



WESTERN ASSESSMENT

of Resource Adequacy





Western Assessment of Resource Adequacy

February 1, 2022

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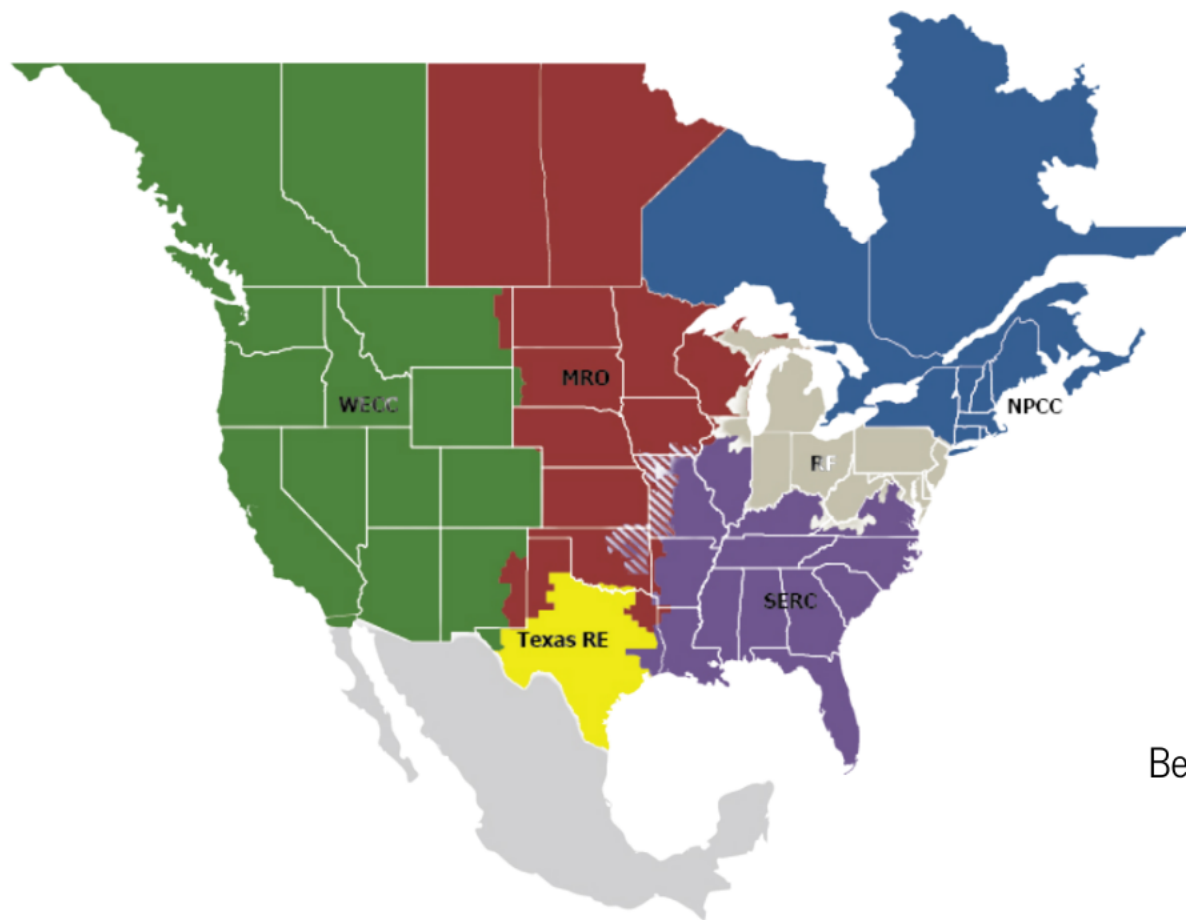
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The Western Interconnection's Reliability Risks



2022 | WECC

RISK PRIORITIES WORKSHOP





COMPLIANCE OPEN WEBINAR

February 17, 2022, 2:00-4:00 PM MT





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Western Assessment of Resource Adequacy

February 1, 2022

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Western Assessment of Resource Adequacy

- Executive Summary
- Chapter 1 — Energy-Based Resource Adequacy*
- Chapter 2 — Probabilistic Analysis Findings
- Chapter 3 — System Condition Scenarios*
- Chapter 4 — Supplemental Subregion Results
- Appendices

*New this year



Findings

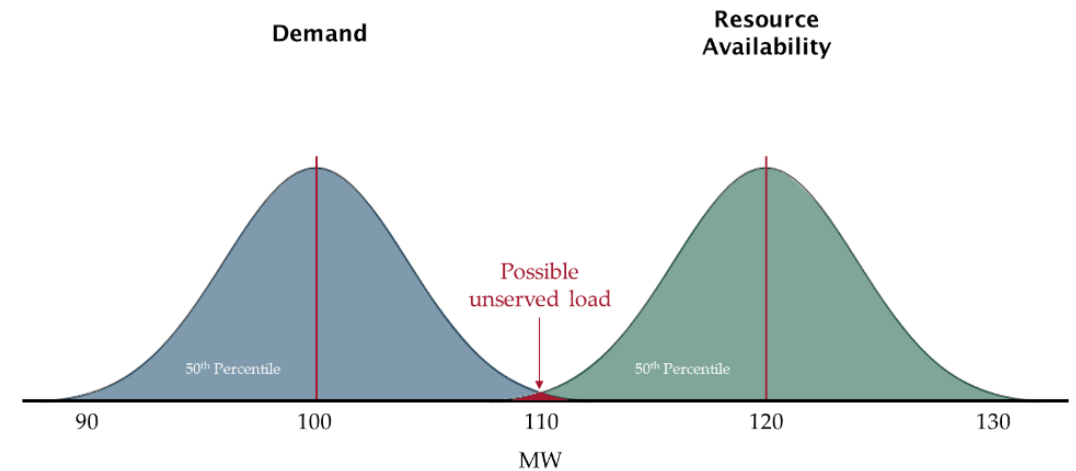
- Increasing variability and the need for urgency
 - Risks to resource adequacy in the Western Interconnection are likely to increase over the next 10 years as variability increases
 - If long-term resource adequacy issues are not addressed immediately, they may be insurmountable when they become near-term issues
- Changes in system strain
 - Times when the system is most strained no longer align with the peak hour
 - Variability is driving strain on the system
 - Planning Reserve Margins (PRM) are not adequately accounting for variability
- Change in reliance on imports
 - Changes on the system are affecting how and when entities can rely on imports

