



## **Item 10.1: System Planning and Weatherization Update**

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Reliability and Markets Committee Meeting

ERCOT Public

February 26, 2024

# 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

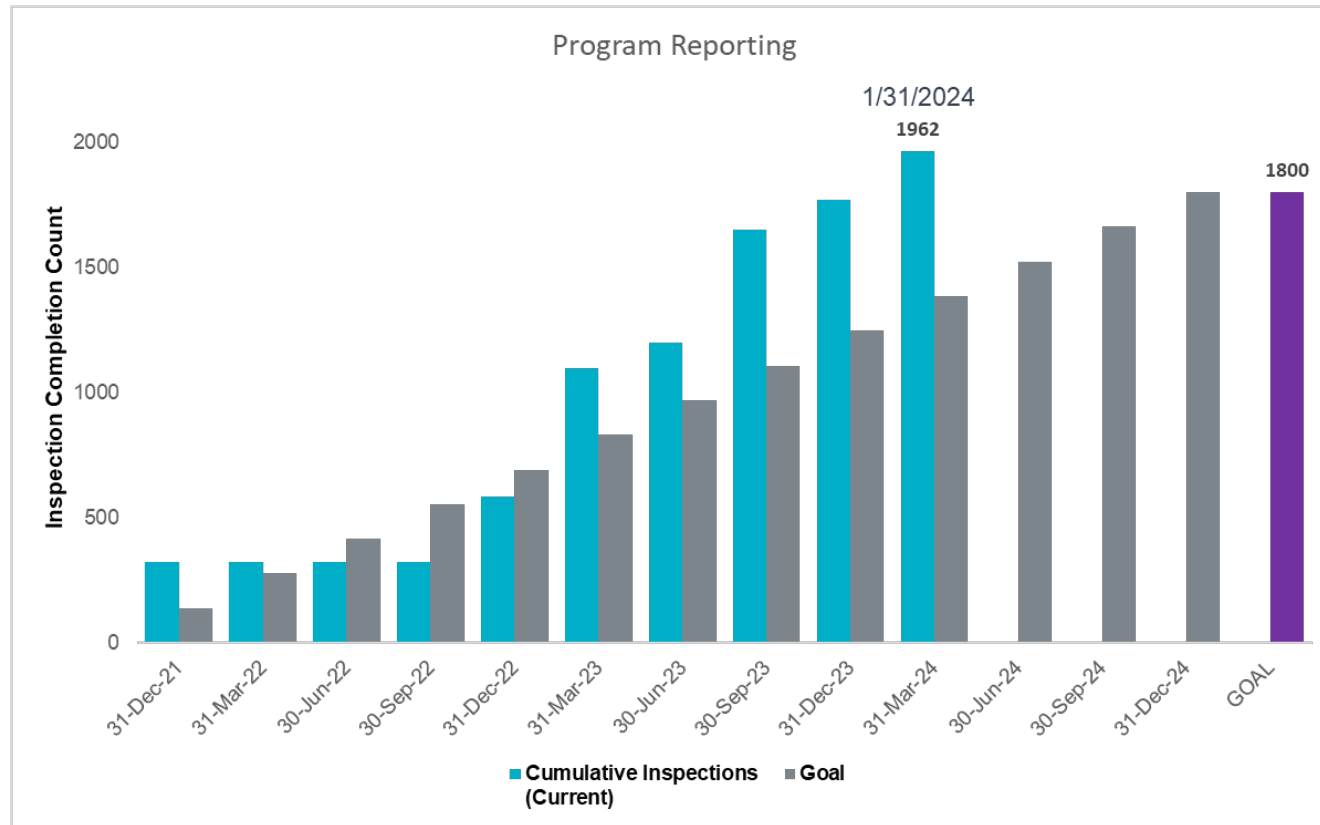
- **Key Takeaways**

- Weatherization and inspection program remains on track to PUC rule requirements as Winter continues.
- Solar and Battery Energy Storage continue to account for the vast percentage of generation capacity requesting new interconnection studies.
- ERCOT is tracking over 39 GW of Large Load interconnection requests.
- The March and April Monthly Outlook of Resource Adequacy (MORA) reports highlight the evening solar ramp hours are the riskiest 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. All ERCOT studies are expected to be complete in Q3-2024.
- Work is underway to develop the Commission directed Permian Basin Reliability Plan to identify transmission needs to accommodate the forecasted significant load growth in the area.

