



ERCOT and the State of the Power Industry
Baker Institute Annual Energy Summit

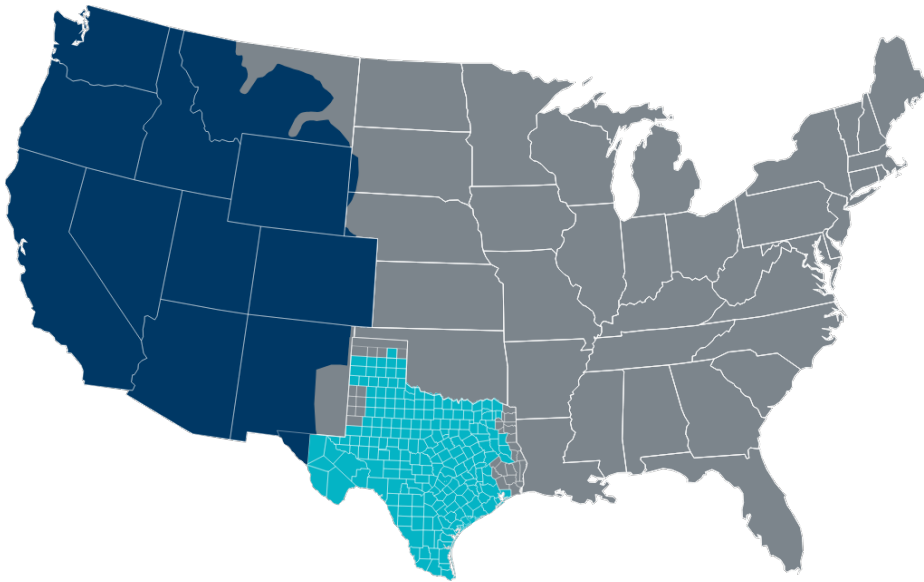
Chad V. Seely
ERCOT Senior Vice President and General Counsel

October 2, 2024

Key Takeaways:

- The ERCOT grid continues to face increasing demand driven by economic growth and more impactful extreme weather.
- There is tremendous forecasted electric growth in the next 5-7 years, which is driving the need for ERCOT to adapt and plan differently for the future.
 - The volume of Large Load (greater than 75 MW) connected to the ERCOT grid is projected to continue growing rapidly.
 - Demand for electric transmission in the Permian Basin is rapidly growing; the September 26, 2024, PUCT Open Meeting is the first major step forward.
 - Recommended transmission projects are expected to far exceed prior annual average infrastructure projects.
- Long-term supply in the interconnection queue is mainly solar and batteries; we need more thermal dispatchable Resources.
- Real-Time Co-optimization and Dispatchable Reliability Reserve Service are future market design changes that will provide more flexibility to reduce energy costs and improve grid reliability.
- The Weatherization Inspection Program has had positive impacts on Generation Resource and Transmission Facility weather preparation requirements.

The ERCOT Region



US

Interconnections

 **Western Interconnection**
Includes El Paso and Far West Texas

 **ERCOT Interconnection**

 **Eastern Interconnection**
Includes portions of East Texas and Panhandle region


~2.0x CAISO
Transmission Lines


~1.7x New England
ISO Customer
Base

The ERCOT grid is the interconnected electrical system serving most of Texas with limited external connections.

ERCOT highlights include:

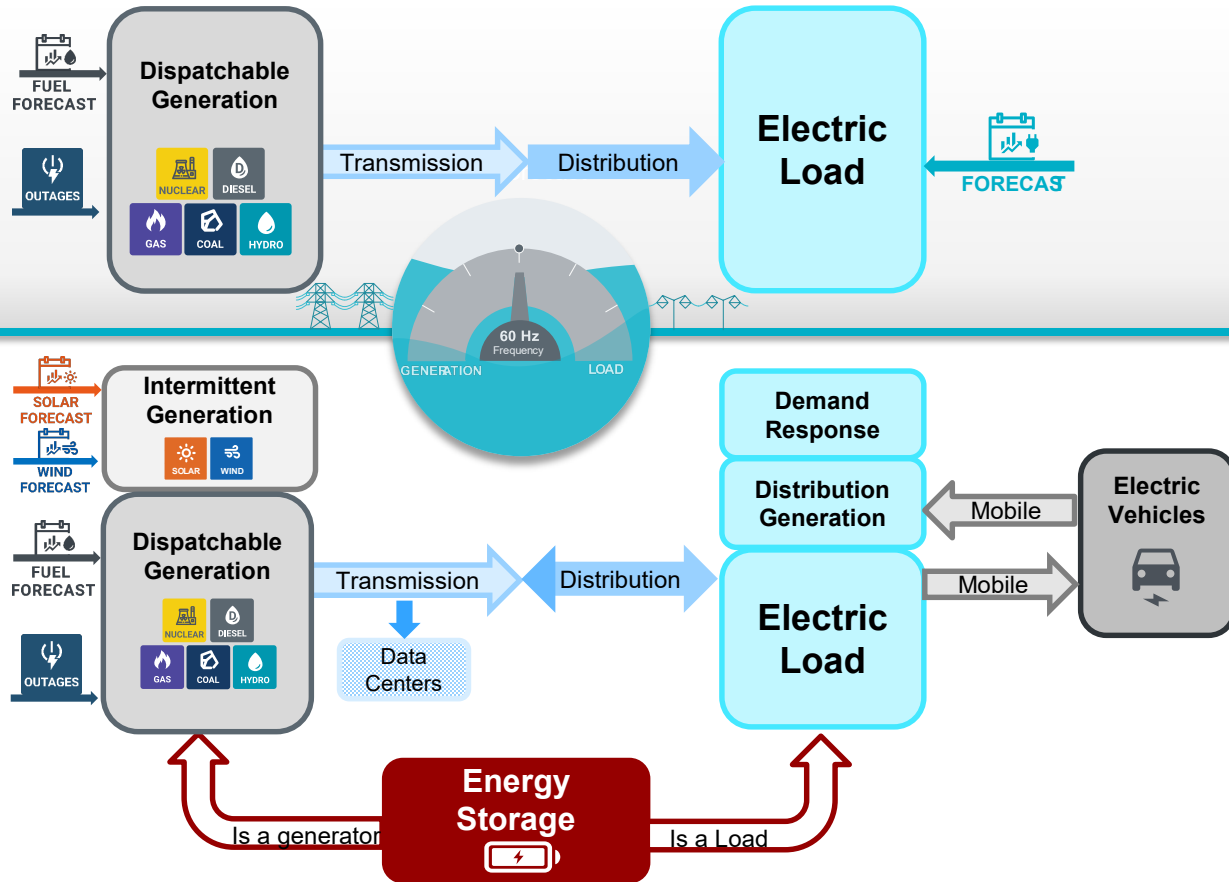
- 27+ million customers in the region
- 90% of Texas electric load; 75% of Texas land
- 85,508 MW peak demand record (8/10/23)
- More than 54,100 miles of transmission lines
- 1,250+ generation units (including PUNs)
- ERCOT connections to other grids are limited to ~1,220 MW of direct current (DC) ties, which allow control overflow of electricity.

