

Western Interconnection Grid Reliability

Brett Wangen

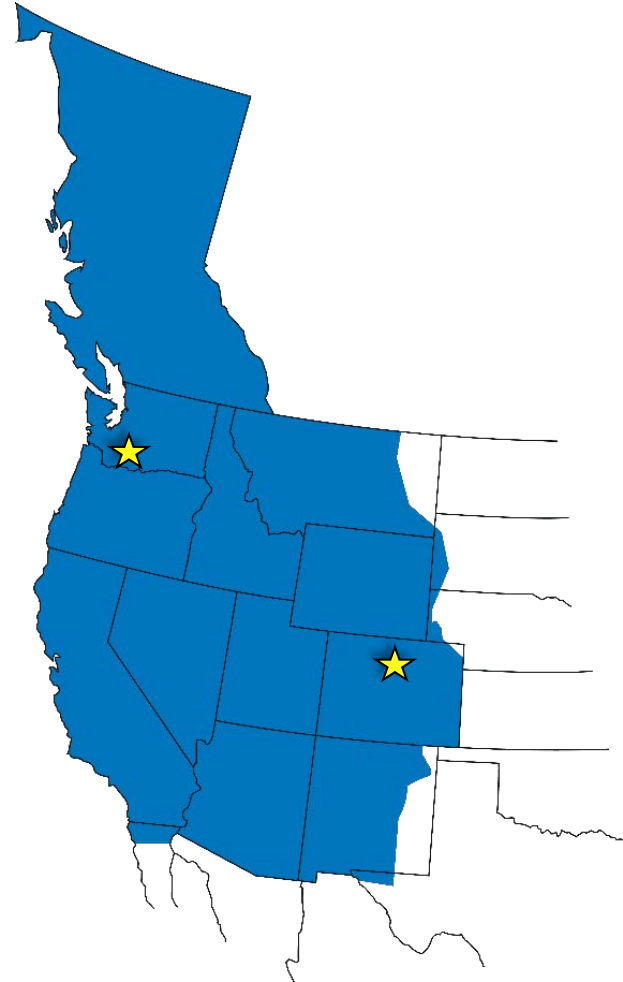
Director of Engineering



PEAKRELIABILITY
assuring the wide area view

Peak Reliability

- Reliability Coordinator
- Two control centers
 - Situational awareness
 - Operations planning
 - Real-time operations
- Peak's objective
 - Reliable and efficient operation of the Bulk Electric System



Generation Resource Mix in the.....

Past

Flexible

Predictable

Consistent

Controllable (fast)

Centralized



Future

Less flexible

Uncertain

Intermittent

Less controllable

Distributed

Peak's mission is to maintain high levels of Bulk Electric System reliability regardless of the challenges

