



Item 8.1: System Planning and Weatherization Update

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Reliability and Markets Committee Meeting

ERCOT Public

April 22, 2024

Overview

- **Purpose**

Provide an update on recent activity related to planning, modeling, generation interconnection, resource adequacy and weatherization

- **Voting Items / Requests**

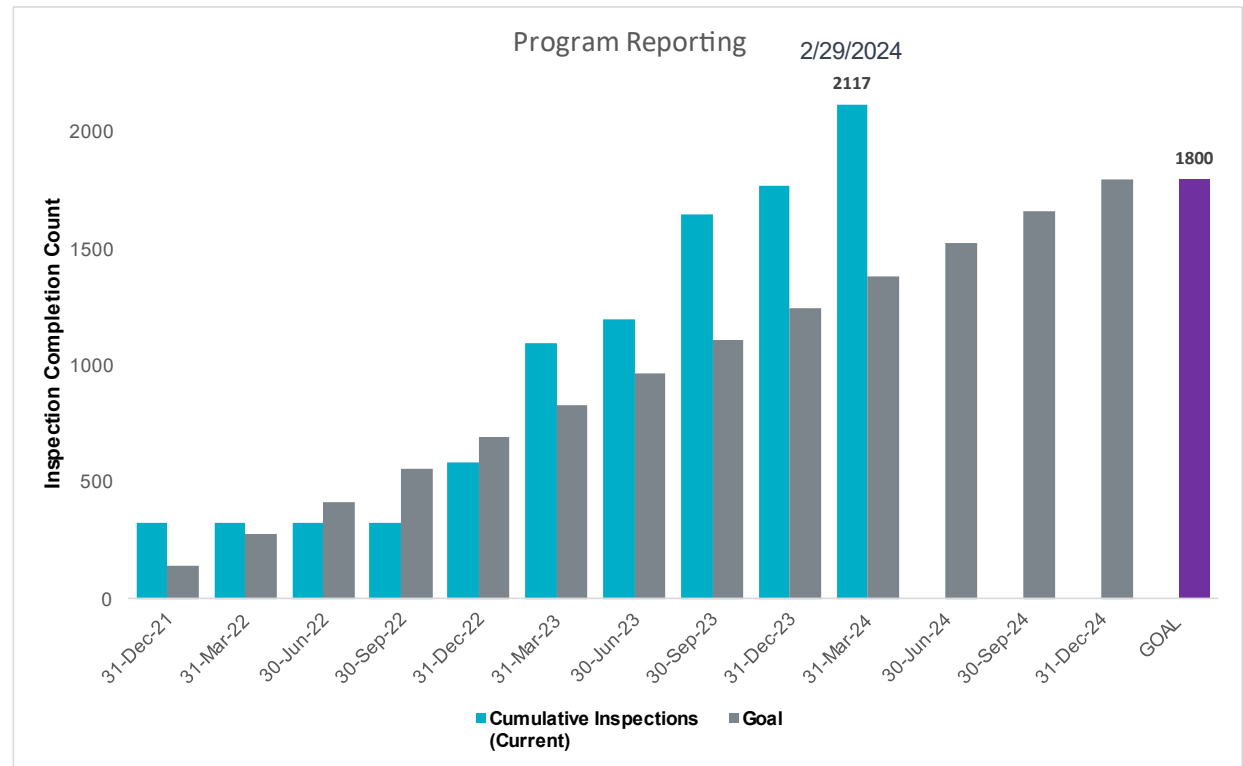
No action is requested of the Reliability and Markets (R&M) Committee or Board; for discussion only

- **Key Takeaways**

- The Weatherization Inspection Program remains on track to meet PUC requirements with winter 2023-2024 inspections completed. Summer preparations are underway.
- Development of the PUC directed Permian Basin Reliability Plan is ongoing to identify transmission needed to accommodate the significant forecasted Load growth in the area.
- With HB5066's new transmission planning rules for additional Load inclusion, a challenge has arisen to model future generation to meet the significant projected 2030 Load growth forecast.
- Solar and Battery Energy Storage continue to account for the vast percentage of generation capacity requesting new interconnection studies.
- As ERCOT is tracking almost 41 GW of Large Load interconnection requests, work with stakeholders continues to define rules to move forward where there is consensus and mitigate reliability risks on topics where there is not.
- ERCOT continues working with the PUC to make progress on the Reliability Standard, Value of Lost Load and Cost of New Entry studies.

