

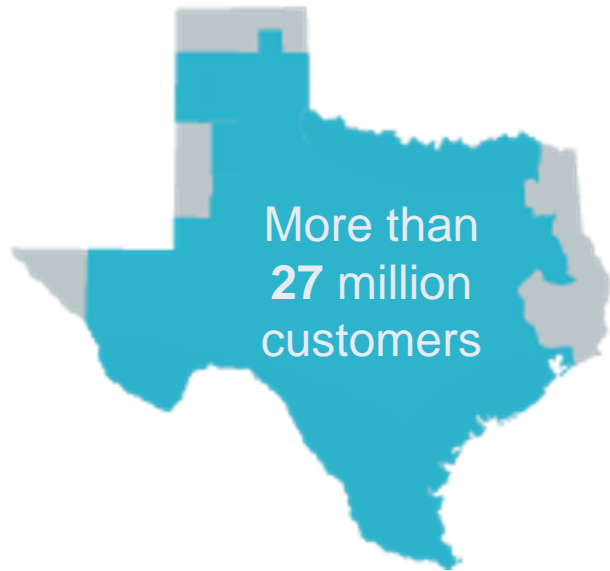


**Energy Systems Integration Group (ESIG)**  
**Spring Technical Workshop**  
Co-Located Load & Generation in ERCOT

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# ERCOT Facts



**85,508 MW**

Record peak demand (August 10, 2023)

**115,596+ MW**

Expected capacity for summer 2025 peak demand (May 2024 CDR)

**\$3.8 billion**

Transmission projects endorsed in 2024

## 2024 Generating Capacity

Reflects the forecasted operational installed capacity for Summer 2025 based on December 2024 CDR report.



The sum of the percentages may not equal 100% due to rounding.  
\*Other includes biomass-fired units and DC tie capacity.

## 2024 Energy Use



\* Other includes solar, hydro, petroleum coke (pet coke), biomass, landfill gas, distillate fuel oil, net DC-tie and Block Load Transfer important/exports and an adjustment for wholesale storage load.

**1 MW** of electricity is enough to serve about 250 residential customers during ERCOT peak hours.



**39,518 MW**

Wind

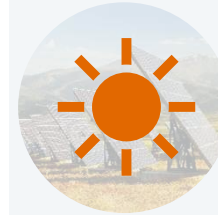
of installed wind capacity as of February 2025, the most of any state in the nation

**28,550 MW**

Generation Record (March 5, 2025)

**69.15 %**

Penetration Record (April 10, 2022)



**30,305 MW**

Solar

of utility-scale installed solar capacity as of May 2025

**25,041 MW**

Generation Record (March 10, 2025)

**54.23 %**

Penetration Record (March 1, 2025)

**~76 % (~36,966 MW)**

Preliminary Wind + Solar Penetration Record (March 1, 2025)



**10,193 MW**

Battery Storage

of installed battery storage as of May 2025

**4,963 MW**

Storage Discharge Record (March 10, 2025)

## Overview

1. Charges/credits to load
2. Motivation for loads to co-locate with generation
3. Private Use Networks (PUNs): Existing ERCOT structure for loads co-located with generation
4. What lies ahead for sites with co-located loads and generation in ERCOT?
5. What's driving all this? Large Load Interconnection requests

# ERCOT ISO Settlements: Charges/Credits to Loads

- a) Energy Settlements by ERCOT on a 15-minute Settlement Interval. This is calculated using Transmission and Distribution Service Provider (TDSP) installed and read Settlement Meters and provided to ERCOT. For loads co-located with generation, typically there is a single meter at the Point of Interconnection (POI) and the load is charged if the net energy for a Settlement Interval is a consumption.
- a) Load Ratio Share (LRS) Charges/Credits: The ratio of a Load's energy consumption to the ERCOT total energy consumption during a given 15-minute Settlement Interval. This is calculated using TDSP installed and read Settlement Meters and provided to ERCOT. For loads co-located with generation, the LRS is positive only if the net energy for a Settlement Interval is a consumption.
1. Charge: Ancillary Service Costs – calculated based on LRS for each 15-minute Settlement Interval
  2. Charge: Other LRS charges (e.g., charges to recover make-whole payments to Resources, ERCOT Admin fee) – calculated based on LRS for each 15-minute Settlement Interval
  3. Credit: Congestion Revenue Rights (CRR) auction revenue is allocated to ERCOT Load – Monthly payment to load based on their share of the ERCOT-wide coincident MW peak in that month. For loads co-located with generation, their share of the ERCOT-wide coincident MW peak is dependent on whether the site was a net load during the Settlement Interval that corresponds to ERCOT-wide coincident MW peak.

