

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

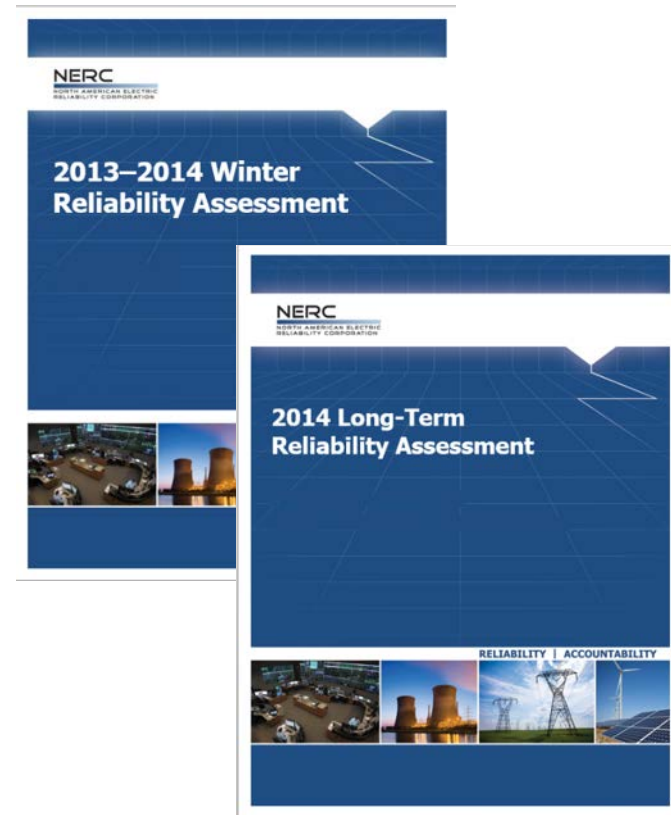
2019 Long-Term Reliability Assessment

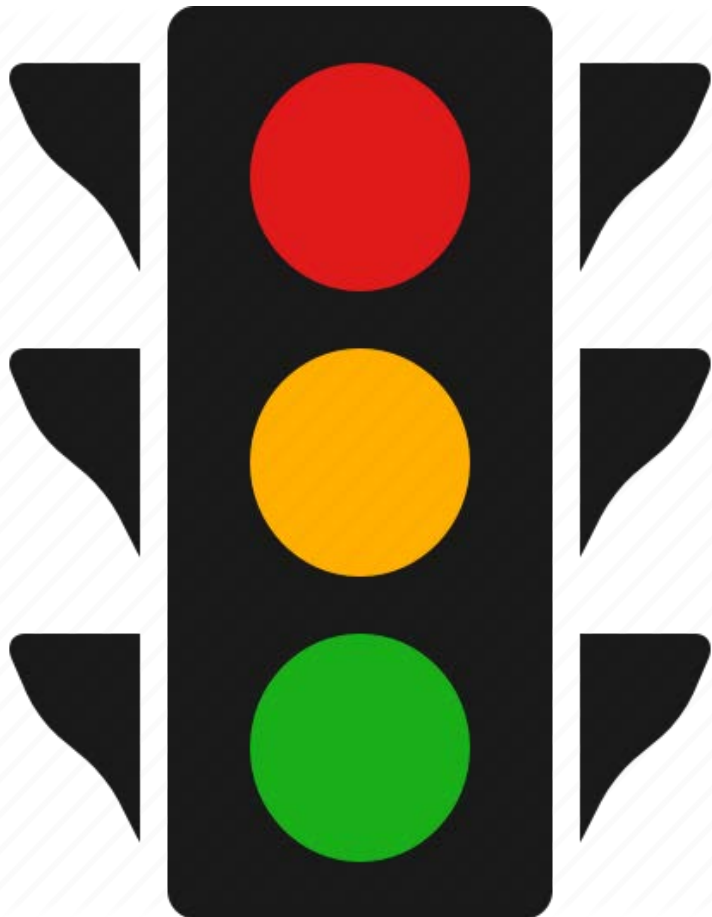
John Moura, Director, Reliability Assessment and Performance Analysis
Media Webinar
December 19, 2019

RELIABILITY | RESILIENCE | SECURITY



- Reliability
 - Resource Adequacy
 - Operating Reliability
- Transmission Adequacy
- Demand and Generation Forecasts
- Demand-Side Management
- Regional Coordination
- Key Issues – Emerging Trends
 - Technical Challenges
 - Evolving Market Practices
 - System Elements/Dynamics
 - Potential Legislation/Regulation





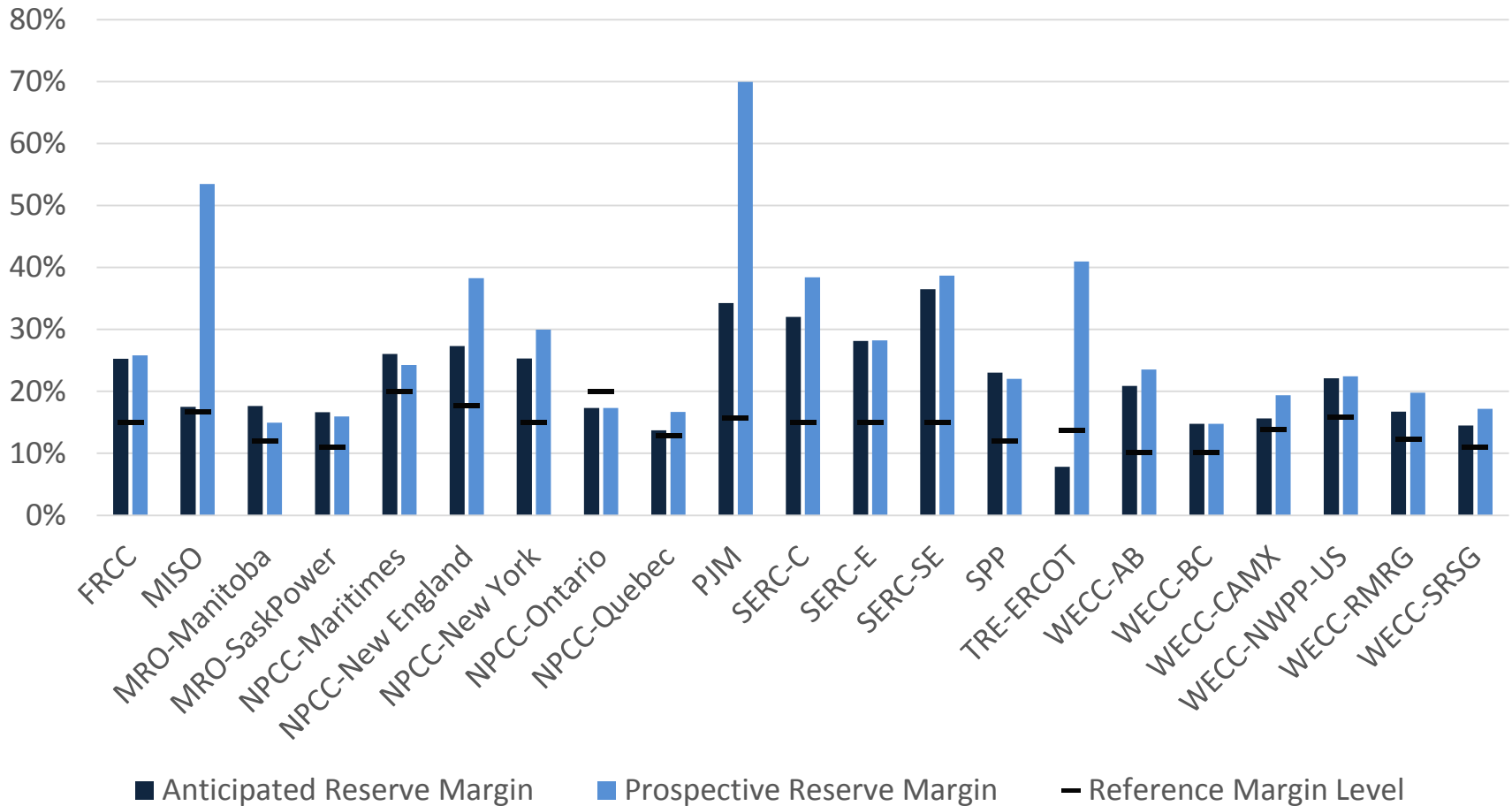
Inadequate: Anticipated and Prospective Reserve Margins are less than the Reference Margin Level and Tier 3 resources are unlikely to advance.