Weatherization and Inspection – Winter Review

- ERCOT completed 340 generation resource and 129 TSP Winter Weatherization Inspections to bring total completed inspections to date to 2,117.
- Systemwide non-IRR forced outage levels have improved since Winter Storm Uri as demonstrated by reliable performance during three significant winter storms:
 - February 2022
 - Elliott (December 2022)
 - Heather (January 2024)



Key Takeaway: The Weatherization Inspection Program remains on track to PUC rule requirements with this winter's inspections completed.

Weatherization and Inspection – Summer Preparation

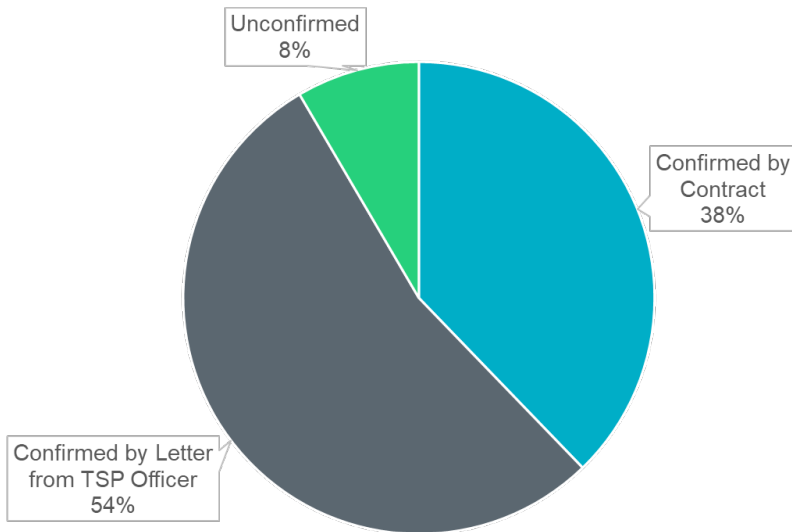
- ERCOT has set a goal to complete approximately 600 summer inspections.
- A Summer Weatherization Workshop is scheduled for April 26, 2024.
- A new software platform for weatherization interactions between ERCOT and Market Participants will go-live on May 1, 2024.
- Two ERCOT inspectors, Greg Schwierking and Alan Allgower, received their Certified Weatherization Inspector (CWI) certifications in March, bringing the total to seven CWIs.



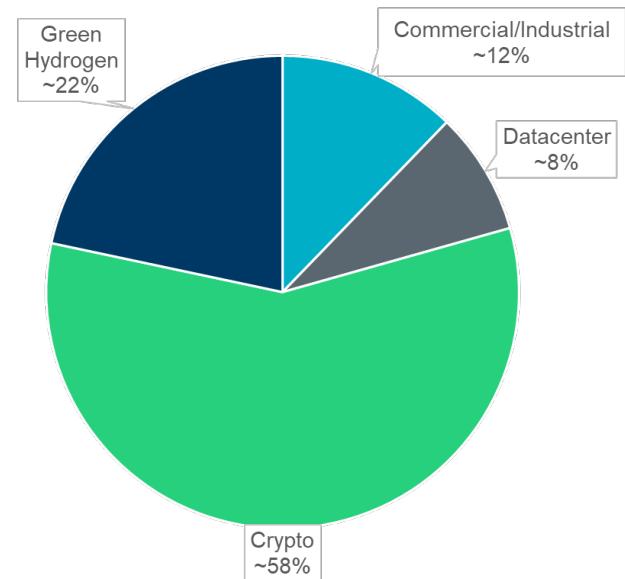
Permian Basin Reliability Plan Study - Update

- Per House Bill 5066 (HB5066), the PUC directed ERCOT to develop a Permian Basin Reliability Plan and file a final plan at the Commission no later than July 2024.
- Based on Load forecast data provided by the TSPs, ERCOT is studying a total Permian Basin Load for 2030 of 23,959 MW (11,964 MW oil & gas and 11,995 MW additional Load).

