Item 10.1: System Planning and Weatherization Update

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Reliability and Markets Committee Meeting

ERCOT Public
December 18-19, 2023

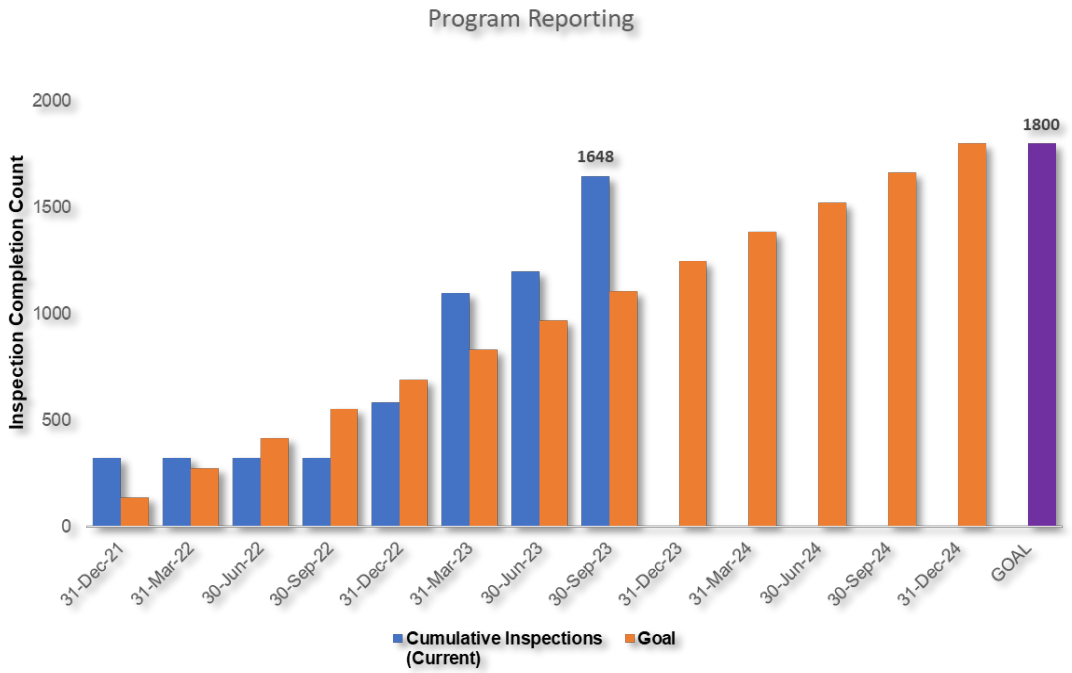
Overview

- **Purpose**
  Provide an update on recent activity related to planning, modeling, generation interconnection, resource adequacy and weatherization
- **Voting Items / Requests**
  No action is requested of the R&M Committee or Board; for discussion only

- **Key Takeaways**
  - Weatherization and inspection program remains on track to PUC rule requirements as Winter begins.
  - Battery Energy Storage continues to be the most active type of Resource requesting new interconnection studies.
  - ERCOT is tracking nearly 40 GW of Large Load interconnection requests.
  - The January and February Monthly Outlook of Resource Adequacy (MORA) reports highlight 8 a.m. remains the riskiest hour for experiencing emergency conditions.
  - ERCOT continues working with the Commission to make progress on the Reliability Standard, Value of Lost Load and Cost of New Entry studies.

