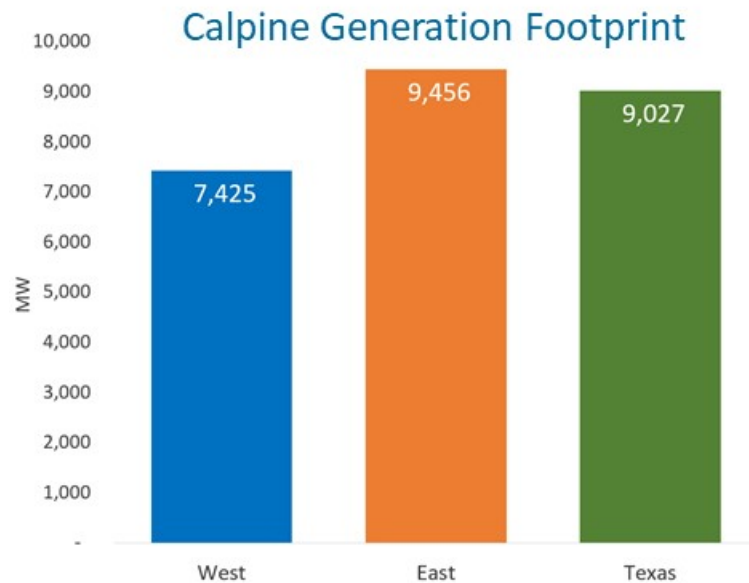


A satellite view of the Earth at night, showing the illuminated continents of North and South America against the dark background of space.