Recommendations

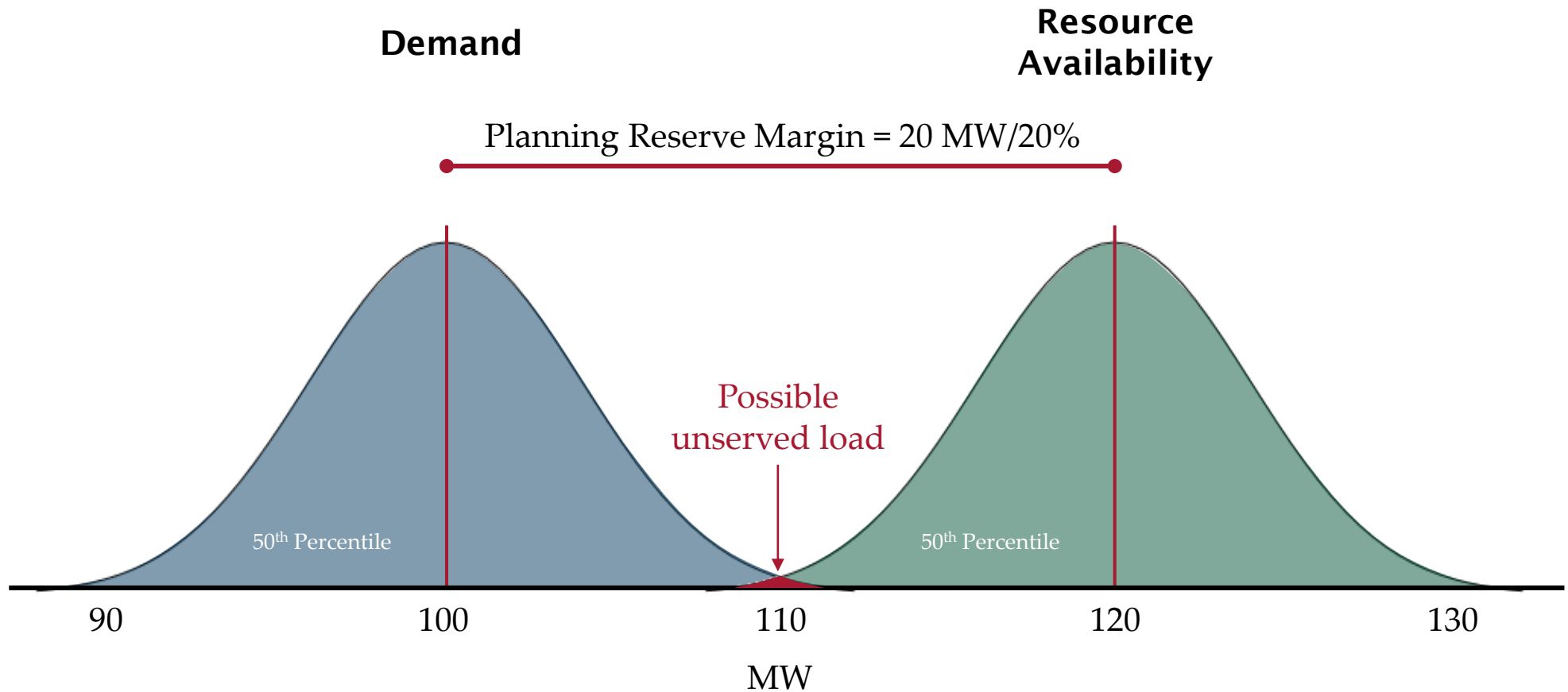
- Entities need to act now to address long-term issues
- Entities should change the way they approach PRMs
 1. Calculate PRMs based on energy, not capacity
 2. Evaluate the most strained times on the system, not necessarily the peak hour
 3. Recalibrate PRMs when changes to demand or resources increase variability on the system
- Industry needs to change how it counts imports

WECC's Approach

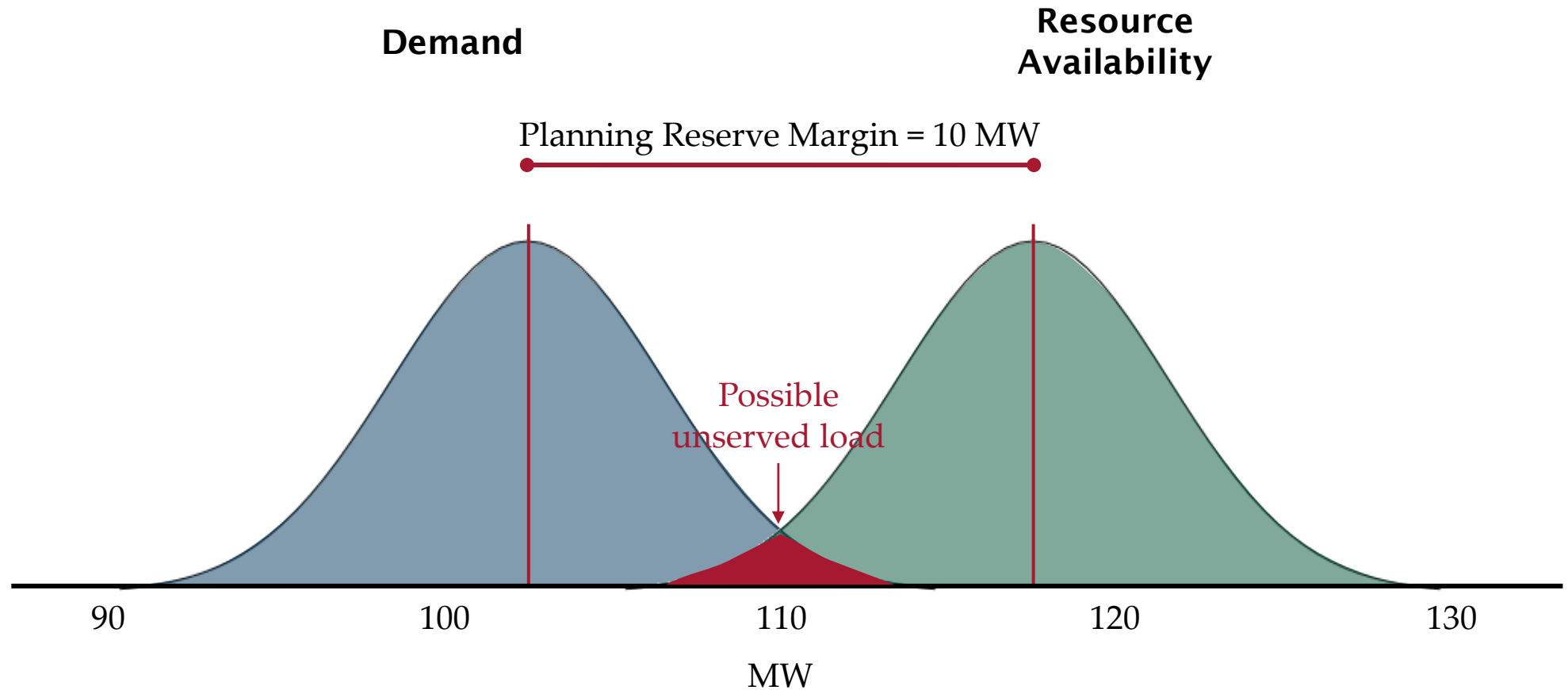
- Energy-based
 - Capacity-based approaches only estimate variability (% of capacity)
 - To fully account for variability, need to look at energy output
- Probabilistic
 - Probabilistic analysis allows us to evaluate a range of potential resource and demand scenarios
 - Helps to fully account for variability
- Hourly
 - Examining every hour ensures the analysis sees the times of greatest strain