Marginal: Anticipated Reserve Margin is lower than Reference Margin Level and Prospective Reserve Margin is higher than Reference Margin Level.

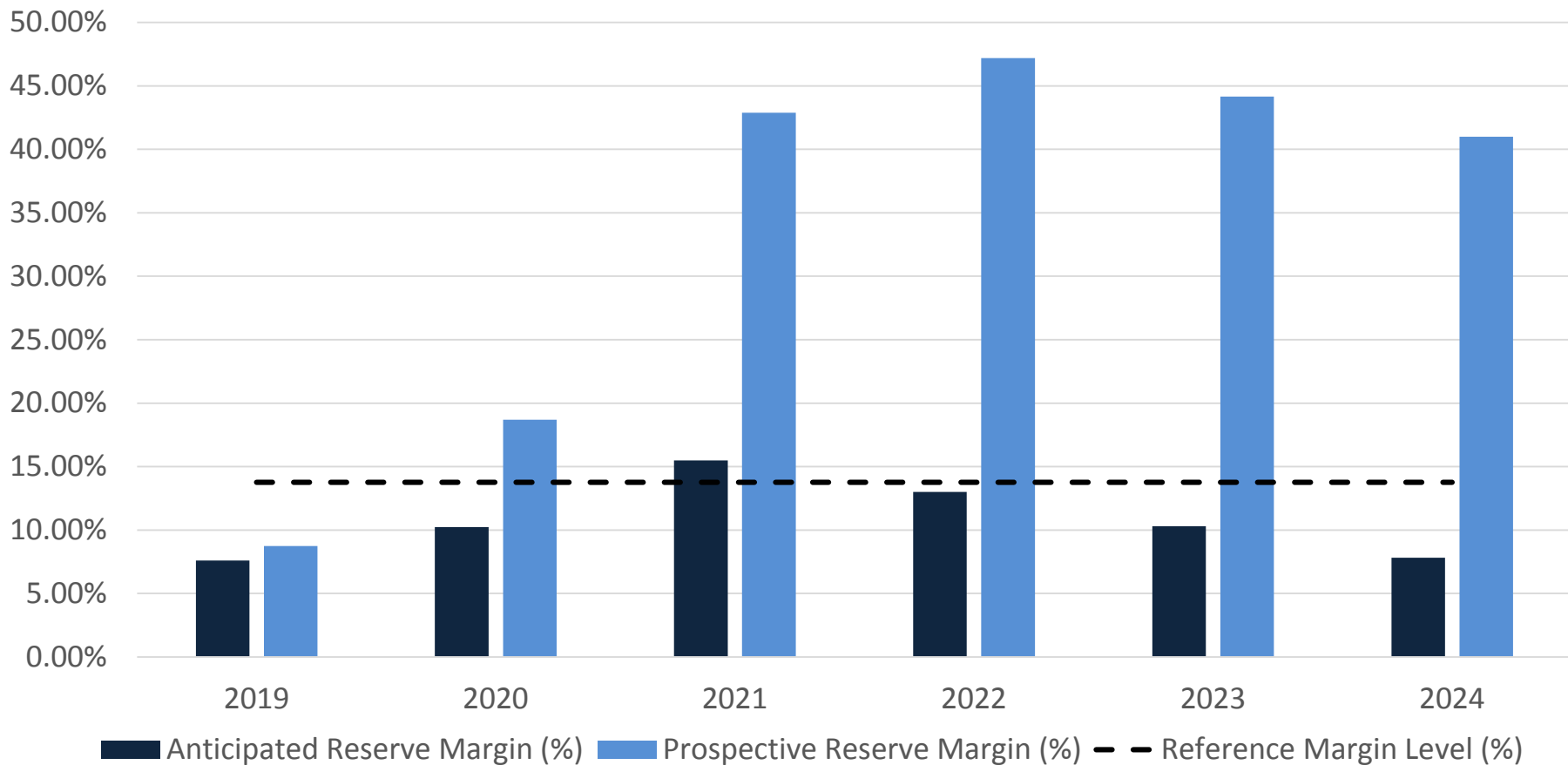
Adequate: Anticipated Reserve Margin is greater than Reference Margin Level.

- **Resource Adequacy:** Projected reserves fall below the Reference Margin Level in TRE-ERCOT and NPCC-Ontario; there is sufficient generation supply in all other areas
- **Resource Mix Changes:** Resource mix changes are driven by the addition of large amounts of new wind, solar, and natural gas resources
- **Storage and Distributed Energy Resources:** Large amounts of storage and distributed energy resources require coordinated interconnection and a robust transmission system
- **Transmission:** Transmission planning and infrastructure development need to keep pace with an increasing amount of utility scale wind and solar resources

