



Technical Session
Large Load Impacts on the Bulk Power System
March 11, 2025

Background

The 2024 WECC [Western Assessment of Resource Adequacy](#) highlights that energy demand growth is expected to grow more than 20% over the next 10 years—more than double what was predicted in load forecasts from just two years ago.

A major driver for this increase in demand is the expansion of large loads like data centers, manufacturing facilities, and cryptocurrency mining operations. These loads consume immense amounts of energy, can be built quickly, have different consumption patterns, and require changes or additions to infrastructure. In addition to resource adequacy and other grid infrastructure challenges associated with these loads, there are also concerns with the way large loads may behave during grid disturbances, including their ride-through capability. According to current plans, the effects of large-load growth are greatest in the next three to five years, making this an urgent issue that industry must get its arms around.

For this technical session, Katie Rogers, WECC manager of Reliability Assessments; Gaurav Karandikar, SERC director of RAPA and Technical Services; and Julie Snitman, ERCOT Large Load Integration Supervisor, will discuss their perspectives on the reliability challenges and opportunities of connecting large loads to the Bulk Power System and address questions such as:

- What lessons can the West learn from other areas of the country that have had a lot of experience interconnecting large loads?
- From a grid planning perspective, what are some of the biggest challenges associated with large loads?
- From an operational perspective, what are significant challenges associated with large loads?
- What opportunities exist through improved coordination with large load customers?
- How is WECC beginning to quantify and address the risks associated with large load customers?



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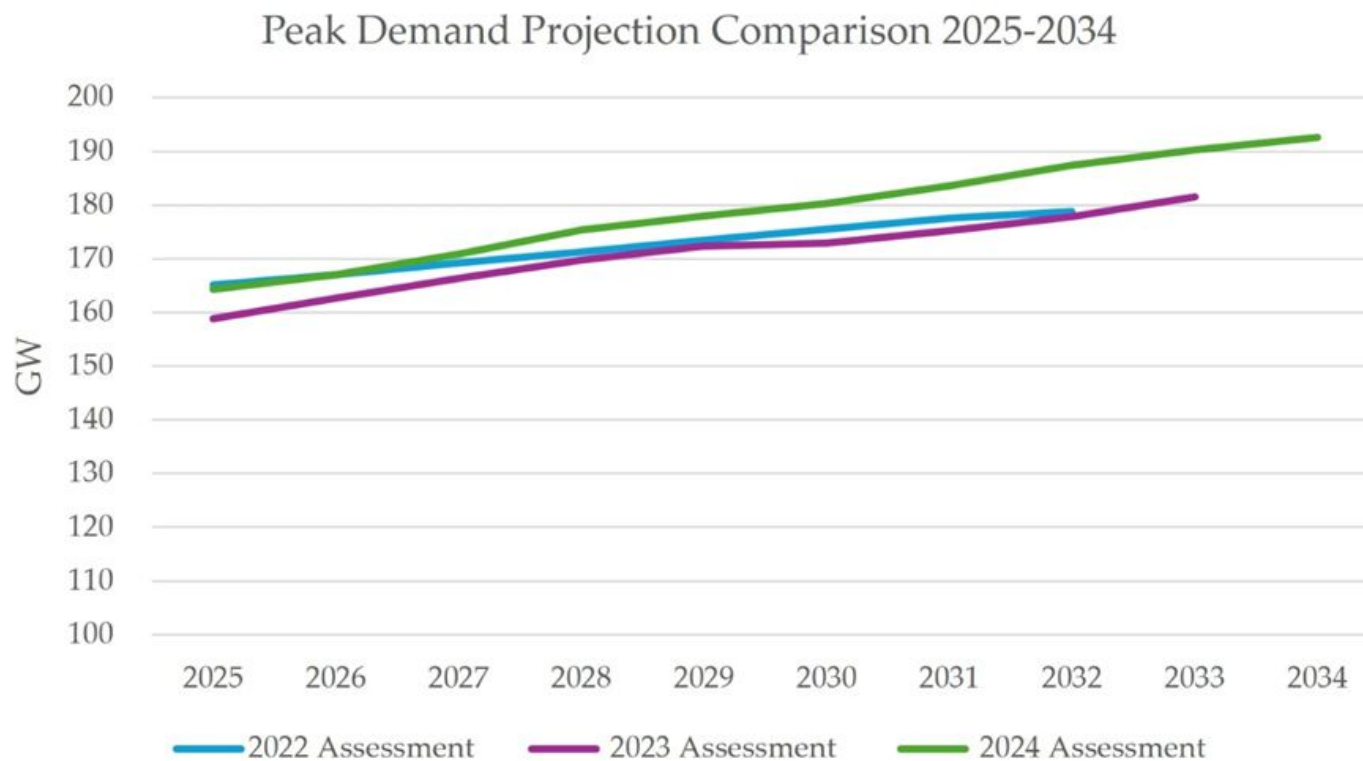
WECC Board Meeting Technical Session— Large Loads

