Large Loads in ERCOT – Observations and Challenges

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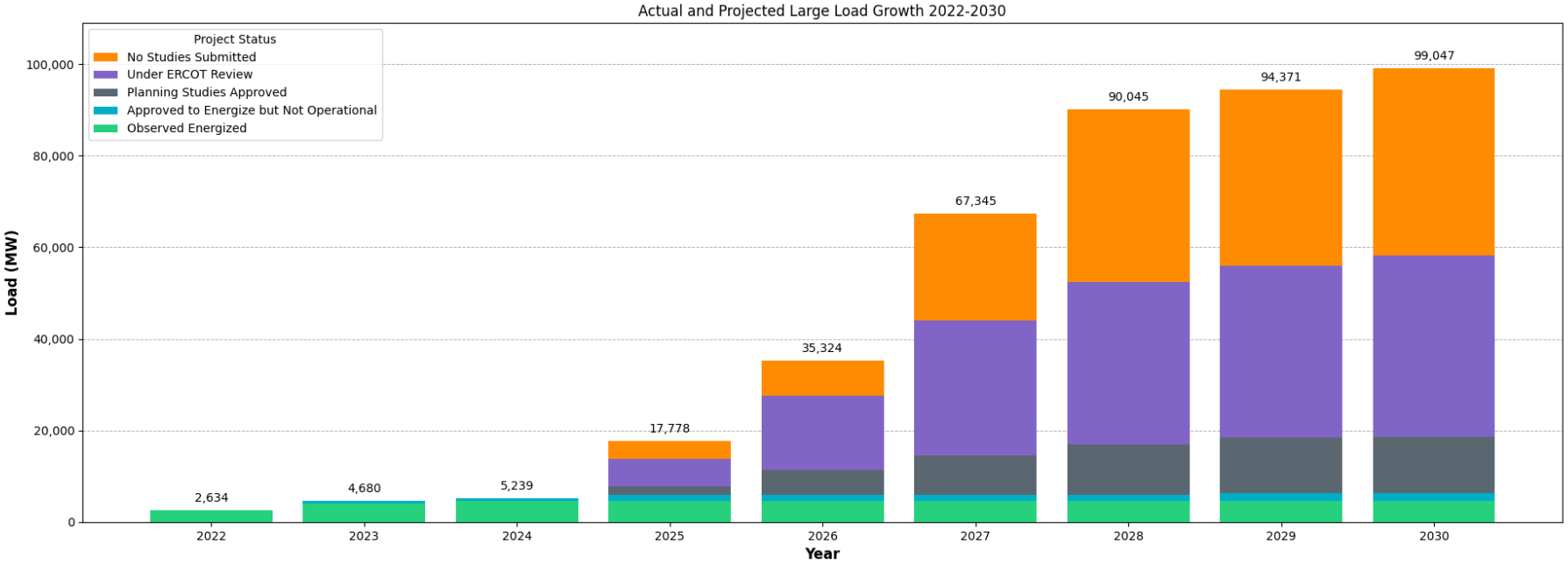
Current Large Load Interconnection Queue



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
Total (MW)	**2,634**	**4,680**	**5,239**	**17,778**	**35,325**	**67,346**	**90,045**	**94,371**	**99,047**

- **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.

Grid Planning Challenges with Large Loads

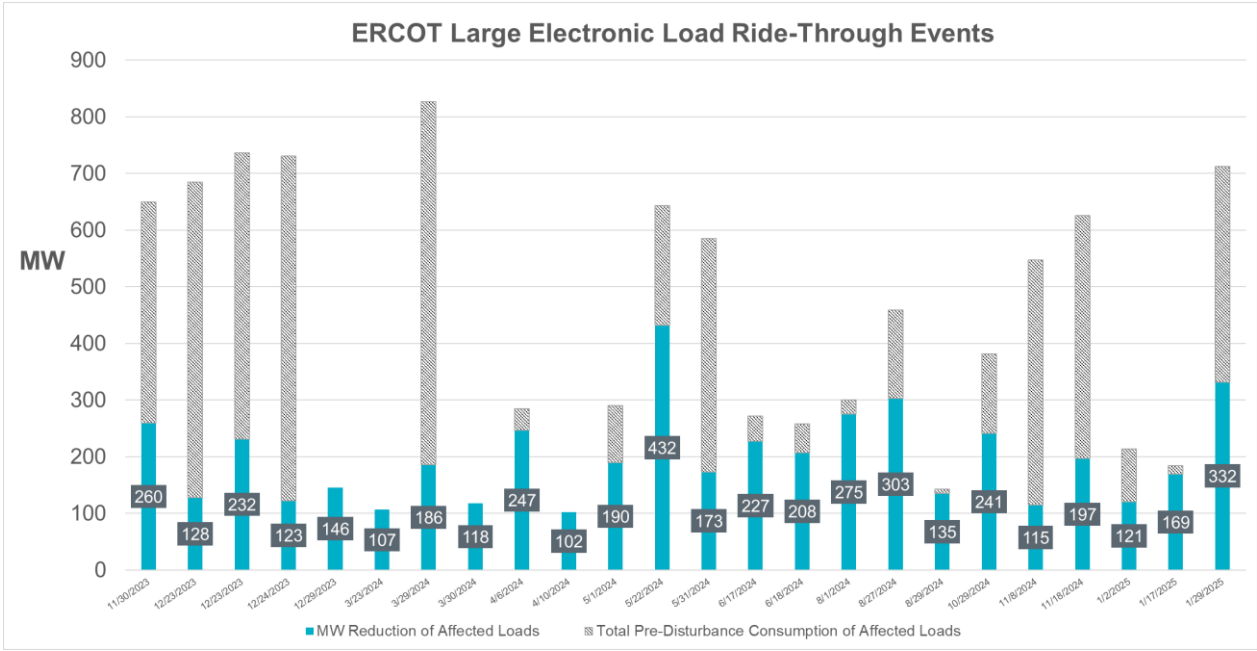
- Far more interconnection requests than available capacity on current grid and uncertainty on which projects will move forward

- How to incorporate large loads into planning studies
  - When should a project be considered “real” enough to include in other planning studies?
  - Should demand flexibility of a load be taken into account?
  - What happens if the grid is upgraded and the load does not materialize?

- Current models do not capture dynamic behavior of power electronic based loads, making accurate studies difficult

Operational Challenges with Large Loads

- Voltage Ride-Through
  - Many new loads are very sensitive to voltage disturbances and can reduce consumption suddenly
  - Large reductions can lead to frequency disturbances
- Oscillations
  - Subsynchronous oscillations have been observed (risk to nearby generation)
  - Potentially a growing risk from AI data centers
- Price-responsive behavior outside of SCED
  - Ramping up or down is not coordinated with the other needs of the grid



Final Thoughts – Familiar challenges in a new world

- The ERCOT grid saw many of the same challenges from the rapid growth in wind, solar, and storage over the past 15 years
  - Some of the same solutions may work with large loads

- The historical relationship between loads and the grid is fundamentally different than the relationship between generators and the grid

- New thinking is going to be needed to maintain reliability for all customers while serving these new large loads
  - Large loads also have the potential to be tools for maintaining grid reliability

Questions?