Breakdown for 11,995 MW of additional non-oil & gas load by confirmation status



Breakdown for 11,995 MW of additional non-oil & gas load by type



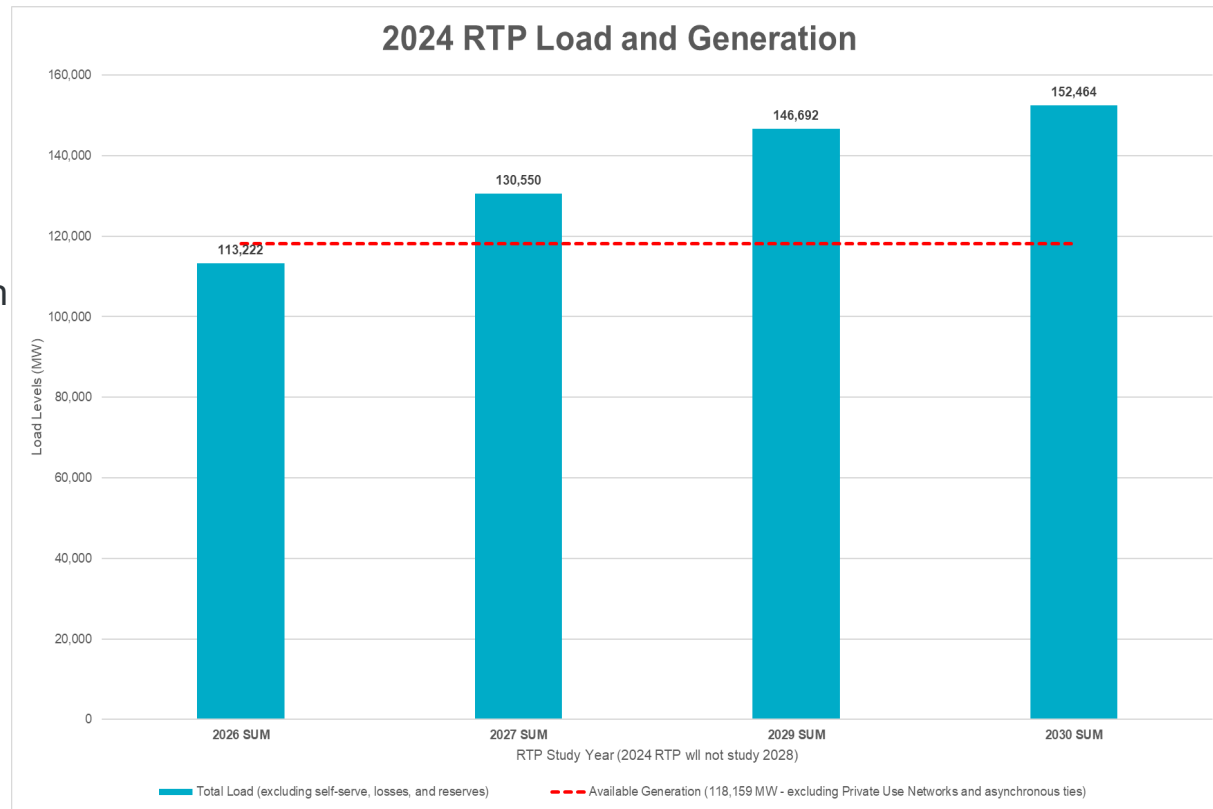
- Initial study indicates substantial amounts of local transmission projects will be needed to serve incremental Loads in the Permian Basin region.
- In addition, significant regional transmission upgrades will be needed to transfer power across the ERCOT System, which ERCOT will soon begin evaluating.

2024 Regional Transmission Plan (RTP)

- Recent amendments to PUC Substantive Rule 25.101, Certification Criteria, include the requirement for any review conducted by ERCOT to incorporate historical Load, forecasted Load growth, and additional Load currently seeking interconnection.
- HB5066 included an additional requirement to consider Load for which the electric utility has yet to sign an interconnection agreement, as determined by the electric utility with the responsibility to serve the Load.
- Compared to historical RTPs, significant amounts of large Load were submitted by the TSPs during the 2024 RTP Load review.

For the 2030 summer peak case:

- Load is 152.5 GW (or 164 GW with self-serve Load, losses & reserves included).
- Available generation is less than 119 GW excluding Private Use Networks (PUNs).
- ERCOT is reviewing potential solutions for the generation imbalance, which may include adding Generation Resources not meeting current Planning Guide 6.9(1) requirements.

