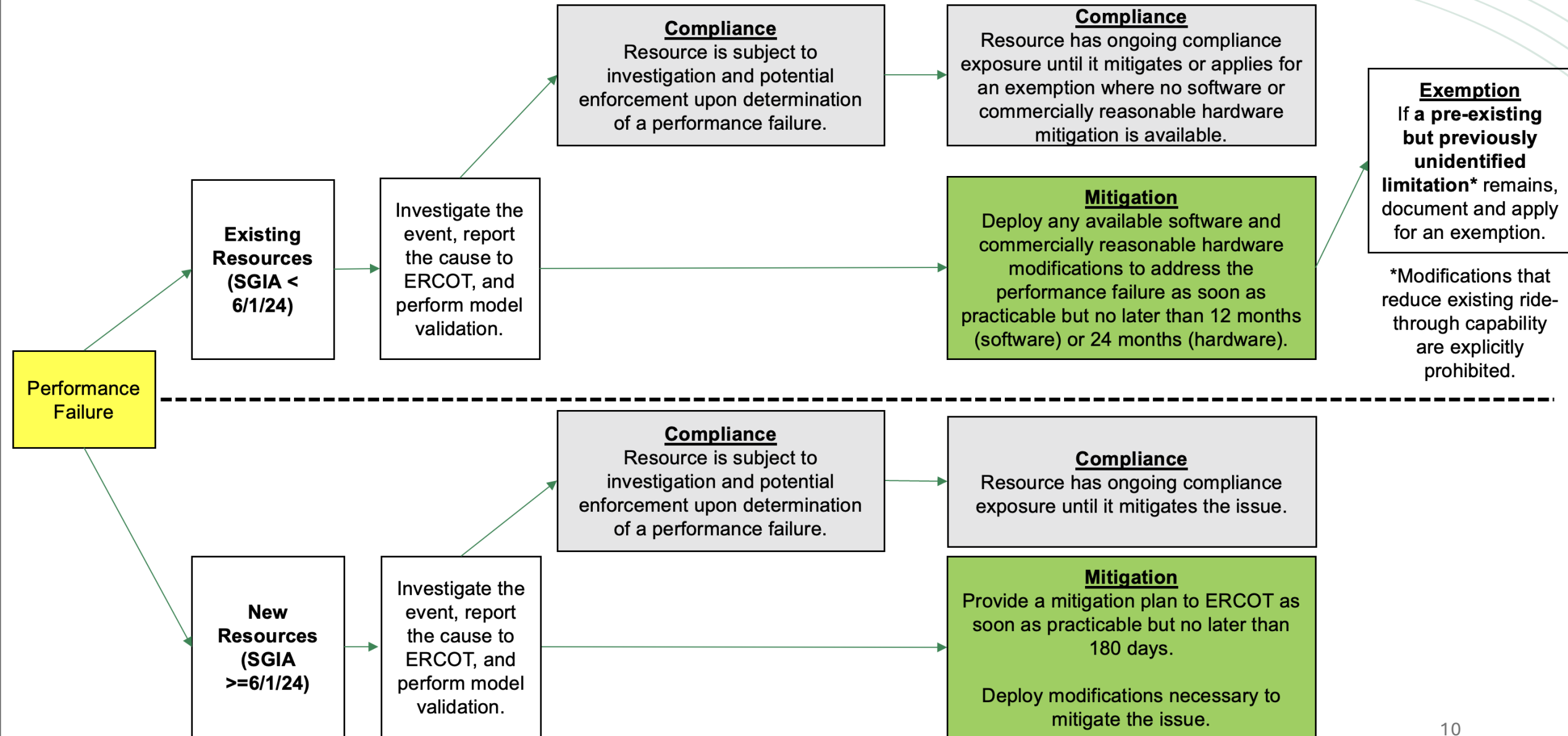
Software and settings modifications are solving the abnormal solar performance issues seen in the Odessa disturbances