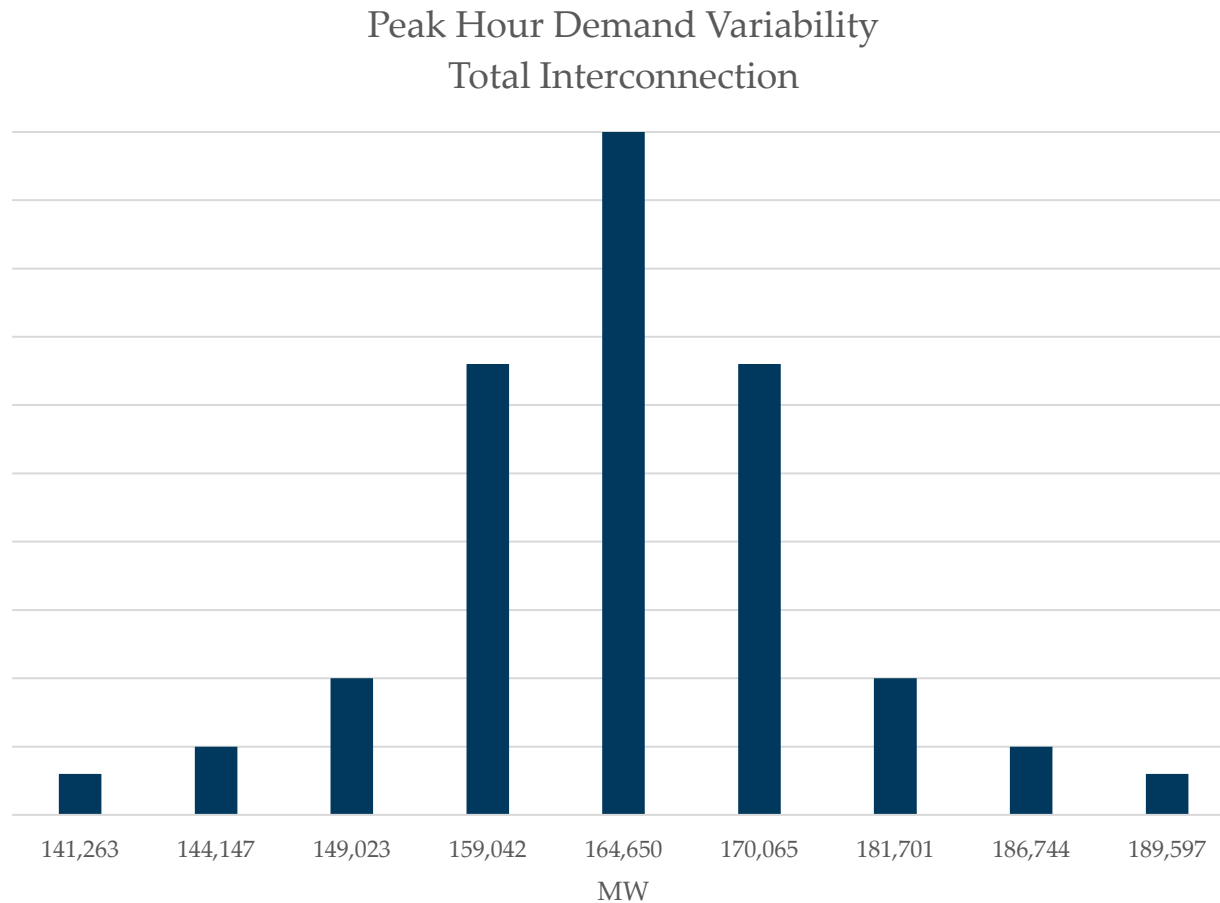
Loss of Load Probability



Loss of Load Probability

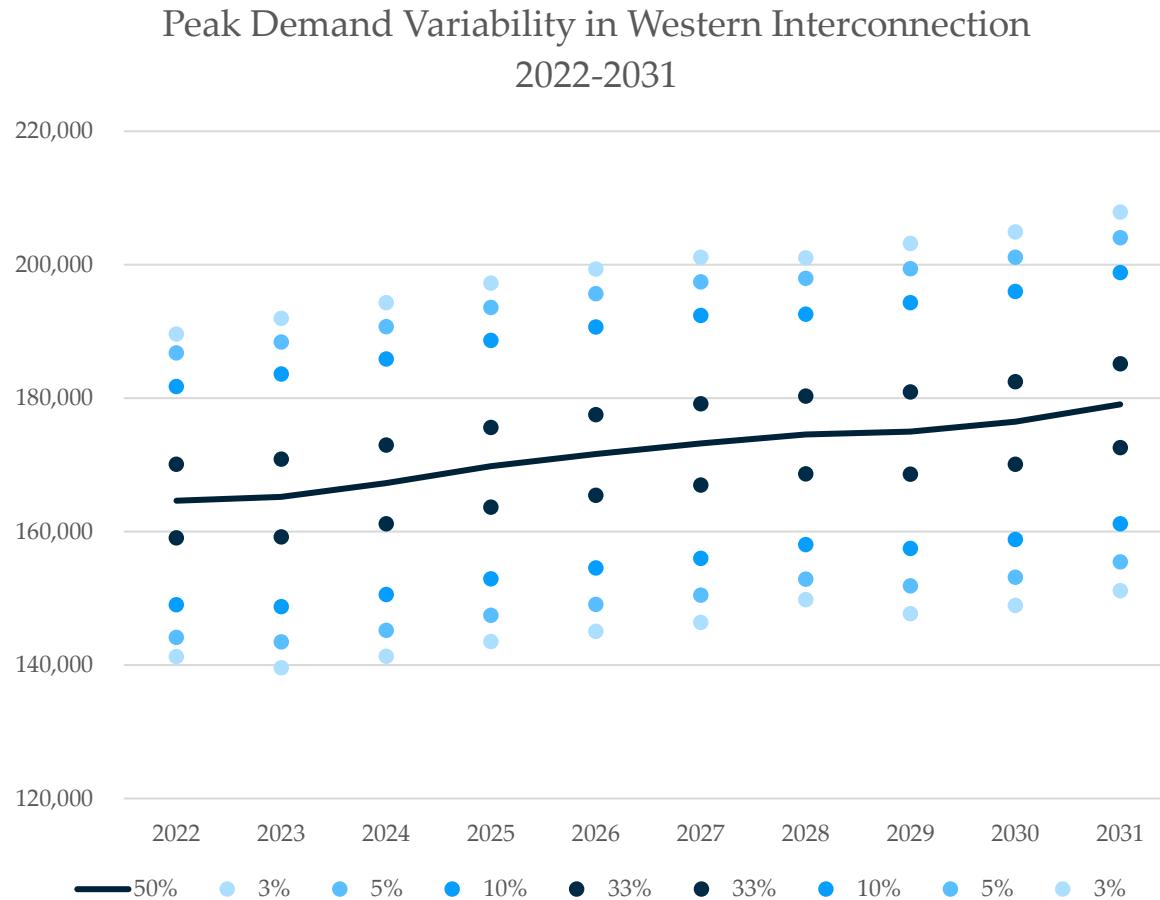


Increasing Variability: Demand



- Demand is analyzed on a probability curve
 - Shows the range of possible demand levels

