Winter 2018-2019 Operations and Market Performance

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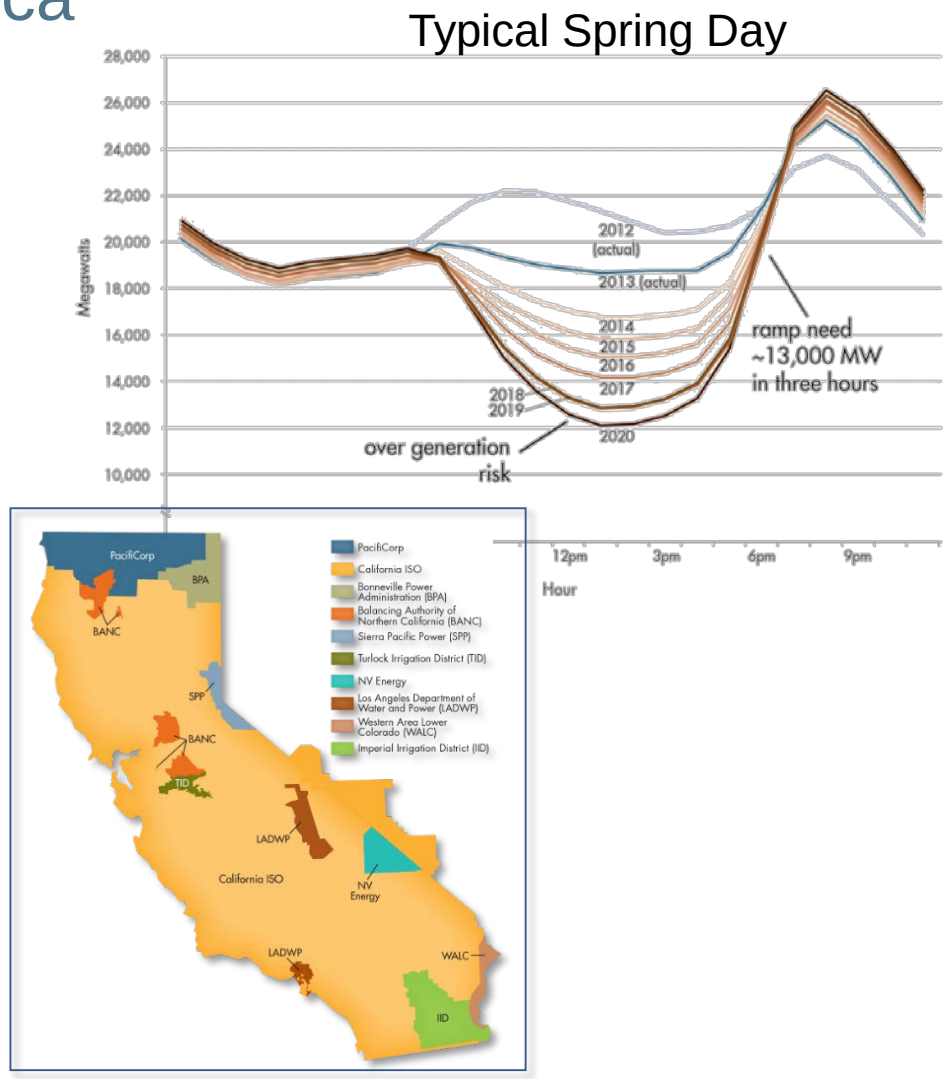
The California ISO is one of nine independent grid operators in North America

- One of 38 balancing authorities in the west
- Manages 80% of California's grid
- Uses advanced technology to balance supply and demand every four seconds
- Operates markets for wholesale electricity and reserves
- Manages new power plant interconnections
- Plans transmission expansion and upgrades



A suite of solutions is necessary to manage changing resource mix

Storage – increase the effective participation by energy storage resources.

Western EIM expansion – expand the western Energy Imbalance Market.

Demand response – enable adjustments in consumer demand, both up and down, when warranted by grid conditions.

Regional coordination – offers more diversified set of clean energy resources through a cost effective and reliable regional market.

Time-of-use rates – implement time-of-use rates that match consumption with efficient use of clean energy supplies.

