

Session 6 – Energy Storage Developments

UVIG 2019 Spring Technical Workshop

Thursday, March 21, 2019

8:00 – 9:45

Russ Philbrick

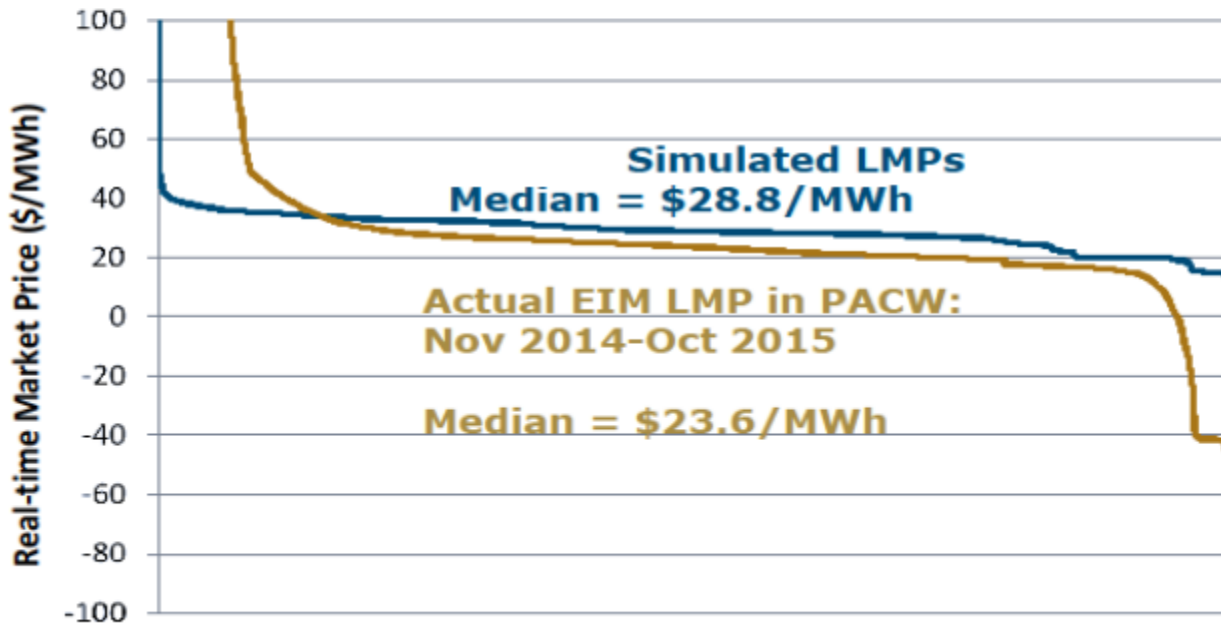
Polaris Systems Optimization



Simulated Prices Fail to Capture Real-World Volatility

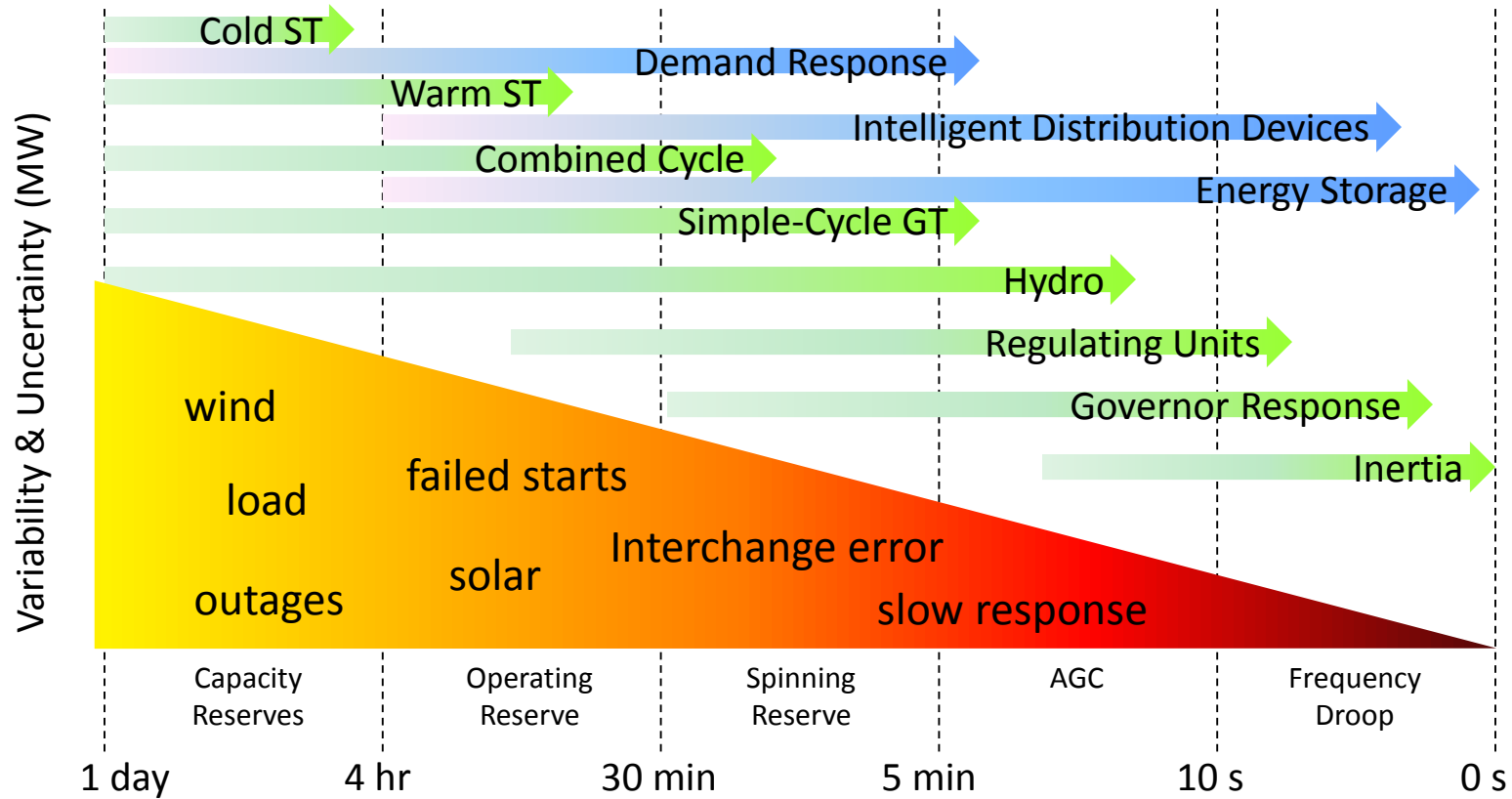
Modeled:
68% of intervals within +/- \$5/MWh from median; 93% of intervals within \$10/MWh

