



Item 11: South Central Cold Weather Event – ERCOT Assessment of FERC/NERC Recommendations

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Board of Directors Meeting

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2019 FERC and NERC Staff Report

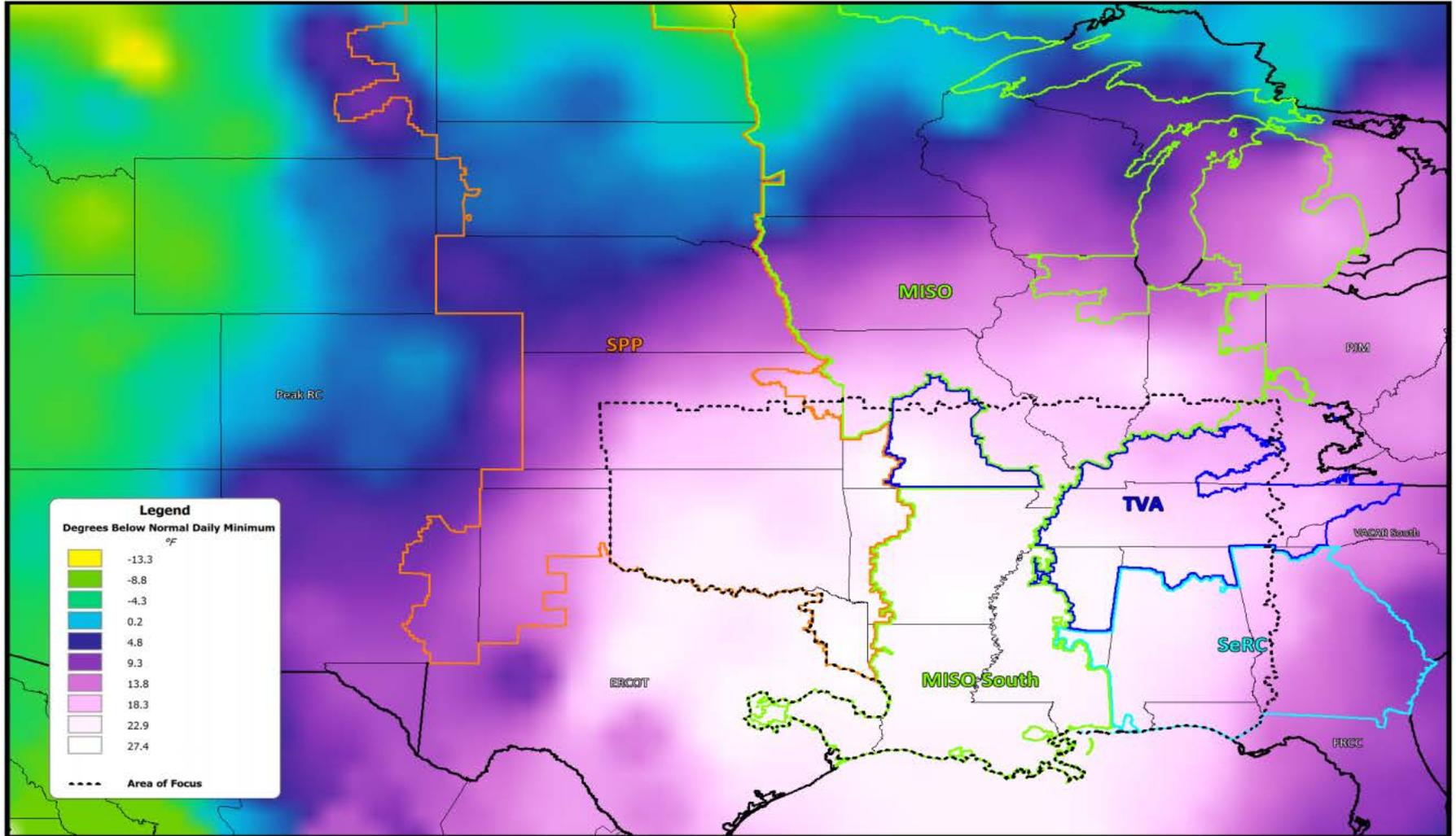
The South Central United States Cold Weather Bulk Electric System Event of January 17, 2018

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Scope of the Report

- During January 15-19, 2018, an area of the south central U.S. experienced unusually cold weather that resulted in outages to 183 generating units representing approximately 30,000 MW.
- NERC/FERC report evaluated effects of weather on generation availability, forecasting, and transmission constraints in the SPP, MISO, TVA, and SeRC areas.
- Report included recommendations for improving generation availability during extreme cold weather events.
- The recommendations provide a useful basis for comparison to the improvements that ERCOT made after the February 2011 cold weather event.