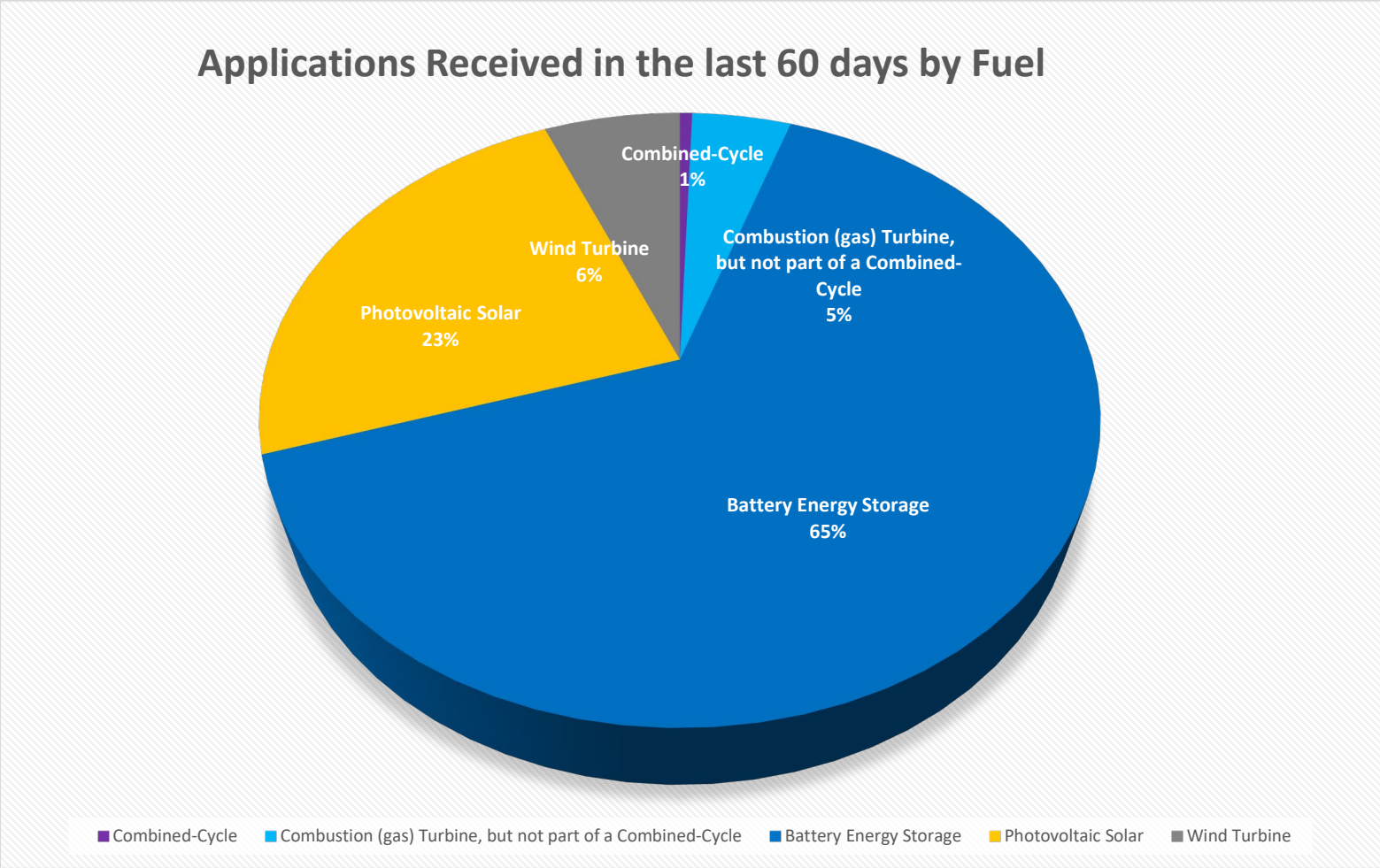
Weatherization and Inspection – Winter Preparation

- Five ERCOT Inspectors received their Certified Weatherization Inspector certifications December 1st after completing all requirements.
- Market Participant declarations of Winter Weather Preparedness were submitted to ERCOT during November 1st through December 1st.
- Winter Weatherization Inspections started the first week of December and will continue through February.
- ERCOT anticipates inspecting more than 350 Generation Resources and over 100 Transmission facilities this winter.