Equipment Manufacturer	PVGRs in ERCOT	PVGRs in 2022 Odessa Event	Deployed Solutions
TMEIC	32% (36 facilities)	65% (8 facilities)	<ul style="list-style-type: none"> • 4 systemic issues; all now have software, settings, or firmware solutions • Solutions largely deployed at the 8 Odessa projects. (6 of 8 have all 4 changes made; remaining 2 have 3 out of 4 changes made to-date and plan to deploy remaining changes) • For the 28 projects not involved in Odessa events, solutions are either deployed (11), planned for 2024 (9), or plan is under development (7), except for 1 generator in construction
Power Electronics	22% (23 facilities)	29% (5 facilities)	<ul style="list-style-type: none"> • 1 systemic issue – has a firmware solution • Some non-systemic, project-specific issues and limitations at the 5 affected facilities • 5 facilities involved in Odessa events appear to be working with ERCOT to maximize capability and document remaining limitations • Outside Odessa, 16 of 18 projects have fixed the systemic issue through a firmware upgrade; ERCOT is following up with remaining 2 facilities
KACO	7% (8 facilities)	6% (4 facilities)	<ul style="list-style-type: none"> • At the 4 Odessa projects, limited corrective actions identified; 3 of 4 implemented • No data provided on the remaining 4 projects (not involved in previous disturbances) • KACO no longer in service

NOGRR 245 TAC Report Exemption Process



TAC-approved NOGRR245 places a duty on Resources to mitigate performance failures



Response to ERCOT's Seven Concerns (1/2)

- **Timing of "preferred" requirements.** We oppose retroactive regulations, and most of the "20-30 GW" of facilities between the two dates are solar and storage facilities that meet IEEE 2800 reqs with software.
- **Existing IBRs that fail to meet requirements.** ERCOT fails to consider commercial reasonability. If a facility must make upgrades it cannot afford, it risks retirement. TAC says IBR must remedy if commercially reasonable.
- **Existing IBRs that cannot meet current requirements.** As stated, commercial reasonability is an important principle.
- **Can units continue operating after a failure?** As stated at TAC and elsewhere, TAC/JC approach does not change ERCOT's authority.

Response to ERCOT's Seven Concerns (2/2)

- **Mitigation after failure.** See above. New IBRs must mitigate regardless of commercial reasonability. Existing IBR mitigations subject to commercial reasonability.
- **Allowed deviations from requirements.** ERCOT appears to be discussing exemptions. ERCOT's preferred approach is "evidence acceptable to ERCOT" or "ERCOT's sole discretion" or similar. This standard may be impossible to appeal and raises due process concerns.
- **Dates for agreed improvements.** Clearly inaccurate, deadlines are specified as 12 and 24 months for software and hardware.

ERCOT's reliability rhetoric (1/2)

- Jan '23: All IBRs must meet new requirements or "they will not be allowed to operate on the system" to "minimize (reliability) risk"
- April '23: ERCOT "remains open to minor edits" to most aggressive proposal, but granting exemptions poses "an unacceptable risk"
- June '23: Granting exemptions is an "unacceptable reliability risk," recommends approval "without delay"
- Aug '23: In comments that introduce an exemption process, ERCOT sought passage at Oct '23 board meeting.
- Sept '23: ERCOT "cannot support" changes past Aug comments or risk "serious consequences" that would put "system reliability at risk," states studies aren't necessary because ERCOT has experienced "actual system events." (i.e. Odessa, etc., covered above), and that the consideration of financial costs "creates a false impression for decision making." It believed that NOGRR 245 had already been "thoroughly discussed."

ERCOT's reliability rhetoric (2/2)

- In Sept '23, after ROS endorsed a June 2026 implementation date and a commercial reasonability framework, ERCOT determined in Sept '23 to perform an RFI for OEM and generator capabilities. ERCOT asked to table NOGRR 245 at TAC.
- After FERC Order 901 created a hardware/software dichotomy for existing generator compliance, ERCOT extended its exemption approach in January '24 comments but stated that ERCOT required "clear language giving ERCOT authority to impose operational restrictions."
- In March '24 comments, ERCOT removed the operational restriction language but asserted that this did not change its authority and allowed for its version of a "commercially reasonable" standard.
- In March '24, ERCOT acknowledged at the IBRWG that Odessa issues have largely been addressed through software and settings changes and that most of the facilities have updated or are in the process of updating those changes.
- In April '24, after TAC endorsed the JC approach to commercial reasonability and implementation, ERCOT filed comments that propose to remove commercial reasonability in favor of a cost-based standard.
- **Stakeholders are well aware of ERCOT's perspective on this topic and have had multiple opportunities to endorse ERCOT's evolving approaches. Yet, both ROS and TAC (with nearly 70% in favor), declined to support ERCOT's position.**