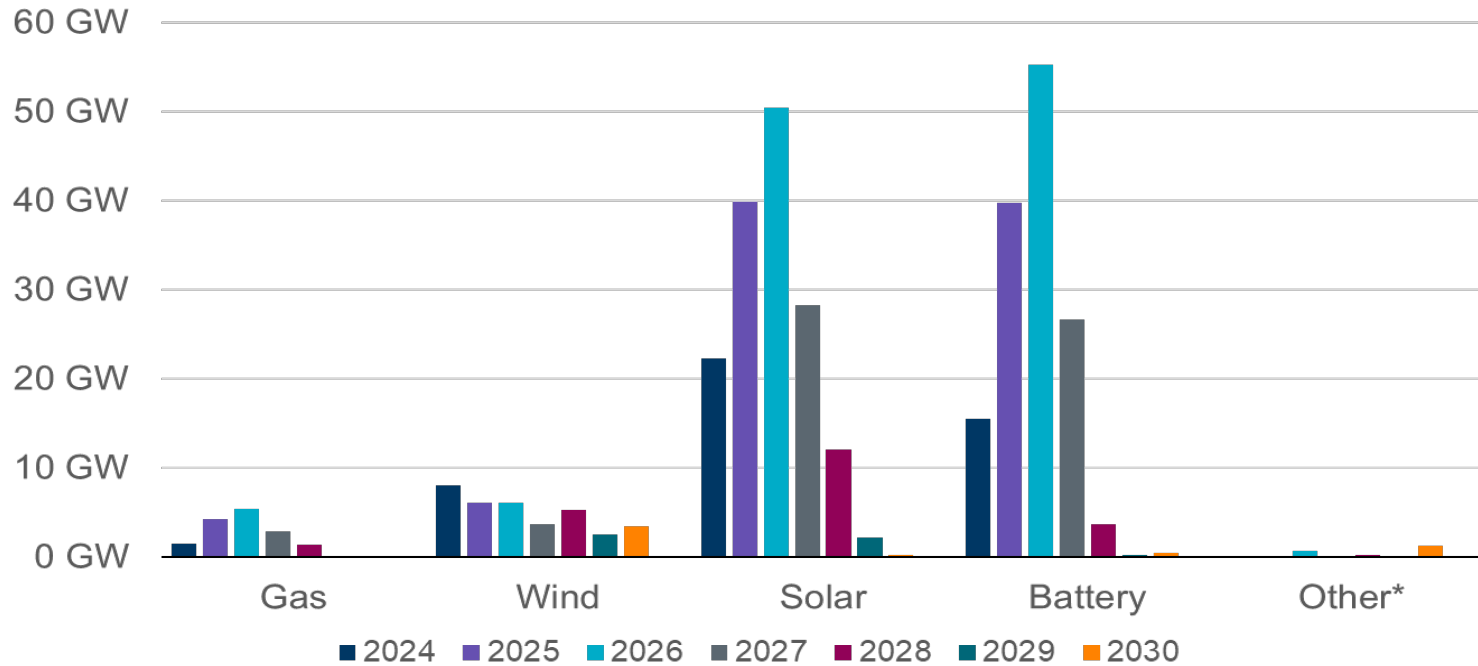


Key Takeaway: The required inclusion of additional load projections has led to challenges in modeling future generation to meet the 2030 load growth forecast.

Generation Interconnection Requests

1,775 active generation interconnection requests totaling 346 GW as of March 31, 2024
(Solar 155 GW, Wind 35 GW, Gas 15 GW, and Battery 141 GW)

(Excludes capacity associated with projects designated as Inactive per Planning Guide Section 5.7.6)