# Weatherization and Inspection – Winter Update

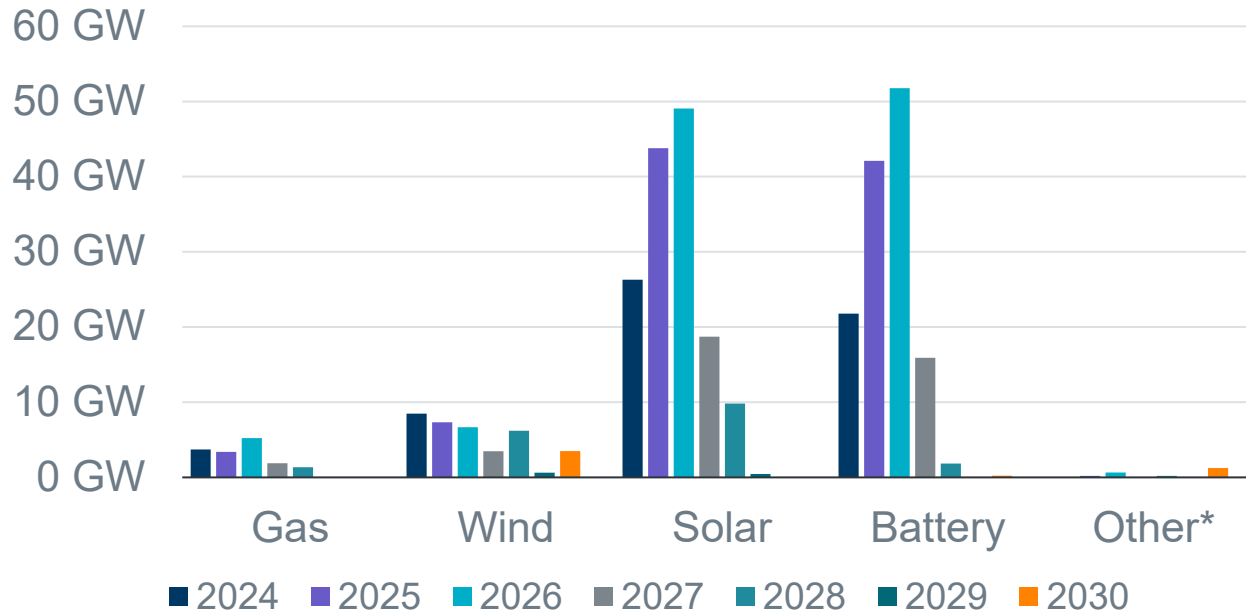
- One additional ERCOT inspector received their Certified Weatherization Inspector certification in January.
- ERCOT has completed 248 generation and 66 Transmission Service Provider (TSP) Winter Weatherization Inspections through the end of January.

- ERCOT anticipates inspecting more than 350 generation resources and more than 100 TSP facilities this winter.



# Generation Interconnection Requests

1,731 active generation interconnection requests totaling 335,835 MW as of January 31, 2024  
(Solar 148,135 MW, Wind 36,261 MW, Gas 15,546 MW, and Battery 133,592 MW)



A break-out by zone can be found in the monthly Generator Interconnection Status (GIS) reports available on the ERCOT Resource Adequacy Page: <http://www.ercot.com/gridinfo/resource>

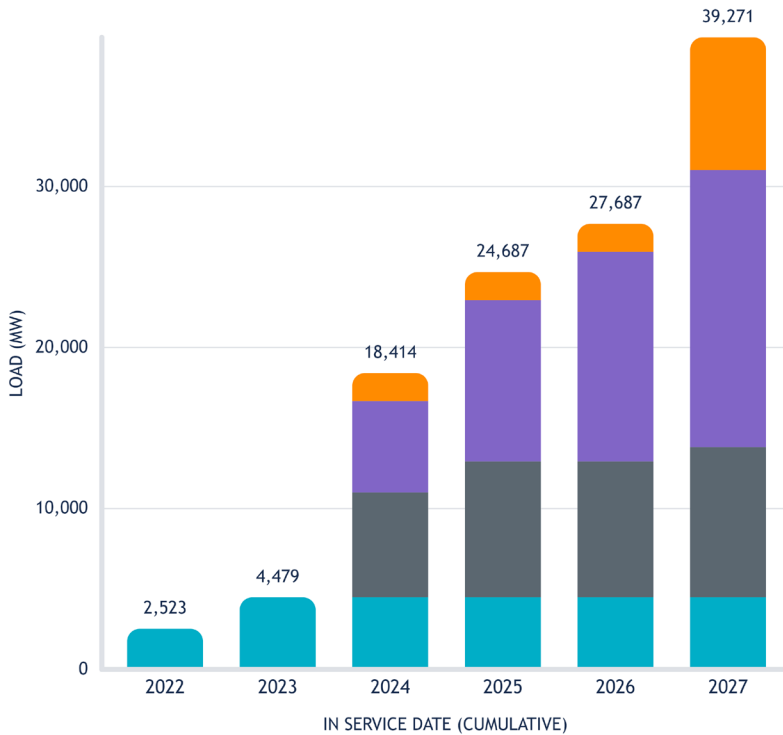
\* Other includes petroleum coke (pet coke), hydroelectric, fuel oil, geothermal energy, other miscellaneous fuels reported by developers, and fuel cells that use fuels other than natural gas.