Projected 2024 Peak Planning Reserve Margins

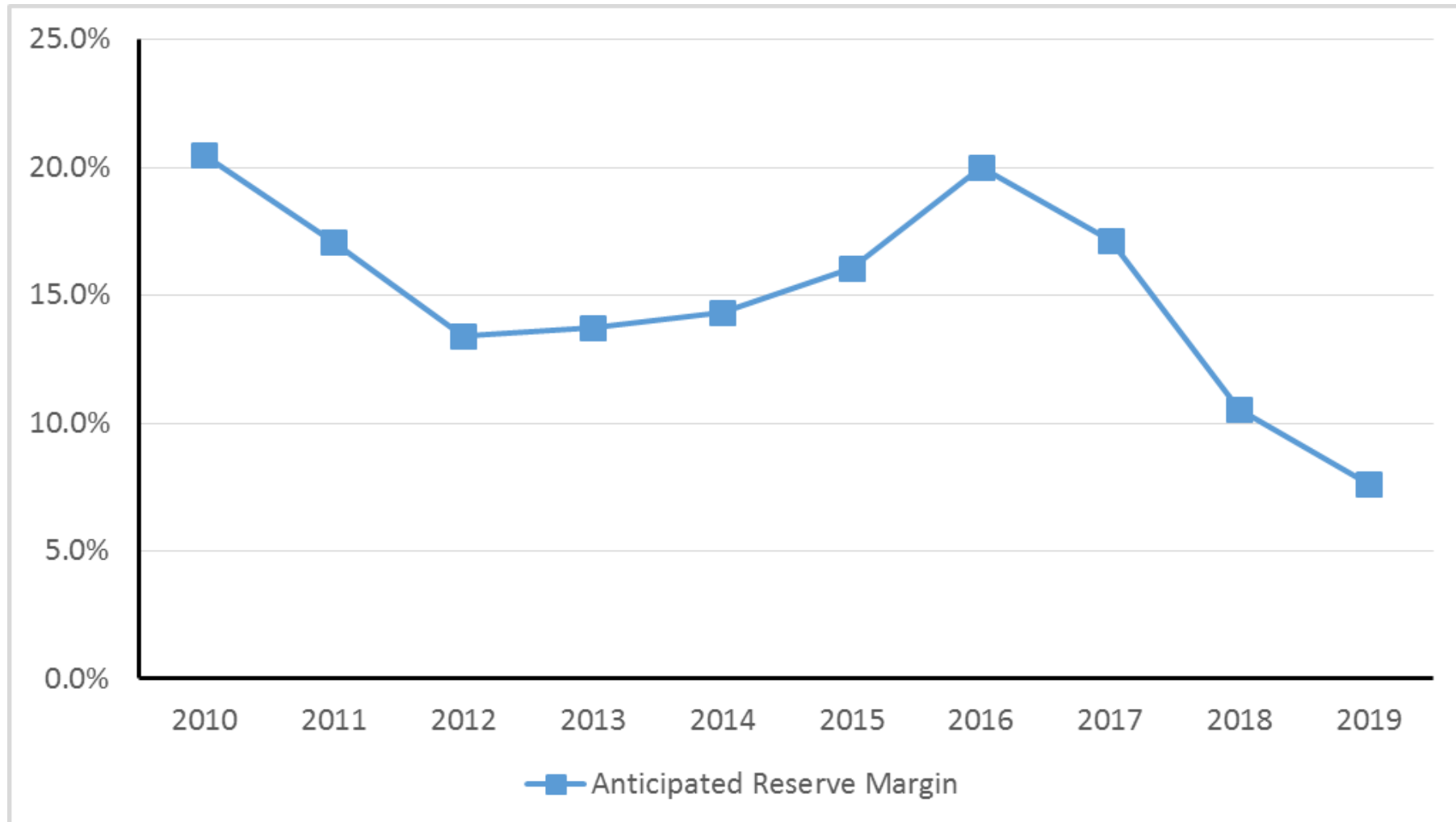


Texas-RE-ERCOT Reserve Margins

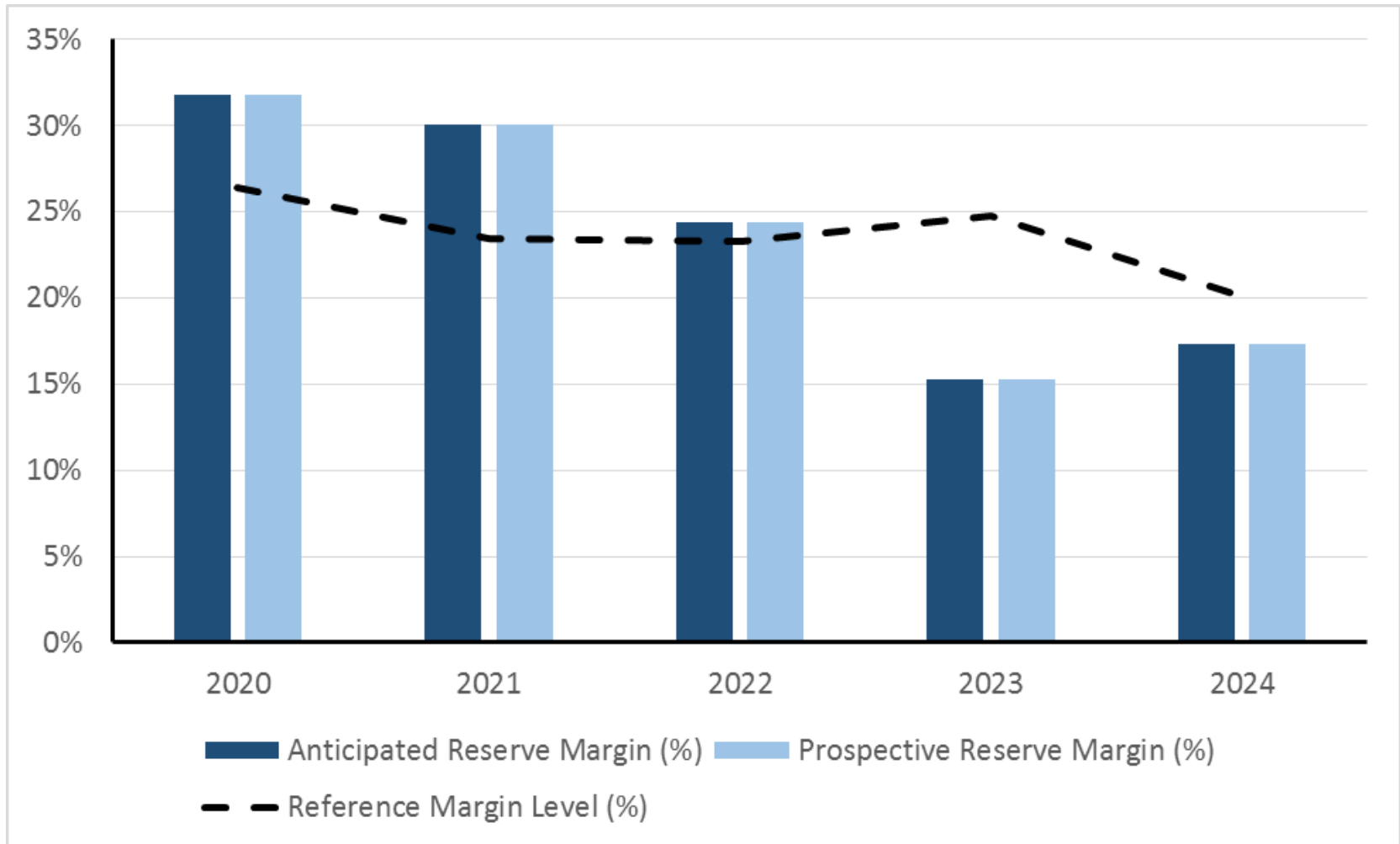


Key Finding: Anticipated and Prospective Planning Reserve Margin Shortfall

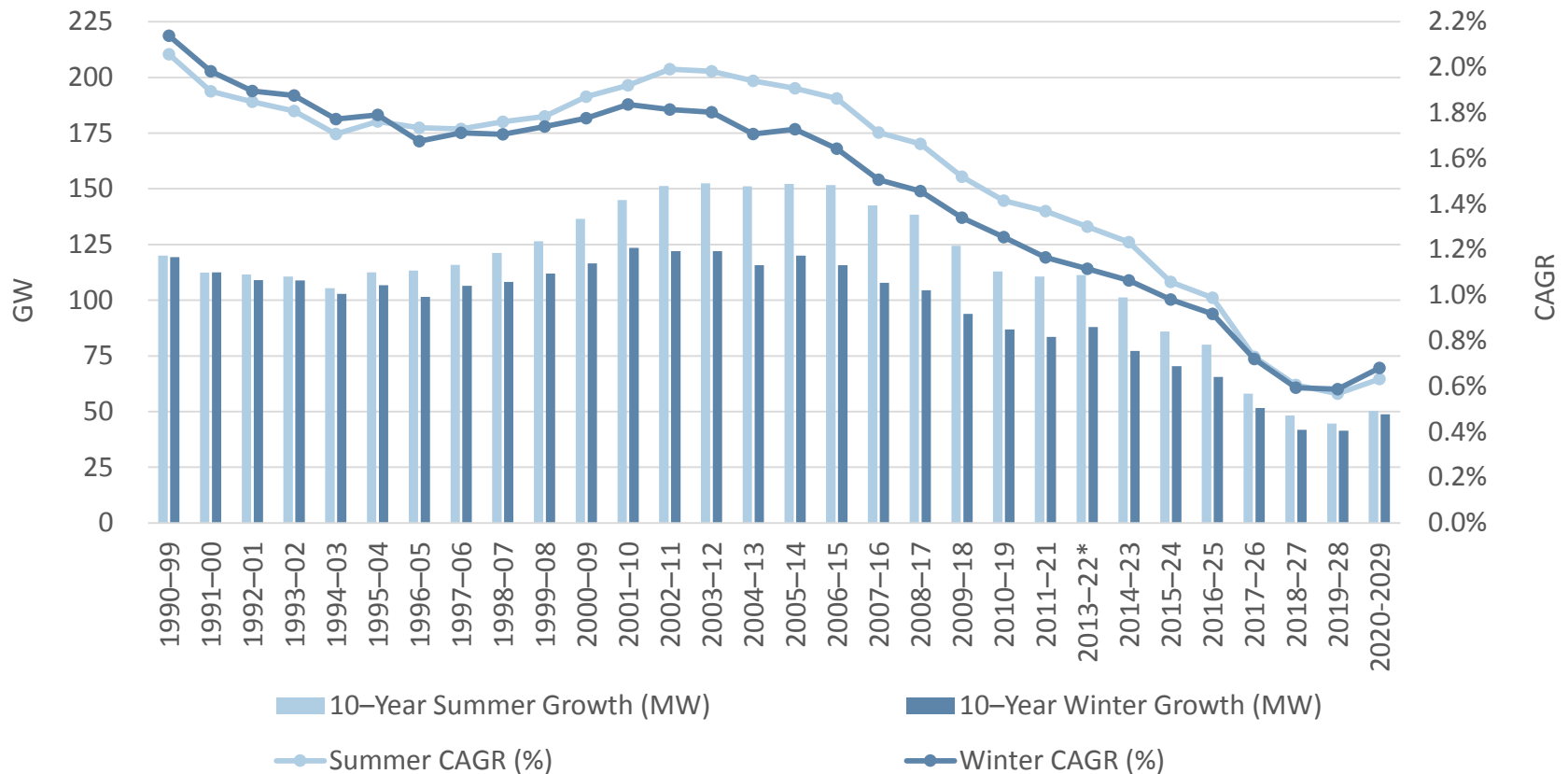