ERCOT's April 15 proposal steps backwards

Concept	4/15/24 ERCOT Comments	3/20/24 ERCOT Comments
Commercial Reasonableness	Removed commercial reasonability language and instead, all modifications must be made “as soon as practicable.” Commercial reasonability to be determined by the PUC only, and imposes arbitrarily high cost thresholds for required modifications.	Section 2.11 set requirements for Resources to implement “commercially reasonable” modifications to comply with or increase the level of compliance with the requirements for voltage and frequency ride-through. ERCOT noted that this language was added to the 3/20 Comments “in the spirit of compromise.”
Exemptions and Extensions	The Resource must demonstrate that it has maximized the applicable ride-through capability with all <i>technically feasible upgrades</i> and accurately represented all limitations in models provided to ERCOT. (Section 2.11).	The resource must demonstrate that it has maximized the ride-through capability with all <i>available commercially reasonable upgrades</i> and accurately represented the limitation in models provided to ERCOT. (Section 2.12.2).
Standard for Exemptions or Extensions	ERCOT may allow an exemption or extension in its “sole discretion” and the information provided must be to ERCOT’s “satisfaction.”	Established a process for exemptions and extensions. The information provided must be to ERCOT’s “satisfaction.”
Operational Restrictions for Performance Failures	Specifically authorizes ERCOT to implement operational restrictions or to disconnect a Resource for performance issues in ride-through events (Section 2.6.2.1(10)).	A failure in ride-through performance would be reported to ERCOT and the Resource must prepare a mitigation plan within 90 days and timely implement it. (Section 2.6.2.1(9)).

ERCOT's April proposal has conflicting provisions that would impose arbitrarily high costs on existing Resources

- First ERCOT's proposal says all technically feasible modifications are required, apparently regardless of cost:
 - 2.11.1(1) If a Resource Entity requests an exemption....The information must demonstrate to ERCOT's satisfaction the Resource Entity ...has maximized the applicable ride-through capability with all technically feasible upgrades.
 - 2.11.1(2) Any technical exemption will expire: or (ii) when ERCOT and the Resource Entity or IE learn the technical limitation no longer exists and sufficient time has lapsed to implement a solution
- But then it implies exemptions could be granted under arbitrarily high cost thresholds. Using these thresholds could easily impose multimillion dollar costs per Resource for modifications.
 - 2.11.1(1)(iii) ...documentation describing any available technically feasible modifications that the Resource Entity is declining to implement due to a lack of commensurate reliability improvement relative to the implementation cost
 - 2.11.1(3)(f)(i), for example:"...the Resource Entity or IE can implement an available technically feasible solution that provides a material improvement to fully meeting the performance requirements at a reasonable cost to the Resource Entity on a per inverter or turbine/converter basis (e.g., 20% of the cost to replace it with a new, in kind, inverter or turbine/converter);"

Appendix

Appendix: Four illustrative examples show ERCOT's arbitrarily high cost thresholds exposing existing Resources to multimillion dollar costs for additional modifications.

ERCOT's proposed expenditure requirements per modification from 2.11.1(3)(e)

Existing Resource SGIA date

Improvement modification makes to fully meeting the performance requirements

Required expenditure level per inverter or turbine/converter

SGIA < 1/16/14

Substantial Improvement

20% of the cost to replace

SGIA > 1/16/14

Material Improvement

20% of the cost to replace

Substantial Improvement

50% of the cost to replace

Wind examples

Cost to replace one converter

X% of cost

Representative project size, MW

Total expenditure required on a representative project, \$

Total expenditure required on a representative project, \$/MWh for one year

Wind Project A

\$200,000

20%

127.5

\$3,400,000

\$8.70

Wind Project B

\$200,000

50%

127.5

\$7,500,000

\$16.79

Solar examples

Cost to replace one converter

X% of cost

Representative project size, MW

Total expenditure required on a representative project, \$

Total expenditure required on a representative project, \$/MWh for one year

Solar Project C

\$75,000

20%

252

\$4,500,000

\$8.86

Solar Project D

\$75,000

50%

252

\$11,250,000

\$22.16

Notes:

Total expenditure required on a representative project, \$ = # of inverters or converters at a representative project x cost to replace an inverter or converter x [20, 50] %.

Total expenditure required on a representative project, \$/MWh = previous answer/MWh generation per year using MW and a capacity factor.

Wind Project A: 85 1.5 MW turbines, 35% capacity factor.

Wind Project B: 75 1.7 MW turbines, 40% capacity factor.

Solar Project C: 300 0.84 MW inverters, 23% capacity factor.

Solar Project D: 300 0.84 MW inverters, 23% capacity factor.