**Key Takeaway:** Solar and Battery Energy Storage account for approximately 84% of the amount of generation seeking interconnection.



# Large Load Integration Overview

Actual and Projected LFL Growth 2022-2027



Project Status	2022	2023	2024	2025	2026	2027
No Studies Submitted	-	-	1,750	1,750	1,750	8,244.5
Under ERCOT Review	-	-	5,674	10,021	13,021	17,221
Planning Studies Approved	-	-	6,511	8,437	8,437	9,326.5
Approved to Energize	2,523	4,479	4,479	4,479	4,479	4,479
<b>Total (MW)</b>	<b>2,523</b>	<b>4,479</b>	<b>18,414</b>	<b>24,687</b>	<b>27,687</b>	<b>39,271</b>

- **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.

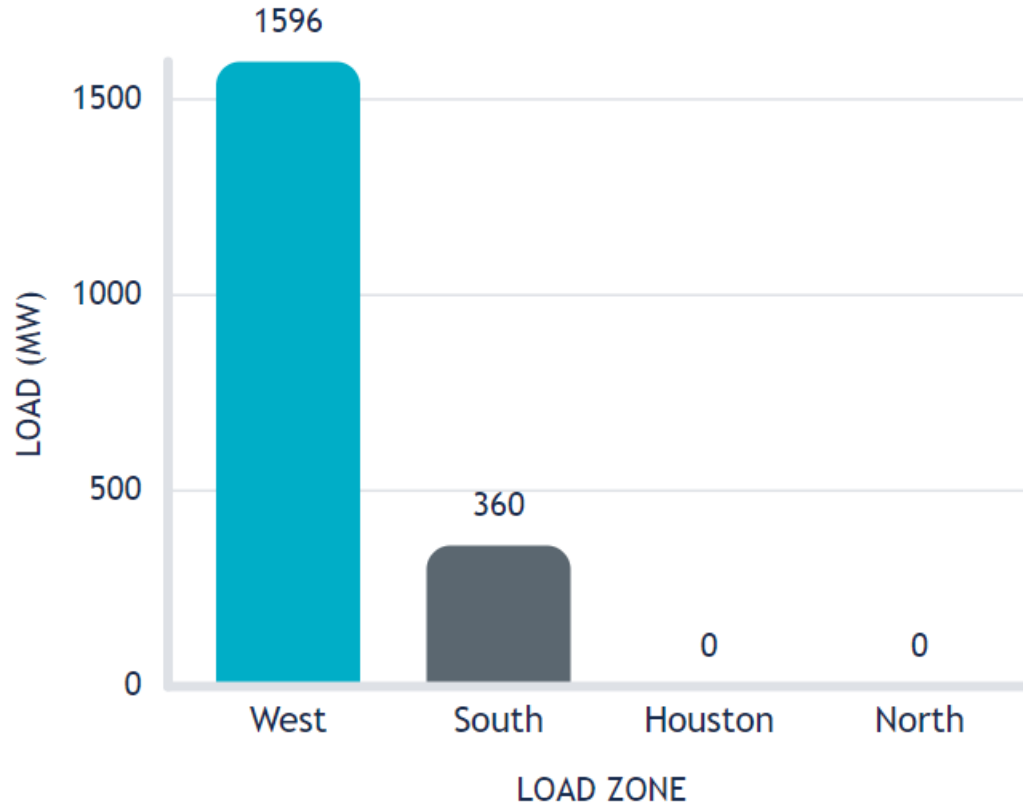
**Key Takeaway:** ERCOT continues to track over 39 GW of Large Load interconnection requests.

- Since January 2022, 4,479 MW approved to energize.
- Another 6,511 MW with proposed energization dates on or before December 31, 2024, have had planning studies reviewed and approved.