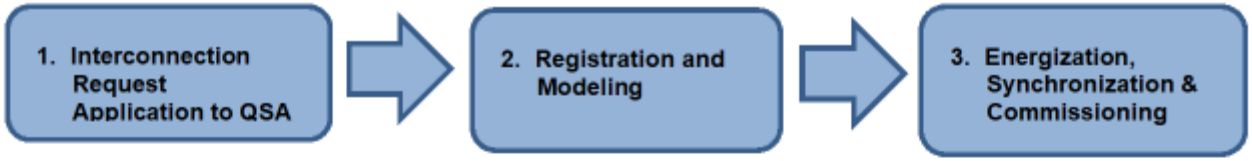
Key Takeaway: The Weatherization Inspection Program remains on track to PUC rule requirements as winter 2023-2024 commences.

Generation Interconnection Activity



Key Takeaway: Battery Energy Storage continues to be the most active type requesting interconnection studies.

Generation Resource Interconnection Process Overview



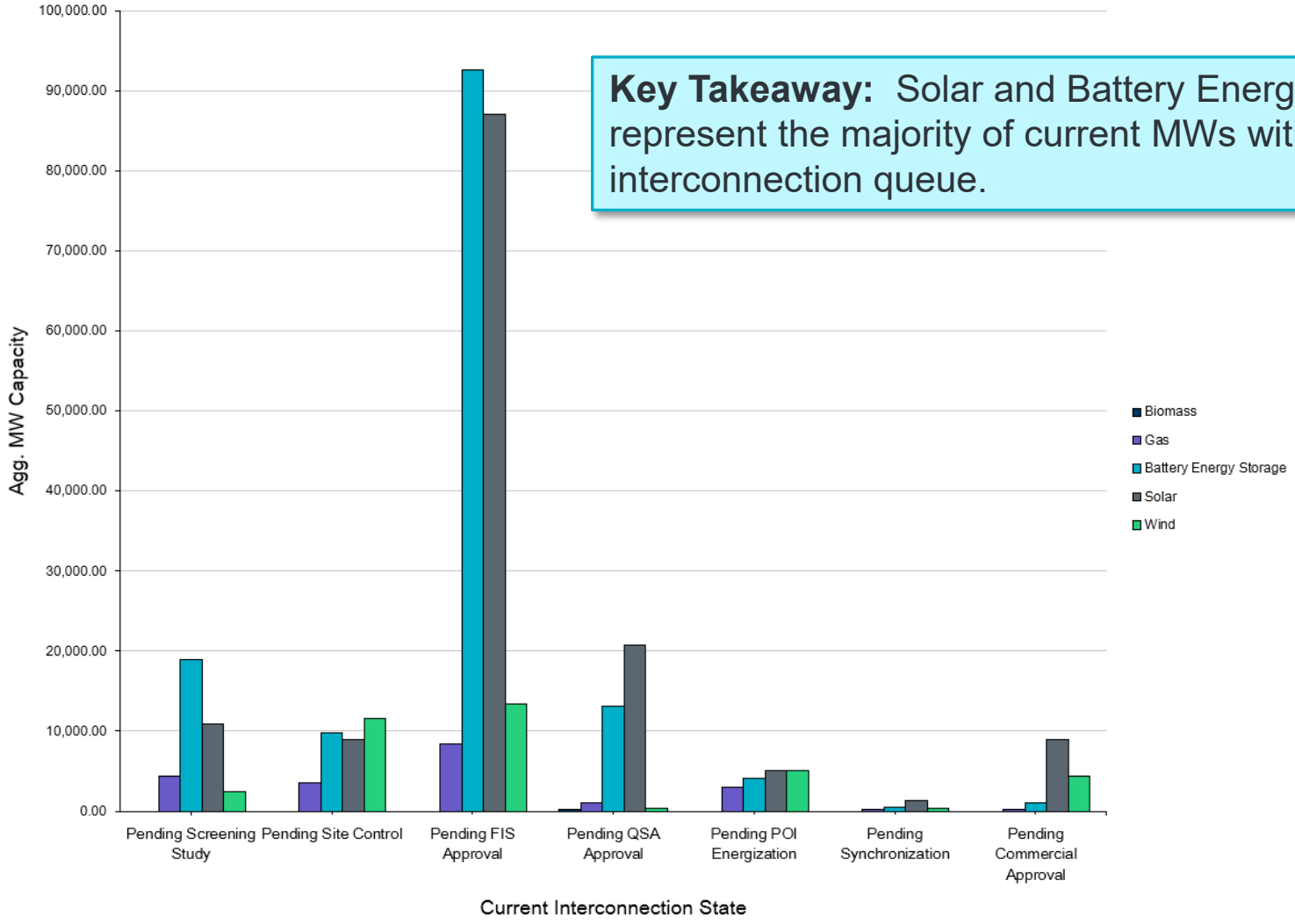
- GINR Application and Fees
- Security Screening Study
- Full Interconnection Studies
- Subsynchronous Resonance Study
- Standard Gen. Interconnection Agreement
- Resource Integration and On-Going Operations data submittal
- Compliance with Operational Standards
- Reactive Study