Figure 1: January 17, 2018 Event Area – Low Temperature Deviation From the Normal Daily Minimum



Recommendations From The Report (abbreviated)

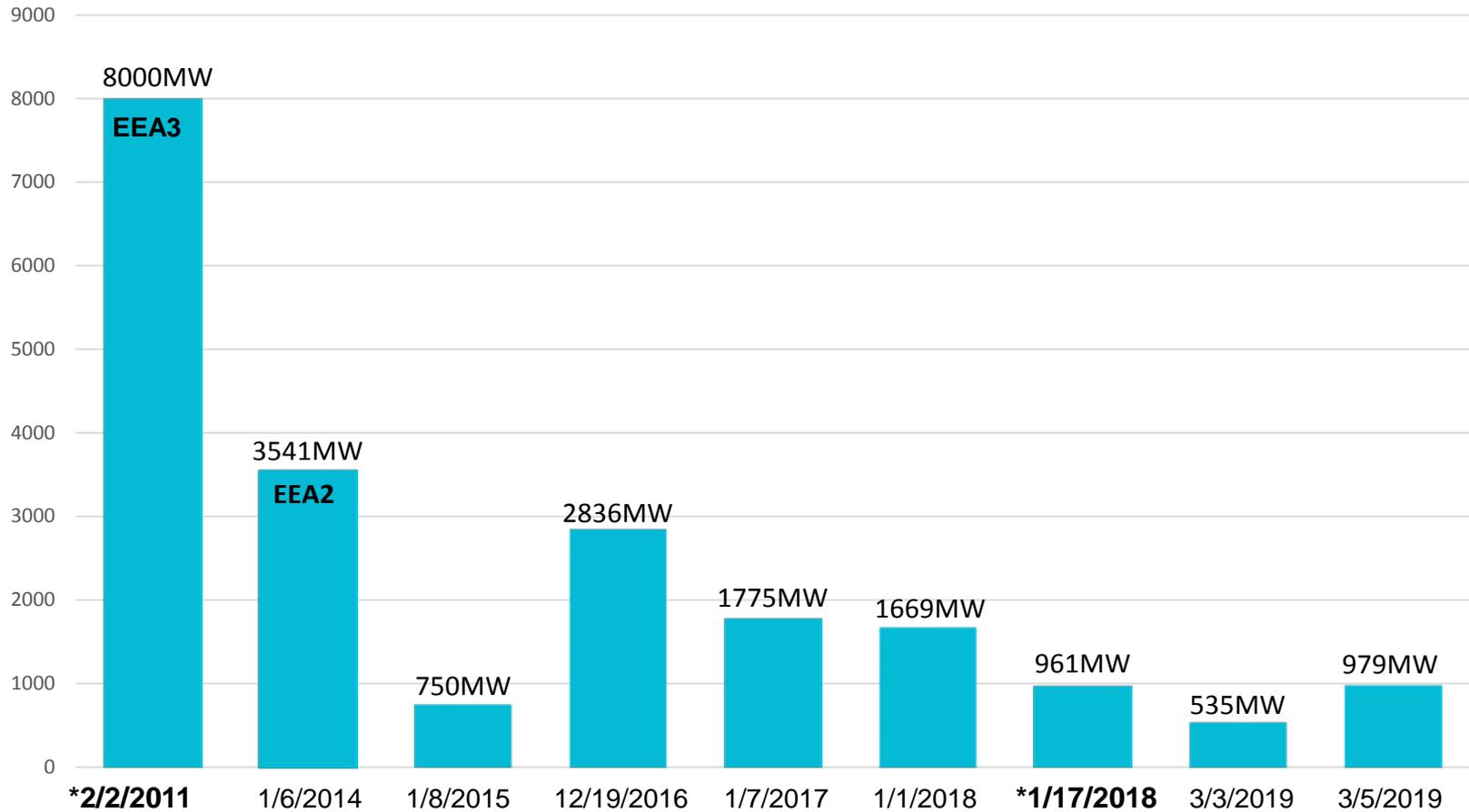
1. Multiple improvements to increase generator cold-weather preparedness
2. Real-time voltage stability analysis
3. Benchmark models to actual events
4. Analysis of contingencies in adjacent RC areas (not applicable to ERCOT)
5. Emergency drills to ensure readiness and coordination
6. Changes to Regional Transfer Procedure (not applicable to ERCOT)
7. Planning studies should include extreme condition scenarios
8. MISO and SPP improve seasonal transfer studies (not applicable to ERCOT)
9. Studies should delineate summer and winter ratings
10. Deliverability of reserves for multiple Balancing Authorities (not applicable to ERCOT)
11. Enhance coordination of shared reserves (not applicable to ERCOT)
12. MISO to receive improved load forecast information (not applicable to ERCOT)
13. MISO changes to mid-term load forecasts (not applicable to ERCOT)

Recommendation 1a - Improvements to Generator Cold Weather Preparedness

Generator Owners should take measures to increase winterization activities

- ERCOT and the TRE perform an annual workshop on weatherization.
- PUCT Substantive Rule § 25.53 requires generators to have an emergency operations plan that addresses preparations for severely cold and hot weather.
- Protocol Section 3.21(3) requires generators to submit an attestation that they have completed weatherization preparations before each summer and winter season.
- ERCOT performs approximately 80 field checks a year to review weatherization plans for selected units.
- NERC's 2012 reliability guideline on weatherization was largely a result of the best practices developed by generators in ERCOT following 2011 cold weather event.