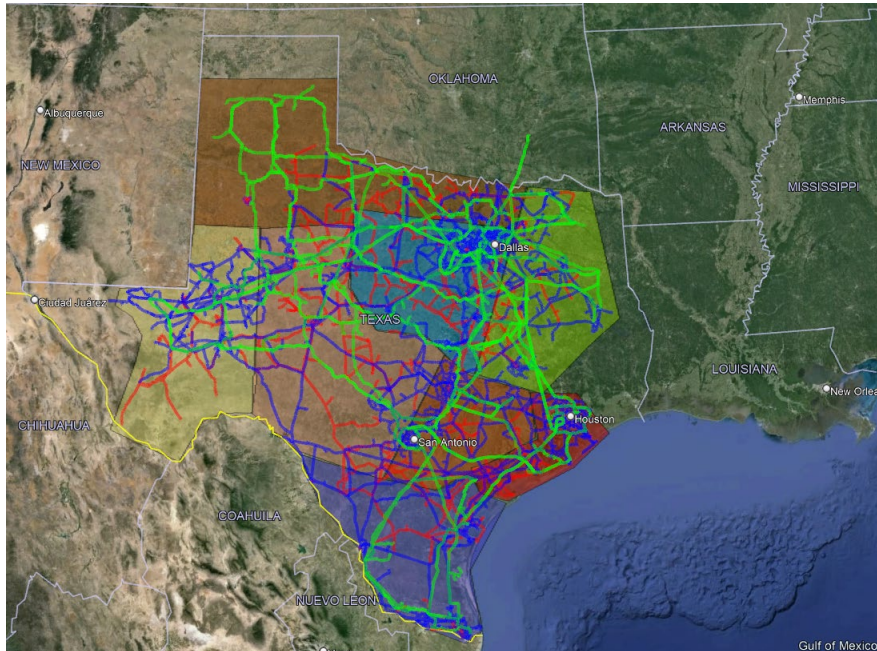
# Large Load Additions in 2023

## Approved to Energize Loads by Load Zone 2023

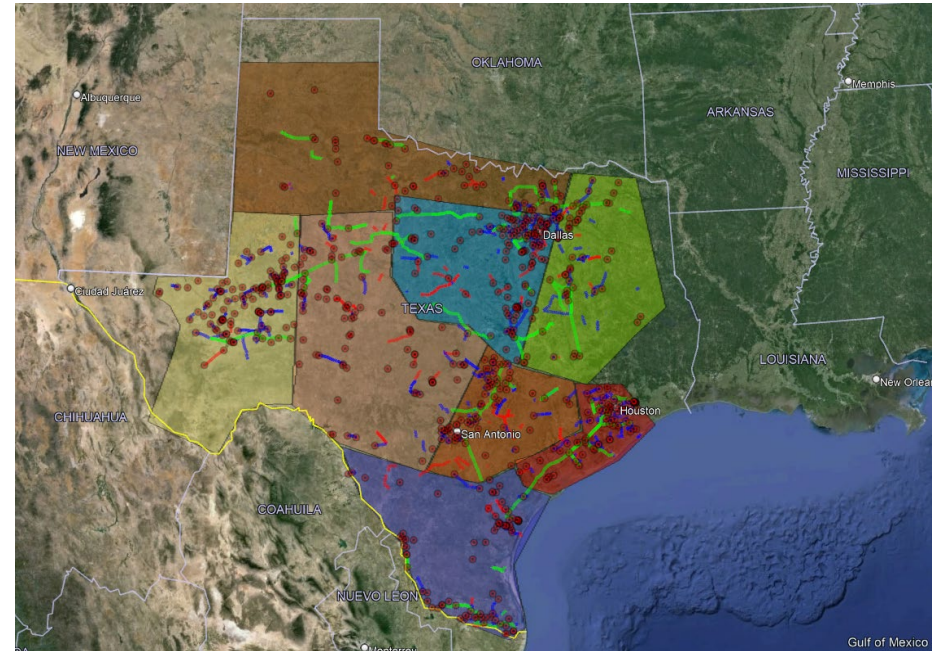


**Key Takeaway:** The large loads that were added to the system fell predominantly in the West Load Zone.

# ERCOT Model Changes to Existing Location in 2023



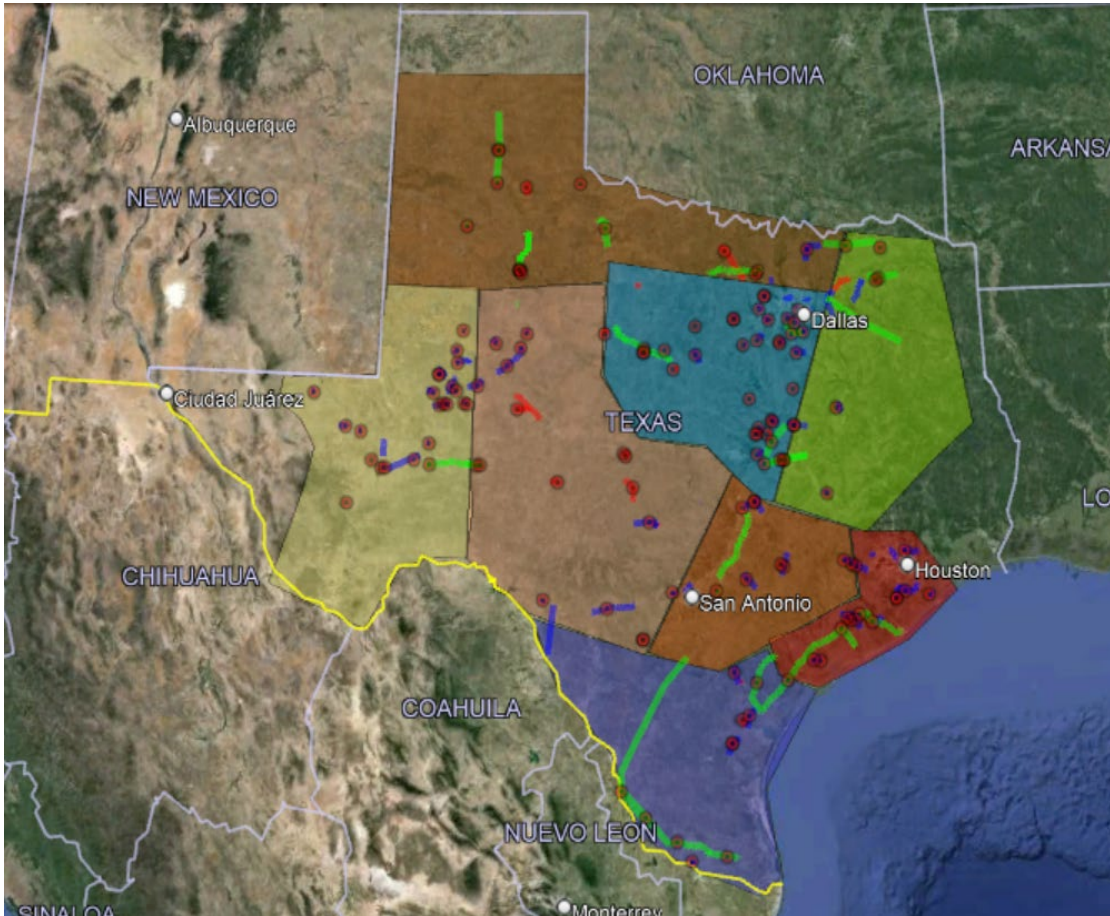
ERCOT System Representation  
December 2023



Existing locations with model changes  
made in 2023

**Key Takeaway:** A large volume of work is required to maintain the network model for an evolving grid.

# ERCOT Model Growth in 2023



## Substations

Total: 5,683

New: 121

## Transformers

Total: 2,424

New: 64

## Miles

Total: 54,142

New: 418