- RE Registration
- Resource Integration and On-Going Operations data submittal
- ERCOT Polled-Settlement Meters and ESI ID Requirements
- Telemetry and ICCP Requirements

- TSP: 1: Request to Energize POI
- Commissioning Plan Template
- New Generator Commissioning Checklist
- 1: Request to Energize
- 2: Request for Initial Synchronization
- 3: Request to Commission a Resource
- Reactive Capability & Performance

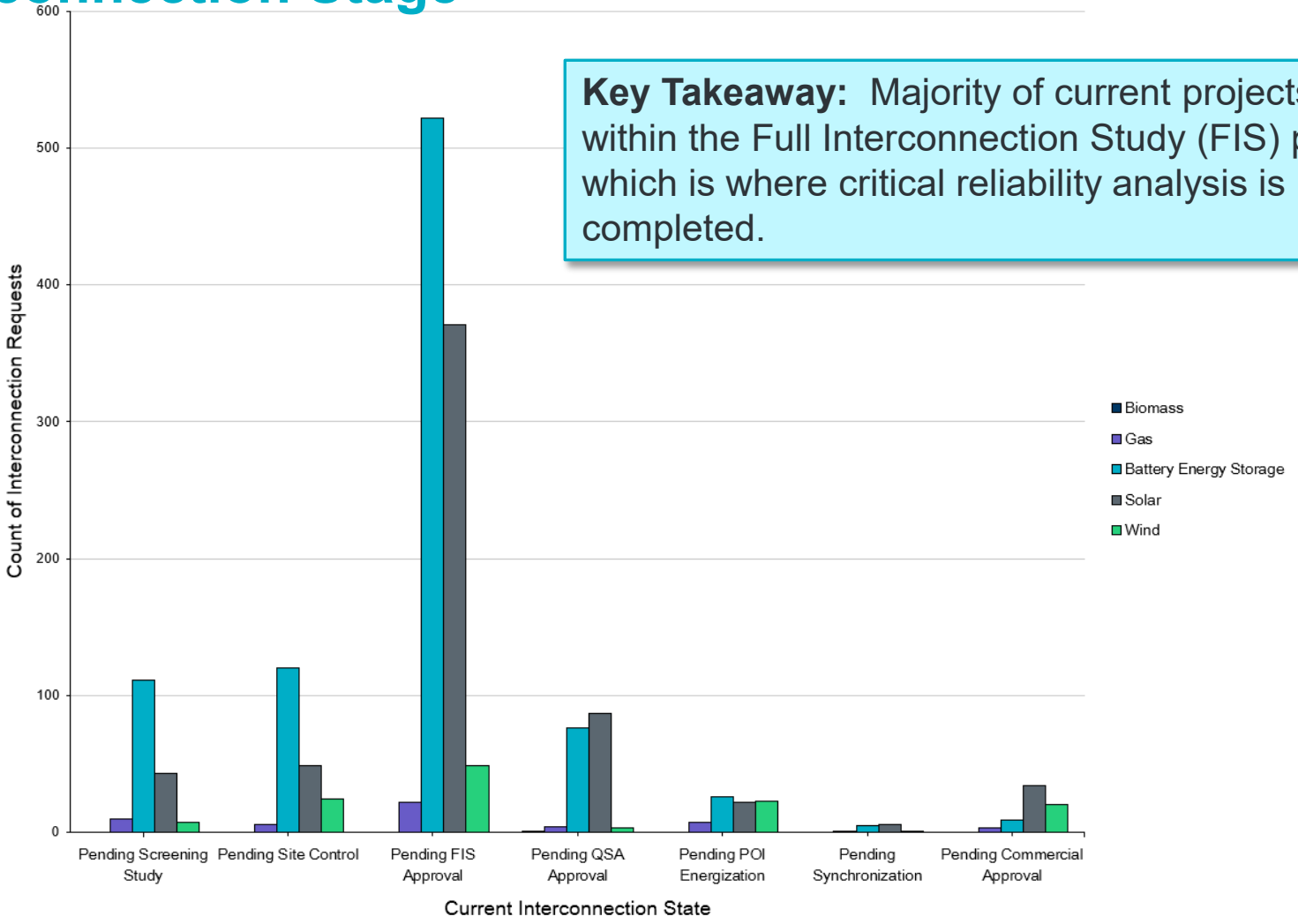
Key Takeaway: The interconnection process requires a series of interactions between the developer/owner of the Generation Resource, ERCOT and Transmission Service Providers.

