



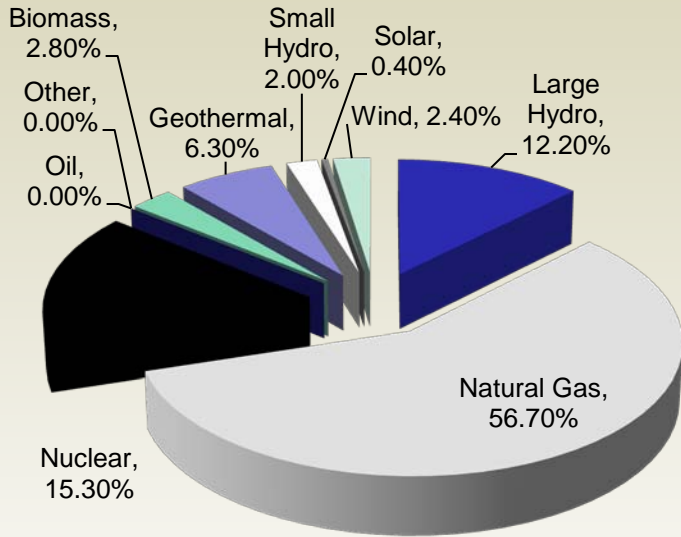
Why Forecasting is becoming Crucial to Grid and Utility Operations