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>

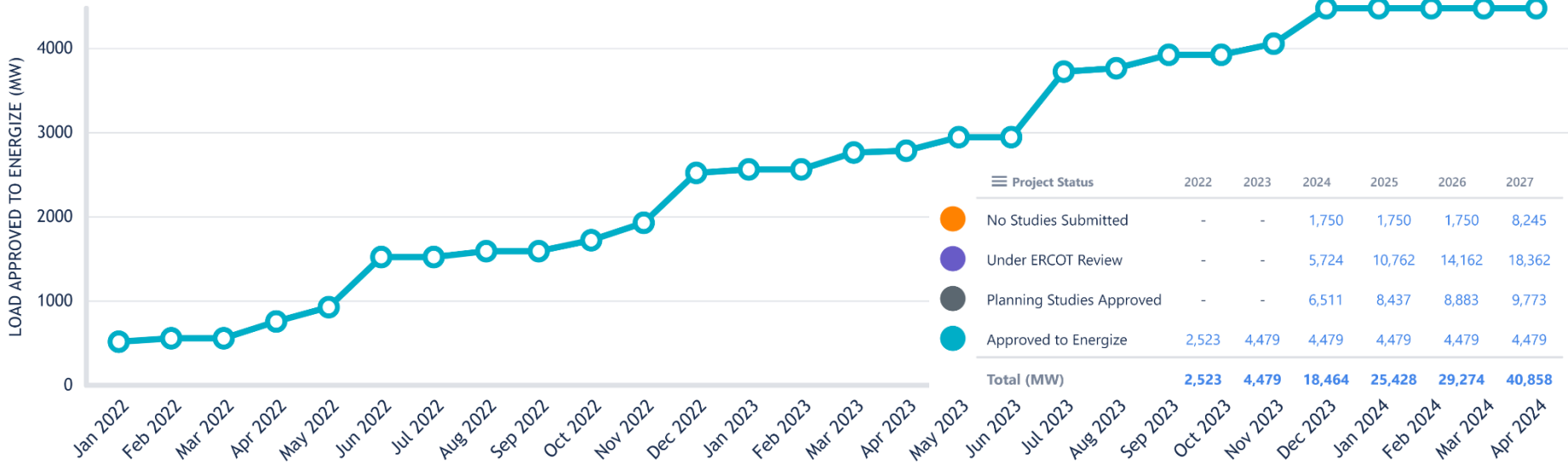
* Other includes petroleum coke (pet coke), hydroelectric, fuel oil, geothermal energy, other miscellaneous fuels reported by developers, and fuel cells that use fuels other than natural gas.

Key Takeaway: Solar and Battery Energy Storage account for over 85% of the amount of generation seeking interconnection.



Large Load Integration Overview

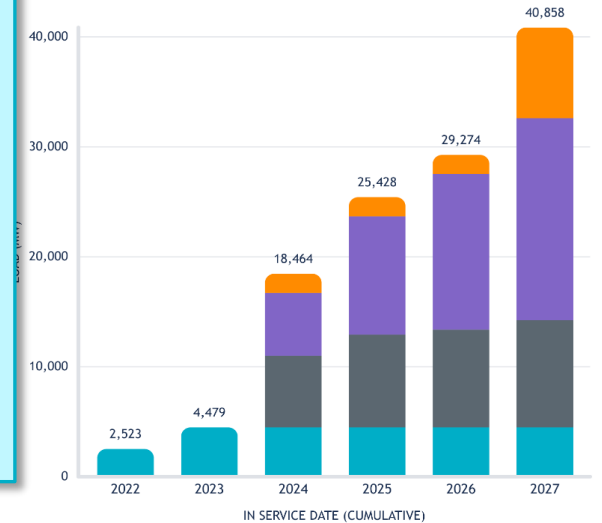
Large Loads Approved to Energize - Growth Since 2022



Key Takeaways

- 4,479 MW of Large Load have been approved to energize in the past 2 years.
 - Of these, 2,844 MW is believed to be operational
 - Remaining 1,635 MW may energize at any time without additional approval
- The amount of Large Load connected to the ERCOT grid is projected to continue growing rapidly.
- Work continues with the Large Flexible Load Task Force on rules to move forward where there is consensus and mitigate reliability risks on topics where there is not.

Actual and Projected LFL Growth 2022-2027



Reliability Standard, VOLL, and CONE Study Updates

- Reliability Standard:
 - Filed phase 4 simulations with the PUC on April 4, 2024, reflecting:
 - A more recent base-case resource mix (December 2023 CDR)
 - A narrower range of Loss-of-Load Expectation (LOLE) frequency values with more increments within that range
 - Incremental system cost information to assist in comparing the cost impacts of setting the frequency, maximum magnitude and maximum duration criteria to specific values
 - A whitepaper with guidance on interpreting and selecting reliability criteria values
- Value of Lost Load (VOLL):
 - A “Soft” Competitive Area survey was launched on March 26th, followed by full roll-out and Non-Opt-In Entity (NOIE) customer survey on April 16th
 - Survey will remain open until May 17th

Key Takeaway: ERCOT has completed current requested analysis for the Reliability Standard. VOLL analysis is expected to be completed by Q3-2024.