# Transmission Cost (TCOST) Charges to Loads

## c) Transmission Cost (TCOST) allocated to loads:

1. TCOST is socialized to ALL loads in ERCOT (postage stamp)
  - Public Utility Commission of Texas (PUCT) approves the tariff of each TSP for O&M as well as capitol cost recovery with guaranteed rate of return.
2. The total revenue required for each Transmission Service Provider (TSP) is subdivided into different load (consumer) buckets.
  - For loads greater than 700 kW peak demand, charges based on their LRS during 4CP Intervals
    - This method of TCOST recovery has had the unintentional consequence of incenting huge demand response. The incentive is that for every MW reduction during all of the 4CP intervals, the expected cost savings are upwards of \$50,000 /MW-year.
  - Loads less than 700 kW peak demand (e.g., residential loads) cannot avoid TCOST by reducing consumption during 4CP intervals. The allocated TCOST to this category is charged to the Retail Electricity Provider (REP), who simply passes costs associated with TCOST to the consumers. In general, residential consumers pay portion of TCOST based on monthly kWh consumption.
3. 4CP Interval: 4CP intervals are identified as the highest ERCOT-wide coincident peak MW load over a 15-minute Settlement Interval for the months of June, July, August, and September. These 4 intervals are used to calculate the loads LRS for the 4CP intervals and determines their charges for TCOST recovery.
4. ERCOT does not perform TCOST settlements. ERCOT's role is to identify the 4CP intervals and calculate the loads share during the 4CP intervals and provide this data to the PUCT/TSPs. The TSPs bill the REPs representing the loads.

## Data Center Loads: Motivation to Co-Locate At Existing Generation Sites

- a) Data center setup time is extremely short compared to similar MW industrial loads. **Bottlenecks are in procuring/setting-up/commissioning of electrical infrastructure:**
1. Transmission build out. Typical data centers are large >100 MW requiring transmission interconnection
  2. Electrical equipment: transmission voltage power transformers and switchgear
- b) **Primary driver for Data Center Load to co-locate at existing generation sites is speed of interconnection:**
1. Transmission already available at existing generation site
  2. Location generally not an issue as data centers do not require many personnel to operate relative to the size (MW) of their load as the personnel required for similarly sized industrial loads
  3. Cost savings as some of the existing electrical equipment can be used to serve data center load (transmission voltage power transformers and switchgear)
  4. To a lesser extent, as these sites are re-registered as a PUN:
    - TCOST allocation is based on the net energy consumption (if any) during the 4CP intervals. This can lead to significant savings (> \$50,000 MW/year)
    - Other Load Ratio Share costs can be reduced, which are based on the net energy consumption (if any) during a 15-minute Settlement Interval

## Private Use Network (PUN): Existing ERCOT Construct for Load Co-Located With Generation

- a) Traditionally, industrial sites with co-gen (steam host for refineries, chemical plants). PUN sites can consume energy from the grid or inject energy into the grid – i.e., bidirectional flow of energy allowed
  - Data center load co-locating with existing generators or with backup generation (including storage) register as a PUN
- b) Energy settlement is based on net of generation or load as measured by TDSP installed/maintained at Point Of Interconnection (POI) over a 15-minute Settlement Interval
- c) Only net PUN load during a 15-minute Settlement Interval is part of ERCOT load – not the gross PUN Load
- d) Load Ratio Share calculations for other settlements is also based on net generation or load as measured by TDSP installed/maintained at POI over a 15-minute Settlement Interval
- e) For generation or battery energy storage systems (BESS) within a PUN that is registered as a full-fledged market Generation Resource (GR) or a full-fledged market Energy Storage Resource (ESR), respectively:
  - Can only offer to sell its surplus MW capacity after serving ALL PUN load
  - Must coordinate with co-located load entity to provide ERCOT their surplus MW capacity (Current Operating Plan) after serving all planned energy consumption by co-located load, on a rolling hourly window of 168 hours
  - PUN ESR charging load is NOT eligible for Wholesale Storage Load (WSL) Treatment (exemption from LRS charges/credits, TCOST allocation)