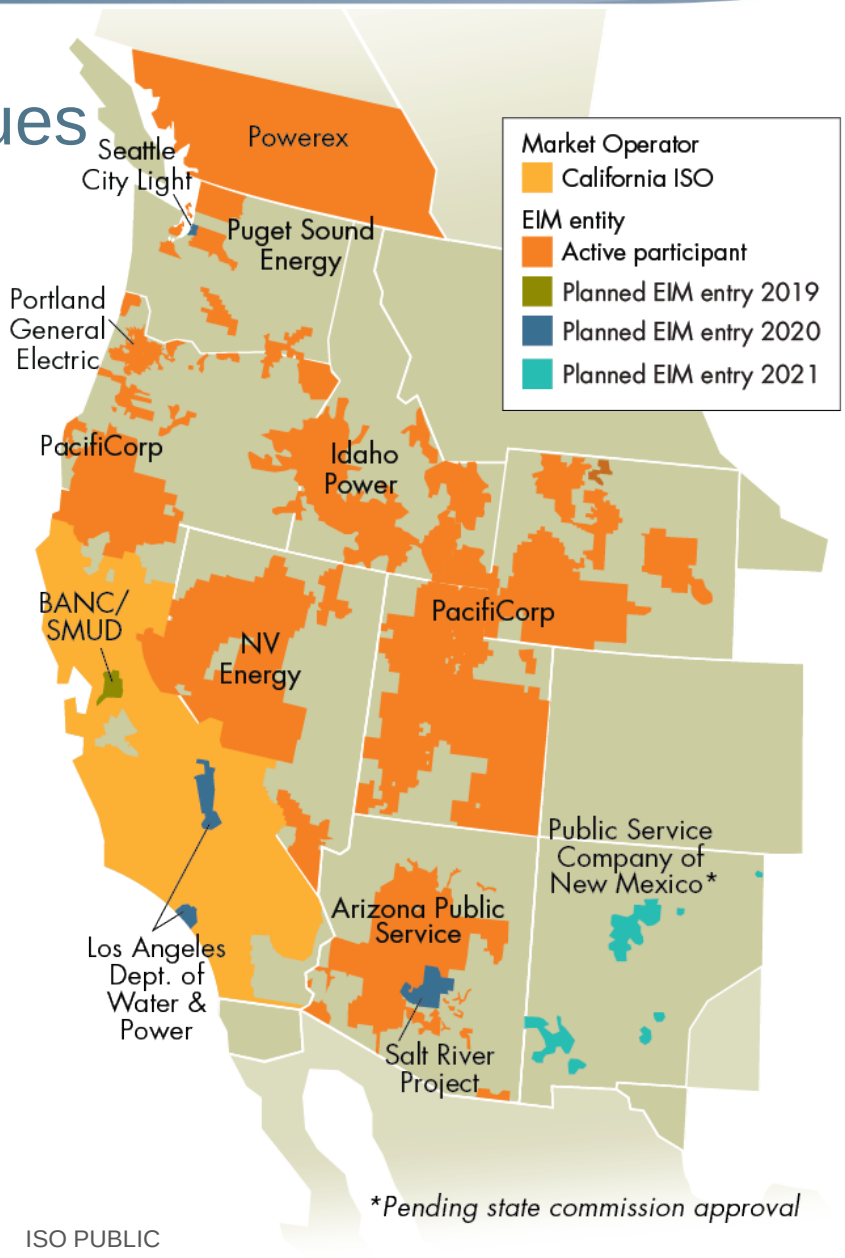
Electric vehicles – incorporate electric vehicle charging systems that are responsive to changing grid conditions.

Renewable portfolio diversity – explore procurement strategies to achieve a more diverse renewable portfolio.