Increasing Variability: Demand

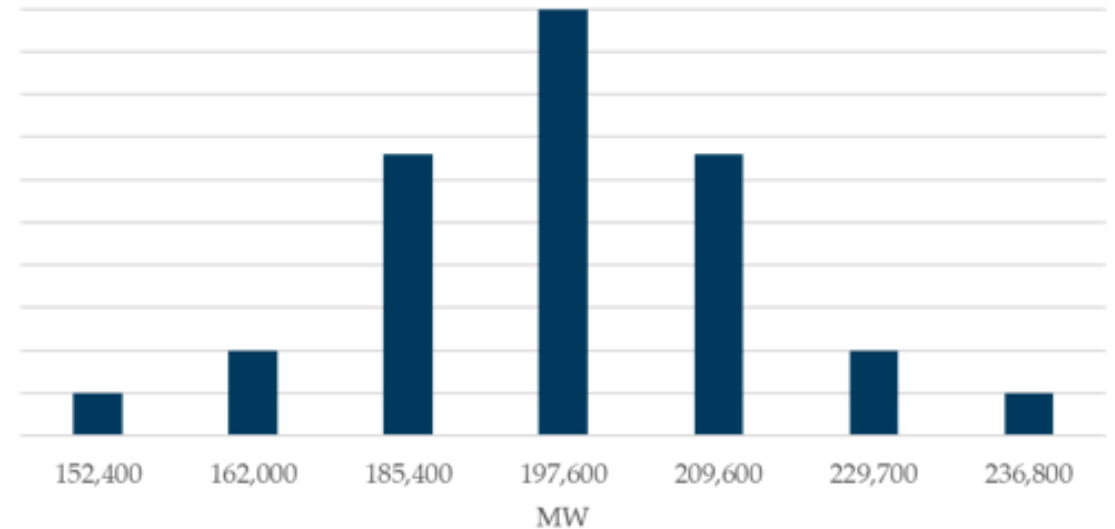


- Demand variability curves for the next 10 years
 - Expected peak of ~179 GW by 2031
 - 3% probability to be ~208 GW

Increasing Variability: Resources

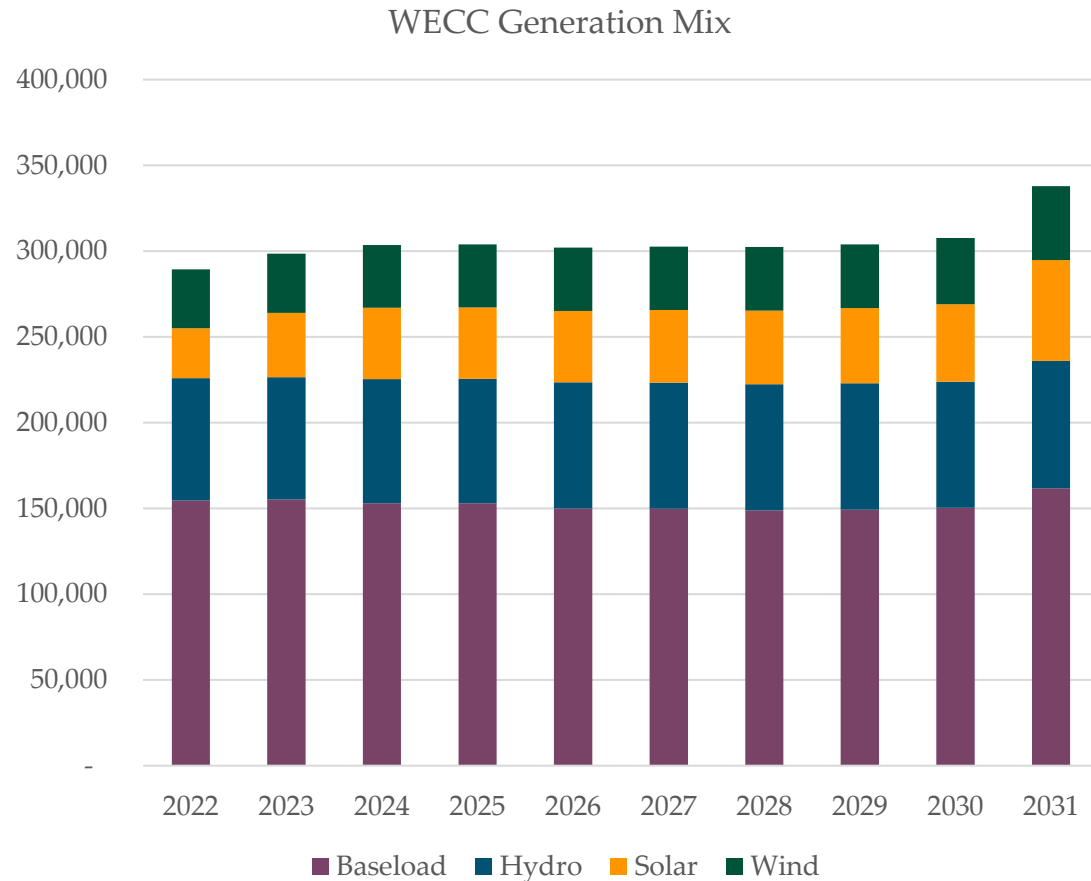
- Difference between expected and low availability
 - Baseload—12% loss
 - Hydro—40% loss
 - Solar—42% loss
 - Wind—94% loss

2022 Peak Hour Resource Variability—
Western Interconnection



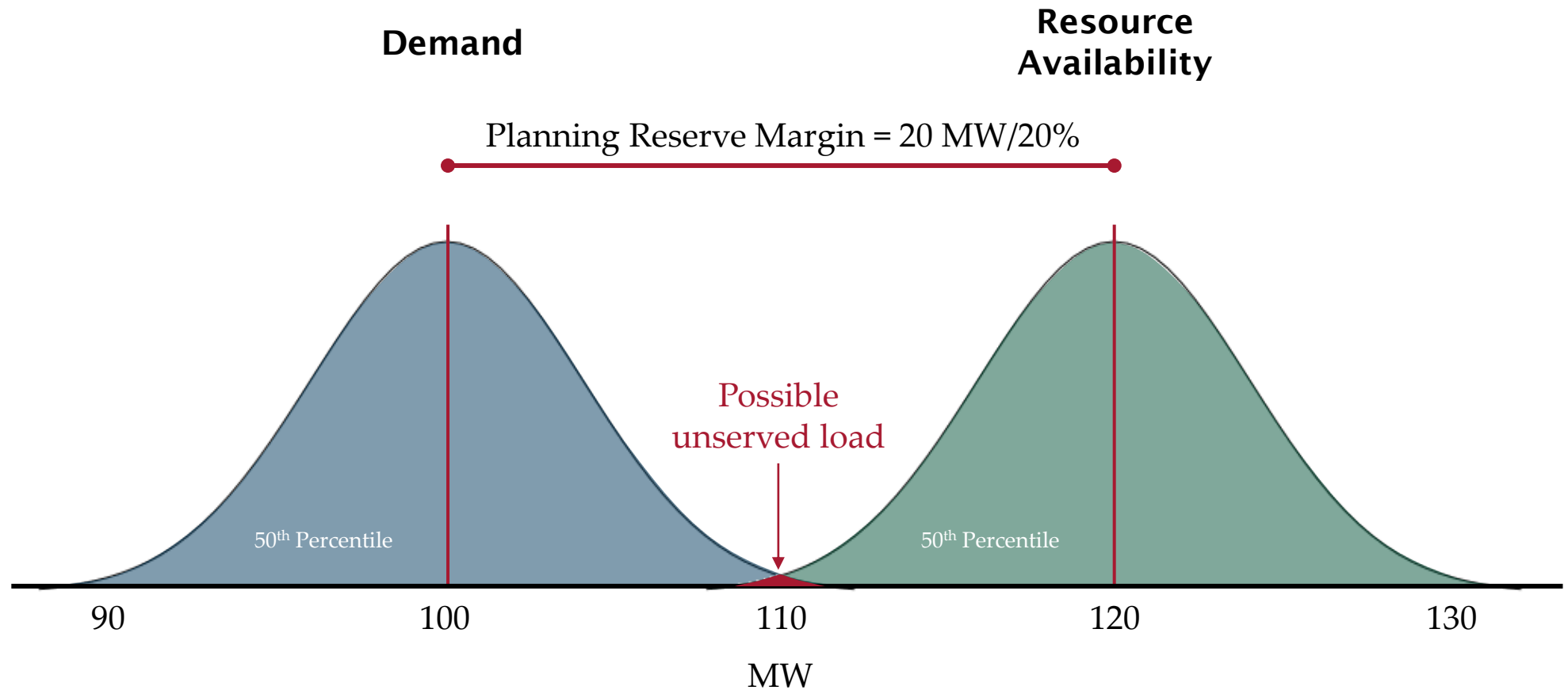
	1-in-20	1-in-10	1-in-3	1-in-2	1-in-3	1-in-10	1-in-20
Baseload	116,300	199,800	128,600	131,800	134,600	138,500	139,400
Hydro	24,400	27,800	35,300	40,600	44,600	50,000	51,700
Solar	11,300	13,700	18,000	19,300	20,800	23,400	25,000
Wind	400	400	3,500	5,900	9,600	17,800	20,700