Actual:
54% of intervals within +/- \$5/MWh from median; 73% within \$10/MWh

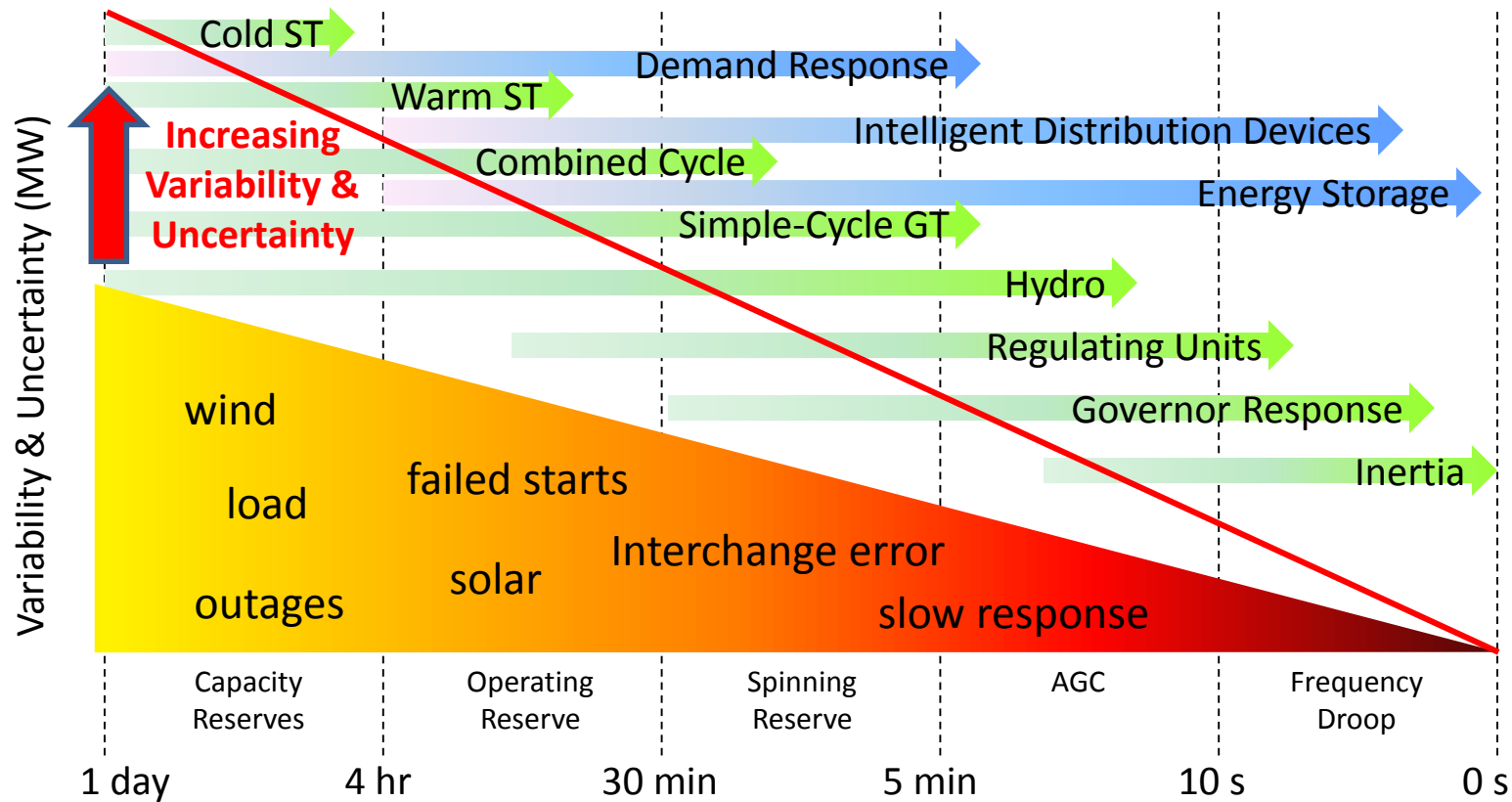


Nick Schlag, Energy & Environmental Economics, Inc., Utility Variable Integration Working Group, Spring Workshop, April 26, 2016, Sacramento, CA.

The need for flexibility ...



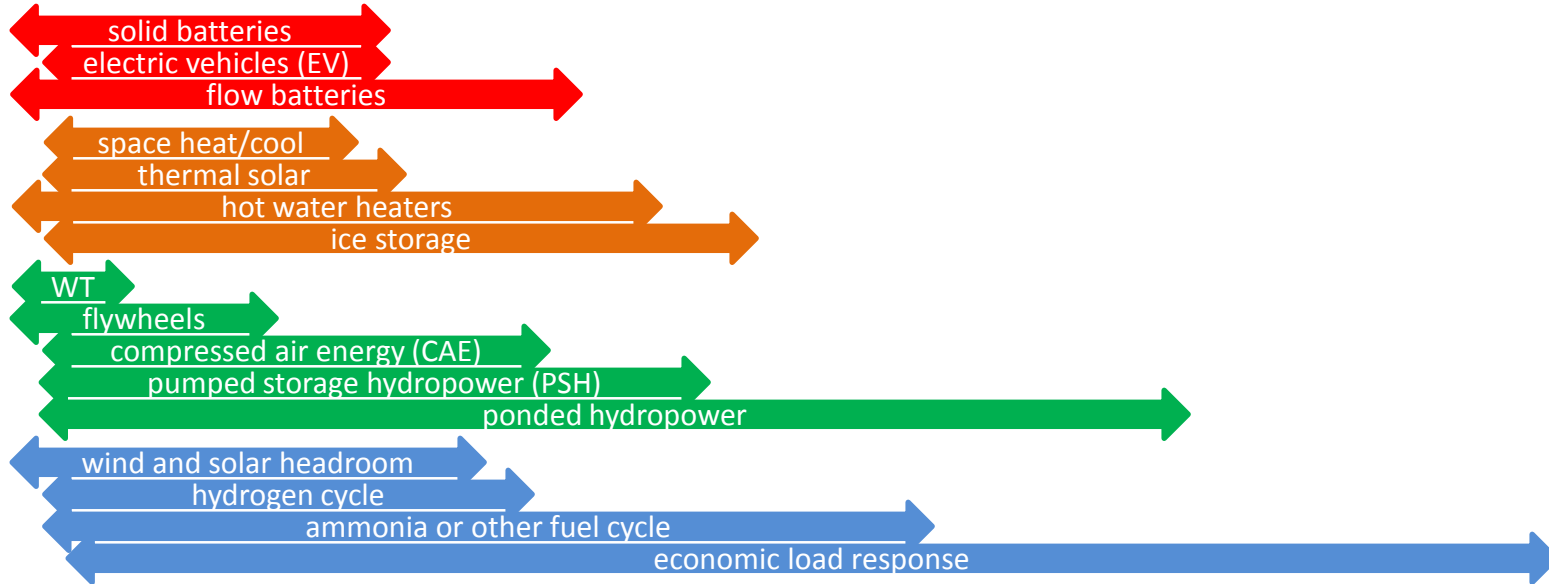
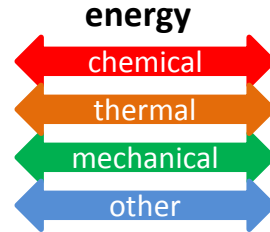
... is increasing with integration of variable generation



The Hard Problem is Long-Term Flexibility



sec min hour day week season



Storage: Looking For the Holy Grail?



It is important, but it will not address all challenges

Filings in Response to FERC Order 841

- **Jason Burwen**, *Vice President – Policy*, **Energy Storage Association**, Washington D.C.

Energy Storage Optimization for Solar Power Plant Applications

- **Mak Nagle**, *Senior Director*, **sPower**, Glen Allen, VA

Demonstration of Advanced Frequency Response Battery Energy Storage for Low-inertial WECC Scenarios

- **YC Zhang**, *Manager, Sensing, Measurement, and Forecasting Group*, **NREL**, Golden, CO
- **Vahan Gevorgian**, *Chief Engineer*, **NREL**, Golden, CO

Long Duration Energy Storage Batteries

- **Lynn Trahey**, *Materials Scientist*, **ANL**, San Francisco, CA