**Key Takeaway:** The grid continues to evolve to meet the demands of the growing Texas economy.



# Monthly Outlook on Resource Adequacy (MORA)

March/April 2024 reports published; 7 p.m. is the riskiest hour for March, whereas for April the riskiest hour is 8 p.m.

March

Hour Ending	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
	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.	99.99%	0.00%	0.00%
2 a.m.	99.99%	0.00%	0.00%
3 a.m.	100.00%	0.00%	0.00%
4 a.m.	100.00%	0.00%	0.00%
5 a.m.	99.99%	0.00%	0.00%
6 a.m.	100.00%	0.00%	0.00%
7 a.m.	99.97%	0.00%	0.00%
8 a.m.	99.96%	0.03%	0.03%
9 a.m.	99.98%	0.00%	0.00%
10 a.m.	100.00%	0.00%	0.00%
11 a.m.	100.00%	0.00%	0.00%
12 p.m.	100.00%	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.	99.89%	0.03%	0.02%
7 p.m.	98.97%	0.26%	0.12%
8 p.m.	99.45%	0.12%	0.05%
9 p.m.	99.85%	0.03%	0.00%
10 p.m.	99.98%	0.00%	0.00%
11 p.m.	100.00%	0.00%	0.00%
12 a.m.	99.99%	0.00%	0.00%

Note: Probabilities are not additive.