## Private Use Network (PUN): Existing ERCOT Construct for Load Co-Located With Generation

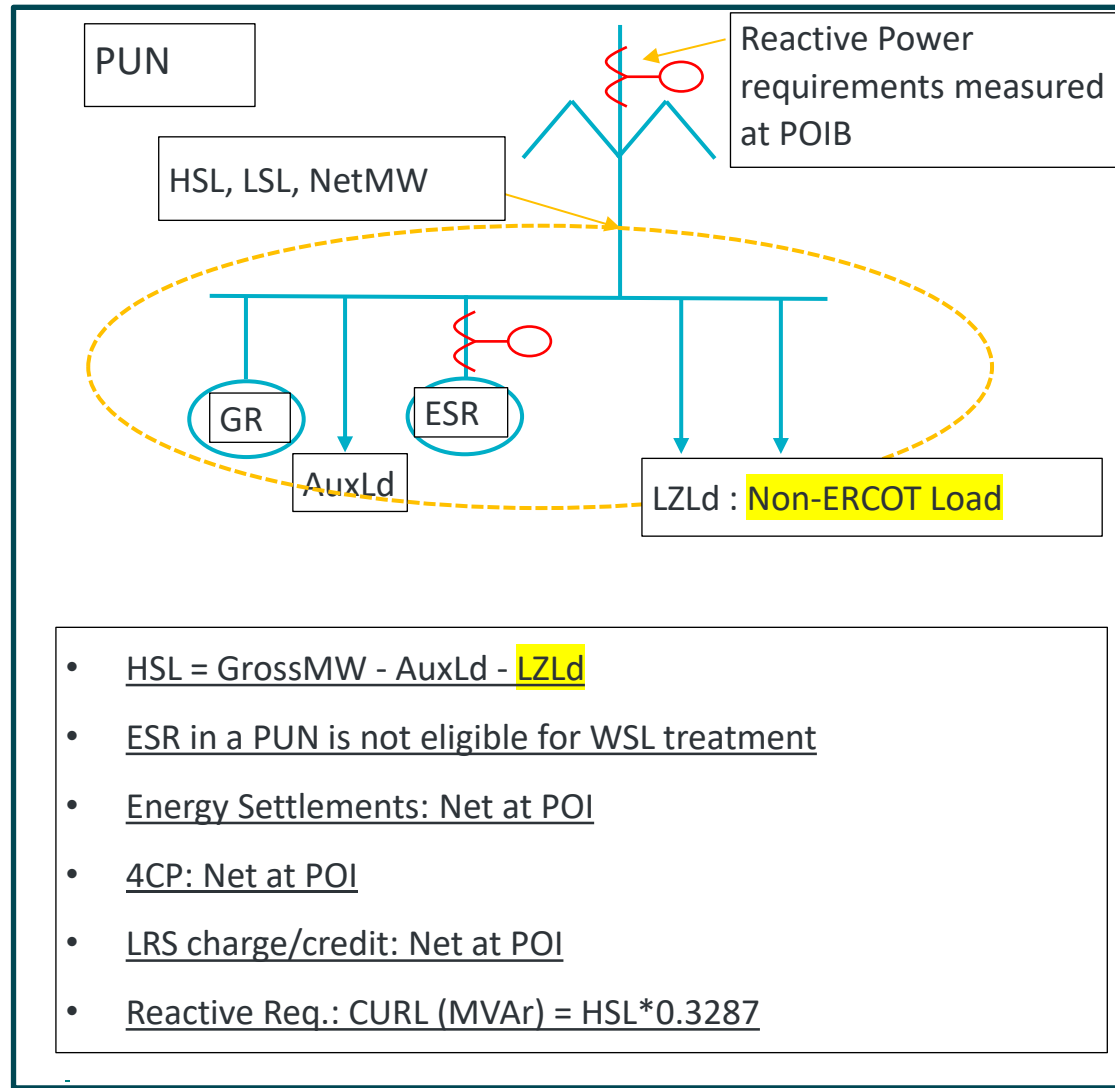
Generation or battery energy storage systems (BESS) within a PUN (including energy storage) can, instead of a full-fledged market Resource registration, register as a Settlement-Only Resource. Settlement-Only Resources are not dispatched by the market and can chase prices.

- Charging load of BESS within a PUN is NOT eligible for WSL treatment.

Example: Data centers with a need for high availability tend to have back-up generation that is sized to be larger than the expected demand from the data center load. (e.g., 400 MW data center has 500 MW of back-up generation. This site will register as a PUN with ERCOT.)