Increasing Variability: Resource Mix



- Variable energy resources expected to increase
 - Baseload—7.1 GW increase (4.5%)
 - Hydro—3.0 GW increase (4.2%)
 - Solar—29.7 GW increase (101.7%)
 - Wind—8.7 GW increase (25.4%)

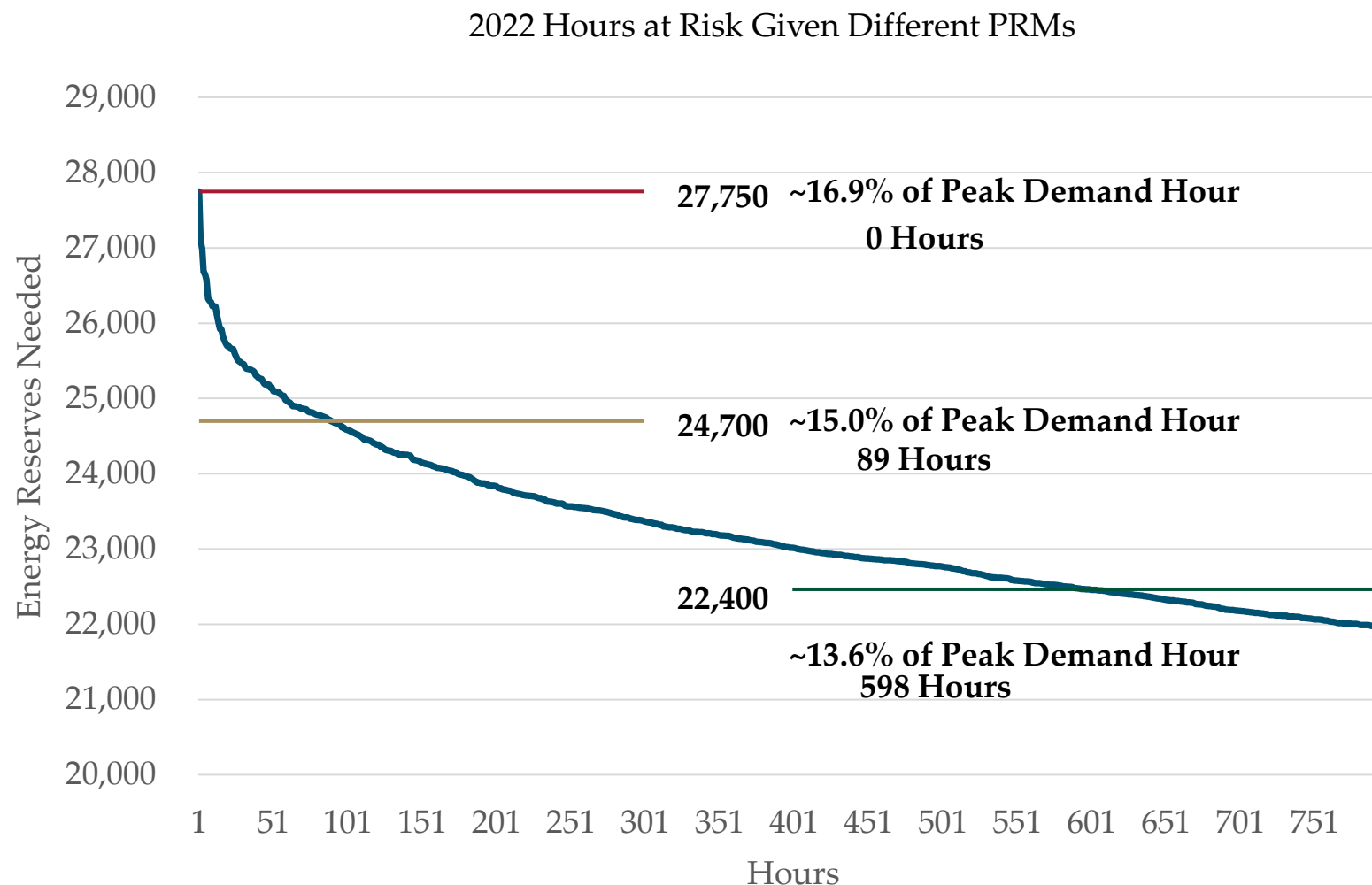
Loss of Load Probability



Planning Reserve Margins

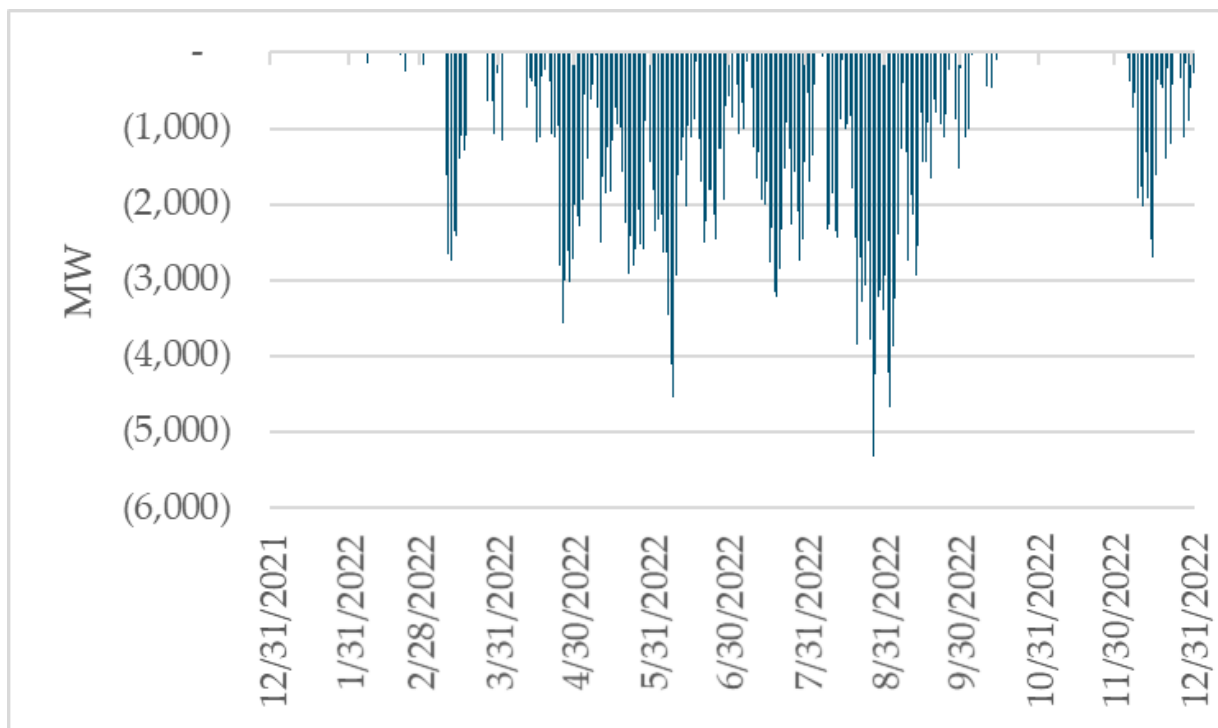
- **Peak Demand PRM:** the PRM needed to ensure the peak demand hour each year is 99.98% reliable. Based on applying peak demand PRM to all hours of the year
- **Fixed PRM:** A 15% PRM applied to all hours
- **Total Reliability PRM:** The PRM needed to account for the demand and resource variability and ensure all hours of the year are 99.98% reliable. This PRM is calculated independently for each hour using the probabilistic, energy-based approach

Planning Reserve Margins

