

Renewable Integration Update

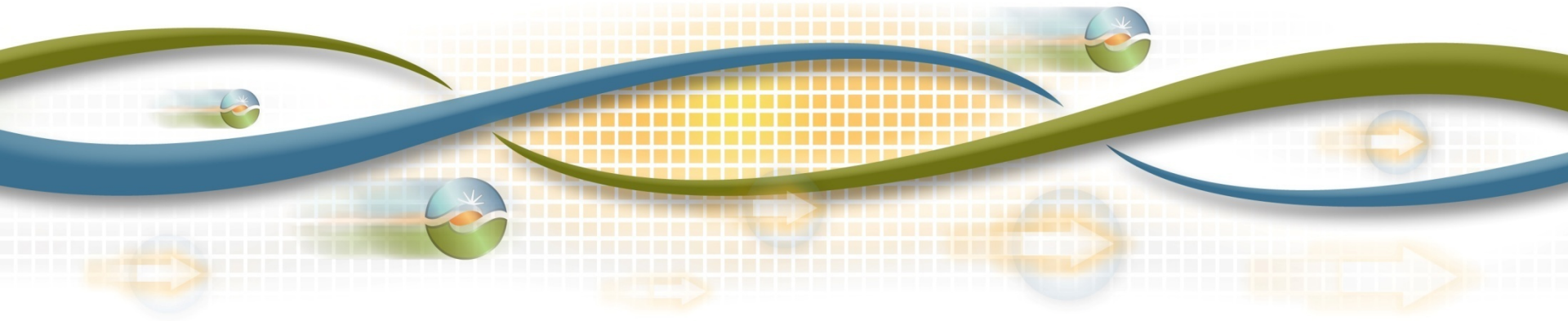
Mark Rothleder

Director, Department Analysis and Development

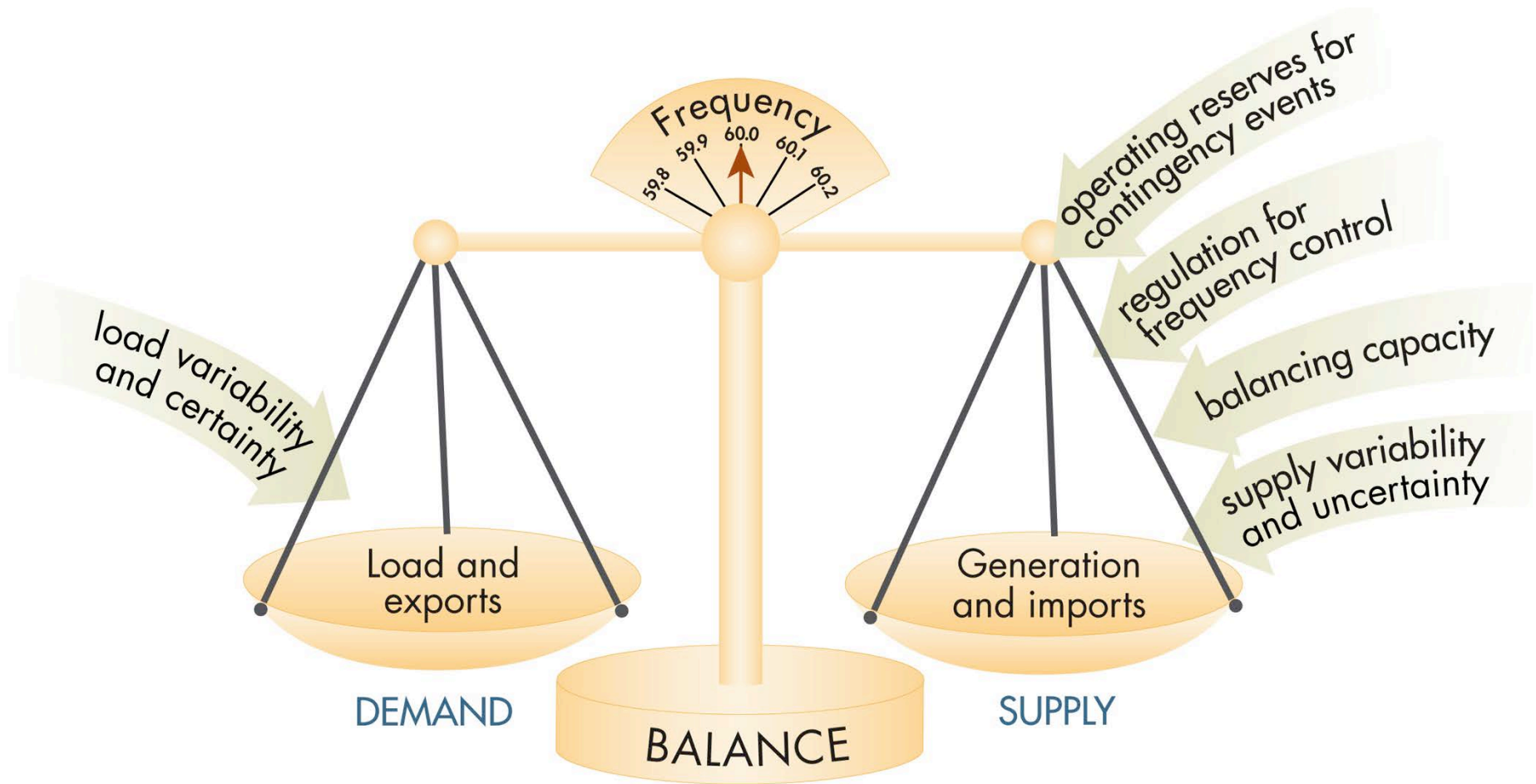