Generation Resource Project MWs by Fuel Type and Interconnection Stage



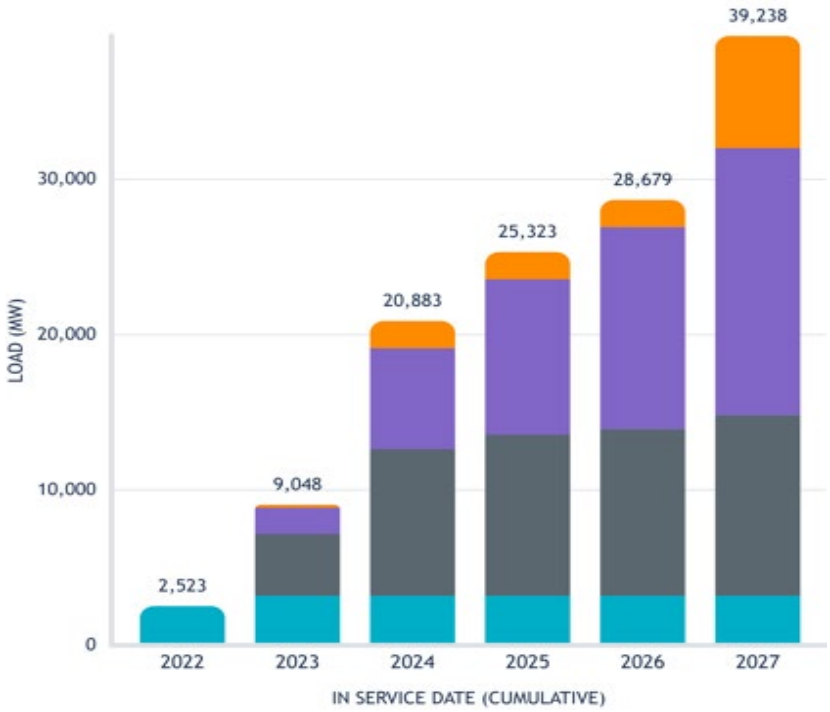
Key Takeaway: Solar and Battery Energy Storage represent the majority of current MWs within the interconnection queue.

Generation Project Count by Fuel type and Interconnection Stage



Key Takeaway: Majority of current projects are within the Full Interconnection Study (FIS) phase which is where critical reliability analysis is completed.