Key ERCOT Facts

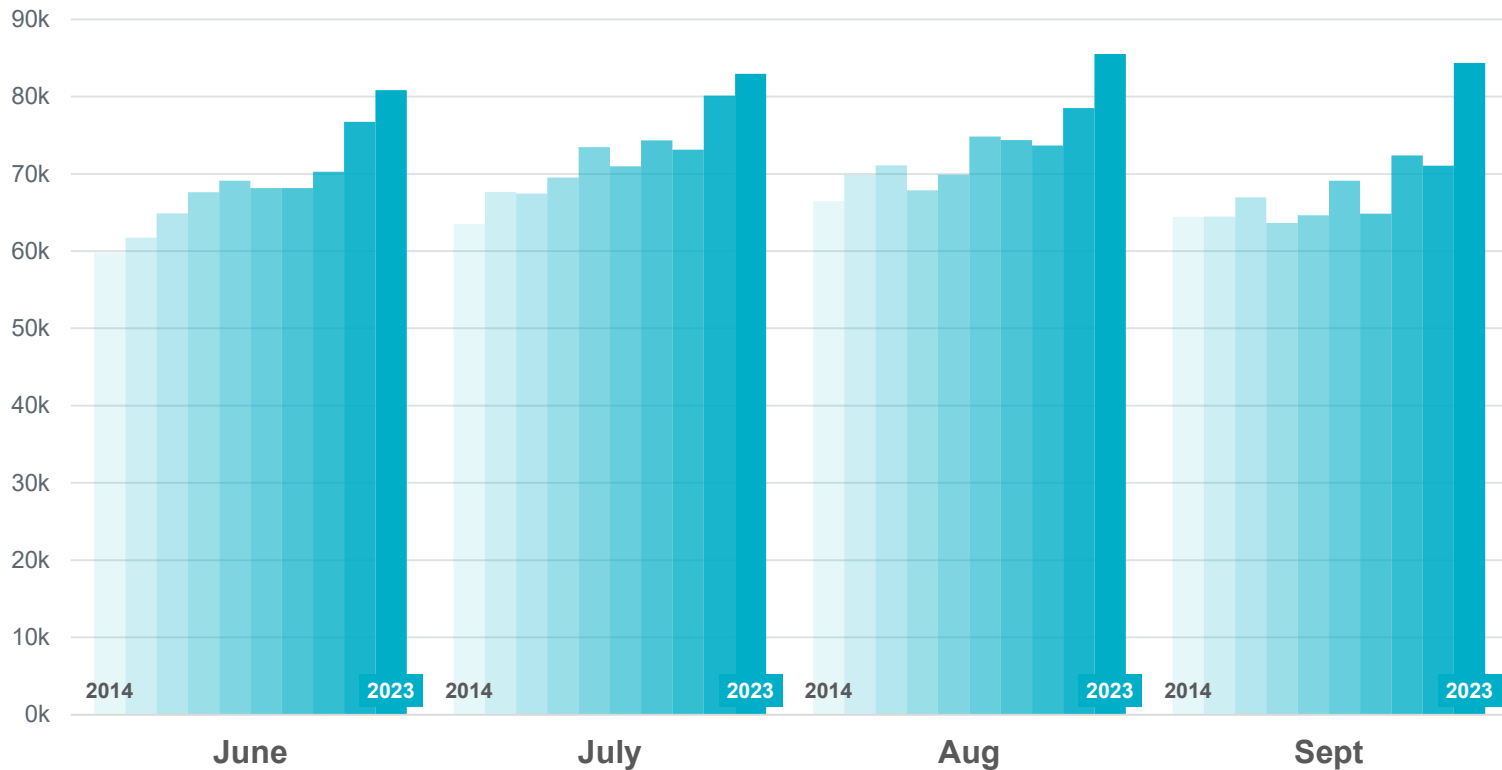
Fact Sheet (September 2024)

1,873+	active Market Participants that generate, move, buy, sell, or use wholesale electricity
54,100+	miles of high-voltage transmission
103,609+ MW	expected capacity for Summer 2024 peak demand
39,450 MW	of installed wind capacity as of June 2024, the most of any state in the nation
25,333 MW	of utility-scale installed solar capacity as of June 2024
7,702 MW	of installed battery storage as of June 2024
27,881 MW	wind generation record (June 17, 2024)
21,667 MW	solar generation record (September 8, 2024)
\$3.3 billion	transmission projects endorsed in 2022
\$1.553 billion	transmission projects energized in 2023