Board of Governors Meeting

General Session

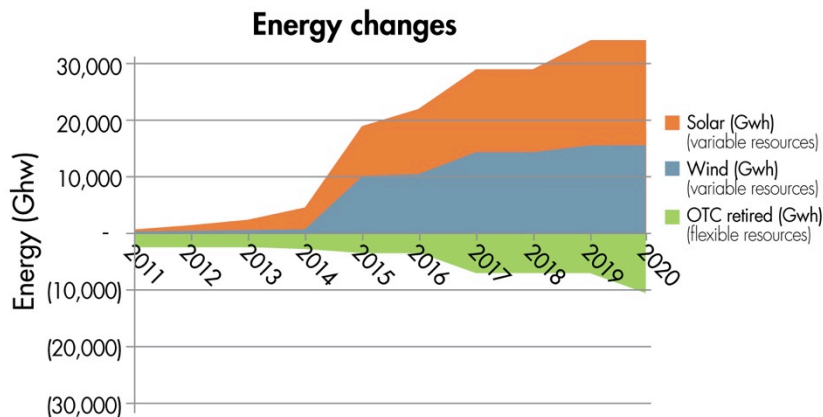
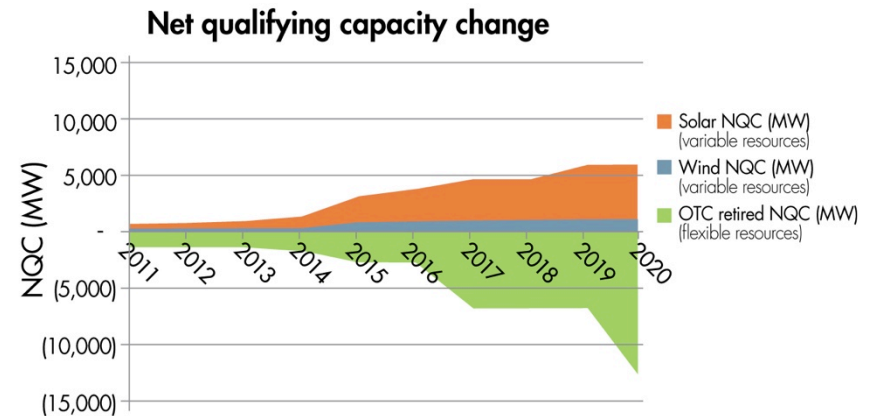
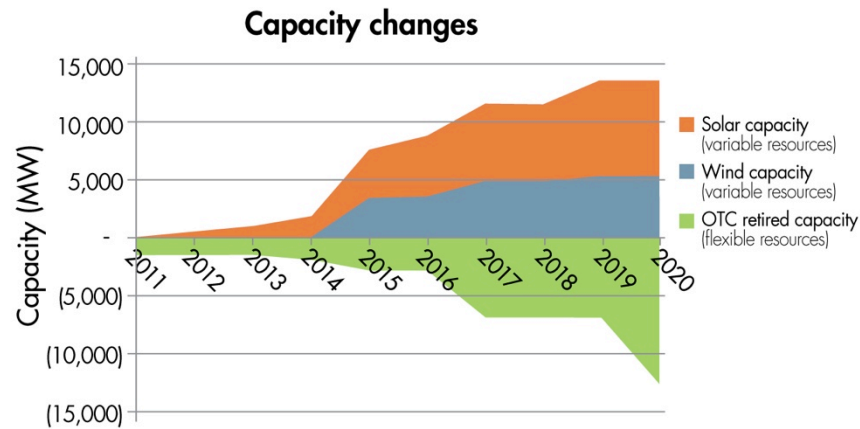
Aug 25-26, 2011