Reliability Standard, VOLL, and CONE Study Updates

- Cost of New Entry (CONE):
 - Reference technologies selected for study:
 - Proenergy LM6000PC aeroderivative combustion turbines (six units) sited in Harris County
 - An alternative technology, represented by a hybrid solar-storage facility consisting of 200 MW of photovoltaic capacity and 100 MW of battery energy storage capacity located in Brazoria County
 - Reference technologies presented at the March 22nd Supply Analysis Working Group; solicited comments on the reference technology specifications as well as on the after-tax Weighted Average Cost of Capital, a key financial parameter
 - Brattle began development of technology cost estimates and the associated parameters for financial modeling
 - On track to deliver draft study report in late April and the final by the end of May
 - Another deliverable is an Excel-based CONE model for sensitivity analysis and CONE updates prior to the next CONE study

Key Takeaway: CONE deliverables are expected to be completed by the end of May 2024.

Appendix

Monthly Outlook on Resource Adequacy (MORA)

May and June 2024 reports published; EEA risk is negligible for both months with the highest risk hour transitioning from 8 to 9 p.m.

May

Hour Ending (CDT)	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.	99.97%	0.00%	0.00%
7 p.m.	99.94%	0.00%	0.00%
8 p.m.	99.43%	0.17%	0.09%
9 p.m.	97.91%	0.64%	0.37%
10 p.m.	99.53%	0.08%	0.05%
11 p.m.	99.97%	0.00%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.

June

Hour Ending (CDT)	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.	99.99%	0.00%	0.00%
6 p.m.	99.98%	0.00%	0.00%
7 p.m.	99.99%	0.00%	0.00%
8 p.m.	99.89%	0.02%	0.00%
9 p.m.	99.35%	0.18%	0.04%
10 p.m.	99.68%	0.02%	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 May and June indicate a small increase in the risk of emergency conditions; the risk increase is lower for June due to increasing evening-hour solar generation that helps offset the reduced wind.

May
Low
Wind

Hour Ending (CDT)	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%
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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.	99.98%	0.00%	0.00%
7 p.m.	99.95%	0.00%	0.00%
8 p.m.	97.50%	0.39%	0.18%
9 p.m.	86.28%	3.92%	1.73%
10 p.m.	98.51%	0.20%	0.03%
11 p.m.	99.97%	0.00%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.

June
Low
Wind

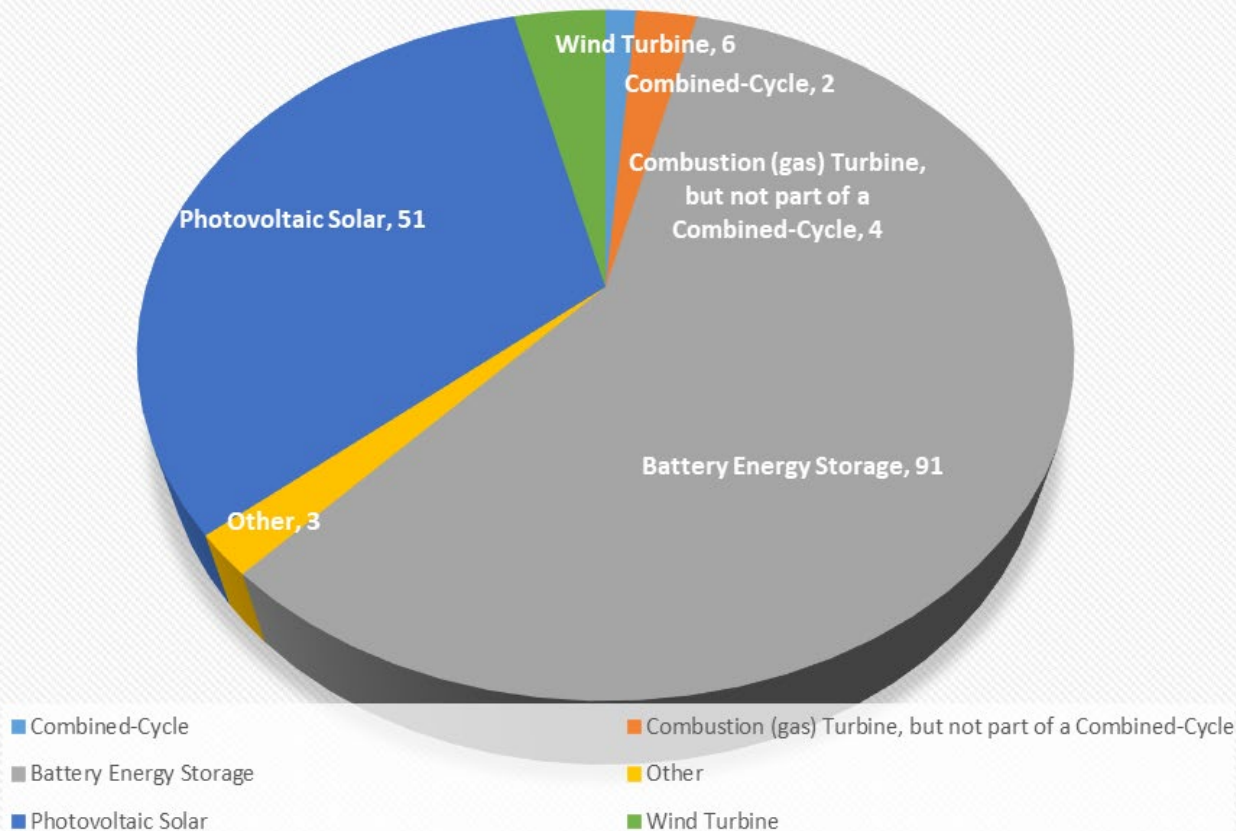
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3 p.m.	100.00%	0.00%	0.00%
4 p.m.	100.00%	0.00%	0.00%
5 p.m.	99.95%	0.00%	0.00%
6 p.m.	99.89%	0.00%	0.00%
7 p.m.	99.95%	0.00%	0.00%
8 p.m.	97.58%	0.12%	0.05%
9 p.m.	93.17%	1.08%	0.27%
10 p.m.	99.93%	0.00%	0.00%
11 p.m.	100.00%	0.00%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.