The ERCOT Electric Grid: Then and Now



Summer Demand by Month Over Last 10 Years

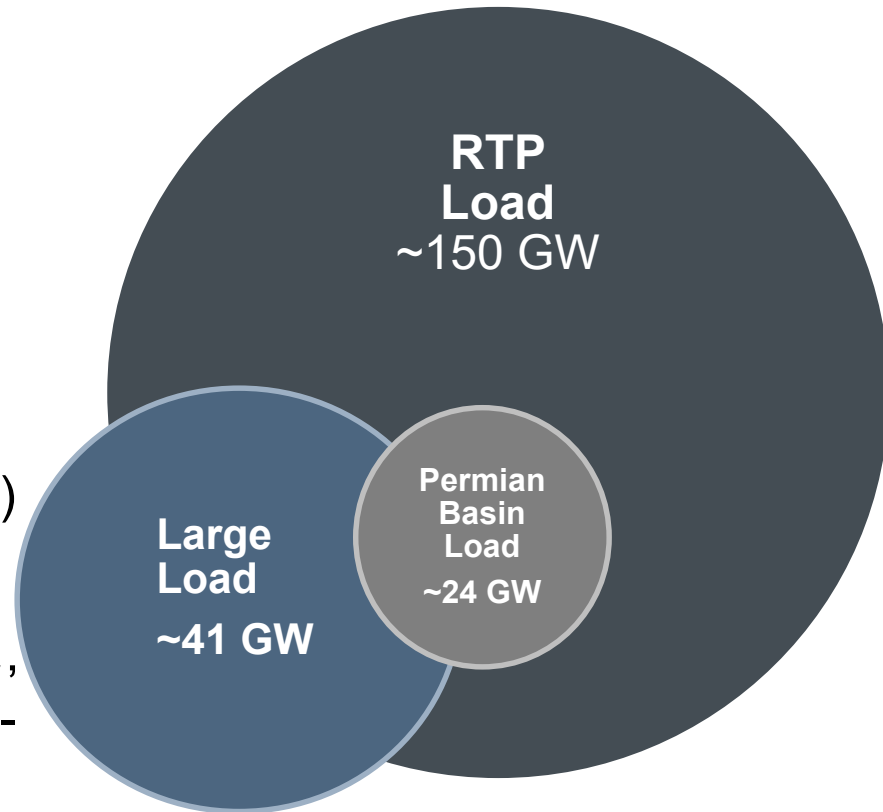


- Summer 2024 peak demand occurred on August 20 at 85,199* MW, which was 309 MW less than record of 85,508 MW set in August 2023 *not official until final settlements occur

Key Takeaways: The ERCOT Region is forecasted to experience tremendous electric demand growth in the next 5-7 years, which is driving the need for ERCOT to adapt and plan differently for the future.

New View of Load Growth in the ERCOT System

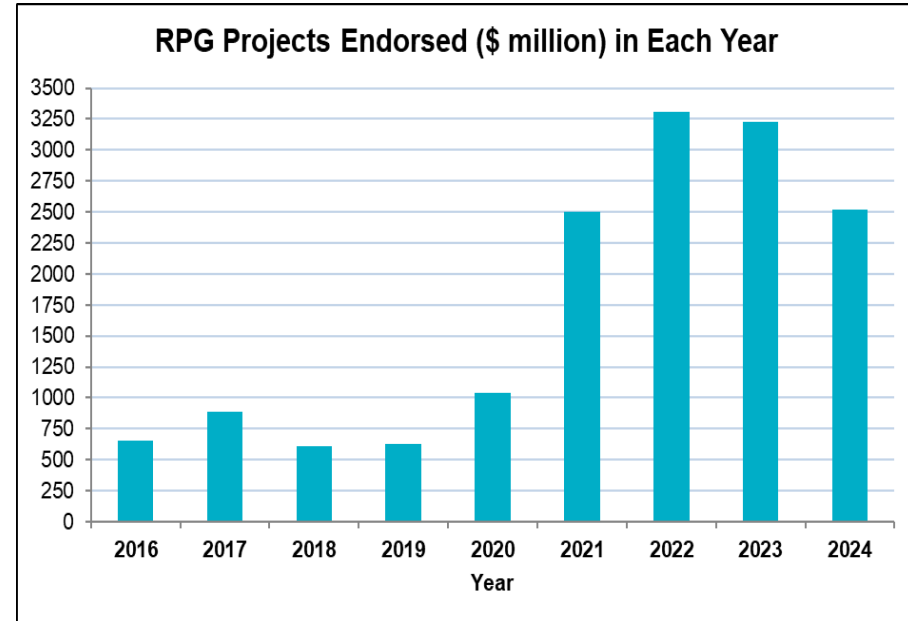
- Previous Regional Transmission Plan (RTP) rules did not allow ERCOT to factor in unsigned Load
- House Bill (HB) 5066 (88th Legislative Session) required ERCOT to include prospective Load identified by Transmission Service Providers (TSPs)
- This led to significant increases in Large Loads considered in studies (*i.e.*, crypto mining, hydrogen and hydrogen-related manufacturing, data centers, and electrification)



Key Takeaway: This new view shows unprecedented and rapid Load growth (approximately 40 GW greater than last year's forecast), which is creating new challenges and opportunities for the ERCOT System.

Transmission Planning Summary

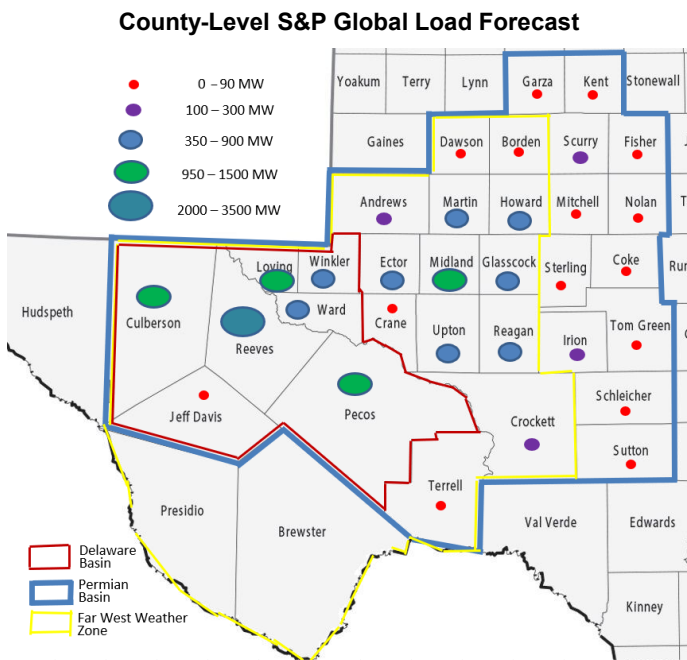
- As of June 1, 2024, projects energized in 2024 total about \$2.160 billion
 - \$1.553 billion energized in all of 2023
- As of July 31, 2024, ERCOT has endorsed transmission projects totaling \$2.518 billion in 2024
 - Total endorsed transmission projects in 2023 equaled \$3.231 billion
- As of June 1, 2024, projects in engineering, routing, licensing, and construction total about \$14.183 billion
- Since 2014, \$5.7B projects have been endorsed for the Permian and Delaware Basin Regions