Electricity is produced, delivered, and consumed at the speed of light while balance must be maintained.

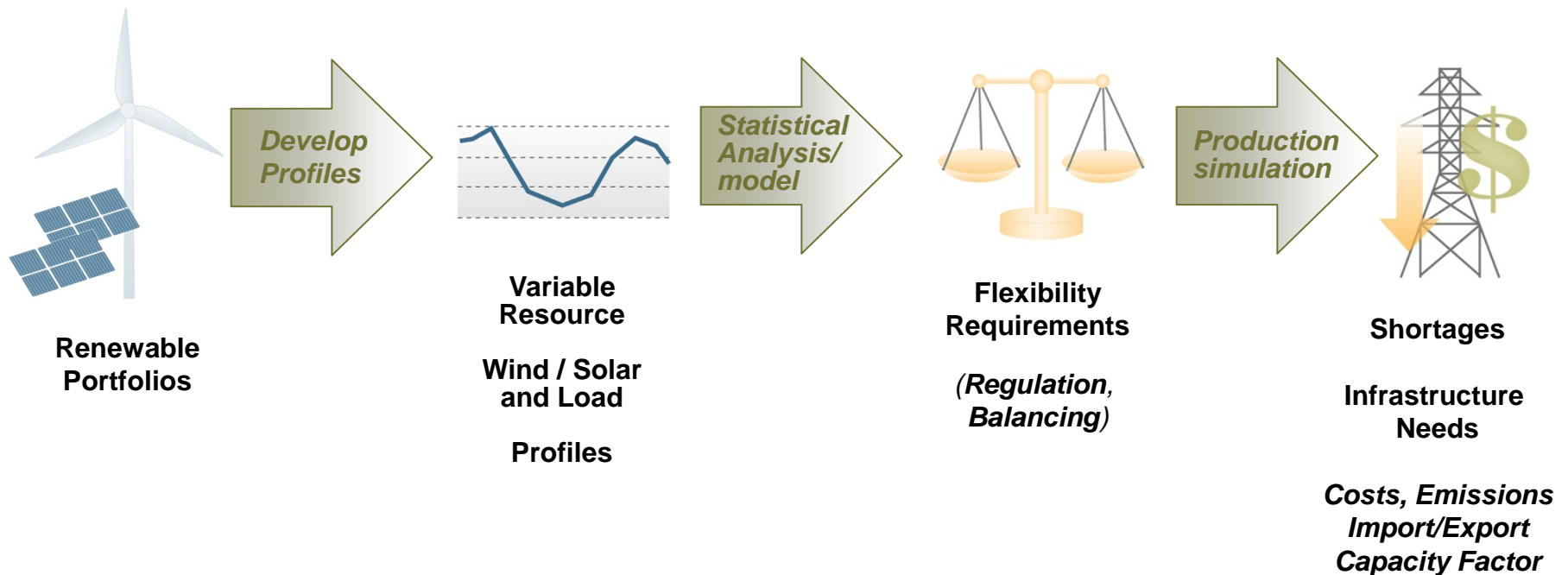


Supply variability and uncertainty will increase while the flexible capability of the fleet is decreases