Texas-RE-ERCOT Reserve Margins



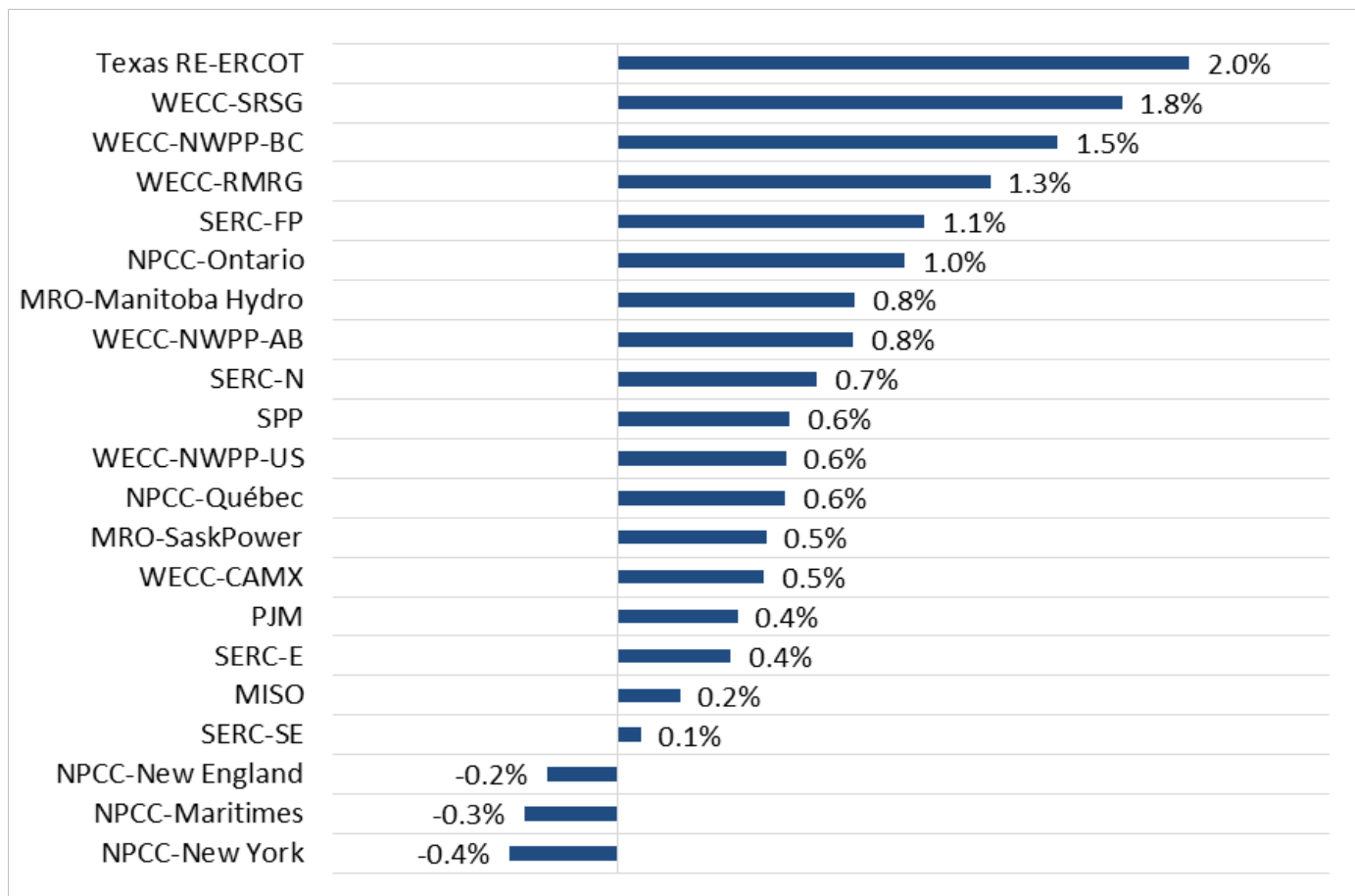
NPCC-Ontario Reserve Margins



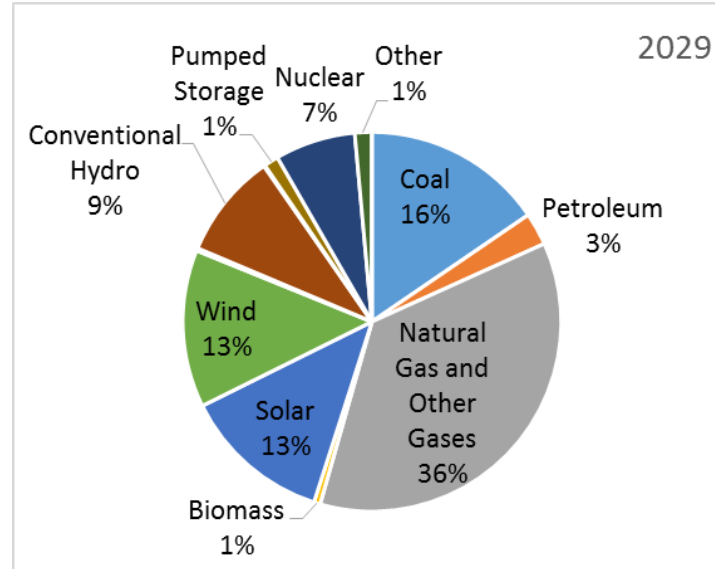
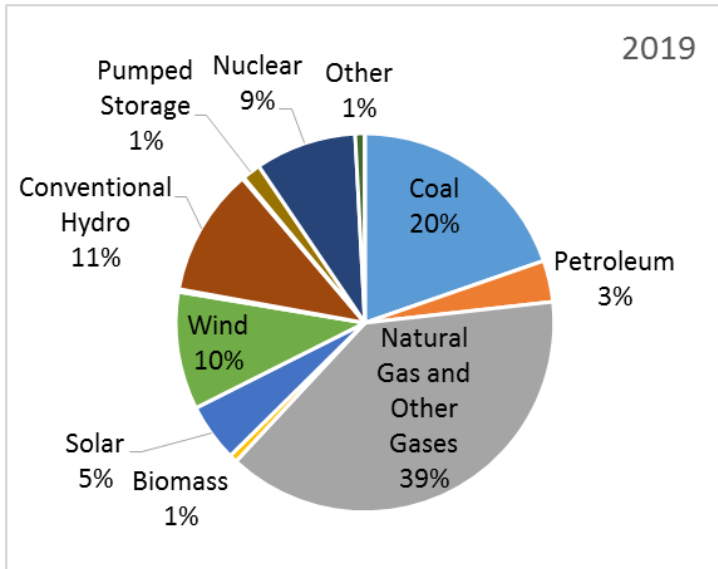
- 10-year compound annual growth rate (CAGR) of peak demand increased for the first