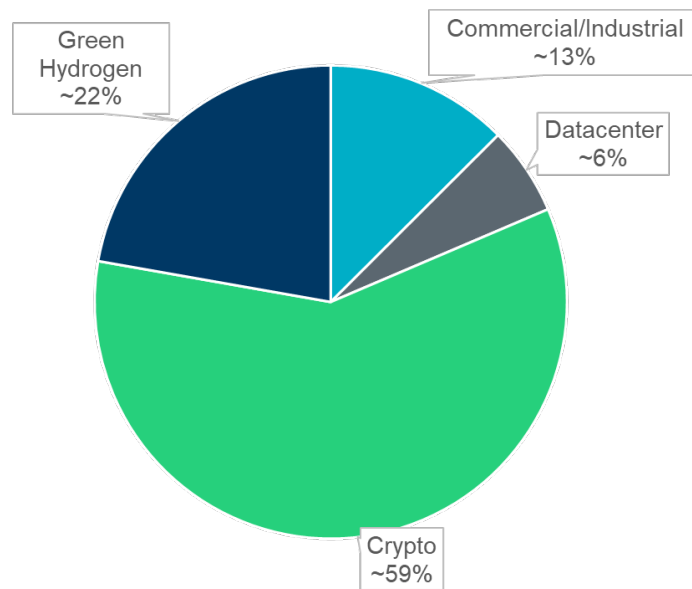
Key Takeaway: Transmission buildout as well as project endorsement continues at a record pace with more projects energized by June than were energized in all of 2023.

Permian Basin Reliability Plan

- Per House Bill 5066 (HB5066), the PUCT 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 studied a total Permian Basin Load for 2038 of 26,400 MW (14,705 MW oil & gas and 11,695 MW additional Load)
- ERCOT evaluated the Transmission Facilities needed to serve the Permian Basin region based on 2030 and 2038 Load forecasts and filed the [Permian Basin Reliability Plan](#) with the PUCT on July 25, 2024



Breakdown for 11,695 MW of additional non-oil & gas Load by type



Permian Basin Reliability Plan

- The Permian Basin Reliability Plan is divided into two categories:
 - Local transmission upgrades are transmission projects that are needed to interconnect and serve the projected Load in the Permian Basin region assuming that power can be imported into the region
 - Import paths are those transmission projects needed to transfer power from other regions into the Permian Basin region to serve the projected demand
 - The significant increase in forecasted Load justifies consideration of the use of extra high voltage (EHV) transmission infrastructure — operated at 500-kV or 765-kV — for the import path options, given that EHV facilities are generally known to provide benefits such as reducing losses for long-distance power transportation, increasing short circuit strength, and improving voltage stability

Summary of the Cost Estimates (\$Billion) for 2038

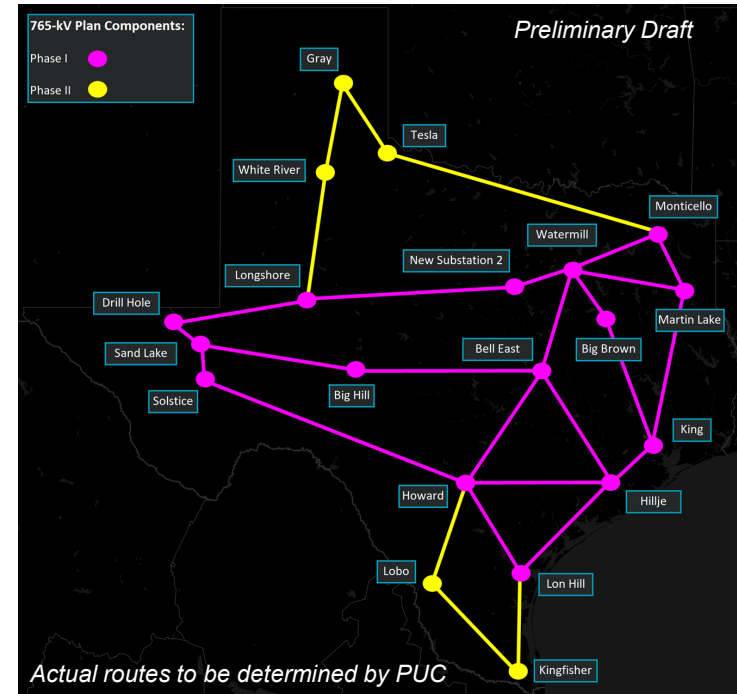
	345-kV Option	500-kV Option	765-kV Option
Common Local Upgrades	4.02	4.02	4.02
Import Paths	7.69	10.61	9.06
Incremental Local Upgrades	1.23	0.69	0.69
Total	12.95	15.32	13.77

September 26 PUCT Decision

- Approved all the common local projects identified in ERCOT's study to serve Load in 2038
- Authorized applicable TSPs to start preparing Certificate of Convenience and Necessity (CCN) applications for all eight import paths identified in ERCOT's study to serve Load in 2038 (five 345-kV and three 765-kV)
 - Directed ERCOT to work with TSPs to identify import paths that would be needed to serve Load in 2030 so that the preparation of those CCN applications can be prioritized
 - Set May 1, 2025, as a date certain for determining which import path voltage will be utilized
- Directed ERCOT to identify TSPs responsible for ownership, construction, and operation of the transmission lines and facilities

New Era of Planning – EHV Considerations

- The evolving generation mix has resulted in increased distance between generation sites and demand centers
- With the increase in Large Loads projected to move to Texas, the preliminary 2024 Regional Transmission Plan (RTP) study results indicate a need for substantial new transmission infrastructure to serve the forecasted Load growth
- ERCOT is considering new EHV transmission lines (765-kV double circuit) as an alternative to only adding new 345-kV in the 2024 RTP
- EHV additions are an effective option for moving power over long distances, reducing congestion, increasing grid stability, and addressing the uncertainty of future generation changes and location
- EHV import path transmission upgrades proposed for the Permian Basin region for 2038 is a subset of the initial holistic transmission expansion being evaluated in the 2024 RTP