- If this site's backup generation or BESS register with ERCOT as a full-fledged market Resource (GR or ESR), they can only sell 100 MW of its surplus capacity into the energy and Ancillary Service markets while requiring to provide real-time and operating plans via Current Operating Plan and outages to ERCOT.
- With the limitations on the MW capacity that can be offered into the ERCOT markets, the incentive is for this site's backup generation or BESS is to register with ERCOT as Settlement-Only Resource.

# Private Use Network

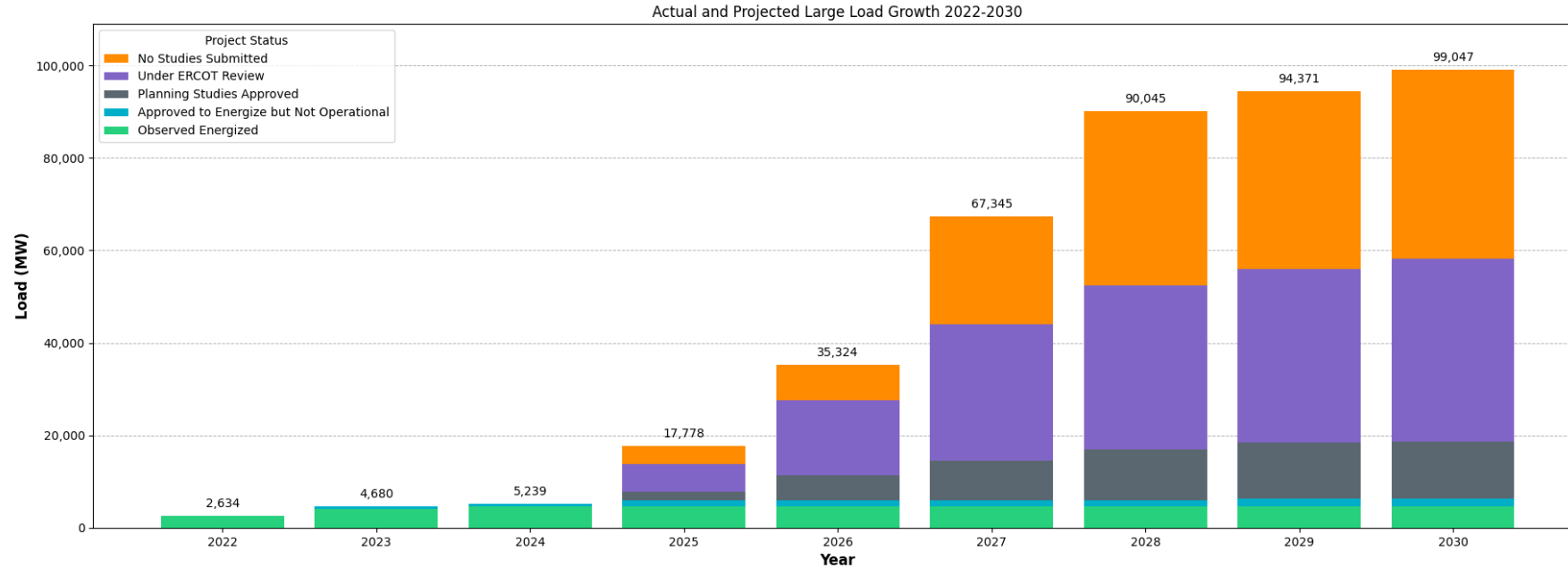


GR=Generation Resource, ESR=Energy Storage Resource, =Settlement Meter

## What Lies Ahead for Sites with Co-Located Loads and Generation in ERCOT?

- **Ongoing Legislative Activity – Senate Bill 6 on Large Loads**
  - Approval process from ERCOT and PUCT for Large Loads co-locating at existing Generation sites that exceed 10% of the Generation site capacity.
  - Minimum TCOST allocation for Large Loads that are co-located with generation behind the POI meter based on non-coincident load peak.
  - Curtailment requirements in case of grid emergency motivation: Incent loads with backup generation to register the backup generation as full-fledged market Resources.
- Future discussions on market participation model to incent loads with backup generation to register the backup generation as full-fledged market Resources by:
  - Enabling the backup generation the ability to sell their full capacity into the energy and AS markets. This includes BESS.
  - Enable ESR (BESS registered as full-fledged market Resources) to get Wholesale Storage Load Treatment for their charging load.
  - Retain the PUN feature of netting the generation and load at the co-located site for energy settlements.