Jim Blatchford
Sr. Renewable Integration Specialist

DOE

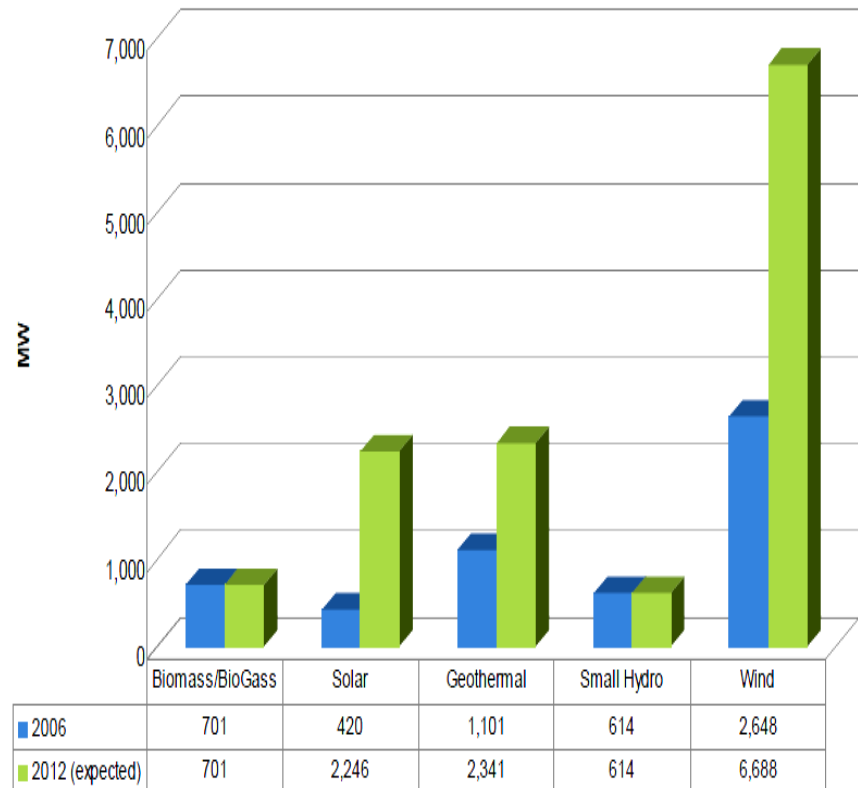
Oct. 15, 2010

Installed today and tomorrow



2009 Installed Capacity

Solar ~ 470 MWs
Wind ~2900 MWs



Integration of renewable 20% report
8/31/2010

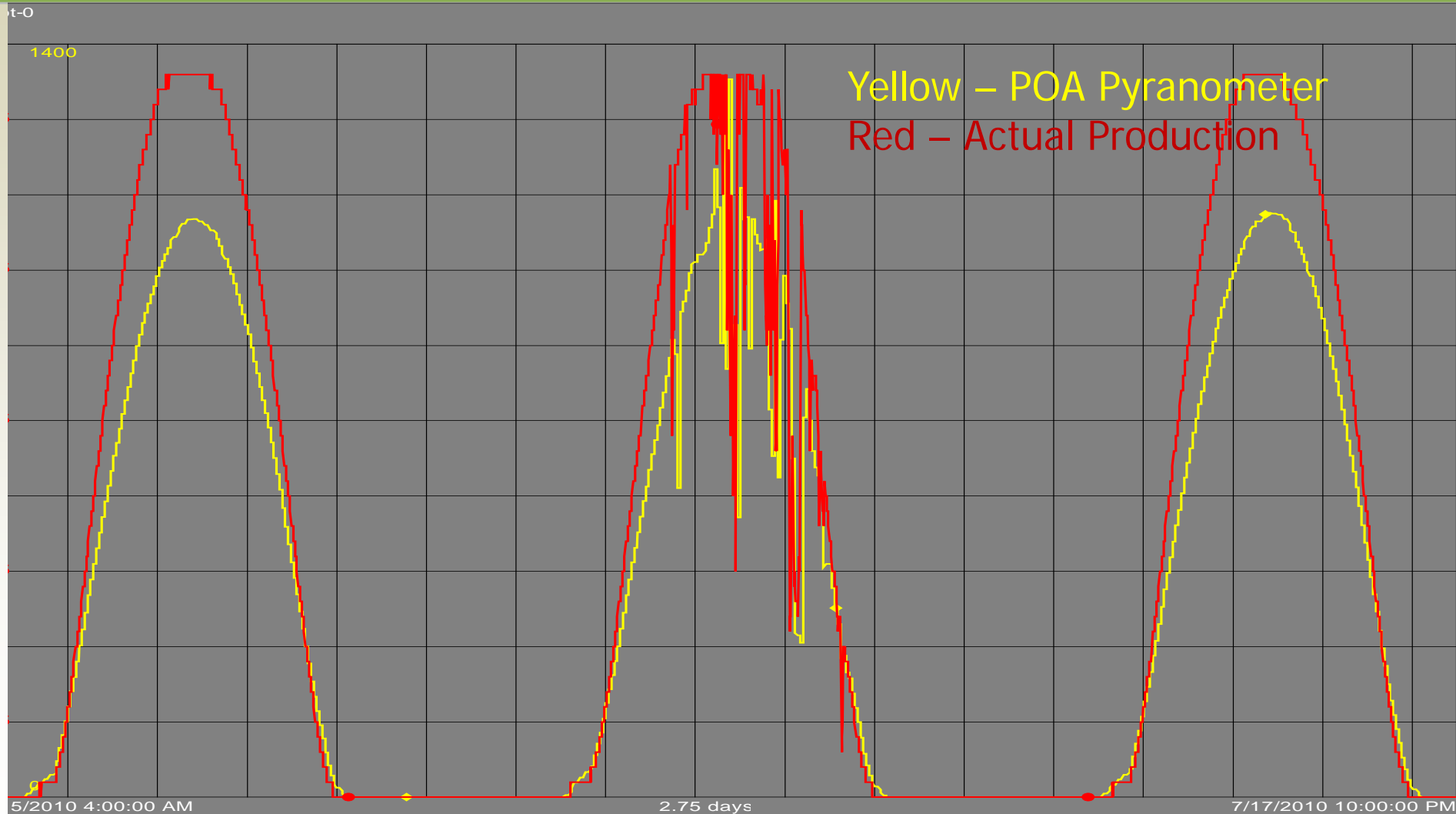
Variability and Uncertainty Challenge.

Forecasting errors could lead to:

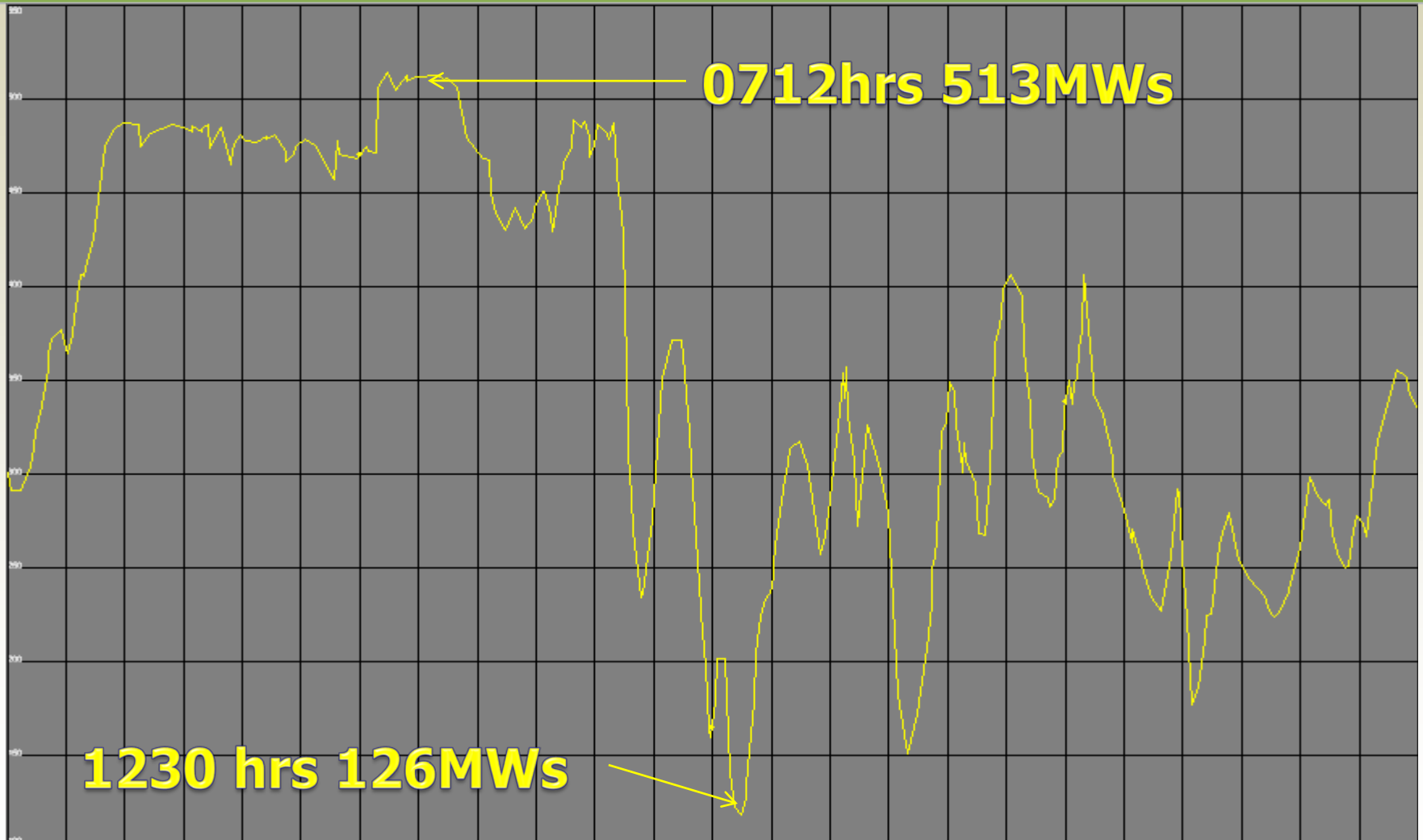
- Less efficient unit commitment
- Unanticipated system ramps
 - upward and downward
- Increased load/renewable resource following requirements
- Increased regulation requirements
- Increased frequency and magnitude of minimum generation or over-generation events.