March 11, 2025

Katie Rogers, WECC
Julia Snitman, ERCOT
Gaurav Karandikar, SERC

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Load Forecast Growth



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What are Large Loads

Medium Commercial Loads (10s of kW to 10s of MWs)



Entertainment



Campuses



Arenas



Wastewater



Commercial

Large Industrial Loads (10s to 100s of MWs)



Refining



Metals



Data Centers



Mining



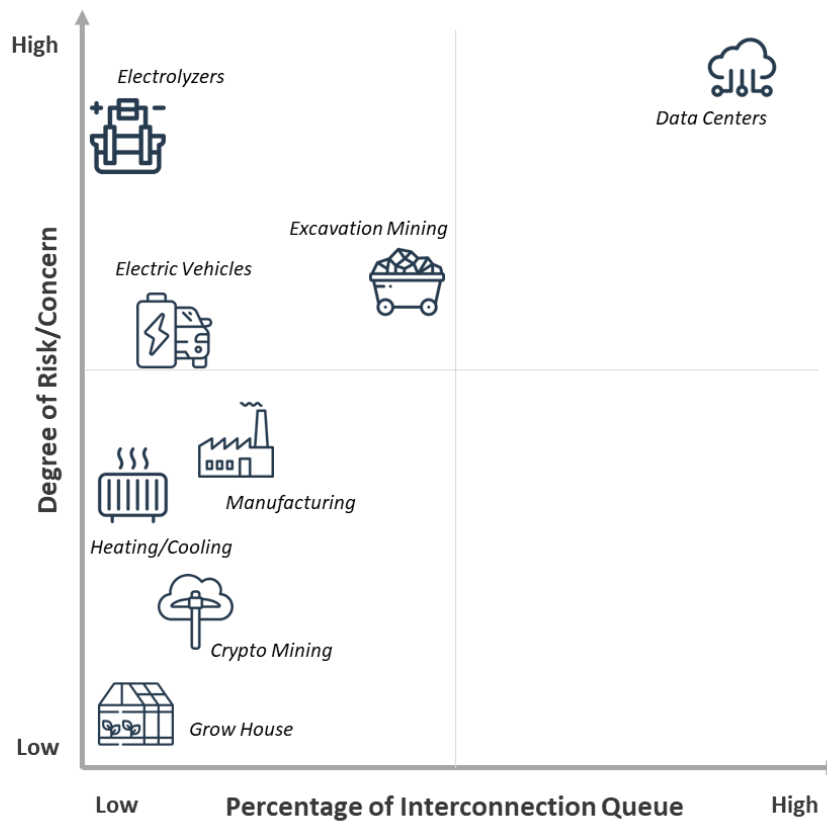
Chemical



Manufacturing

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Interconnection Queues



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What Has Changed

	Past	Current
Facility Size:	1 MW to 400 MW	Some surpass 1,000 MW
Load Patterns:	Regular, predictable	May not be predictable
Advanced Notice:	Sufficient time to plan, design, and construct	Minimal, could be ~18 months

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Risk—Demand Forecast Challenges

- Load interconnection queues overloaded—won't all come to fruition
- Lack of operational information and/or data
- May not include electrification efforts (or other aggregate impacts)
- Some may shift load profiles
- Behind-the-meter not always known or accounted for
- Demand response participation