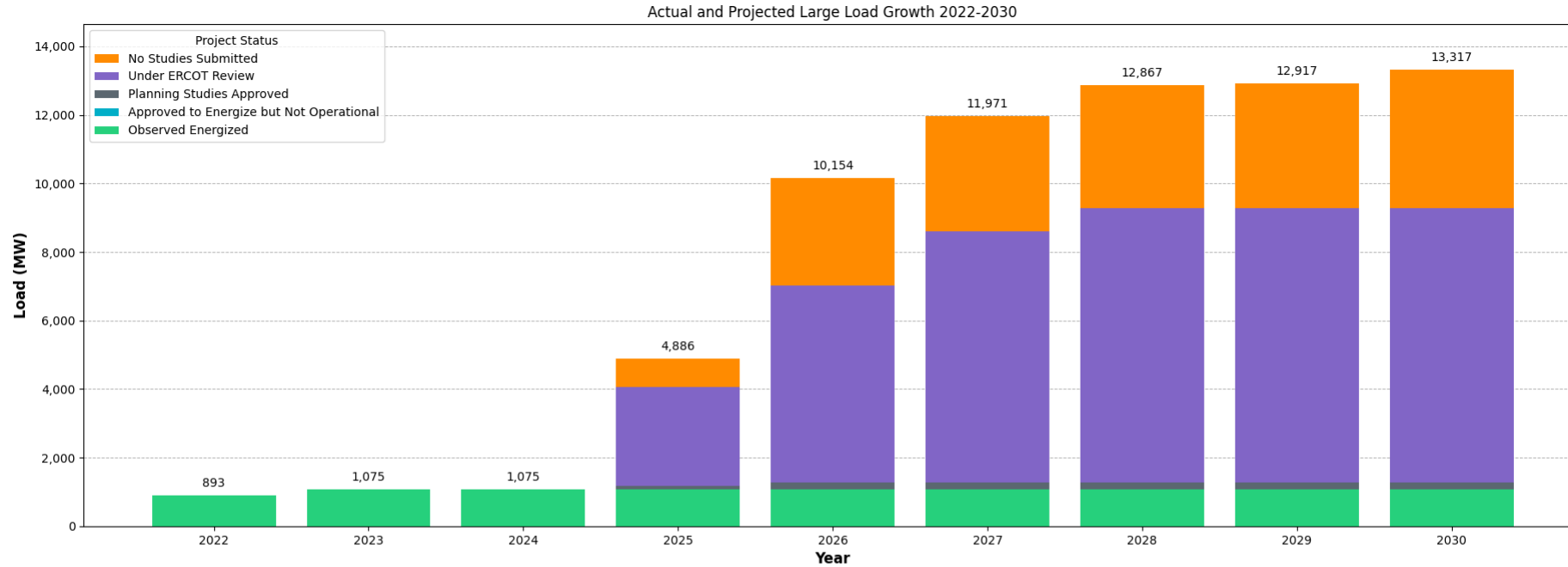
# Current Large Load Interconnection Queue (Total)



Project Status	2022	2023	2024	2025	2026	2027	2028	2029	2030
No Studies Submitted	0	0	0	4,034	7,686	23,418	37,576	38,472	40,799
Under ERCOT Review	0	0	0	6,012	16,198	29,364	35,529	37,509	39,639
Planning Studies Approved	0	0	0	1,726	5,435	8,558	10,934	12,084	12,303
Approved to Energize but Not Operational	0	569	623	1,390	1,390	1,390	1,390	1,690	1,690
Observed Energized	2,634	4,111	4,616	4,616	4,616	4,616	4,616	4,616	4,616
<b>Total (MW)</b>	<b>2,634</b>	<b>4,680</b>	<b>5,239</b>	<b>17,778</b>	<b>35,325</b>	<b>67,346</b>	<b>90,045</b>	<b>94,371</b>	<b>99,047</b>

- **Observed Energized** – Projects that have received Approval to Energize from ERCOT Operations and are fully operational. Represented by all time non-simultaneous peak load consumption.
- **Approved to Energize but Not Operational** – Projects that have received Approval to Energize from ERCOT Operations but are not 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.