IECA – Electricity Discussion Slides
Jeff Bush
November 13, 2019

Calpine Solutions Overview

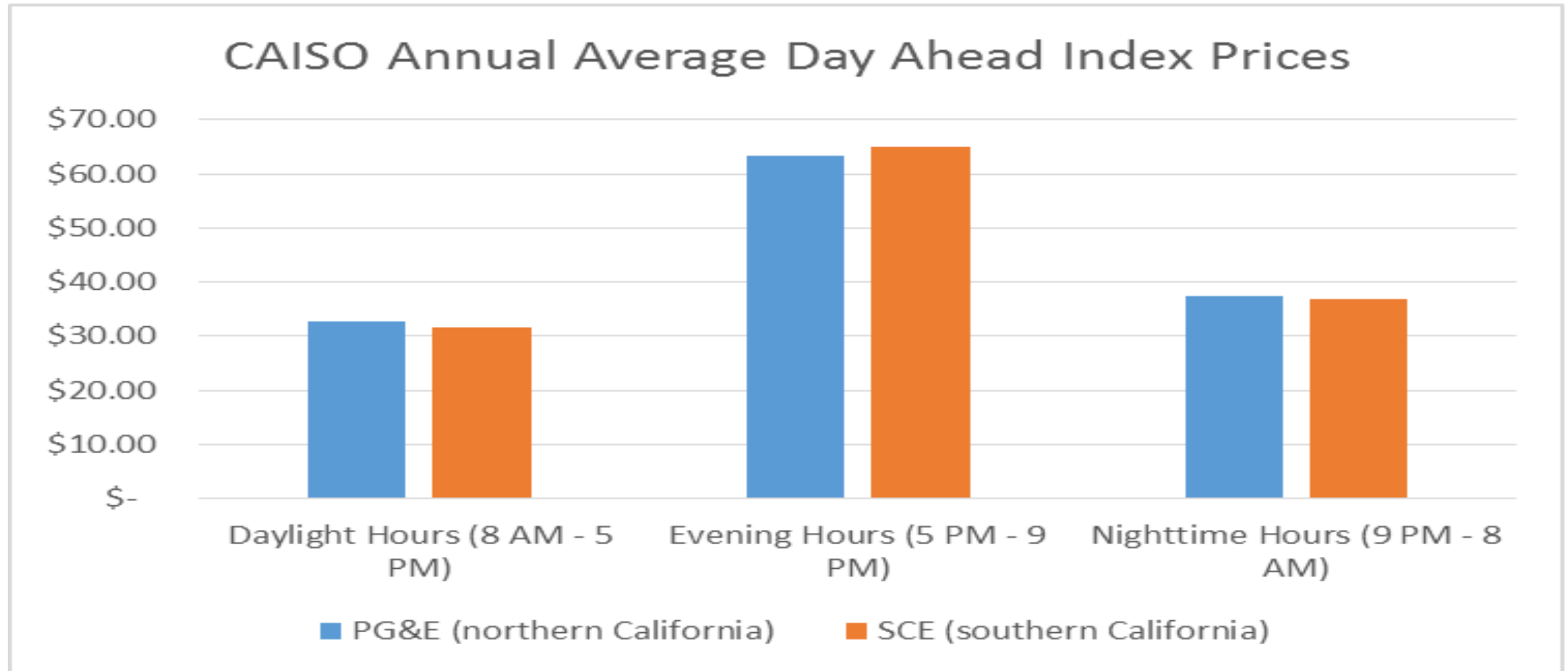


- Calpine Energy Solutions has provided retail electricity and risk management services for over 20 years.
- The parent of Calpine Solutions owns over 27,000 MW of natural gas and geothermal power plants in California, Texas, and the Northeast.
- Calpine Solutions maintains ISO 9001:2015 certification for quality management and continuous improvement.