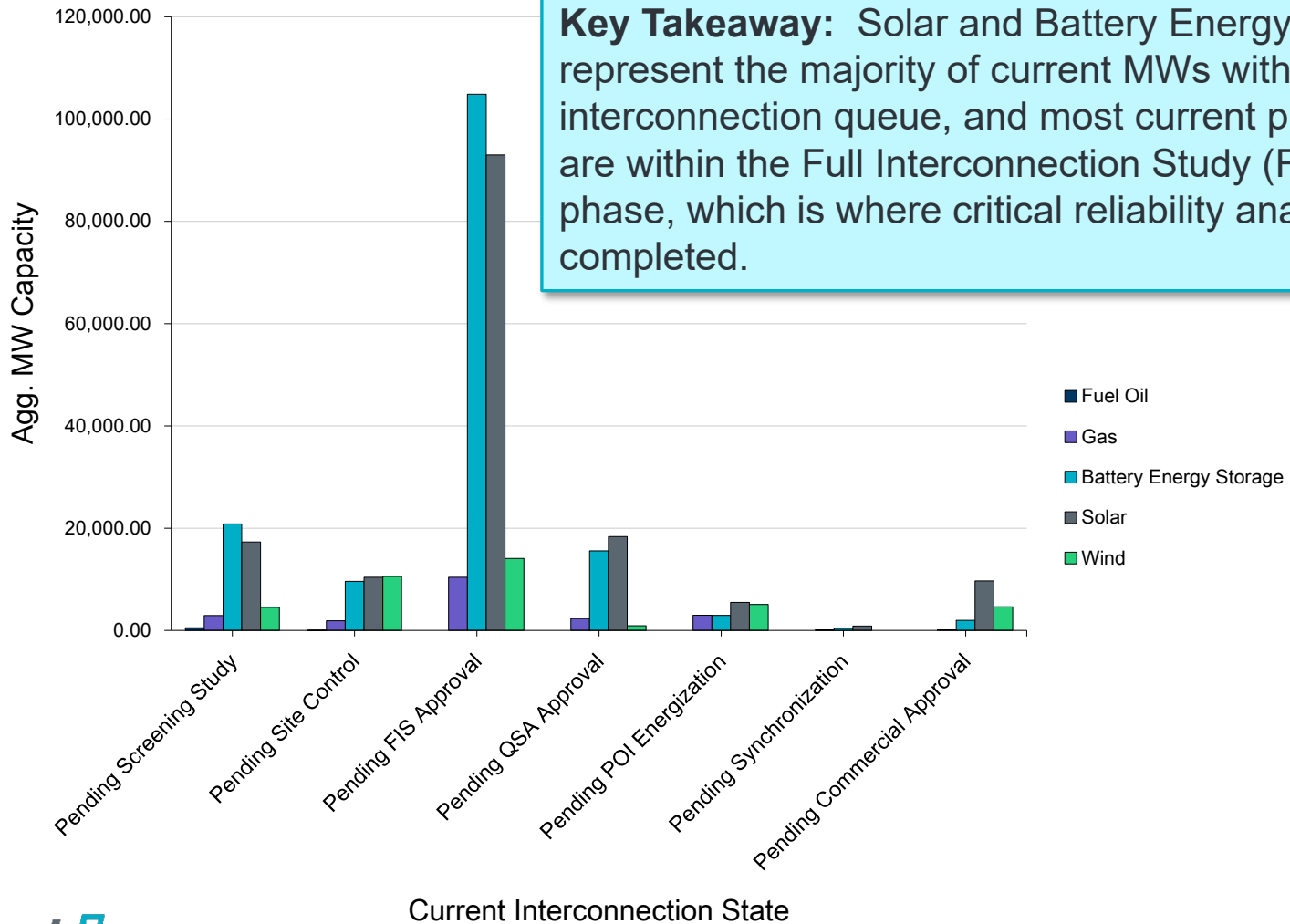
Generation Interconnection Activity (as of April 4, 2024)