ERCOT Generation Tripped Due to Frozen Instrumentation



*2/2/2011 and 1/17/2108 were the two coldest days this decade



Weather Comparison of 2/2/2011 and 1/17/2018 in ERCOT

	2/2/2011		1/17/2018	
	Temperature/Wind	Hours below 32Deg F	Temperature/Wind	Hours below 32DegF
Dallas	13°/20MPH	24	13°/5MPH	19
Houston	21°/16MPH	14	19°/13 MPH	18
San Antonio	19°/25MPH	24	23°/10 MPH	12
Austin	18°/26 MPH	24	18°/10 MPH	20
Brownsville	32°/26 MPH	0	30°/14 MPH	10
Abilene	7°/16 MPH	24	8°/5 MPH	19
Midland	6°/16 MPH	24	28°/7 MPH	10



Recommendation 1b - Improvements to Generator Cold Weather Preparedness

Generator Owners should incorporate ambient temperature ratings and plans and procedures and share them with Balancing Authorities

- Generators supply ERCOT with temperature ratings that are held in the Network Model Management System. These ratings are used in reports, analysis, and in ERCOT systems.

Recommendation 1c - Improvements to Generator Cold Weather Preparedness

Balancing Authorities should be aware of temperature limitations and gas supply limitations and take those into account in operations

- ERCOT incorporates wind generator temperature limitations and wind speed limitations in its wind forecasts.
- ERCOT Protocols require COP and Outage Scheduler data to accurately reflect generator capabilities. ERCOT relies on generators accurately reporting their capabilities in the COP and OS for operational assessments.
- ERCOT Capacity, Demand, and Reserves Report (CDR) uses seasonal ratings provided by each generator.
- ERCOT coordinates the work of the Gas Electric Working Group to allow coordination of gas pipeline maintenance schedules and identification of critical gas infrastructure loads.

Recommendation 2 – Reliability Coordinators should perform real-time voltage stability analysis in addition to RTCA

- ERCOT programmatically performs a voltage stability analysis in real-time every 10 minutes for known voltage-sensitive areas.
- The voltage stability analysis can be manually run at any time.
- ERCOT performs additional assessments for any severe conditions that may be anticipated.

Recommendation 3 – Benchmark Models to Actual Events

- ERCOT has numerous mechanisms to check the accuracy of models, contingencies, load distributions, and forecasts including:
 - Key Performance Indicator for load forecasting.
 - Key Performance Indicator for wind forecasting.
 - Key Performance Indicator for solar forecasting.
 - State Estimator reports and alarms that validate model accuracy.
 - Use of similar day cases in the approval of outages.
 - Planning models are built from the same database as the operational models.

Recommendation 5 – Emergency Drills to Ensure Readiness and Coordination

- ERCOT conducts a severe weather drill annually in which multiple Market Participant segments work with ERCOT operators in an automated simulation of either a winter storm or a hurricane.
- ERCOT conducts Energy Emergency Alert simulator training, including firm load shed, at least once a year for all crews.

Recommendation 7 – Planning Studies Should Include Extreme Condition Scenarios

- ERCOT planning analyses evaluate:
 - Entire plant outages, some multi-plant outages, and effects of gas pipeline disruptions on generation
 - High renewable penetration levels and low-inertia scenarios
 - Impacts on transfer capability of losing multiple circuits in the same right of way or losing complete substations
- ERCOT may need to expand its future-year extreme-winter scenario analysis.
 - Currently under evaluation
 - Would require additional cases to be built
 - Could be used to identify any localized areas of ERCOT that are more at risk during a winter peak

Recommendation 9 – Studies Should Delineate Summer and Winter Transmission Ratings.

- ERCOT systems allow Transmission Owners (TOs) to supply dynamic ratings to reflect thermal limits at different temperatures.
- TOs can also telemeter ratings to ERCOT in real-time.
- Operational planning studies and outage coordination studies both use dynamic ratings for transmission lines.
- Approximately 2/3 of ERCOT transmission lines are dynamically rated.

Summary

- Many of the improvements ERCOT has made since 2011 correspond with the recommendations in the NERC/FERC report.
- ERCOT market provides a strong incentive for generation availability during scarcity conditions.
- ERCOT COP, OS, and modeling requirements provide awareness of weather-related generation availability risks.
- ERCOT Protocols require coordination between ERCOT, Generation Owners, and TOs.