- Calpine serves over 7,000 MW of commercial and industrial customers

California Electricity Market Challenges

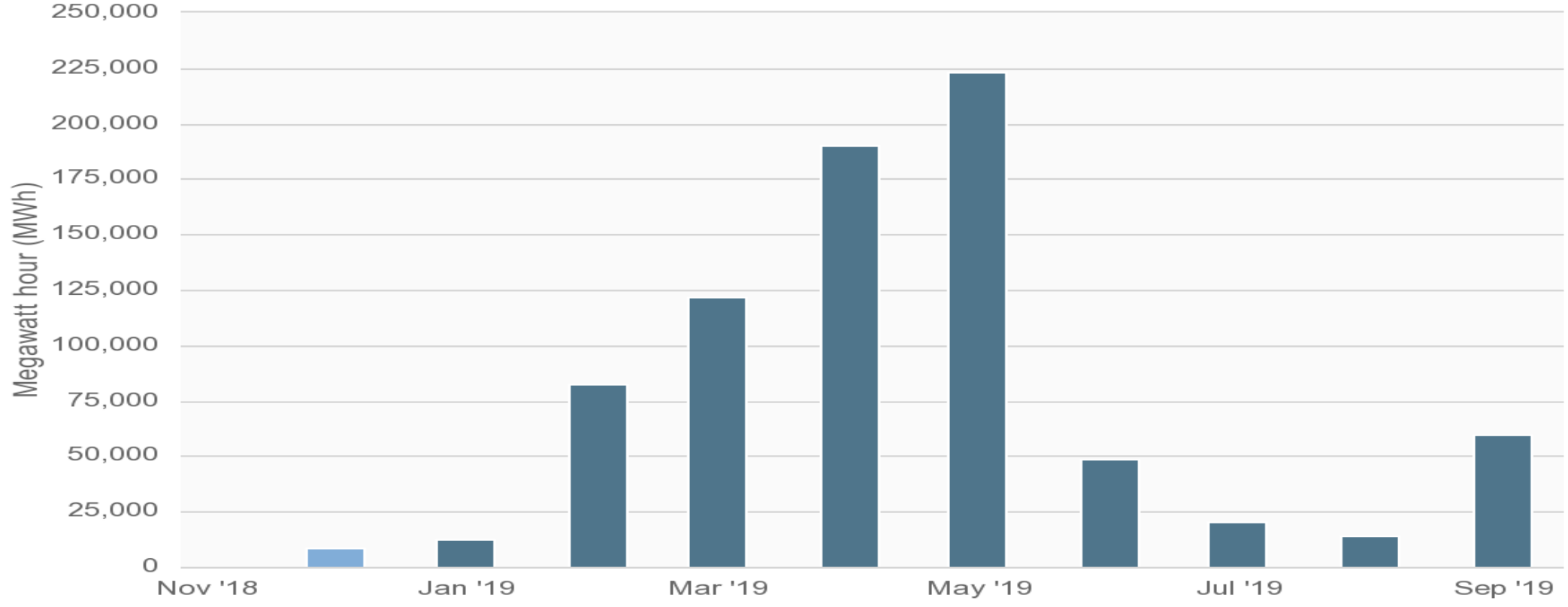
- California Wild Fires and the future of PG&E
- Southern California Gas Infrastructure
- Resource Adequacy Capacity Markets
 - System Import, Once through Cooling, Deration of Renewable Energy Supplies
 - Potential for Centralized Buyer (local, system, flex)
- Expansion of Community Choice Aggregation (CCA's)
- Limited Expansion of Direct Access