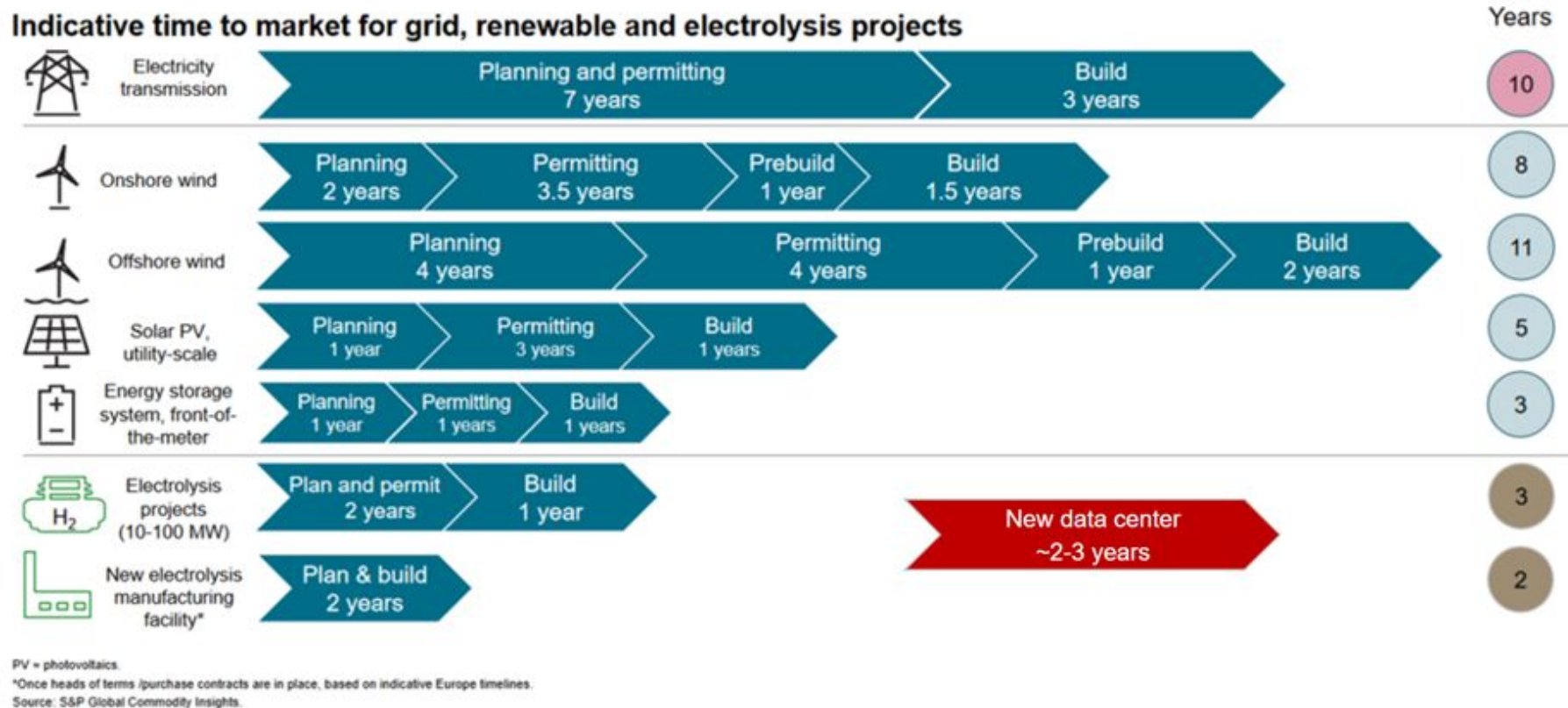
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Risk—Accurate Model Challenges

- Lack of data on large load behavior, composition, and performance
- Simplified static load models don't capture the characteristics of large load performances
 - May underestimate impacts during ride-through events
- Lack of phasor domain transient (PDT) and electromagnetic transient (EMT) models

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Risk—Misaligned Timelines



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Risk—System Planning Challenges

- May exacerbate existing resource adequacy risks
- Distribution system may not be able to keep up with multi-sector electrification
- High uptime limits time available for maintenance

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Risk—Variable and Flexible Challenges

- Increased need for reserves
 - Limits available energy
- Unpredictable behavior and operational characteristics
- Current ramping abilities may not be sufficient for large power fluctuations
- Fast ramps and spikes could cause oscillations, flicker, frequency deviations, oscillations, and other risks