Applications Received in the last 60 days by Fuel



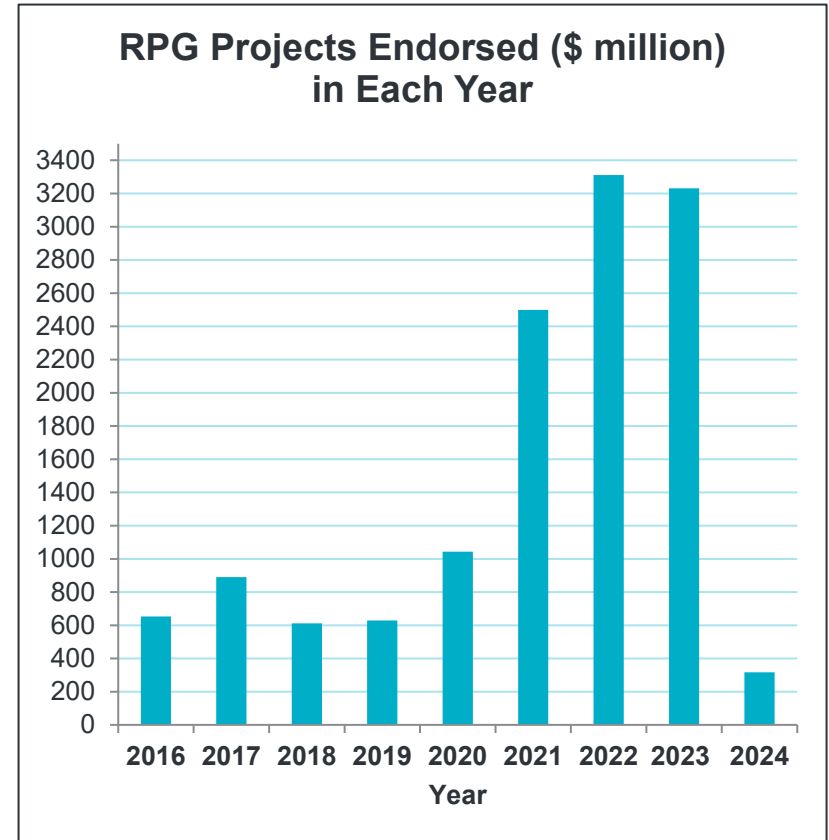
Key Takeaway: Battery Energy Storage continues to be the most active generation type requesting interconnection studies.

Generation Resource Project MWs by Fuel Type and Interconnection Stage (as of April 5, 2024)



Transmission Planning Summary

- As of February 1, 2024, projects energized in 2024 total about \$789.5 million.
 - \$1.553 billion energized in all of 2023
- As of February 29, 2024, ERCOT has endorsed transmission projects totaling \$317.3 million in 2024.
 - Total endorsed transmission projects in 2023 equaled \$3.231 billion
- As of February 1, 2024, projects in engineering, routing, licensing, and construction total about \$13.933 billion.



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