Price Impact of the Duck Curve

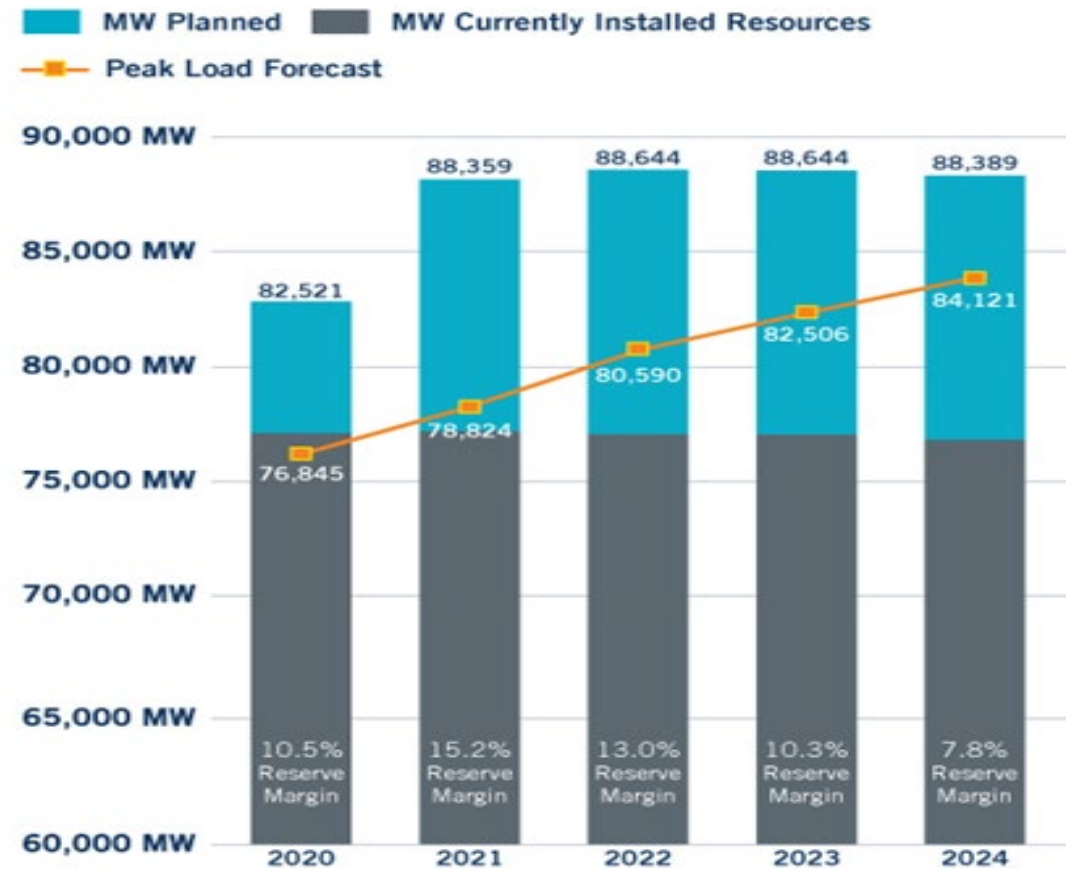
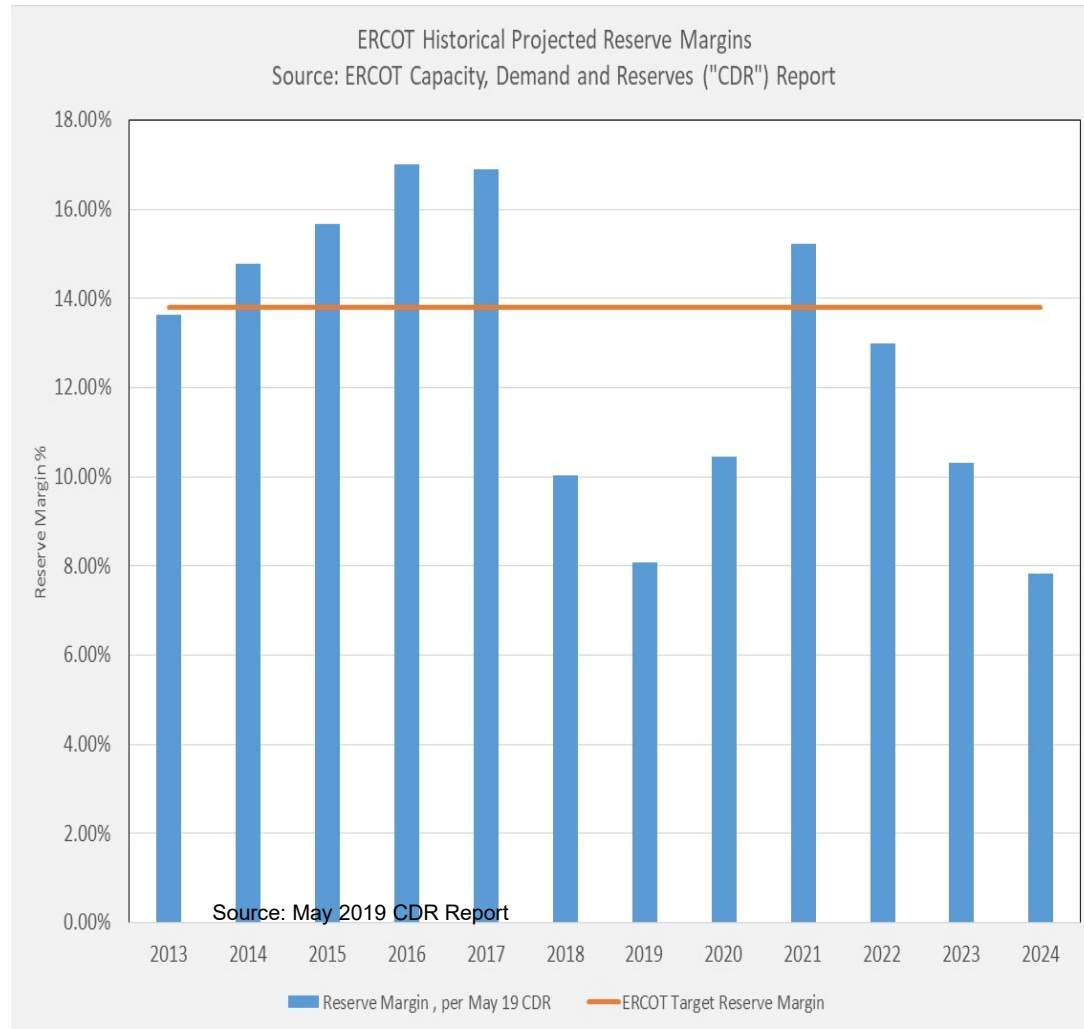