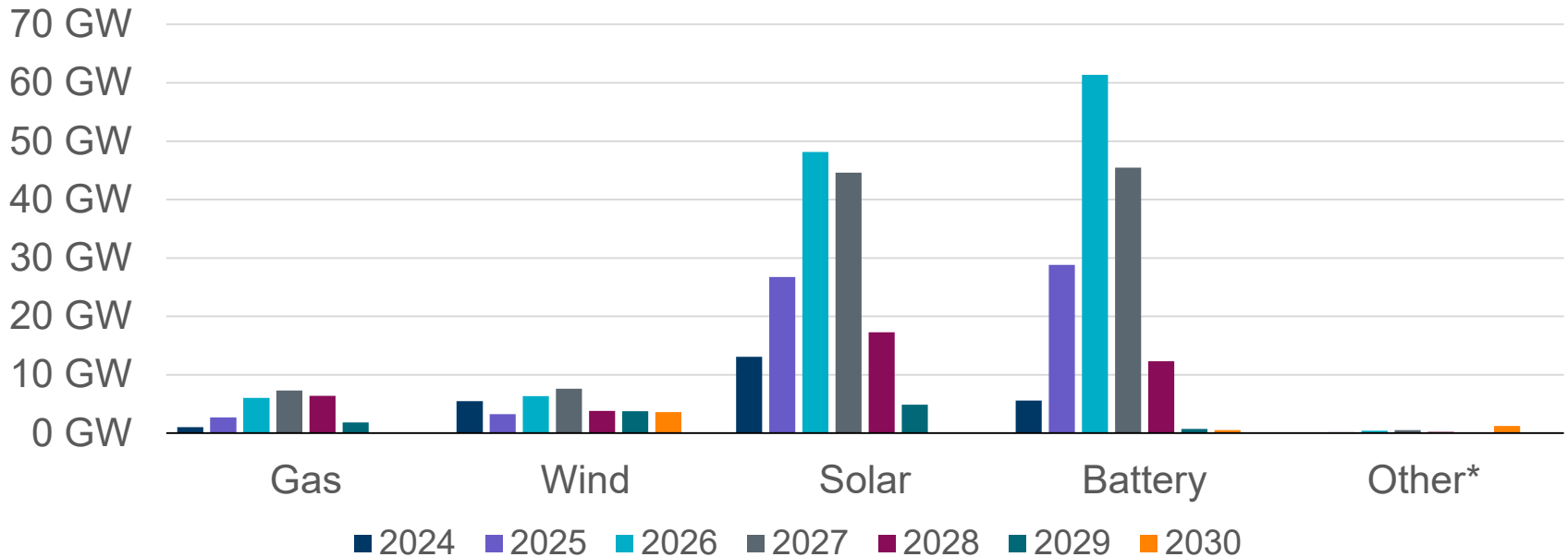


Key Takeaway: Forecasted Load growth coupled with the evolution of generation types and locations has led to EHV infrastructure consideration to reliably and efficiently facilitate large power transfer across the system.

Generation Interconnection Requests

1,886 active generation interconnection requests totaling 371 GW as of August 31, 2024
(Solar 155 GW, Wind 34 GW, Gas 25 GW, and Battery 155 GW)

(Excludes capacity associated with projects designated as Inactive per Planning Guide Section 5.2.5)

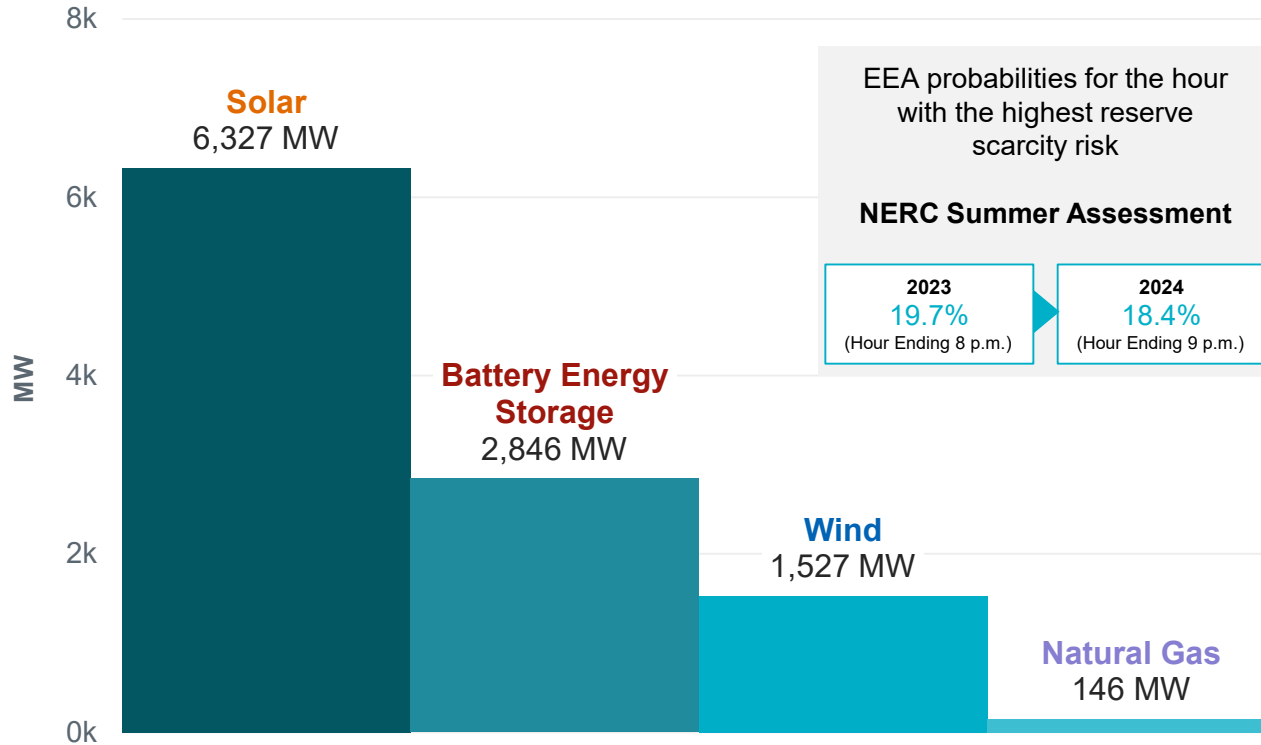


A break-out by zone can be found in the monthly Generator Interconnection Status (GIS) reports available on the ERCOT Resource Adequacy Page: <http://www.ercot.com/gridinfo/resource>