April

Hour Ending	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
	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.	100.00%	0.00%	0.00%
2 a.m.	100.00%	0.00%	0.00%
3 a.m.	100.00%	0.00%	0.00%
4 a.m.	100.00%	0.00%	0.00%
5 a.m.	100.00%	0.00%	0.00%
6 a.m.	100.00%	0.00%	0.00%
7 a.m.	100.00%	0.00%	0.00%
8 a.m.	100.00%	0.00%	0.00%
9 a.m.	100.00%	0.00%	0.00%
10 a.m.	100.00%	0.00%	0.00%
11 a.m.	100.00%	0.00%	0.00%
12 p.m.	100.00%	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.	100.00%	0.00%	0.00%
7 p.m.	94.18%	1.99%	0.99%
8 p.m.	93.26%	2.3%	1.30%
9 p.m.	98.26%	0.50%	0.28%
10 p.m.	99.64%	0.05%	0.00%
11 p.m.	100.00%	0.00%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.



# Monthly Outlook on Resource Adequacy (MORA)

Low wind scenarios for March and April indicate a small increase in the risk of emergency conditions; the risk increase is lower for April due to increasing evening-hour solar generation that helps offset the reduced wind.

March

Hour Ending	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
	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.	99.79%	0.08%	0.06%
2 a.m.	99.79%	0.08%	0.06%
3 a.m.	99.80%	0.09%	0.05%
4 a.m.	99.83%	0.09%	0.05%
5 a.m.	99.79%	0.08%	0.07%
6 a.m.	99.75%	0.12%	0.09%
7 a.m.	99.69%	0.19%	0.14%
8 a.m.	99.70%	0.16%	0.11%
9 a.m.	99.93%	0.04%	0.04%
10 a.m.	99.96%	0.03%	0.03%
11 a.m.	99.97%	0.02%	0.00%
12 p.m.	99.99%	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.	99.98%	0.00%	0.00%
4 p.m.	99.87%	0.00%	0.00%
5 p.m.	99.58%	0.06%	0.02%
6 p.m.	97.90%	0.33%	0.17%
7 p.m.	80.66%	6.67%	3.80%
8 p.m.	85.43%	3.73%	1.53%
9 p.m.	87.15%	3.12%	1.13%
10 p.m.	97.04%	0.11%	0.00%
11 p.m.	99.97%	0.00%	0.00%
12 a.m.	99.99%	0.00%	0.00%

Note: Probabilities are not additive.

April

Hour Ending	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
	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.	100.00%	0.00%	0.00%
2 a.m.	100.00%	0.00%	0.00%
3 a.m.	100.00%	0.00%	0.00%
4 a.m.	100.00%	0.00%	0.00%
5 a.m.	100.00%	0.00%	0.00%
6 a.m.	100.00%	0.00%	0.00%
7 a.m.	100.00%	0.00%	0.00%
8 a.m.	100.00%	0.00%	0.00%
9 a.m.	100.00%	0.00%	0.00%
10 a.m.	100.00%	0.00%	0.00%
11 a.m.	100.00%	0.00%	0.00%
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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.	99.96%	0.00%	0.00%
7 p.m.	80.69%	2.42%	0.76%
8 p.m.	70.40%	4.94%	1.83%
9 p.m.	91.49%	0.50%	0.06%
10 p.m.	99.59%	0.00%	0.00%
11 p.m.	100.00%	0.00%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.



# Reliability Standard, VOLL, and CONE Study Updates

- Reliability Standard:
  - Filed simulation results on January 11, 2024, reflecting the Commission’s requests for additional scenarios and assumption sensitivities.
  - The Commission agreed to postpone evaluating the reliability impact of the PCM’s net cost cap until PCM and cost cap design decisions have been made.
  - Filing contained a “next steps” proposal, accepted by the Commission, for additional simulations to develop a curve that shows the change in societal cost for each megawatt-hour of avoided unserved energy at different reliability levels. The lowest point on the curve is the optimal reliability level from a societal cost minimization standpoint.
- Value of Lost Load (VOLL):
  - VOLL survey plan filed with the Commission on December 7, 2023; results of the VOLL study literature review and interim VOLL estimate filed on December 21, 2023.
  - Based on Commission feedback, surveys will be rolled out around mid-March.
- Cost of New Entry (CONE):
  - Brattle Group/Sargent & Lundy (subcontractor) selected as the consulting team; project kicked off on January 5, 2024.

**Key Takeaway:** All studies are expected to be completed by Q3-2024.



# Permian Basin Reliability Plan Study

- In December 2023, the PUC directed ERCOT to develop the Permian Basin Reliability Plan and file a final reliability plan at the Commission in Project No. 55718 no later than July 2024.
- ERCOT has worked with the regional TSPs to obtain the S&P Global Permian Basin load forecast data as well as the updated additional non-oil & gas load data.