California Renewable Energy Curtailments

Wind and solar curtailment totals by month

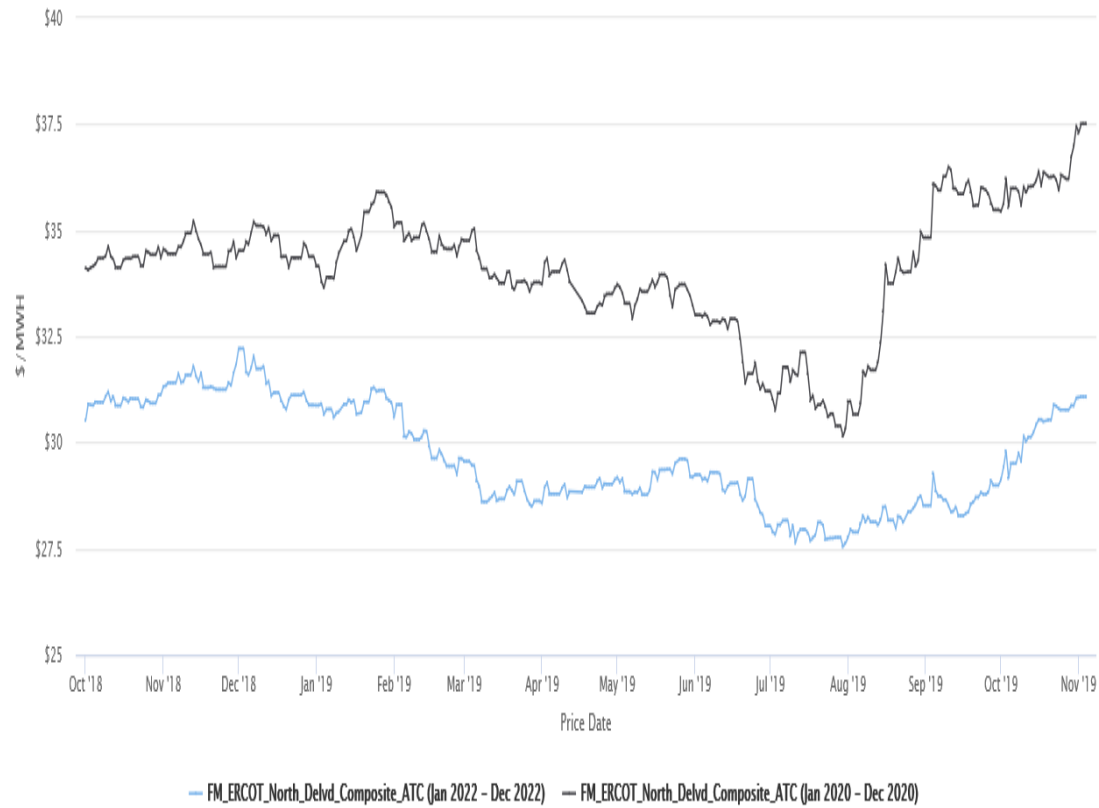


ERCOT Forecast Reserve Margins