- Operational requirements for flexible capacity will approximately double due to increase of variable resources
- Approximately 15% of the fleet's flexible capability will retire by 2020

The renewable integration study process quantifies operational requirements and evaluates fleets ability to meet operating requirements.

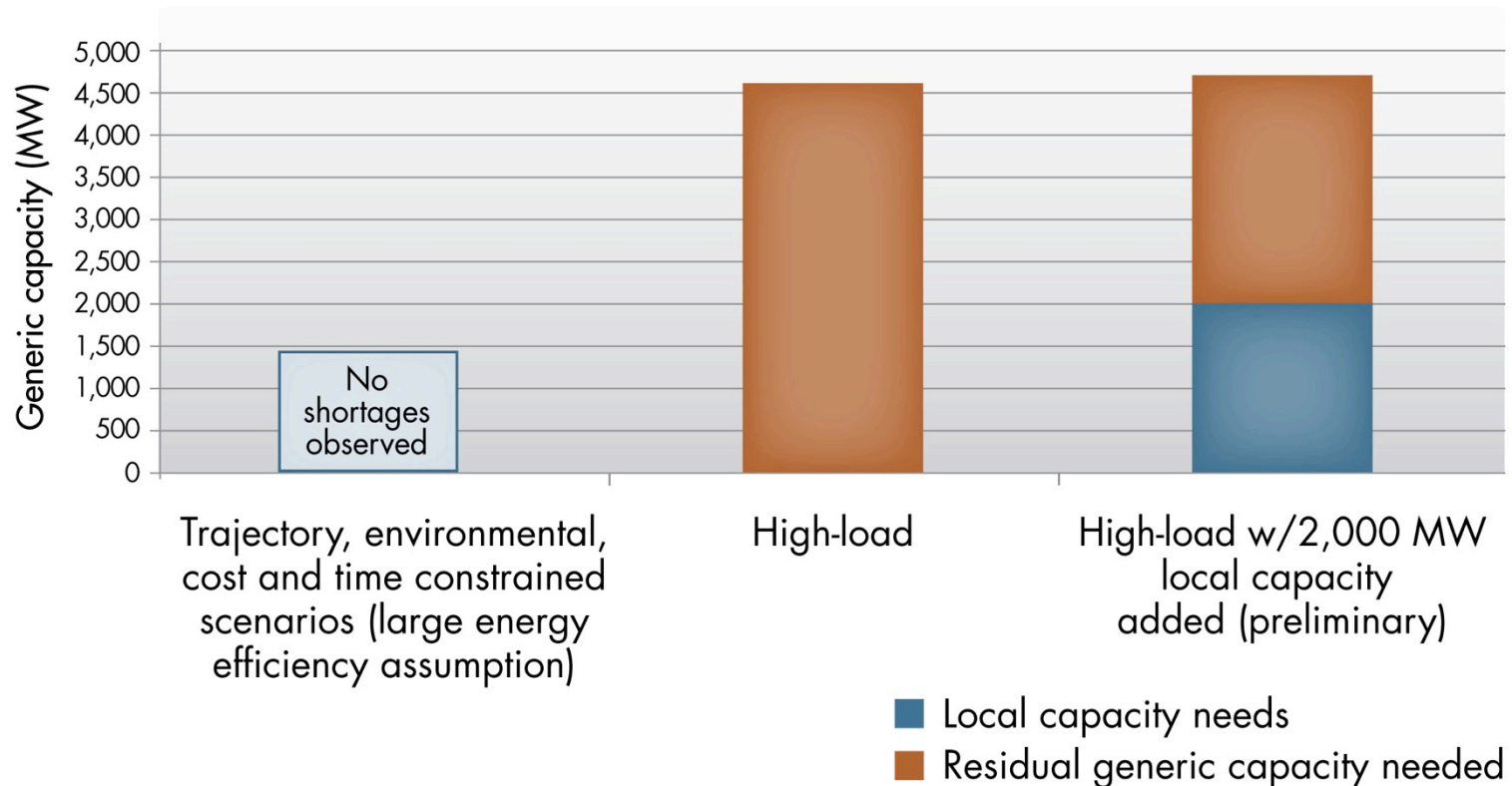


33% scenarios in 2020 cover range renewable and load conditions.

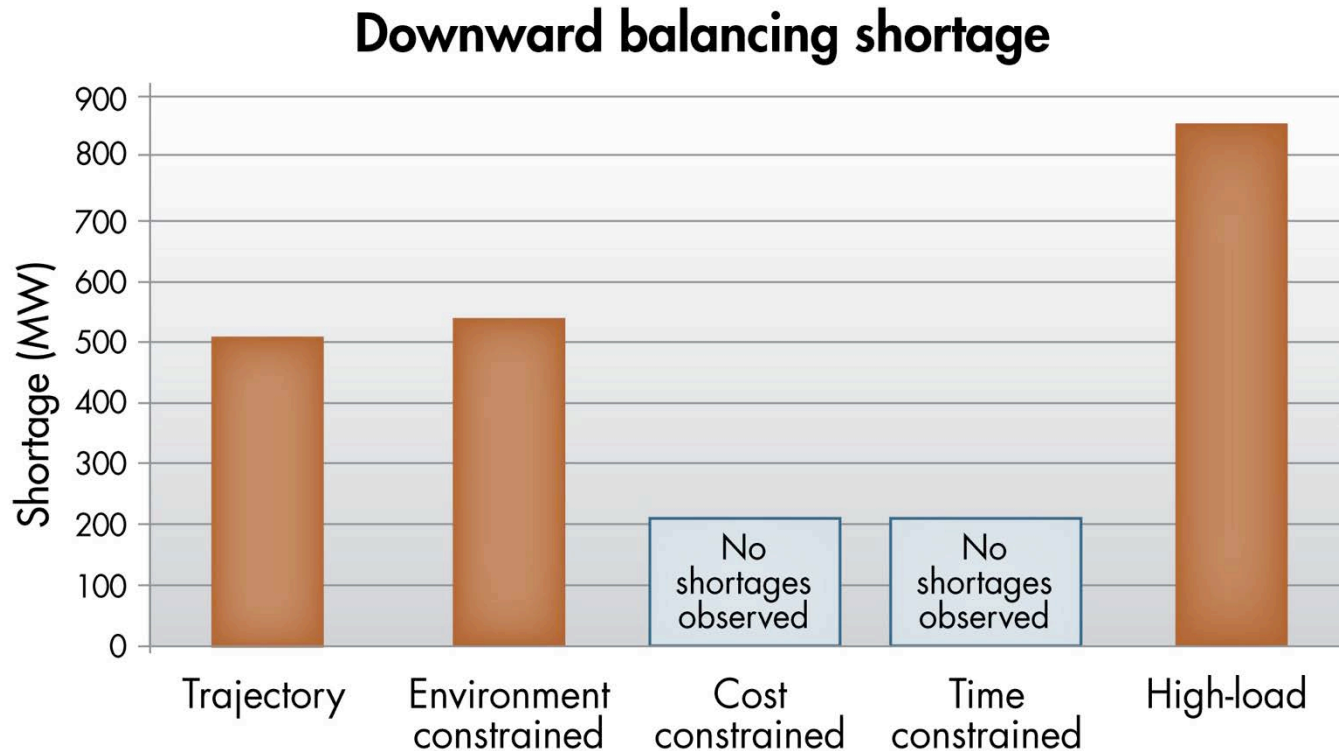
Case	Case Title	Description
1	33% Trajectory	Based on contracted activity
2	Environmental constrained	High distributed solar
3	Cost constrained	Low cost (wind, out of state)
4	Time constrained	Fast development (out-of-state)
5	20% Trajectory	For comparison
6	33% Trajectory high load	Higher load growth and/or energy program under-performance
7	33% Trajectory low load	Lower load growth and/or energy program over-performance

Potential need for 4,600MW of upward flexible resources observed in the high-load scenario.