	2021 Permian Basin Study 2030 Case	2023 RTP Study 2029 Case	Permian Basin Reliability Plan Study 2030 Case	Permian Basin Reliability Plan Study 2038 Case
Permian Basin Total Load	10,527	16,577	23,958	26,700
Permian Basin Oil & Gas Load	10,527	12,341	11,964	14,705
Additional Load	0	4,236	11,995	11,995

- The total load in the Permian Basin is extremely high. For reference, the total non-coincident peak load modeled in the 2023 Regional Transmission Plan case for 2029 was 29.8 GW for the Coast Weather Zone and 32.5 GW for the North Central Weather Zone.
- The Permian Basin lacks local conventional generation compared to the Coast and North Central Weather Zones.
- During Q1-2024, ERCOT will identify the reliability need in the Permian Basin and begin to identify the transmission projects to address the identified need.

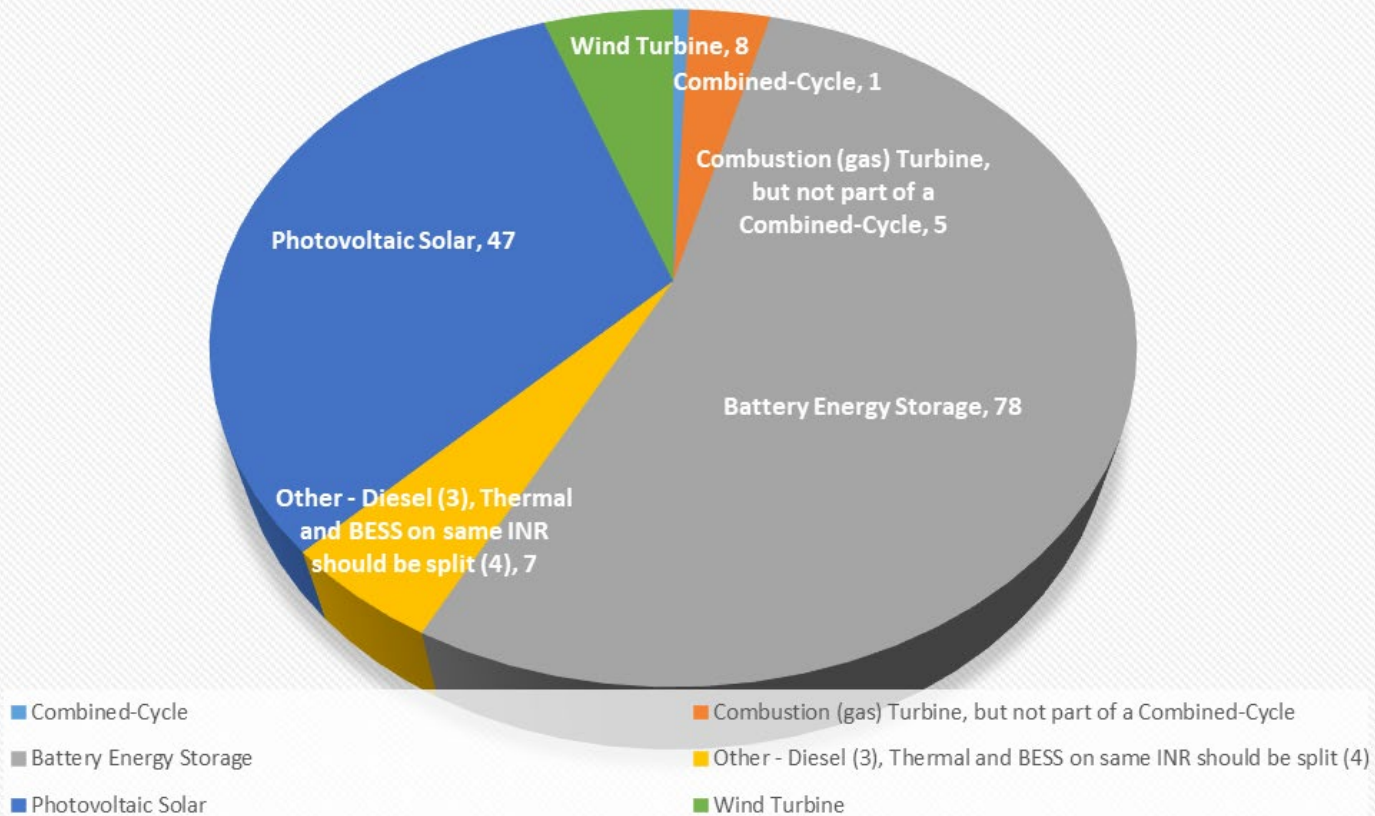
**Key Takeaway:** There is a significant increase in the load growth forecast for the Permian Basin area which will require additional transmission projects.