time in 15 years for North America. Summer growth is 0.63% and winter growth is 0.68%.



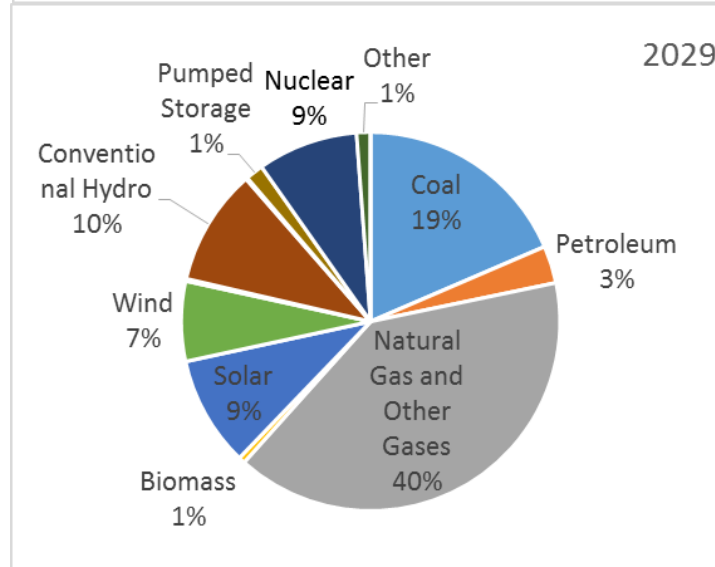
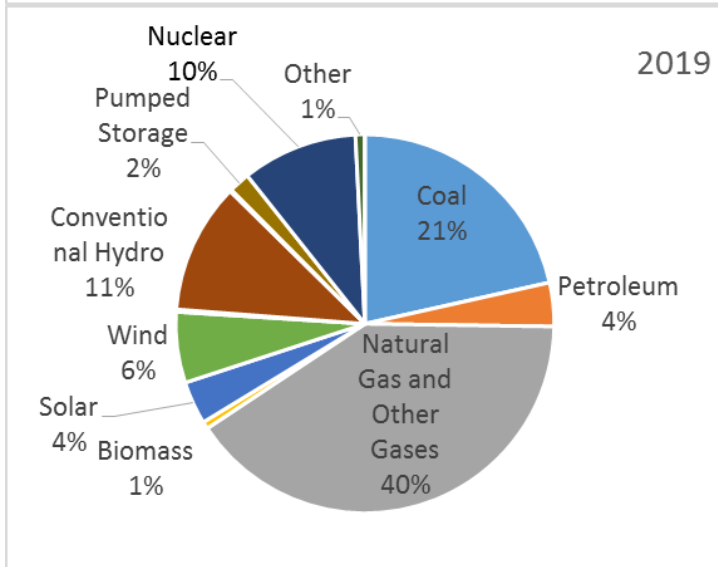
- Load growth in all Assessment Areas is 2% or under, with three areas projecting negative load growth.