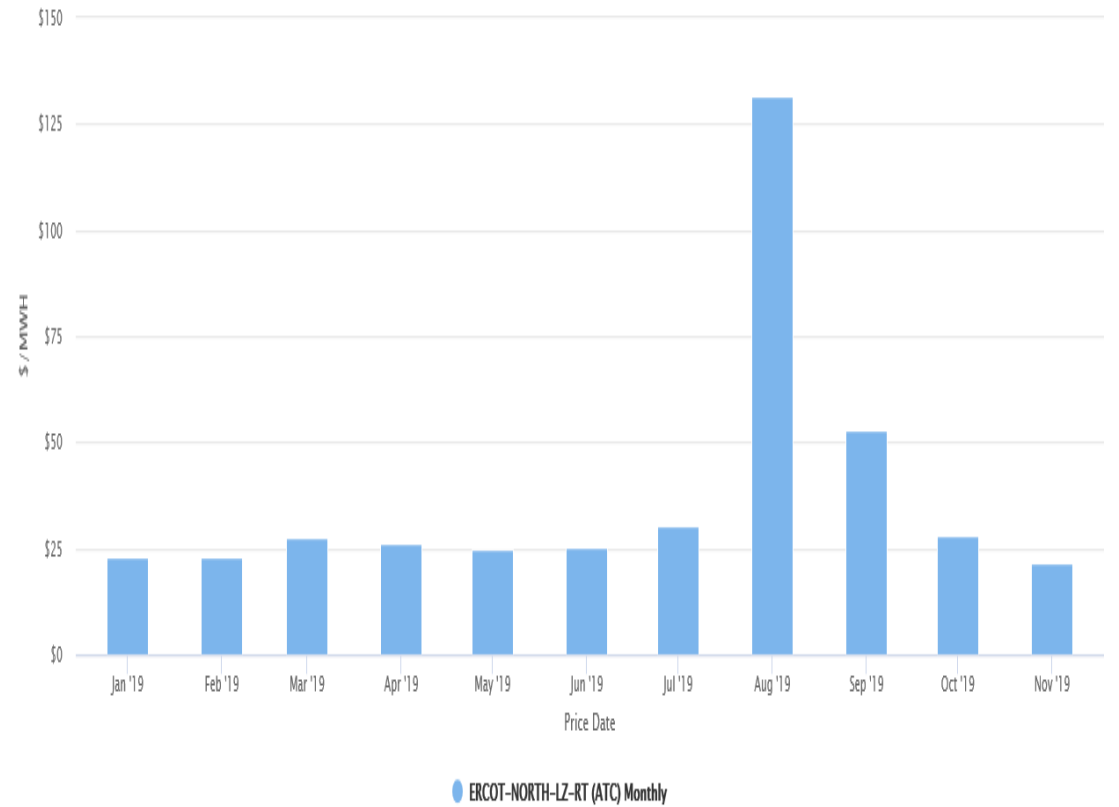


ERCOT Index and Forward Pricing Trends

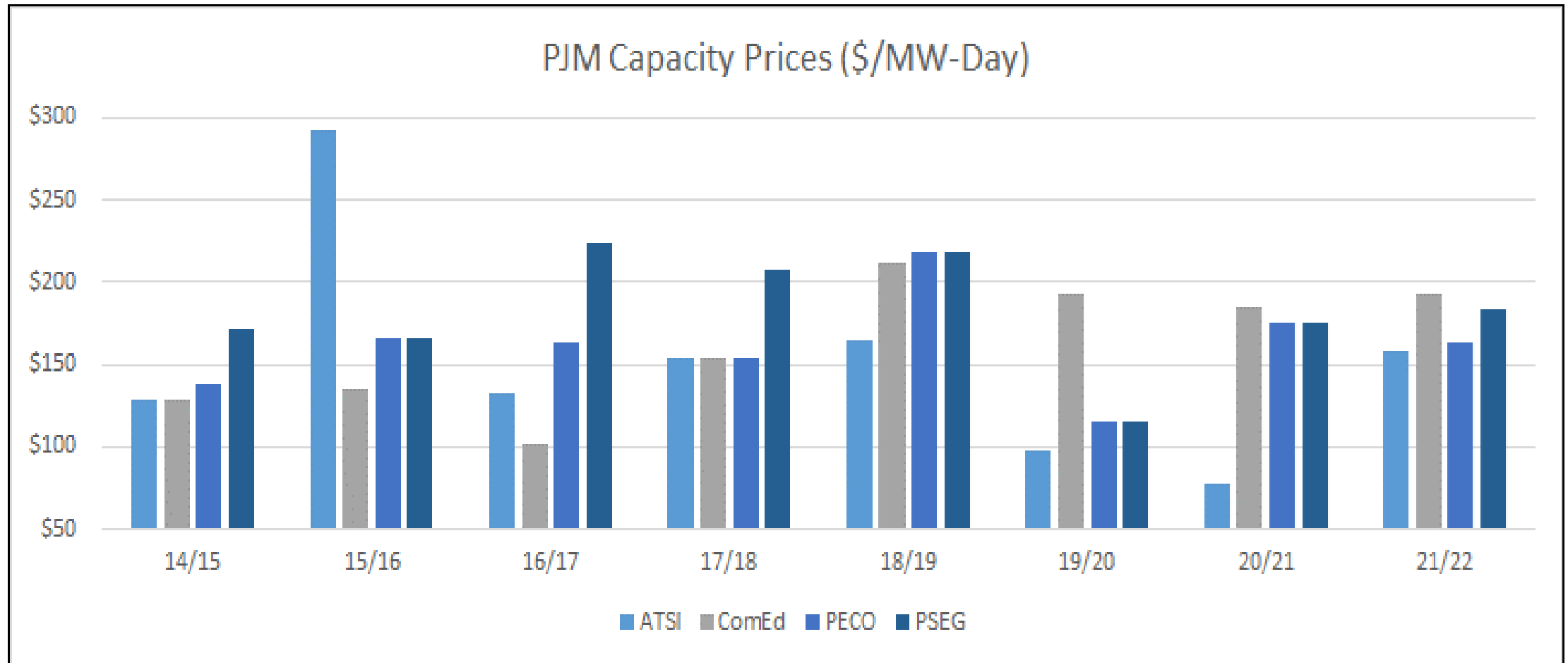
ERCOT NZ - Calendar Year 2020 and 2022 Forwards