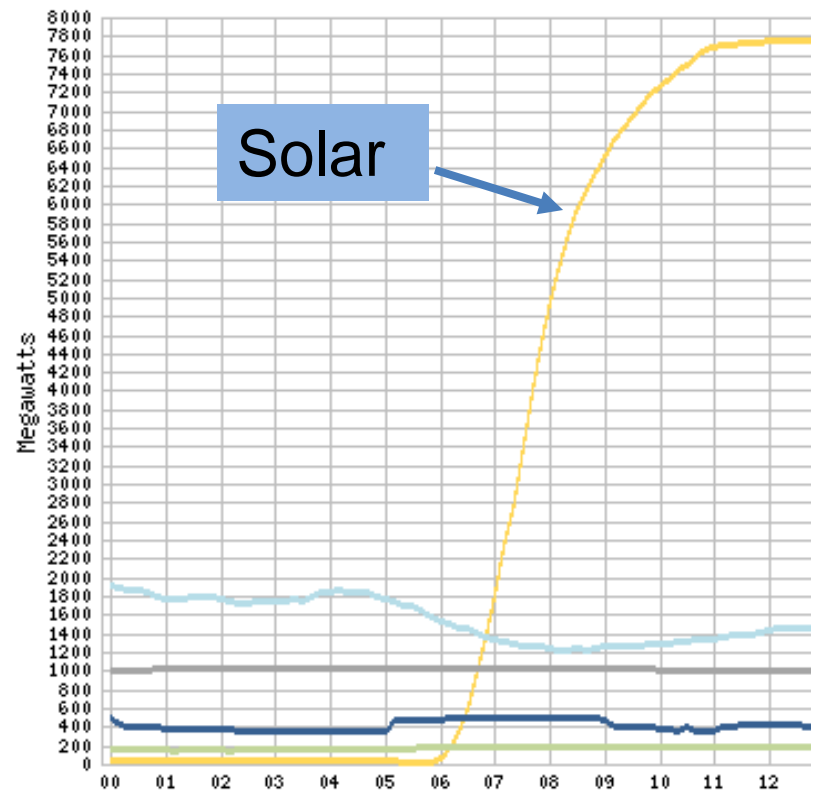
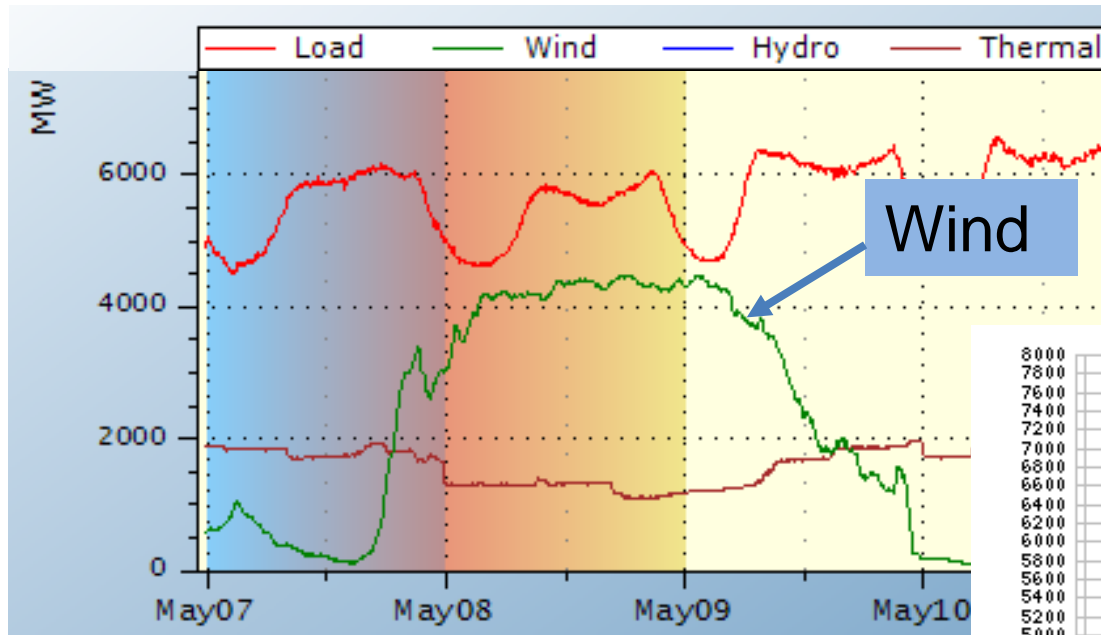


Renewable Capacity by Year



Source: WECC 2015 State of Interconnection Report

Managing Wind and Solar Generation



- Variability
- Transmission congestion
- Difficult to forecast
- System inertia

Source: Bonneville Power and California ISO

Peak is Focused on Key Challenges

System Operating Limits

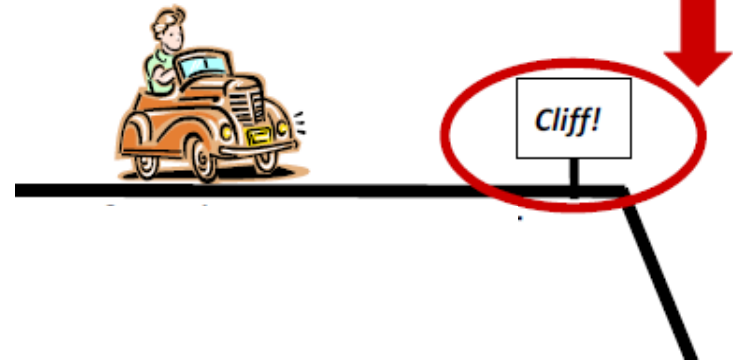


Transient Stability

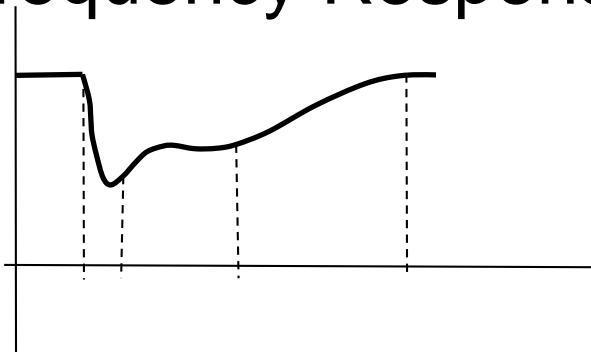


Voltage Stability

Voltage Stability



Frequency Response



Improving Grid Operations through a Wide Area View

- Full Western Interconnection wide view
- Greater visibility of problems impacting multiple entities
- High degree of coordination and collaboration
- Ensuring a reliable future!



Thank you!



Brett Wangen
bwangen@peakrc.com