Key Finding: Changing Resource Mix

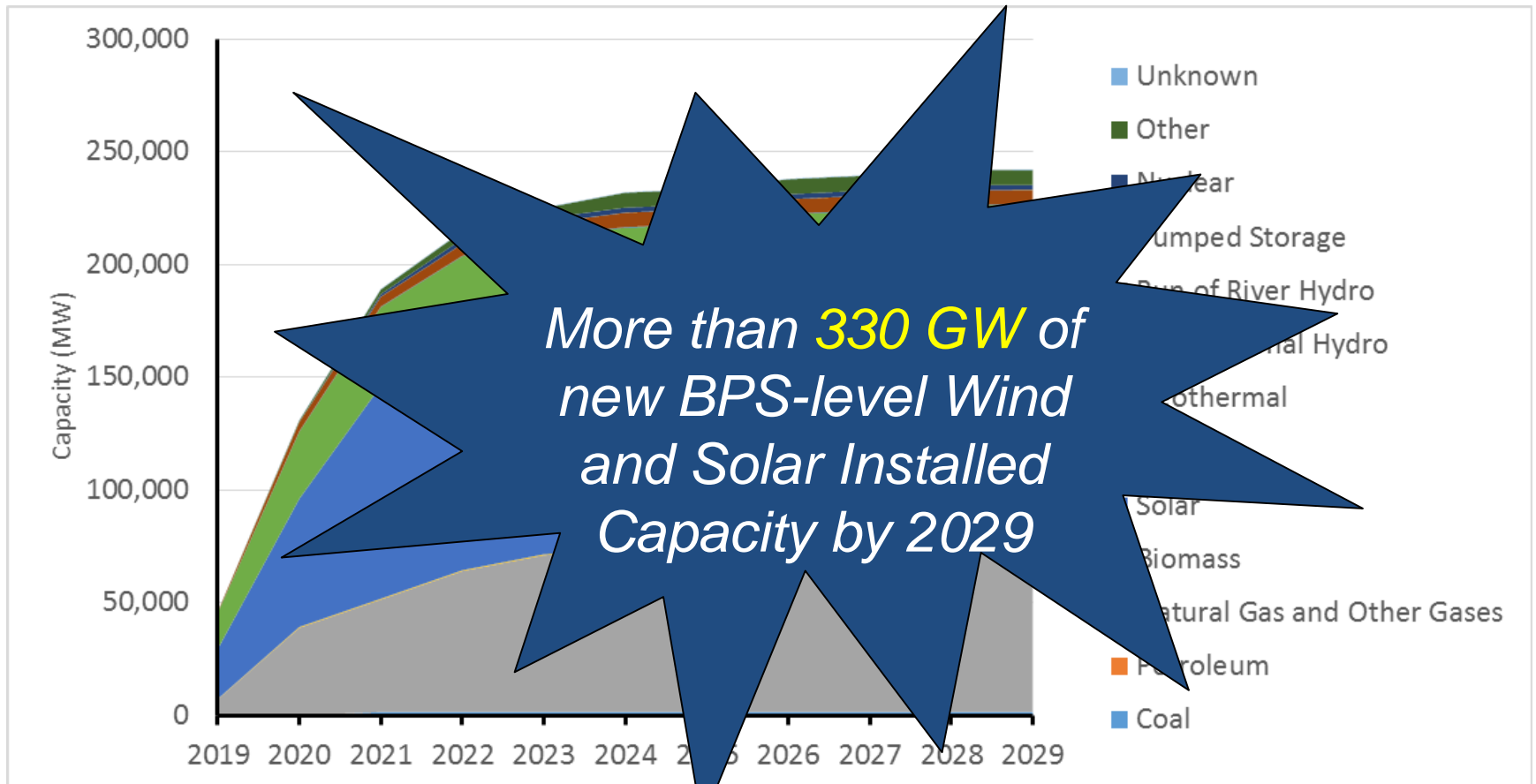


**Nameplate/
Installed
Capacity**

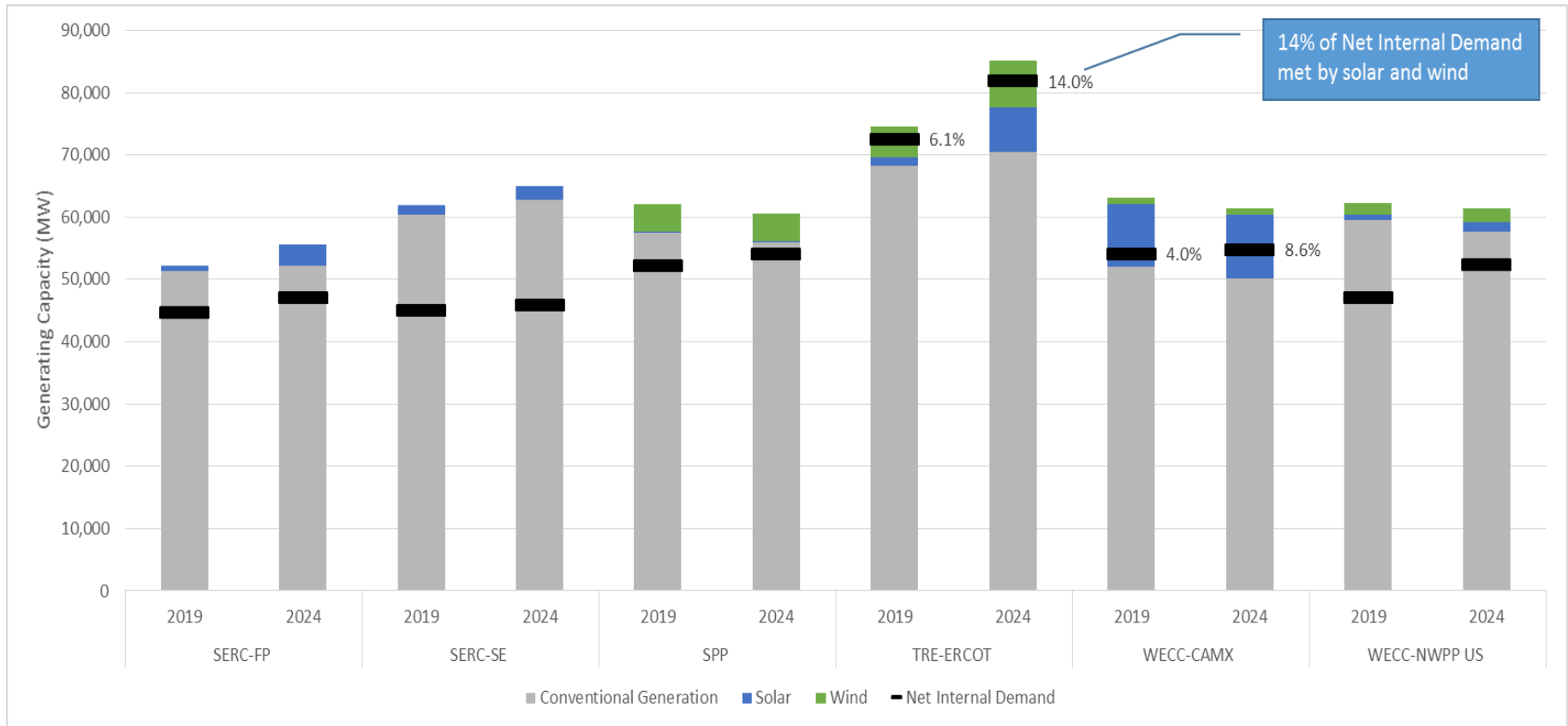


**On-Peak
Capacity**

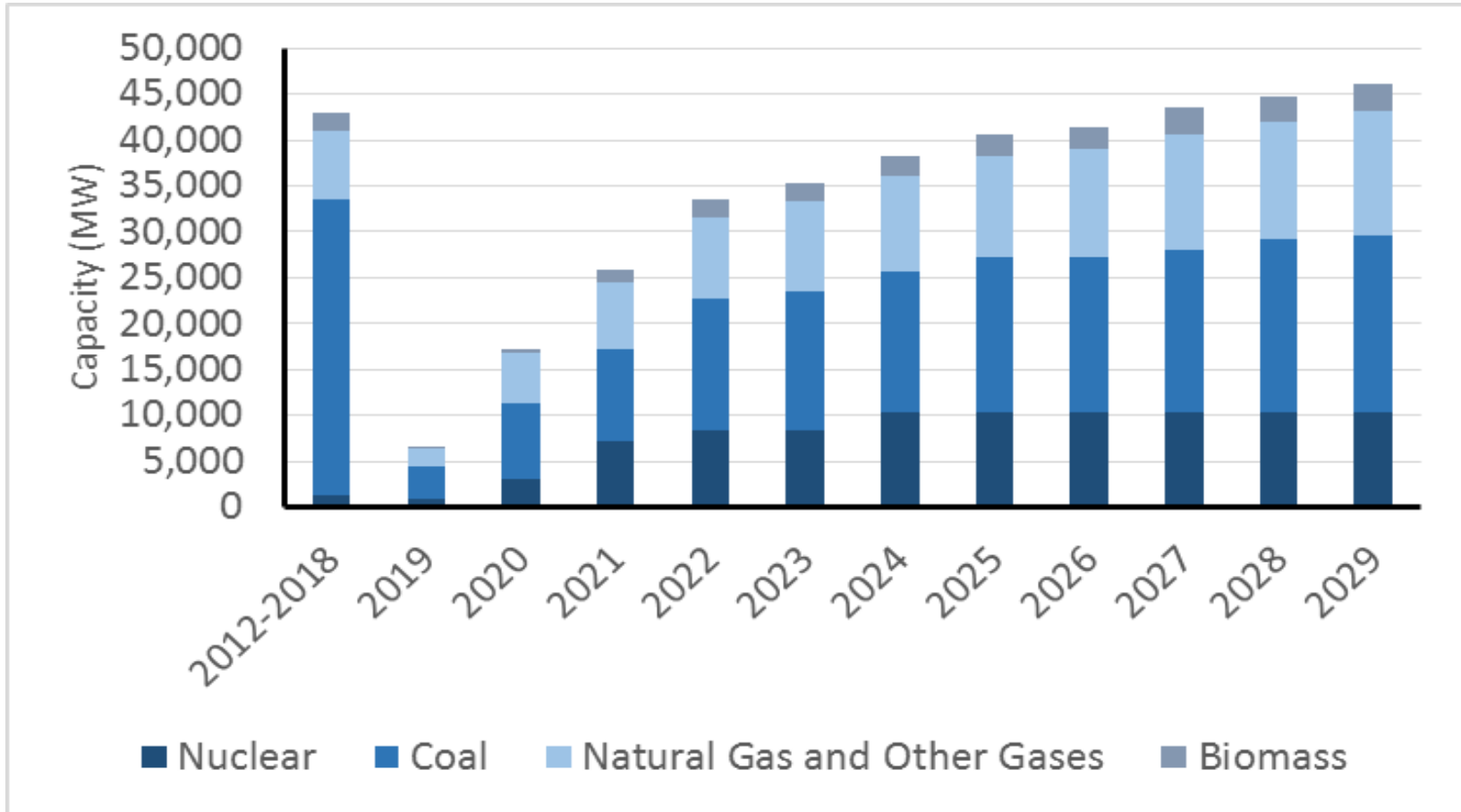
Tier 1 and 2 Planned Resources Projected Through 2029