* 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

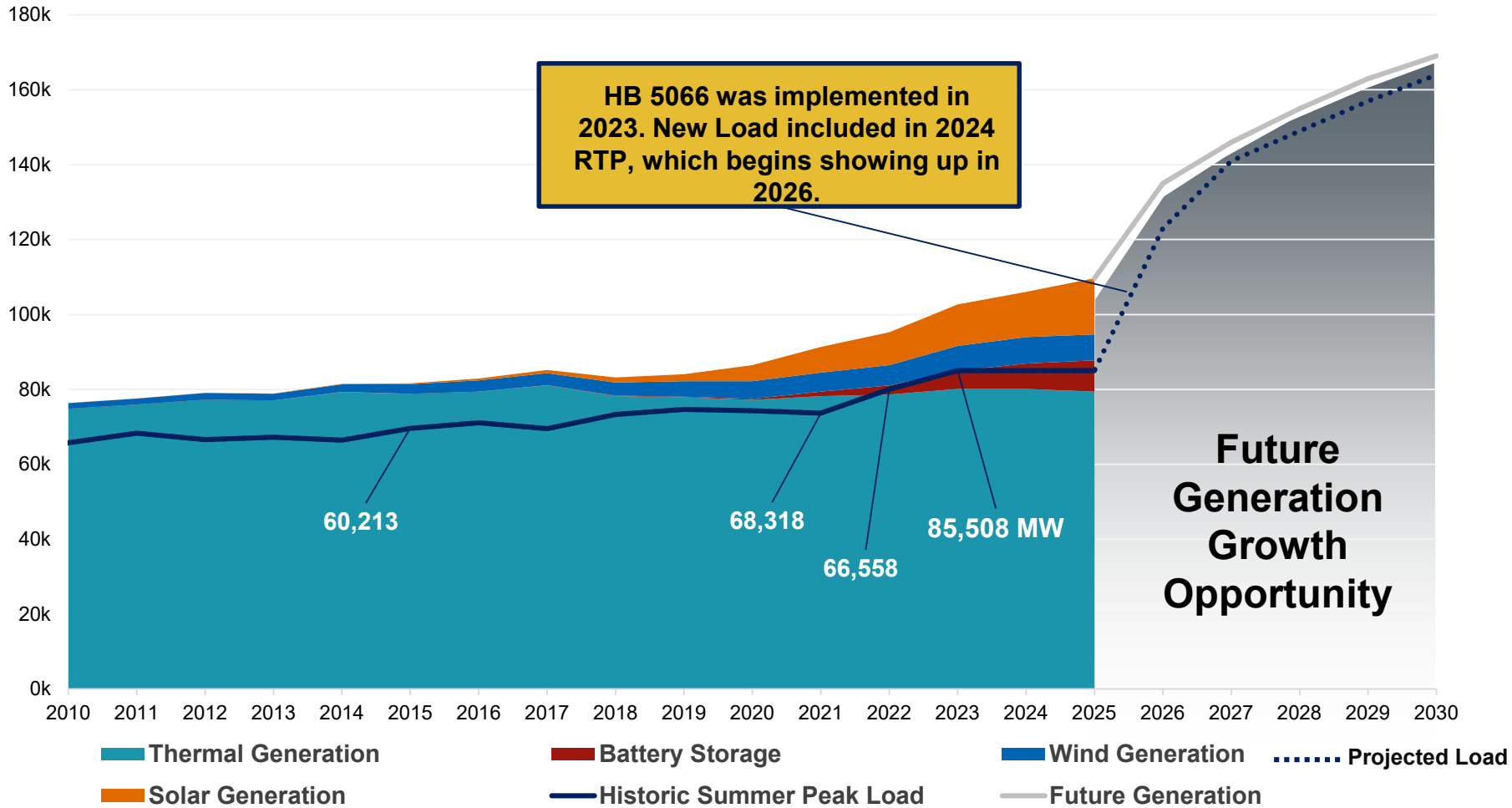
Key Takeaway: Approximately 9 GW of new gas generation requests have entered the interconnection queue since May 31, 2024.

New Generation Since Last Summer



Key Takeaway: While demand continues to grow at record pace, new generation is coming onto the ERCOT grid.

Challenges and Opportunities Ahead



Key Takeaway: The new Load forecast for the ERCOT Region creates significant investment opportunities for balanced generation growth to serve Texans.



Real-Time Co-optimization

What is Real-Time Co-optimization (RTC)?

- RTC is the process of dispatching energy and Ancillary Services interchangeably in the Real-Time Market
 - Under the current market design, ERCOT procures Ancillary Services in the Day-Ahead Market and does not typically move Ancillary Services between Resources in the Real-Time Market

What is RTC plus Batteries (RTC+B)?

- The RTC+B market design change is a key element in the strategic development of the current ERCOT market to provide more flexibility in real-time for ERCOT to efficiently procure energy and Ancillary Services

Key Takeaway: The efficiency benefits of this change have been studied and estimated by the IMM to save \$1.6 billion per year in reduced energy costs.