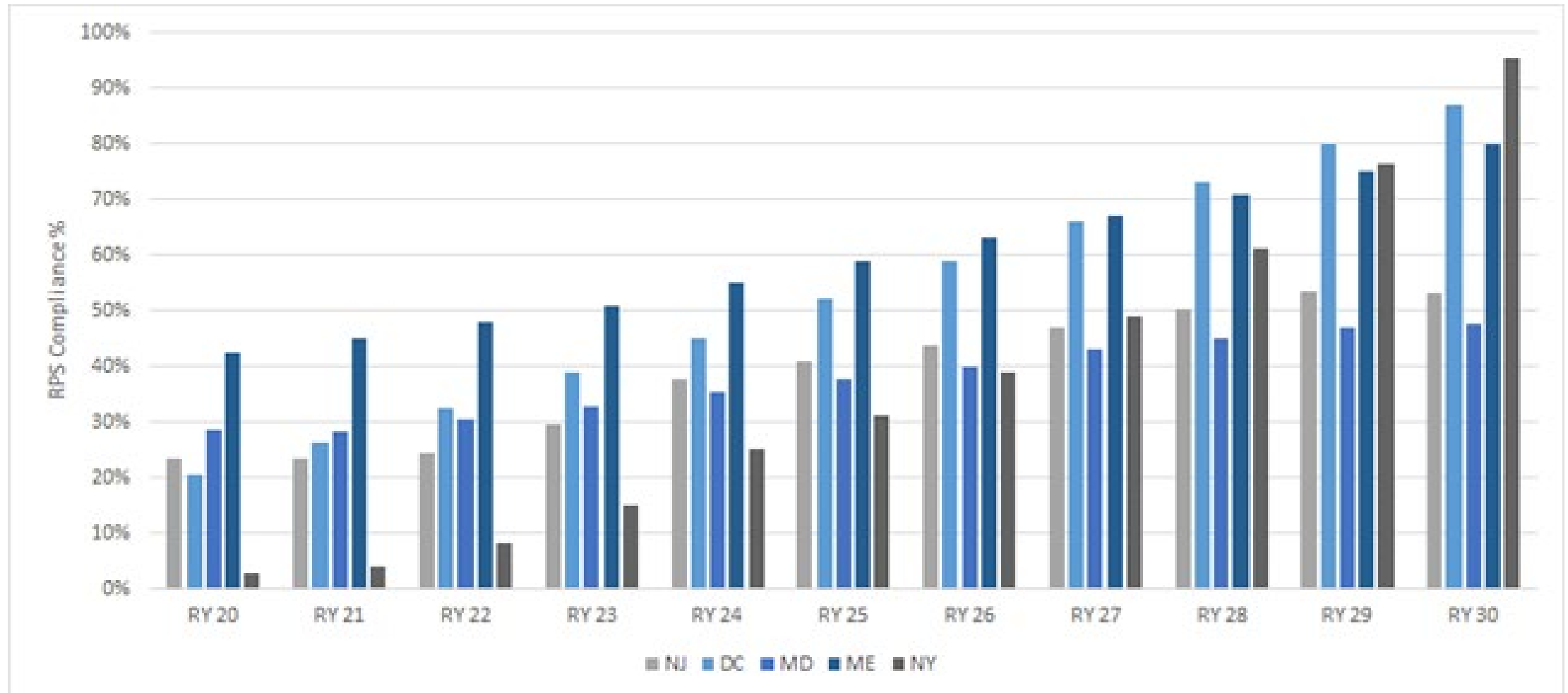
ERCOT North Load Zone - Monthly Average Real Time Index Prices



PJM Capacity Pricing Trends - PJM



RPS Requirements – Eastern Markets





Key Legal Information

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