Assessment Areas with Solar and Wind Capacity Greater than 5% of On-Peak Demand; California and Texas Reliant on Solar and Wind Output

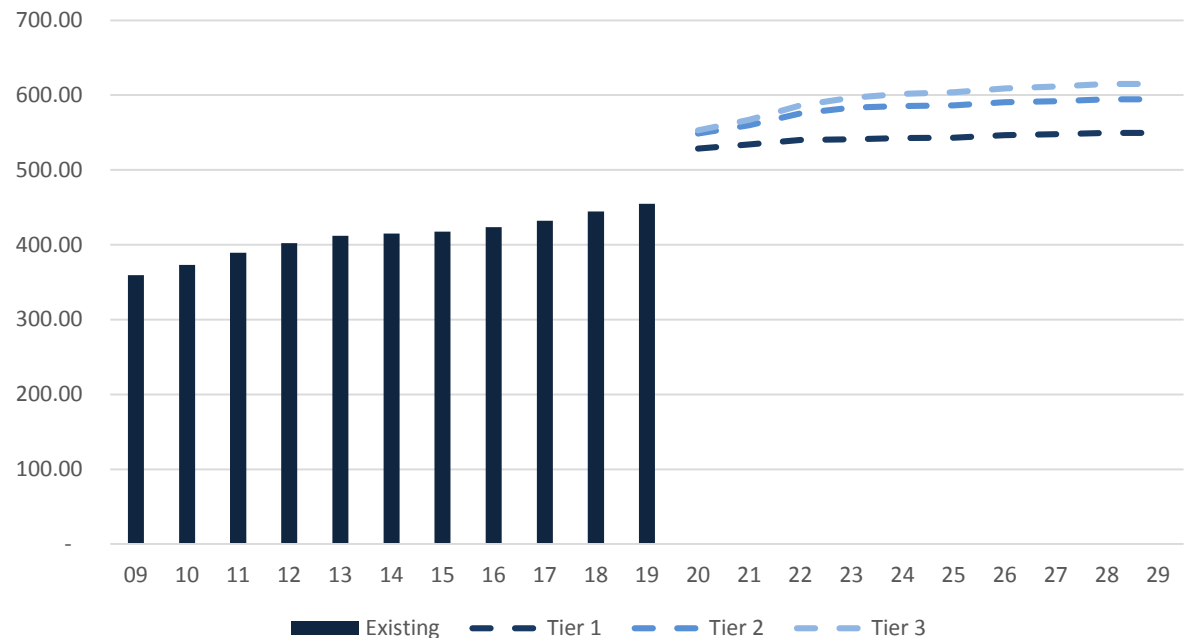


Committed Retirements Through 2029 Expected to Surpass Those of Last 7 Years



- On-peak natural gas-fired capacity has increased to 455 GW, up from 359 GW in 2009.
- 100 GW of Tier 1 gas-fired capacity is planned during the next decade.

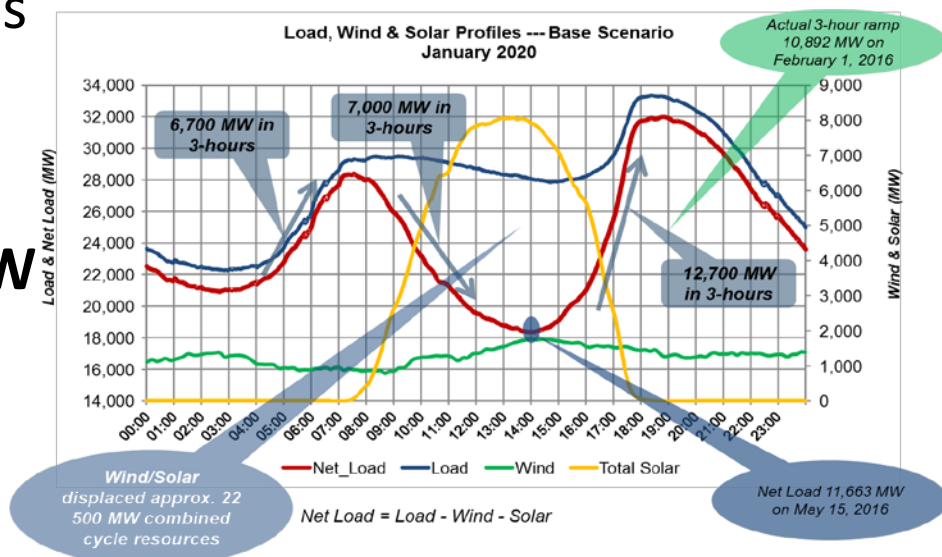
Assessment Area	2024(%)
FRCC	78.1%
WECC-CAMX	68.2%
Texas RE-ERCOT	63.3%
NPCC-New England	52.3%
WECC-SRSG	51.8%
WECC-AB	51.8%



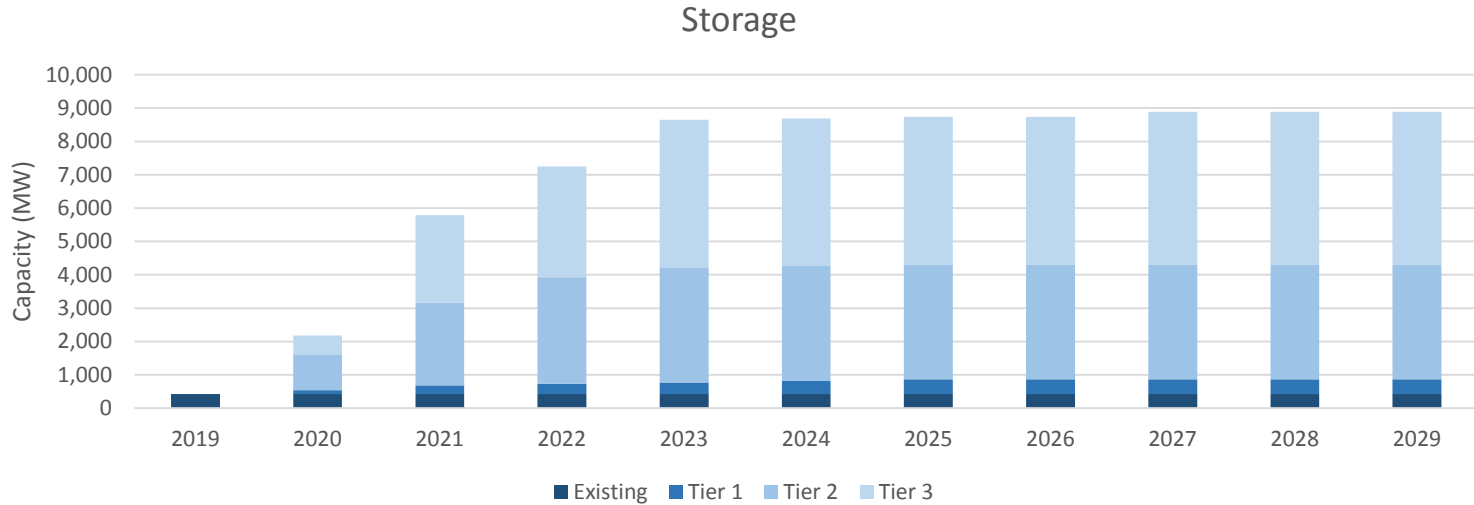
Key Finding: Solar Increases Need for Flexible Resources