Real-Time Co-optimization + Batteries

- Will provide more flexibility in real-time to efficiently assign Resources between energy and Ancillary Services
- Will include significant improvements to modeling and consideration of batteries and state of charge available for providing energy and Ancillary Services
- SCED system will automatically select the most efficient and effective Resources available to serve Load and meet Ancillary Service needs
- Continue working closely with stakeholders on testing and market trials

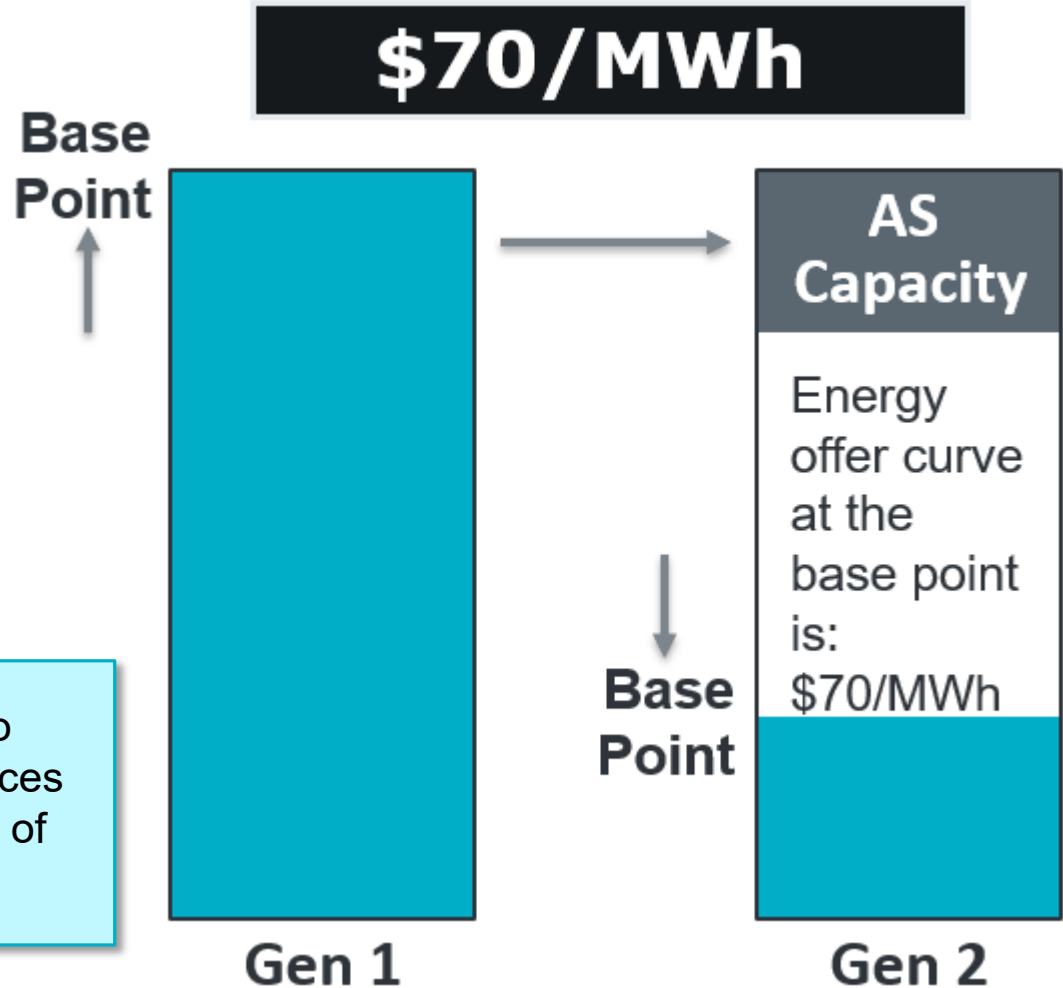


Key Takeaway: The target go-live date represents an important milestone in ERCOT's confidence for planning and tracking the completion of the RTC project for a more dynamic and efficient wholesale power market.

Real-Time Co-optimization Design

- RTC is designed to find the most effective set of Resources for providing energy and Ancillary Services (AS)

Key Takeaway: Allowing ERCOT to optimize energy and Ancillary Services in real-time increases the efficiency of system dispatch.



Dispatchable Reliability Reserve Service (DRRS)

- Intended to cover risks associated with historical variations in generation variability, including intermittency of non-dispatchable generation facilities and Forced Outages
- Resources providing DRRS must be capable of being online and dispatchable within two hours of being called on for deployment, must have dispatchable flexibility, and must be capable of running for at least four hours
- [NPRR1235](#) is currently moving through the ERCOT stakeholder process and will implement the framework and requirements for DRRS in the ERCOT market
- ERCOT will begin discussions with stakeholders regarding the methodology to determine procurement quantities of DRRS after NPRR1235 has been approved by the PUCT

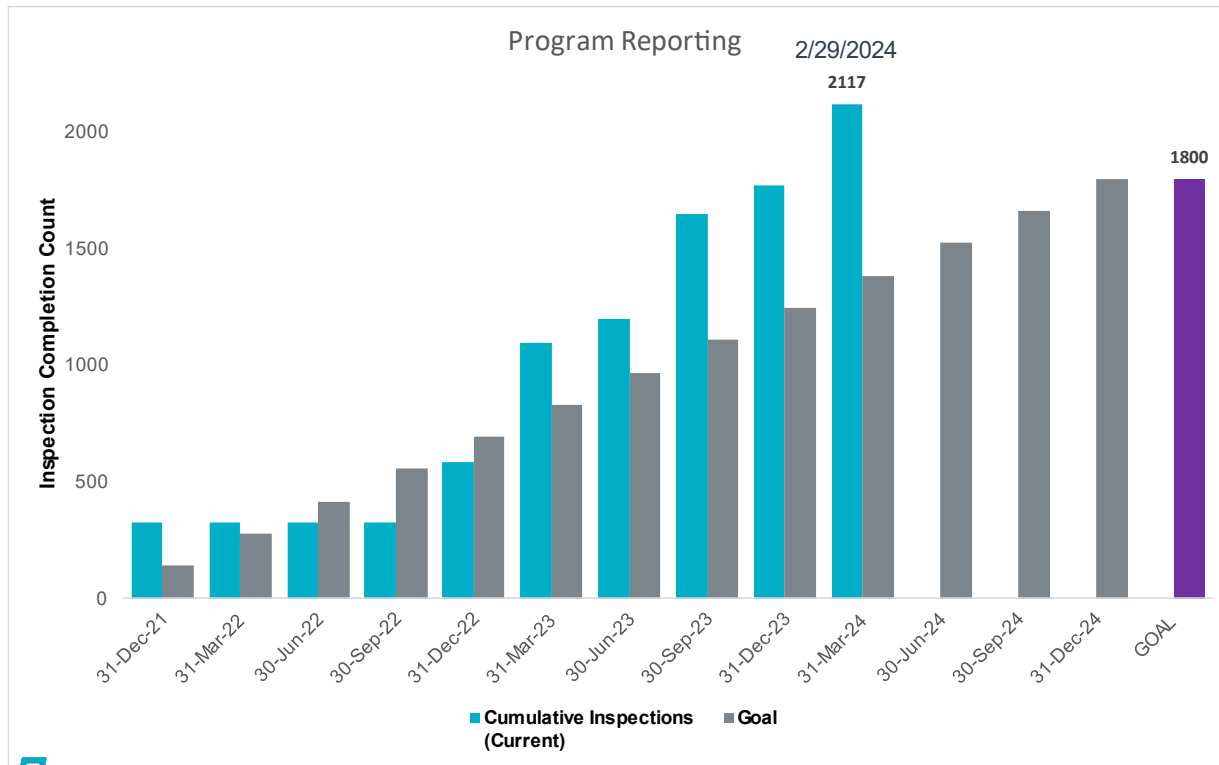
Key Takeaway: Implementation will occur no sooner than 2026 after RTC+B goes live.