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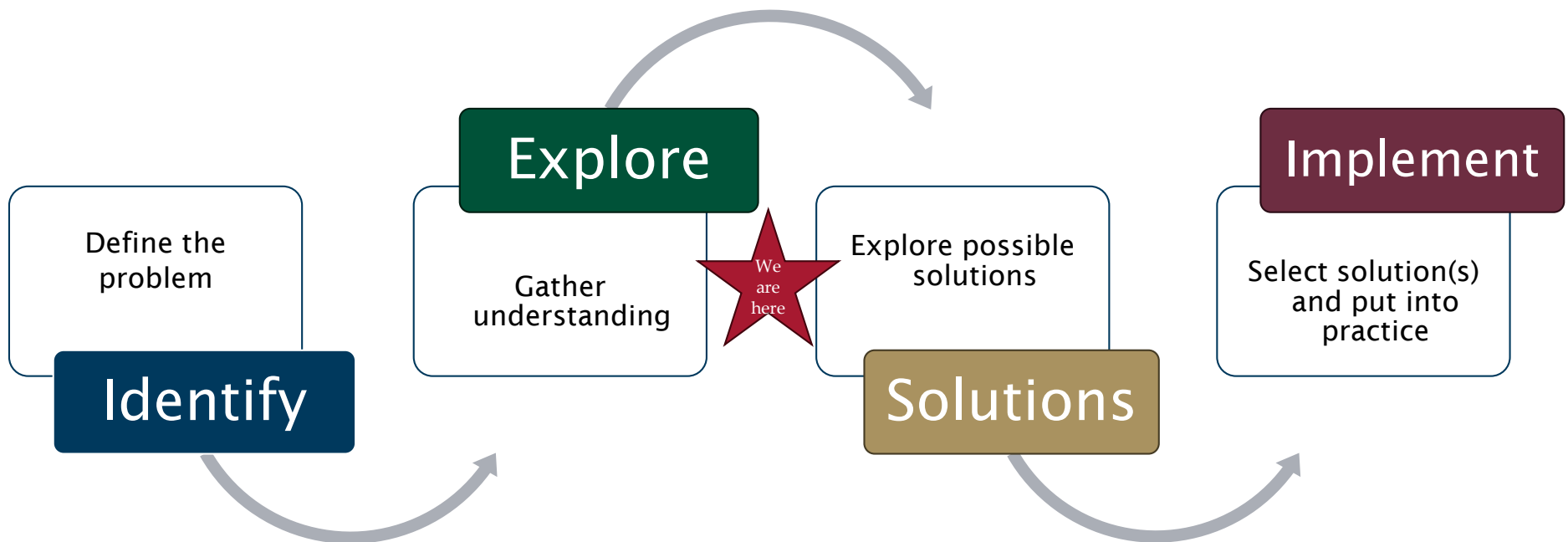
Julie Snitman, ERCOT

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Gaurav Karandikar, SERC

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Where are we in the process?



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WECC Action—Education

- WECC Reliability in the West webinar series
 - October 2024
 - November 2024
 - February 2025
 - March 2025
- This technical session

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WECC Action—Data and Models

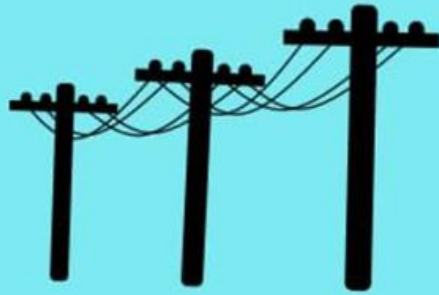
- Data Gathering
 - Contract with Elevate Energy Consulting
 - WECC Large Loads Industry Advisory Group
 - Loads and Resources (L&R) data request expansion
- Models
 - Dynamic model development
 - 20-year production cost model development

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WECC Action—Industry Coordination

- NERC Large Loads Task Force
 - Part I: Characteristics and Risks of Emerging Large Loads (Q2 2025)
 - Part II: Assessment of Gaps in Existing Practices, Requirements, and Reliability Standards for Emerging Large Loads (Q4 2025)
- ESIG Large Loads Task Force
 - Data Collection
 - Load Forecasting
 - Interconnection Process and Performance Requirements
 - Modeling Requirements
 - Transmission Planning
 - Wholesale Market Options
 - Resource Adequacy

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**POWER OUTAGES AREN'T
A LAUGHING MATTER.
THEY'RE TOO DARK.**

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