# Current Large Load Interconnection Queue (Co-Located)

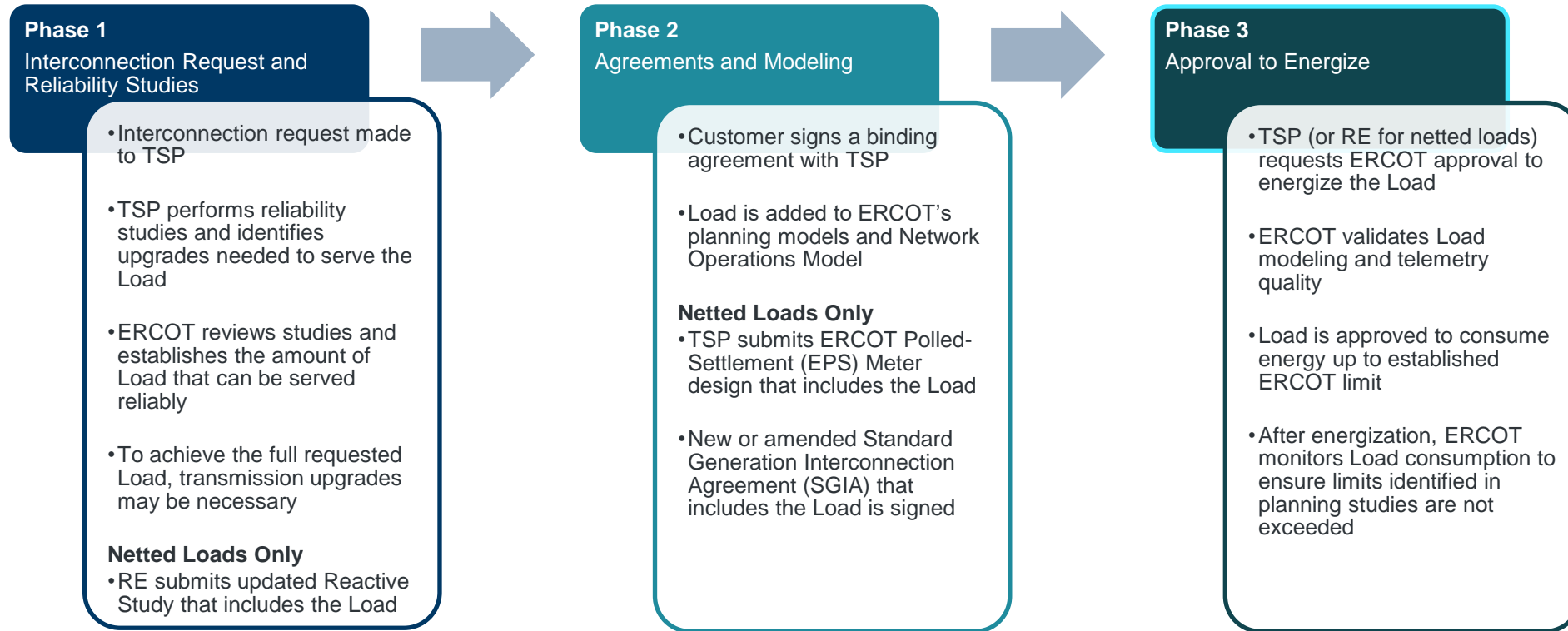


Project Status	2022	2023	2024	2025	2026	2027	2028	2029	2030
No Studies Submitted	0	0	0	826	3,126	3,366	3,586	3,636	4,036
Under ERCOT Review	0	0	0	2,884	5,763	7,331	8,007	8,007	8,007
Planning Studies Approved	0	0	0	100	190	199	199	199	199
Approved to Energize but Not Operational	0	0	0	0	0	0	0	0	0
Observed Energized	893	1,075	1,075	1,075	1,075	1,075	1,075	1,075	1,075
<b>Total (MW)</b>	<b>893</b>	<b>1,075</b>	<b>1,075</b>	<b>4,885</b>	<b>10,154</b>	<b>11,971</b>	<b>12,867</b>	<b>12,917</b>	<b>13,317</b>

- **Observed Energized** – Projects that have received Approval to Energize from ERCOT Operations and are fully operational. Represented by all time non-simultaneous peak load consumption.
- **Approved to Energize but Not Operational** – Projects that have received Approval to Energize from ERCOT Operations but are not observed to be operational.
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# Interim Large Load Interconnection Process Details