Weatherization and Inspection

- Senate Bill 3, signed on June 8, 2021, requires weatherization of generation, transmission, and natural gas facilities
- 16 TAC § 25.55, finalized on October 19, 2021, established a first phase of winter weather emergency preparedness standards for Generation Resources and Transmission Facilities
- 16 TAC § 25.55 – Phase II, adopted on September 29, 2022
 - added summer weather preparation standards for generation and transmission facilities
 - § (c)(1)(B), implements additional weather emergency preparation measures that could reasonably be expected to ensure sustained operation at the 95th percentile minimum average 72-hour wind chill temperature
- All Generation Resources (total ~1,250) will be inspected a minimum of 1x/3yrs
- 10% (~550) of TSP substations/switchyards (total ~5,500) a minimum of 1x/3yrs – selected using risk-based criteria
- Since program inception in December 2021, **ERCOT has completed over 2,750 weatherization inspections**

Weatherization and Inspection – Winter 2023-2024 Review

- ERCOT completed 340 Generation Resource and 129 TSP winter weatherization inspections
 - 2,117 total completed inspections after Winter 2024 inspections
- 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), and Heather (January 2024)



Weatherization and Inspection – Summer 2024 Review

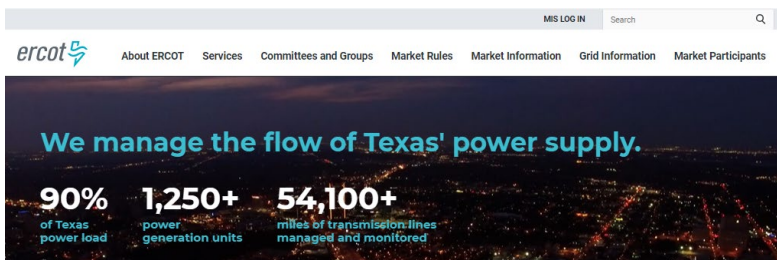
- Summer 2024 weatherization inspections are completed using high Weather Emergency Preparedness compliance levels
- All existing and new Generation Resources that were fully commissioned prior to the end of Q2-2024 were inspected by the end of September

Summer 2024 Weatherization Inspections (as of September 20, 2024)

Month	Resources	TSP	Total
June	73	74	147
July	152	108	260
August	108	118	226
September	60	52	112
Total	393	352	745

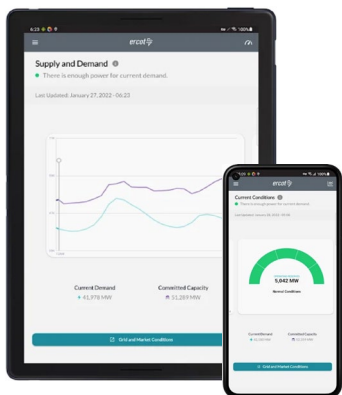
Key Takeaway: The Weatherization Inspection Program successfully met PUCT rule requirements for required inspections for the three-year period since rule approval.

ERCOT Communication Channels



ERCOT website – www.ercot.com

- Today's outlook and grid conditions
- Daily and seasonal weather
- Market information, prices and more



New ERCOT mobile app

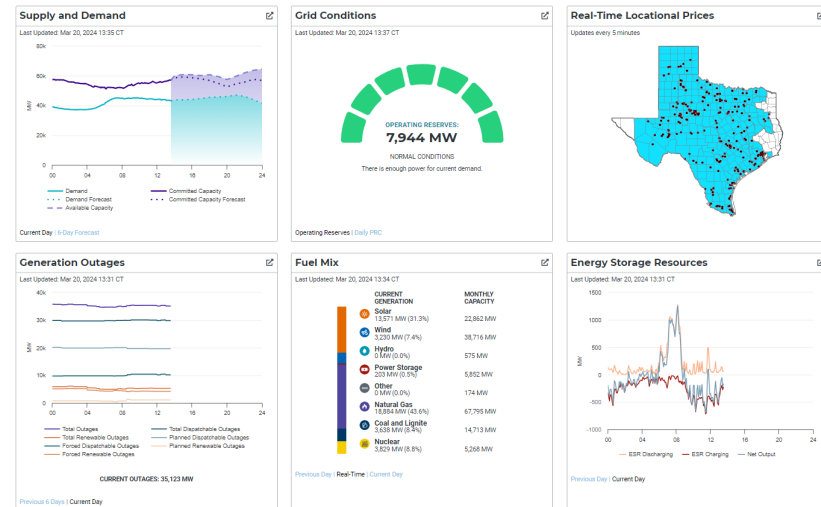
- Real-time updates
- Wholesale pricing
- News and alerts



Grid and Market Conditions

These dashboards offer a snapshot of current conditions in the ERCOT system. The timestamp on each indicates when the information was last updated. Click the Full View link on a dashboard for an expanded display.
 *Note: The 6-Day Forecast graph should only be used as a relative indication of future system conditions. Due to uncertainties associated with the longer-term nature of the forecasts used, both the Available Seasonal Capacity and Demand Forecast may adjust significantly as the Operating Day approaches.

*Note: Capacity available from demand response programs is not reflected in the Current Day and the 6-Day Forecast graphs unless these programs have been deployed.



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- Provides greater transparency on grid operations
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