# Appendix

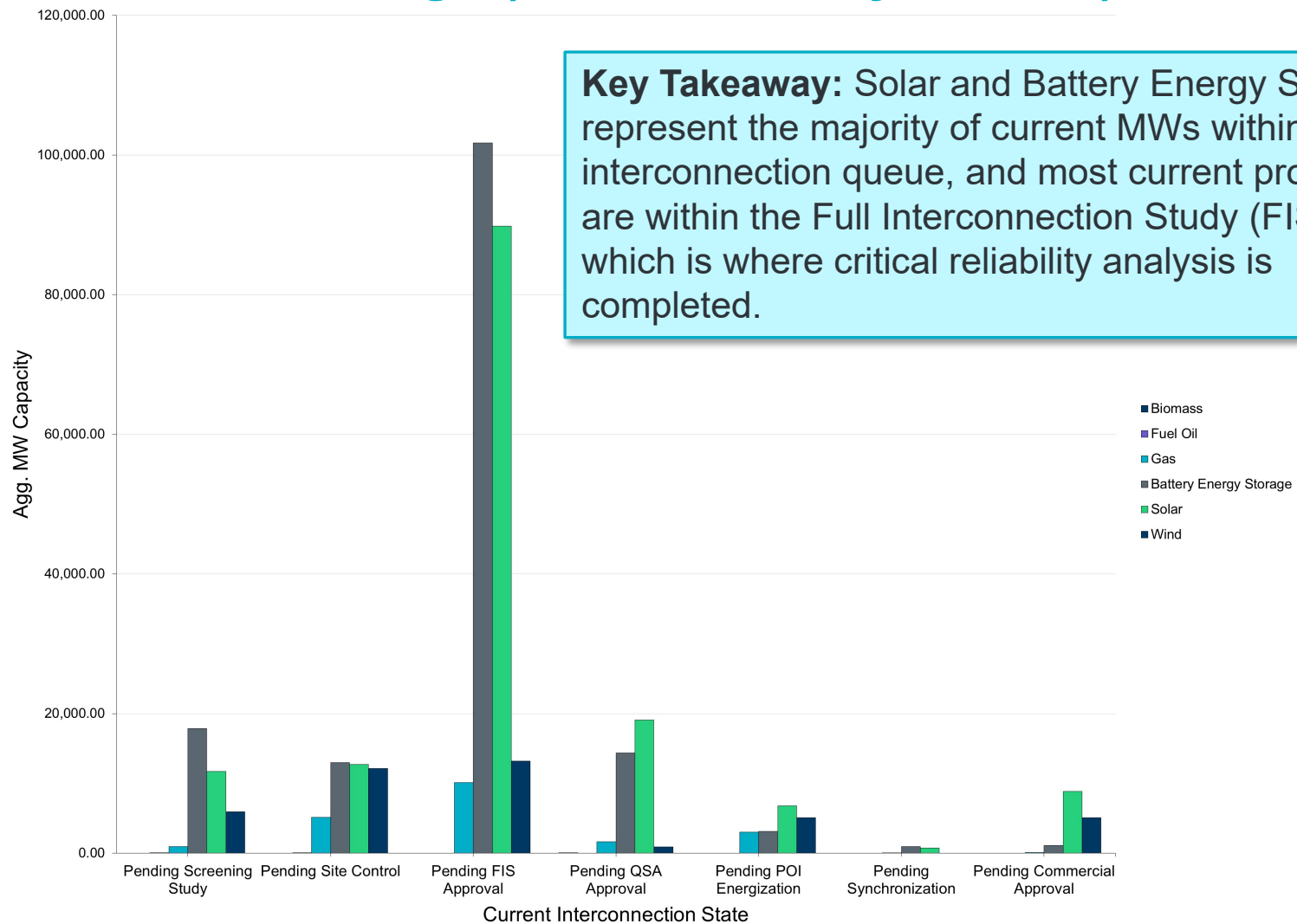
# Generation Interconnection Activity

## Applications Received in the last 60 days by Fuel



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

# Generation Resource Project MWs by Fuel Type and Interconnection Stage (as of February 9, 2024)



# 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
- ERCOT has endorsed transmission projects totaling \$3.231 billion in 2023.
  - Total endorsed transmission projects in 2022 equaled \$3.311 billion
- As of February 1, 2024 projects in engineering, routing, licensing, and construction total about \$13.933 billion.