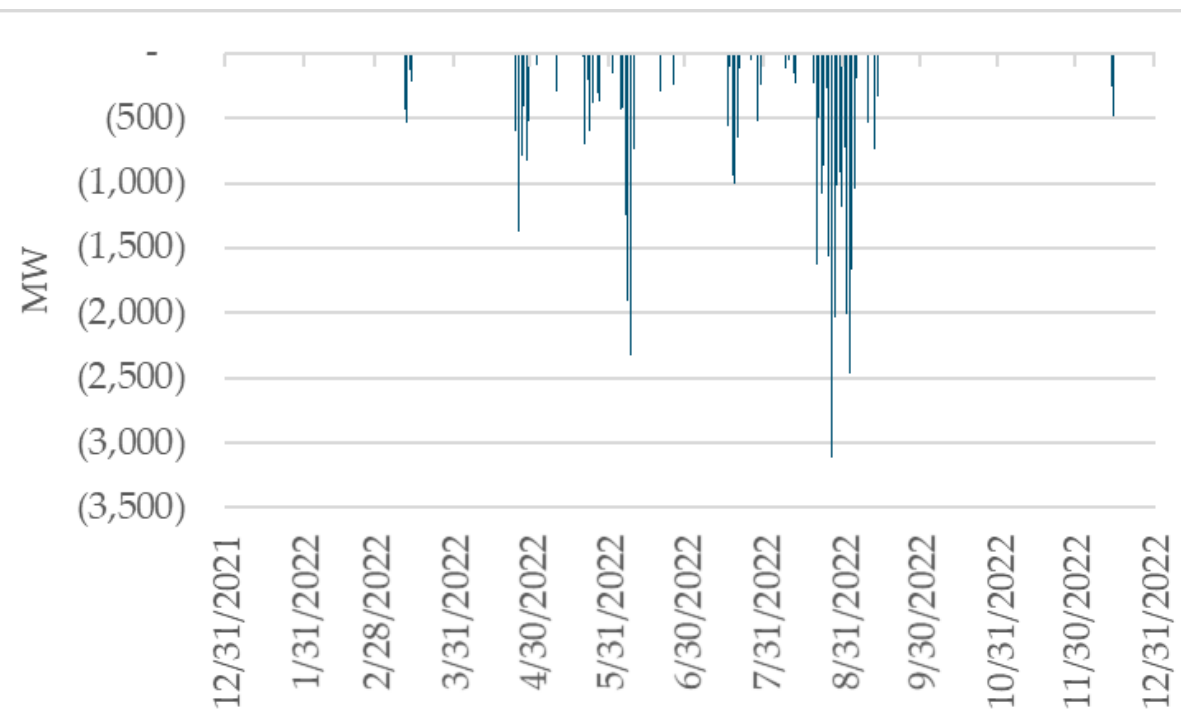


Planning Reserve Margins

2022 Western Interconnection Potential Loss-of-Load Hours with Peak Demand PRM (13.6%)



2022 Western Interconnection Potential Loss-of-Load Hours with Fixed PRM (15%)



Planning Reserve Margins

2022 Subregional Planning Reserve Margins

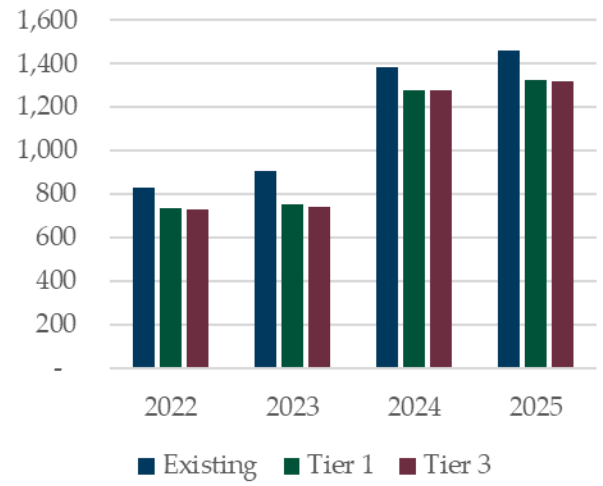
	Peak Demand PRM	Fixed PRM	Total Reliability PRM
NWPP-NW	13.9%	15%	23.9%
NWPP-E	12.1%	15%	16.1%
NWPP-C	14%	15%	17.8%
CAMX	18.4%	15%	21.6%
DSW	12.5%	15%	15%

Planning Reserve Margins

- Subregional Total Reliability PRMs are expected to grow over the next 10 years
- By 2031, PRMs needed to maintain total reliability range from ~19.3% to ~28.1%
- All subregions will be unable to meet the Total Reliability PRM even with all planned resources in service and imports