Large Load Integration Overview



Project Status	2022	2023	2024	2025	2026	2027
No Studies Submitted	-	180	1,750	1,750	1,750	7,219.5
Under ERCOT Review	-	1,695	6,499	10,013	13,013	17,213
Planning Studies Approved	-	3,985	9,446	10,372	10,728	11,617.5
Approved to Energize	2,523	3,188	3,188	3,188	3,188	3,188
Total (MW)	**2,523**	**9,048**	**20,883**	**25,323**	**28,679**	**39,238**

- **Approved to Energize –** Projects that have received Approval to Energize from ERCOT Operations. NOTE: not all MWs in this category have been observed to be operational
- **Planning Studies Approved –** Projects that have received ERCOT approval of required interconnection studies. Any MWs that were not approved are reclassified as No Studies Submitted.
- **Under ERCOT Review –** Projects that have studies under review by ERCOT
- **No Studies Submitted –** Projects that are tracked by ERCOT but that have not yet provided sufficient information for ERCOT to begin review. Additionally, MWs that were not approved by ERCOT after review of planning studies are included in this category until a path to interconnect these MWs is identified or the customer cancels the interconnection request.

Key Takeaway: ERCOT continues to track nearly 40 GW of Large Load interconnection requests

- Since January 2022, 3,188 MW approved to energize. As of the first week in December, 2,432 MW are operational.
- Another 9,446 MW with proposed energization dates on or before December 31, 2024, have had planning studies reviewed and approved.

Monthly Outlook on Resource Adequacy (MORA)

January and February 2024 reports published; 8 a.m. remains the riskiest hour for experiencing emergency conditions, with lower risk in February.

January

	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
Hour Ending	Probability of CAFOR being above 3,000 MW	Probability of CAFOR being less than 2,500 MW	Probability of CAFOR being less than 1,500 MW
1 a.m.	98.53%	1.23%	1.10%
2 a.m.	98.67%	1.12%	1.02%
3 a.m.	98.73%	1.03%	0.97%
4 a.m.	98.67%	1.05%	1.00%
5 a.m.	98.54%	1.15%	1.04%
6 a.m.	97.79%	1.59%	1.38%
7 a.m.	94.43%	3.95%	3.35%
8 a.m.	89.54%	7.6%	6.70%
9 a.m.	93.26%	4.97%	4.29%
10 a.m.	97.11%	2.00%	1.77%
11 a.m.	98.53%	1.02%	0.90%
12 p.m.	99.15%	0.58%	0.47%
1 p.m.	99.55%	0.26%	0.23%
2 p.m.	99.74%	0.16%	0.14%
3 p.m.	99.84%	0.08%	0.07%
4 p.m.	99.79%	0.11%	0.10%
5 p.m.	99.47%	0.27%	0.20%
6 p.m.	97.82%	1.43%	1.27%
7 p.m.	96.33%	2.52%	2.14%
8 p.m.	96.18%	2.62%	2.19%
9 p.m.	97.93%	1.47%	1.19%
10 p.m.	98.33%	1.15%	0.97%
11 p.m.	98.91%	0.74%	0.67%
12 a.m.	99.16%	0.59%	0.53%

Note: Probabilities are not additive.

February

	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
Hour Ending	Probability of CAFOR being above 3,000 MW	Probability of CAFOR being less than 2,500 MW	Probability of CAFOR being less than 1,500 MW
1 a.m.	99.27%	0.62%	0.55%
2 a.m.	99.31%	0.58%	0.51%
3 a.m.	99.45%	0.44%	0.39%
4 a.m.	99.38%	0.46%	0.42%
5 a.m.	99.00%	0.73%	0.69%
6 a.m.	98.80%	0.82%	0.74%
7 a.m.	97.06%	2.21%	1.92%
8 a.m.	95.30%	3.2%	2.81%
9 a.m.	97.45%	1.96%	1.68%
10 a.m.	98.92%	0.82%	0.68%
11 a.m.	99.24%	0.52%	0.48%
12 p.m.	99.59%	0.26%	0.16%
1 p.m.	99.79%	0.17%	0.13%
2 p.m.	99.91%	0.05%	0.04%
3 p.m.	99.94%	0.03%	0.03%
4 p.m.	99.91%	0.03%	0.02%
5 p.m.	99.89%	0.07%	0.06%
6 p.m.	99.63%	0.21%	0.18%
7 p.m.	98.40%	1.16%	0.99%
8 p.m.	98.12%	1.17%	1.02%
9 p.m.	98.67%	0.91%	0.74%
10 p.m.	99.08%	0.56%	0.45%
11 p.m.	99.44%	0.41%	0.35%
12 a.m.	99.63%	0.29%	0.25%

Note: Probabilities are not additive.