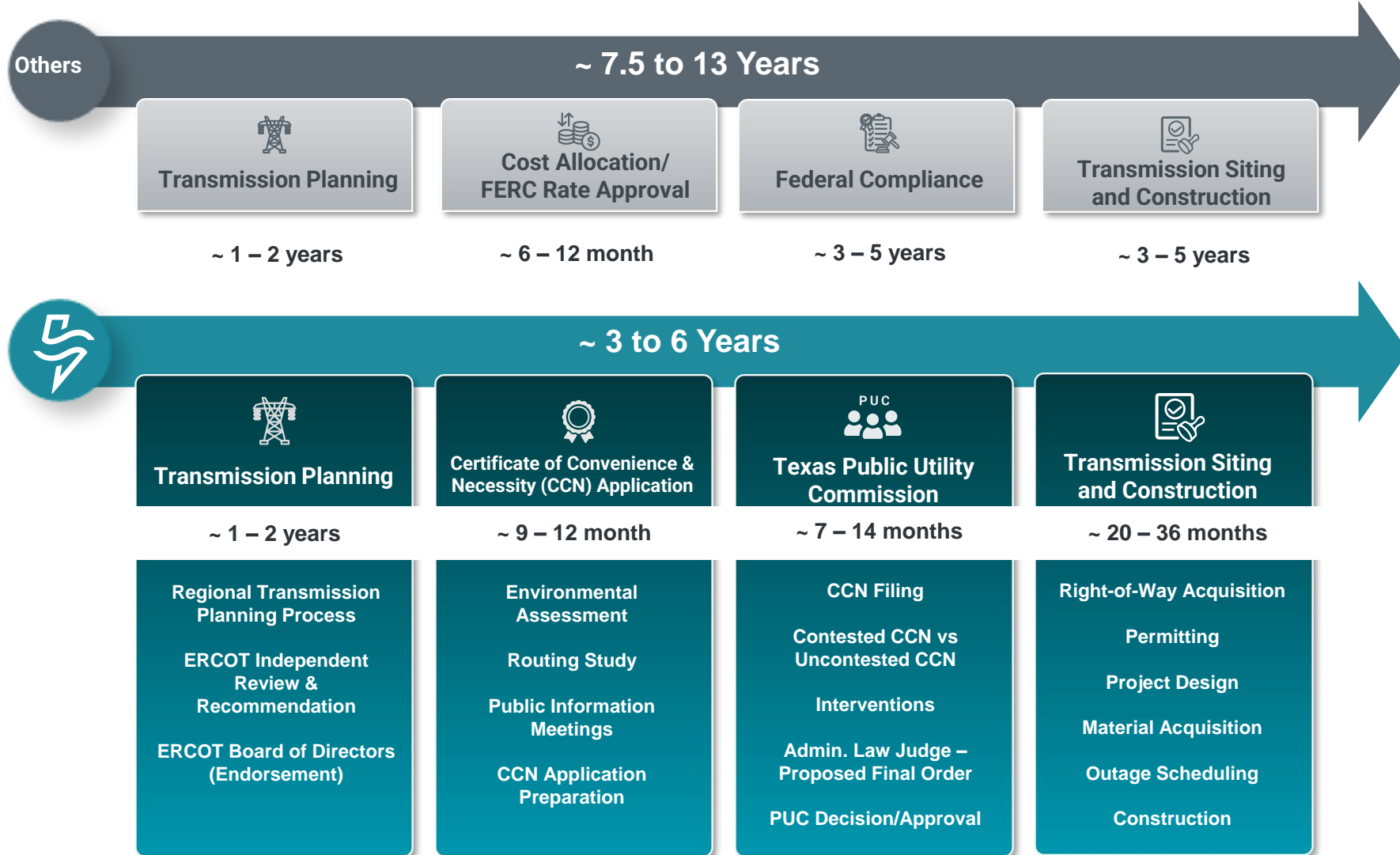
Large Load defined as Load with peak demand  $\geq 75$  MW



NPRR1234 (in the works):

- Needs ERCOT approval to energize
- Interconnection Studies (steady state, protection/short-circuit, dynamic and transient stability, facility, sub-synchronous oscillation/ferro-resonance) required
- Fees (for ERCOT run studies, etc.)
- Co-located loads  $>20$  MW require new Reactive Power Study

# FERC Jurisdictional Markets vs ERCOT Transmission Planning Process



Source: <https://www.ercot.com/files/docs/2024/04/24/5%20CEO%20Update%20REVISED.pdf>