- **May 2017** – CAISO first Stage 1 Emergency in 10 years
- **October 2017** – EEA3 (demand response activated; no load shed)
- **March 2018** – Record breakers:
 - All-time demand served by transmission-connected solar was 49.95%
 - Three-Hour upward net-load ramp was 14,777 MW; 1-Hour 7,545 MW
- Larger ramps in shoulder seasons; however, supply scarcity more likely during summer conditions

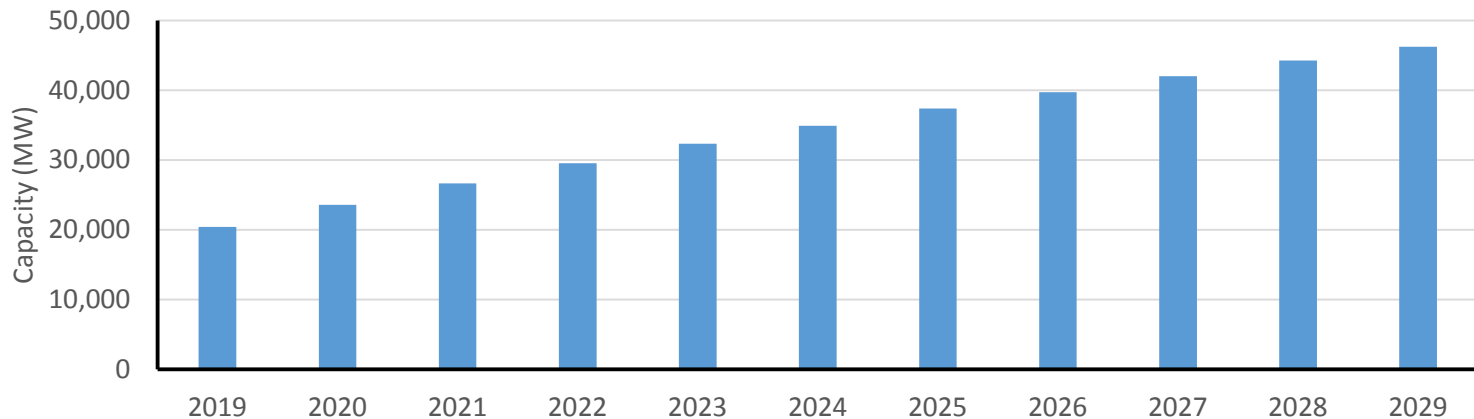
- **June 2019** – Two EEA3
- **Projected 2021 Maximum Three-Hour Ramp = 17,048 MW**



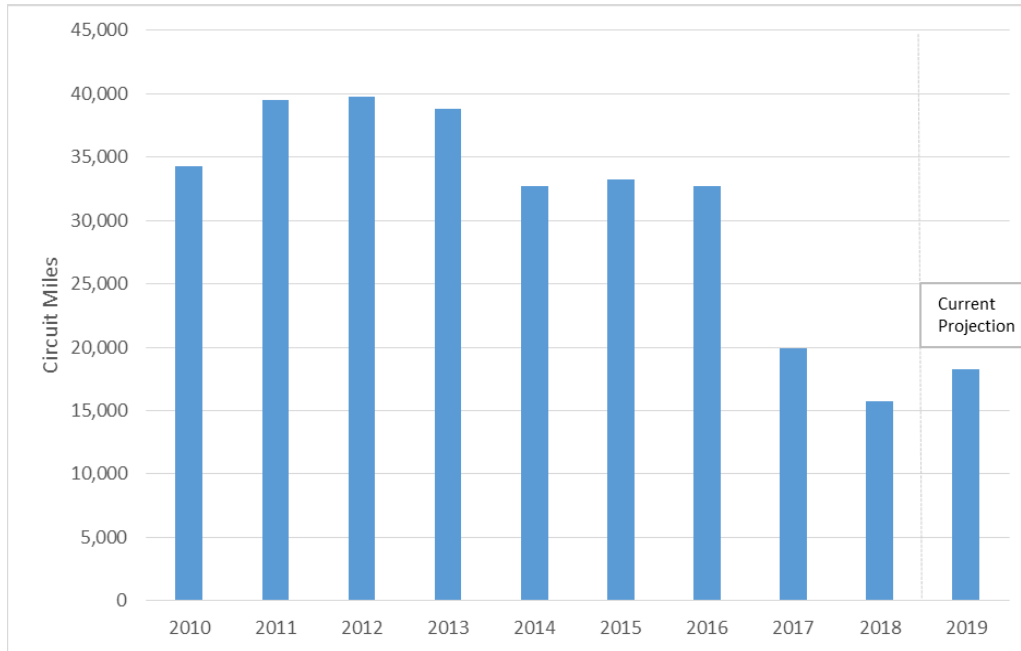
Storage Projected to Increase Over Five Years



10-Year Projected Total Installed DER/BTM Solar PV



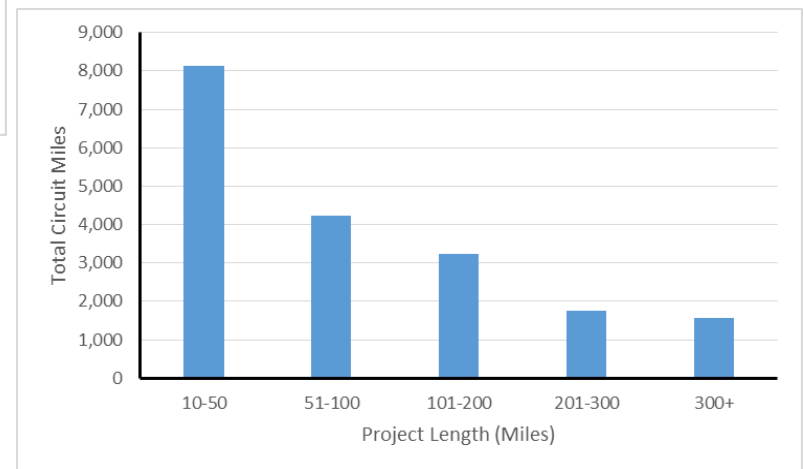
Historical 10-Year Transmission Projections Compared to Current Projection



Less Line Miles

Shorter Lines

Line Lengths of Projected Projects





Questions and Answers