CAFOR is Capacity Available for Operating Reserves

Monthly Outlook on Resource Adequacy (MORA)

A Winter Storm Elliott type scenario fixes peak load expectation to a value reflecting weather and outages comparable to that experienced during storm; risk for emergency conditions increases.

January

	EMERGENCY LEVEL		
Hour Ending	Chance of Normal System Conditions Probability of CAFOR being above 3,000 MW	Chance of an Energy Emergency Alert Probability of CAFOR being less than 2,500 MW	Chance of Ordering Controlled Outages Probability of CAFOR being less than 1,500 MW
1 a.m.	99.59%	0.27%	0.23%
2 a.m.	99.66%	0.20%	0.14%
3 a.m.	99.67%	0.16%	0.13%
4 a.m.	99.68%	0.22%	0.12%
5 a.m.	99.67%	0.24%	0.16%
6 a.m.	99.53%	0.26%	0.18%
7 a.m.	87.64%	5.70%	3.36%
8 a.m.	70.15%	20.6%	16.77%
9 a.m.	84.25%	7.49%	4.93%
10 a.m.	97.80%	0.65%	0.36%
11 a.m.	99.81%	0.06%	0.03%
12 p.m.	99.98%	0.00%	0.00%
1 p.m.	100.00%	0.00%	0.00%
2 p.m.	100.00%	0.00%	0.00%
3 p.m.	100.00%	0.00%	0.00%
4 p.m.	100.00%	0.00%	0.00%
5 p.m.	100.00%	0.00%	0.00%
6 p.m.	99.77%	0.09%	0.04%
7 p.m.	96.97%	0.35%	0.21%
8 p.m.	95.56%	0.94%	0.41%
9 p.m.	99.77%	0.06%	0.03%
10 p.m.	99.86%	0.06%	0.02%
11 p.m.	99.94%	0.01%	0.00%
12 a.m.	99.98%	0.00%	0.00%

Note: Probabilities are not additive.

February

	EMERGENCY LEVEL		
Hour Ending	Chance of Normal System Conditions Probability of CAFOR being above 3,000 MW	Chance of an Energy Emergency Alert Probability of CAFOR being less than 2,500 MW	Chance of Ordering Controlled Outages Probability of CAFOR being less than 1,500 MW
1 a.m.	89.07%	3.56%	1.68%
2 a.m.	88.53%	3.39%	1.74%
3 a.m.	89.79%	2.88%	1.31%
4 a.m.	90.67%	2.50%	1.23%
5 a.m.	87.82%	4.69%	2.65%
6 a.m.	84.75%	6.90%	4.37%
7 a.m.	80.08%	11.35%	8.24%
8 a.m.	71.92%	18.3%	14.66%
9 a.m.	86.55%	6.12%	3.98%
10 a.m.	94.38%	2.25%	1.18%
11 a.m.	97.62%	0.65%	0.20%
12 p.m.	99.82%	0.02%	0.00%
1 p.m.	100.00%	0.00%	0.00%
2 p.m.	100.00%	0.00%	0.00%
3 p.m.	100.00%	0.00%	0.00%
4 p.m.	100.00%	0.00%	0.00%
5 p.m.	100.00%	0.00%	0.00%
6 p.m.	100.00%	0.00%	0.00%
7 p.m.	90.65%	1.69%	0.56%
8 p.m.	92.06%	1.66%	0.69%
9 p.m.	93.31%	1.39%	0.59%
10 p.m.	95.79%	0.64%	0.18%
11 p.m.	99.04%	0.04%	0.02%
12 a.m.	99.72%	0.00%	0.00%

Note: Probabilities are not additive.