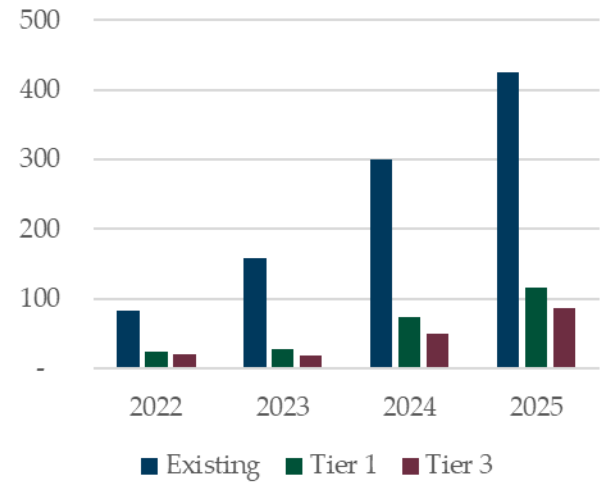
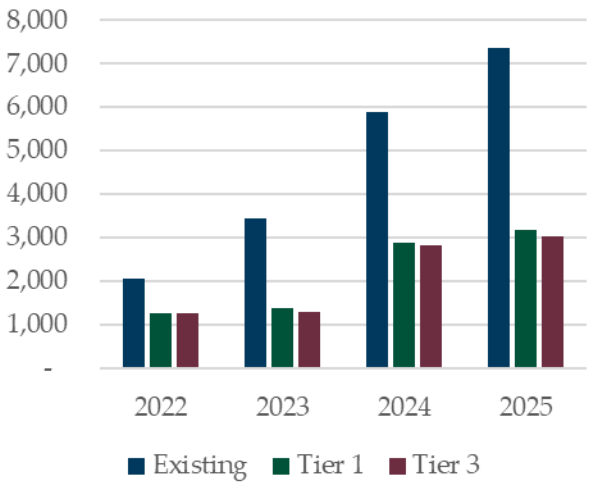
	2022	2023	2024	2025	2031
NWPP-NW	23.9%	23.9%	23.5%	23.5%	22.7%
NWPP-NE	16.1%	16.7%	17.3%	17.5%	20.6%
NWPP-C	17.8%	17.7%	20.1%	20.3%	20.4%
CAMX	21.6%	20.6%	22.0%	21.8%	28.1%
DSW	15.0%	17.7%	18.7%	18.5%	19.3%

Imports: Demand at Risk



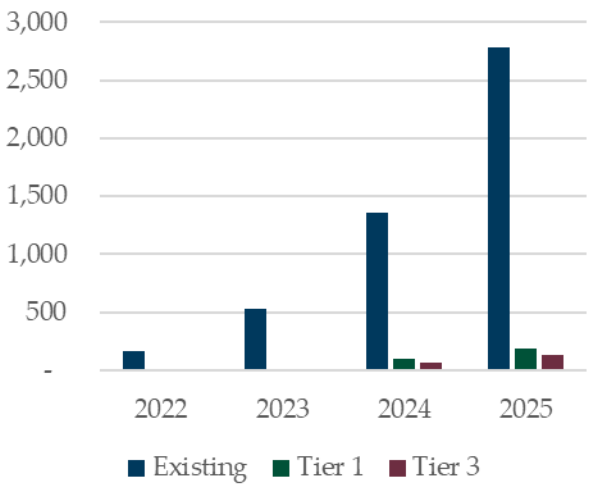
NWPP-Central demand at risk before imports (hours)

NWPP-Central demand at risk before imports (GWh)



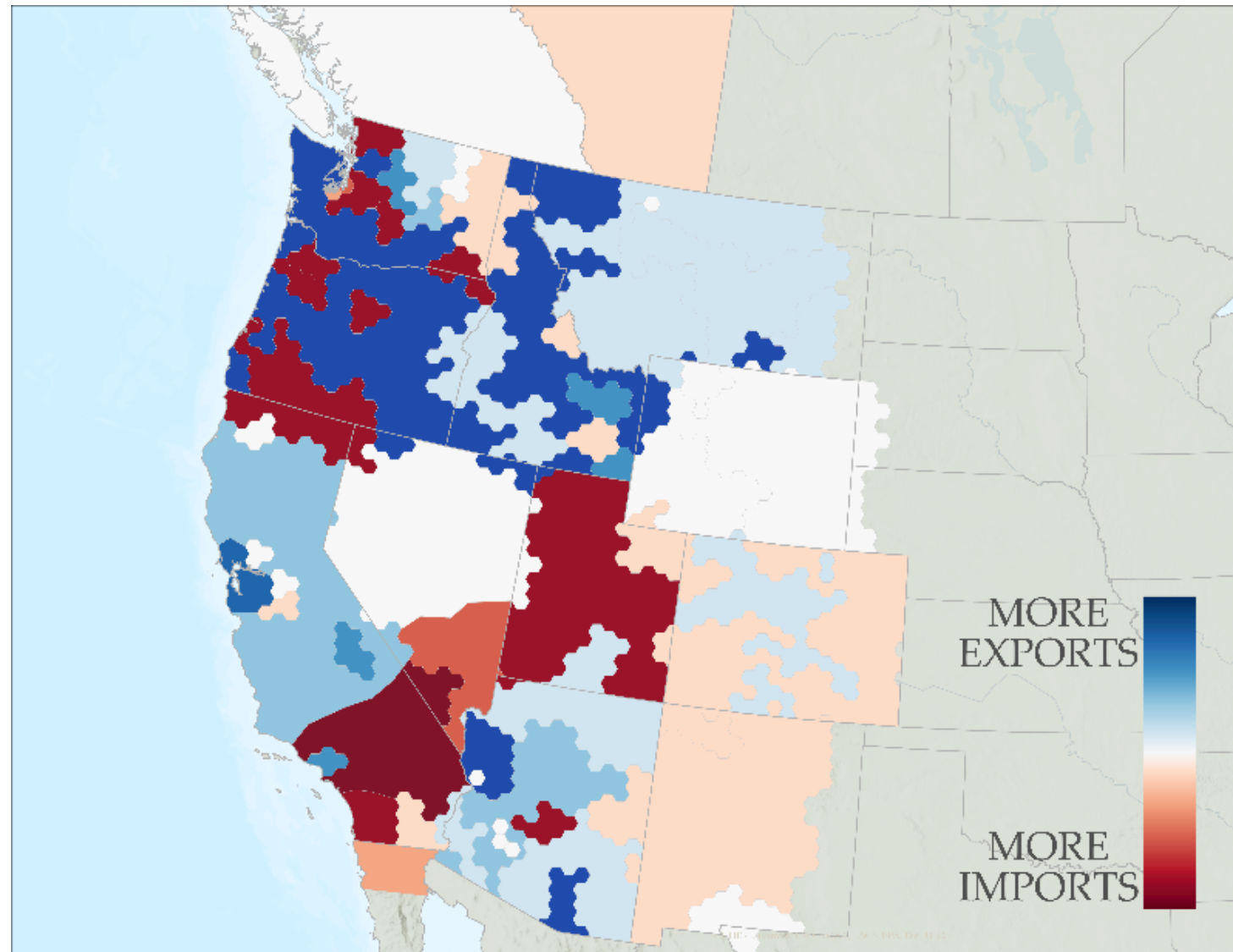
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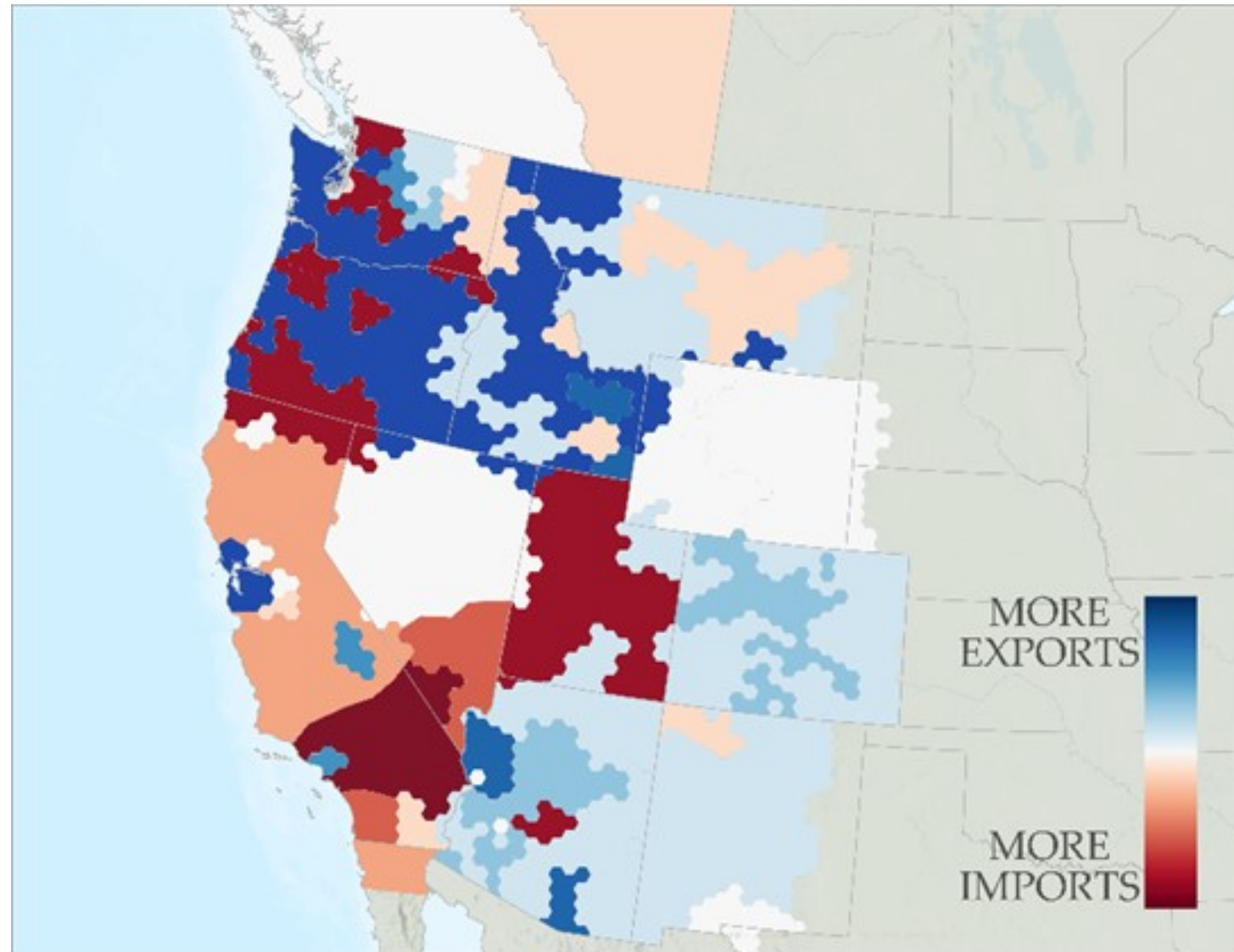
Deterministic Analysis of System Condition Scenarios