Upward balancing flexibility shortage/needs

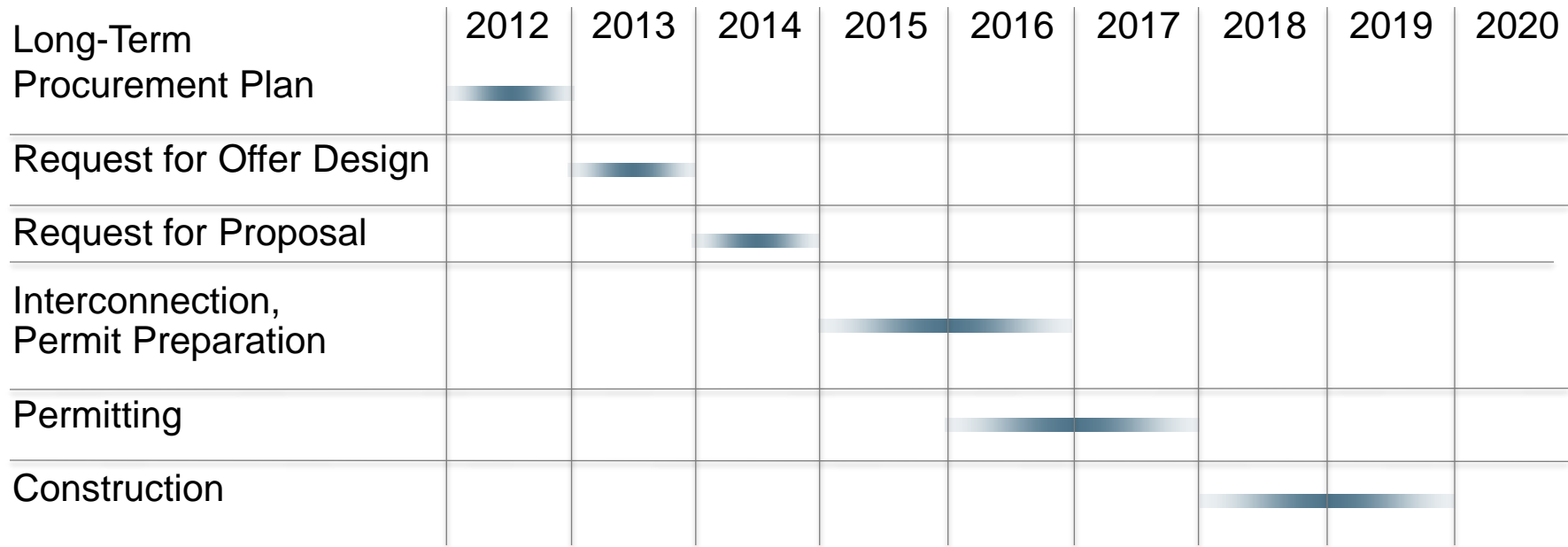


Out of approximately 3,500 MW downward balancing requirements, some hours of potential shortages were observed.



Note: Downward balancing may be more effectively and efficiently managed using curtailment or storage rather than less economic dispatch of flexible resources to higher level to maintain downward flexibility

Development of new generation infrastructure has significant lead time.



Management intends to focus on the following:

- Maintaining the availability of capacity currently on the system to enable successful operations during the transition period.
- Accelerating ISO market design work to gain access to additional flexibility.
- Refining local capacity studies for 2020 so that timely procurement decisions can be made in the 2011-2012 CPUC procurement cycle.
- Supporting generation alternatives to meet flexibility needs such as demand response and storage, with the goal of meaningful levels of deployment before 2020.