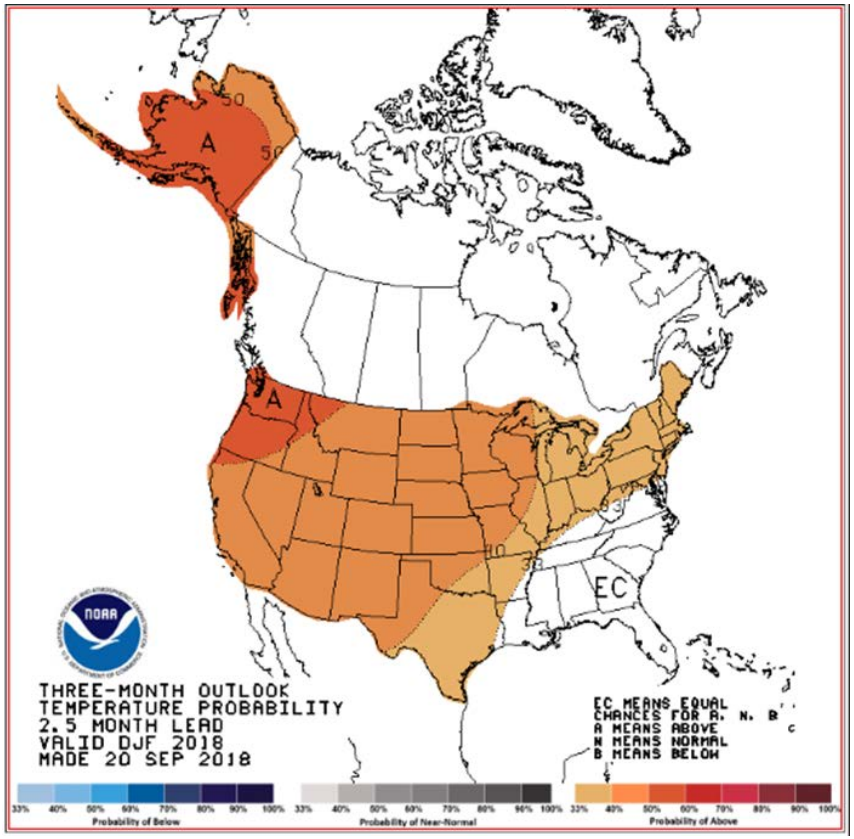
Flexible resources – invest in fast-responding resources that can follow sudden increases and decreases in demand.

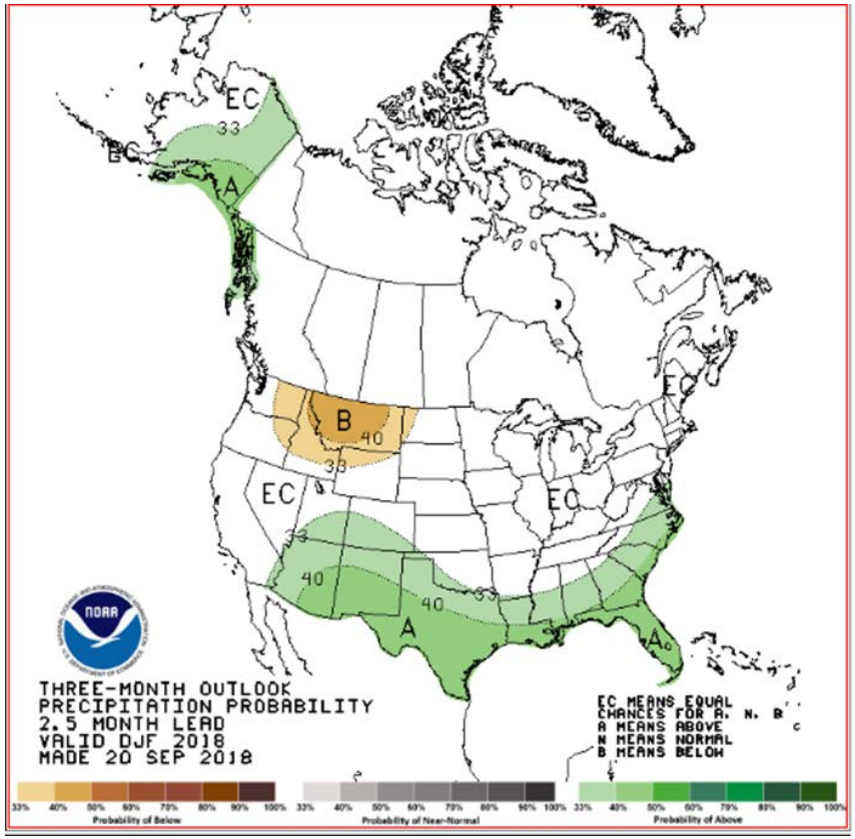
The Western EIM continues to grow

- Savings of over $400 million since start in Nov 2014
- Enhances reliability with improved situational awareness and energy transfers
- Reduces costs through automatic economic dispatch
- Integration of renewables across a larger geographical area
- Balancing authorities maintain control and reliability responsibilities