Expected Case



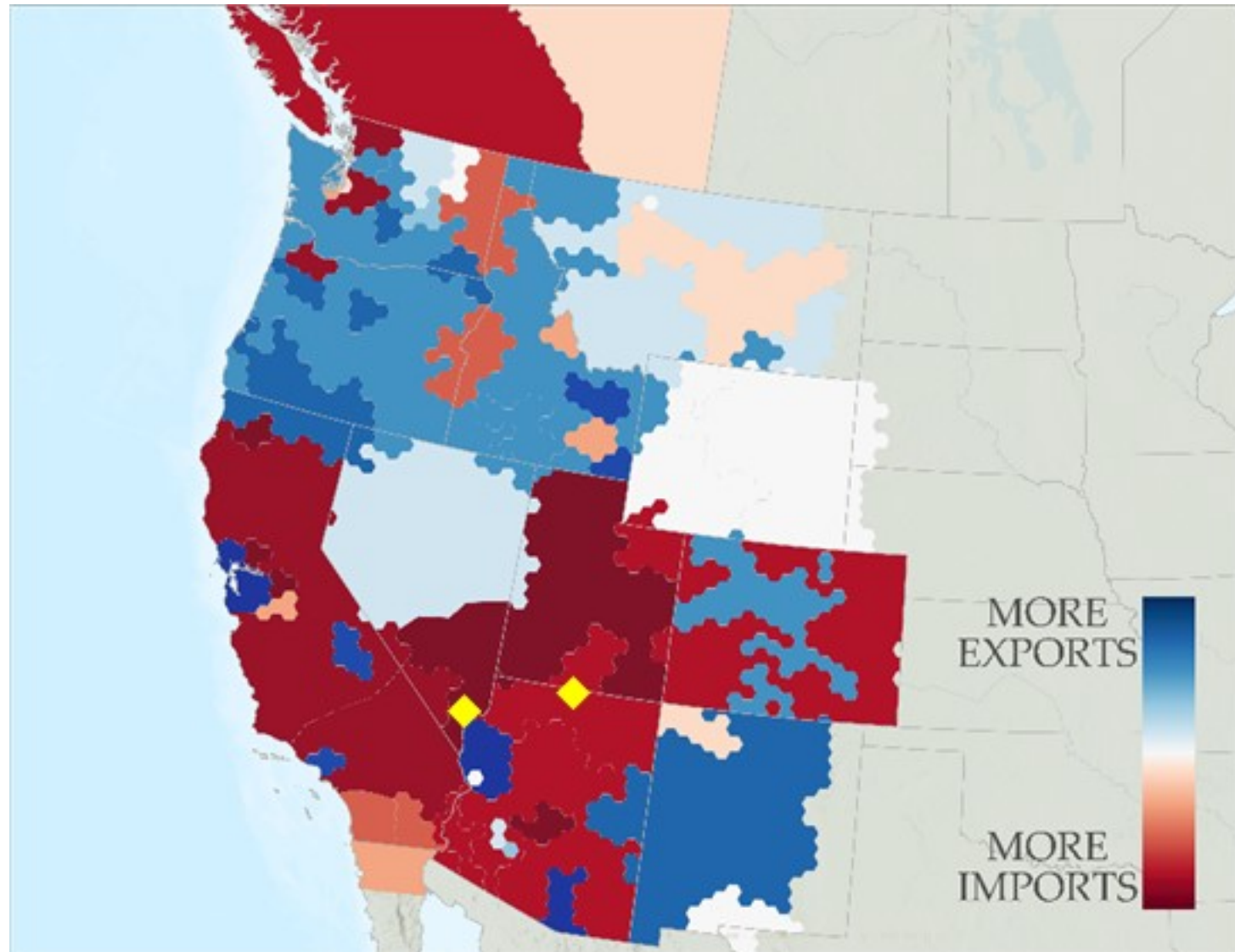
Deterministic Analysis of System Condition Scenarios

High Demand



Deterministic Analysis of System Condition Scenarios

Low Hydro





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