CAFOR is Capacity Available for Operating Reserves

Reliability Standard, VOLL, and CONE Study Updates

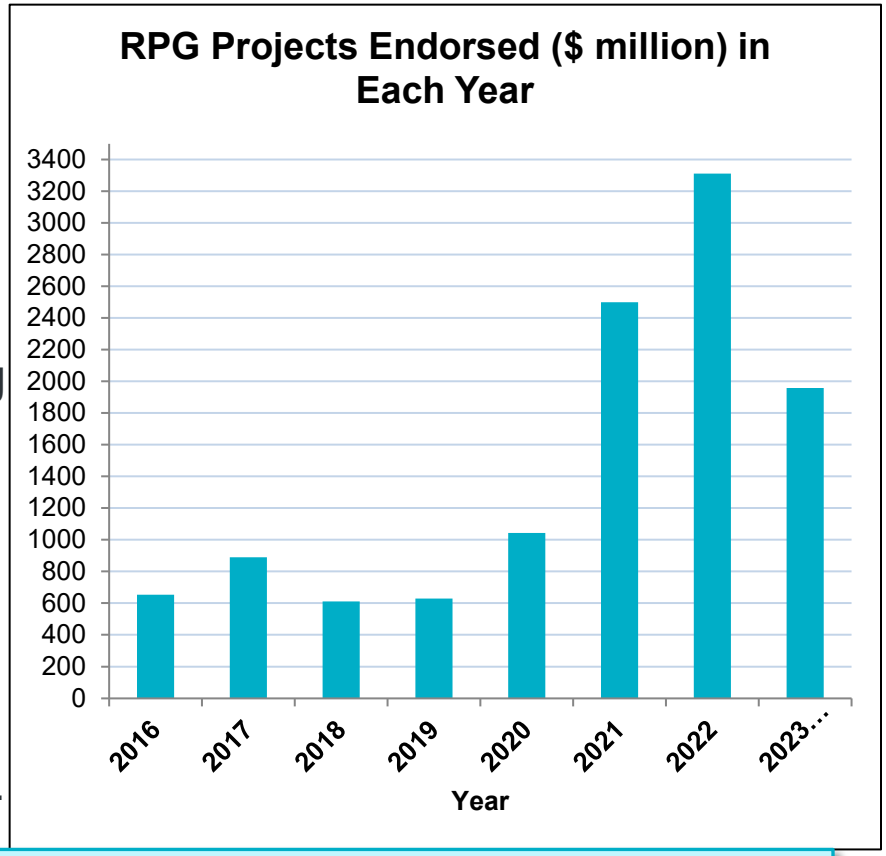
- Reliability Standard:
  - Filed revised simulation results for initial 48 scenarios (using corrected historic weather-year files associated with the 2026 load forecast) and the 2023 “prompt year” study results on November 28, 2023
  - Remaining study simulation tasks requested by the Commission
    - Additional scenarios: portfolios based on a 1-in-8 frequency criterion, and portfolios with more Inverter Based Resources
    - Sensitivity of the weatherization effectiveness assumption
    - Perform simulations with only the most recent 15 years of weather data (as opposed to 42) to more heavily weight recent weather trends
- Value of Lost Load (VOLL):
  - Brattle Group and subcontractor PlanBeyond engaged to perform the study
  - December: VOLL survey plan to be filed with the Commission early December; literature review and interim VOLL estimate to be filed the week of December 18th
  - Q1 2024: Survey rollout using Lawrence Berkeley National Labs survey instrument
- Cost of New Entry (CONE)
  - Consultant chosen for study; expect contract execution by end of December
  - Study Timeline: Begin January 2024 and target completion by June 2024

Key Takeaway: Much progress has been made in advancing studies.

Appendix

Transmission Planning Summary

- As of October 12, 2023, projects energized in 2023 total about $1.533 billion.
  - $1.567 billion energized in all of 2022
- As of October 31, 2023, ERCOT has endorsed transmission projects totaling $1.959 billion.
  - Total endorsed transmission projects in 2022 equaled $3.311 billion
- As of October 12, 2023, projects in engineering, routing, licensing, and construction total about $13.537 billion.



Key Takeaway: Revision Requests will be forthcoming to implement the recommended congestion cost savings test for an economically-driven projects evaluation.