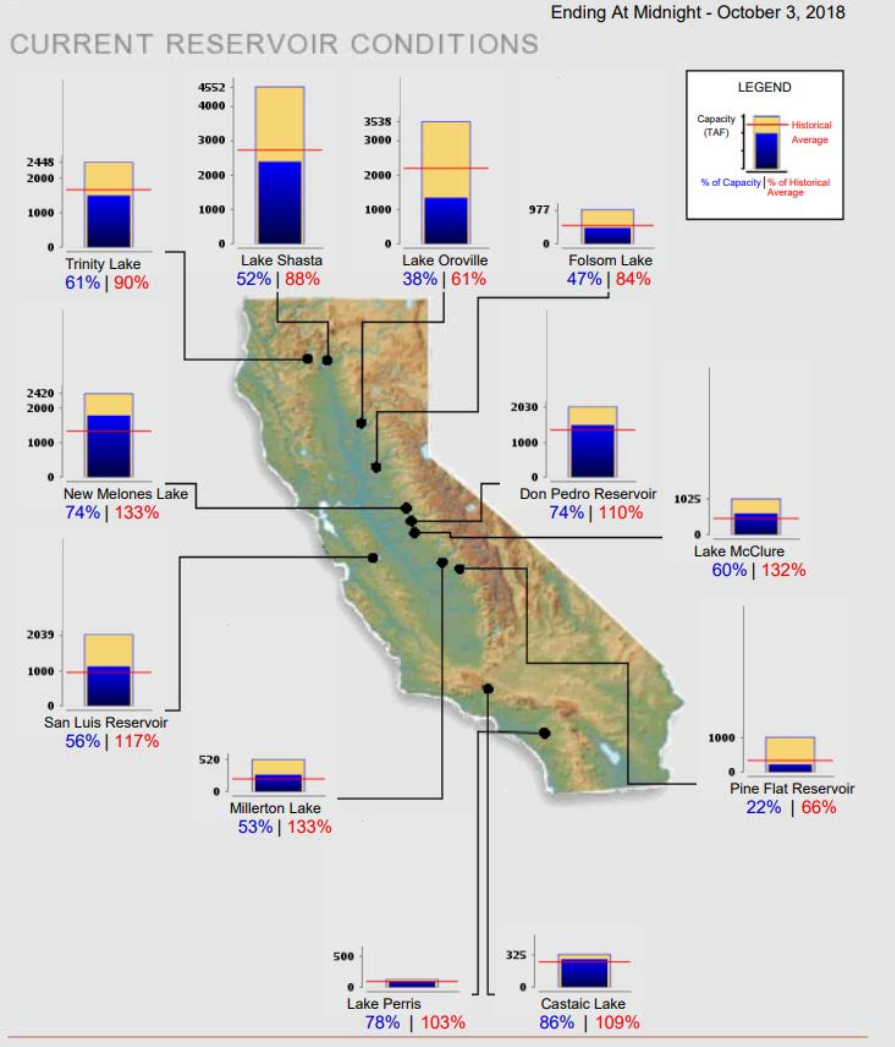


Winter Weather from NOAA's Climate Prediction Center DJF 2018-19: Likely Normal Precipitation





Current Reservoir Levels: Normal to Below Average



Natural gas storage and transportation constraints in southern California are similar to last winter

- Outages and reduced capacity on key natural gas transmission pipelines continue
  - Limited withdrawal capacity at Aliso Canyon
  - SoCalGas Line 235-2 remains out of service
  - SoCalGas Line 4000 operating at reduced pressure
- Electric generators are not the primary demand during winter - demand flips to core heating load
- Greatest risk from gas constraints:
  - Multiple high demand days draw down storage inventories to a point when there is insufficient withdrawal capacity to meet gas demand later in the winter

New infrastructure will enhance reliability in the CAISO during winter of 2018-2019

- Sycamore-Penasquitos 230 kV transmission line reduces congestion
- Carlsbad Energy Center (5 unit 500 MW simple cycle power plant) scheduled to start operation in Q4 2018
- Over 1,000 MW of additional generating capacity to come on line this winter:
  - Predominately solar and wind resources
  - Over 700 MW in new resource additions by December 1, 2018

Winter preparedness involves significant coordination between the CAISO and other entities

- Participating transmission owners, generator operators and EIM Entities to ensure planned maintenance does not jeopardize reliability
- Gas pipeline operators to ensure gas pressure will support electric system operations
- Adjacent Balancing Authorities to mitigate any operating and maintenance issues
- Reliability Coordinator to discuss potential risks
- State regulators to advise on grid conditions that may impact regulated utilities