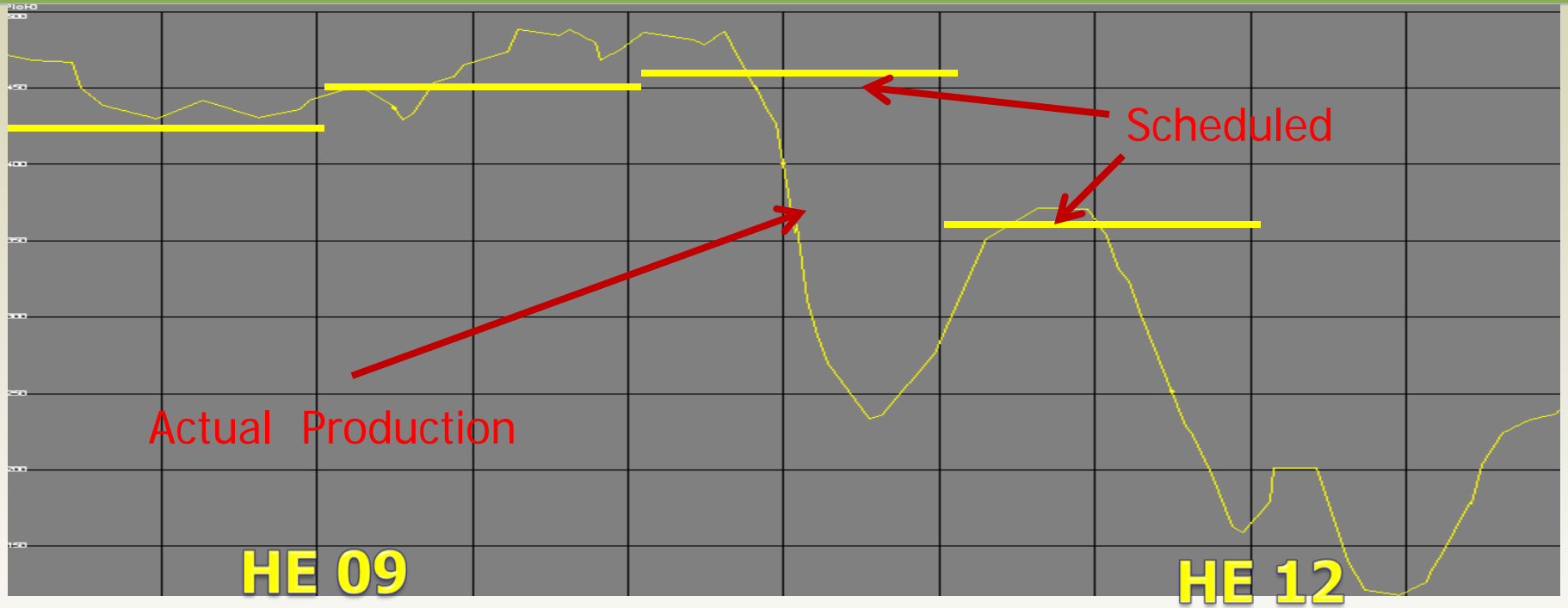
Solar Event July 17, 2010




Wind Event 1/20/10 Solano Area HE 01 – HE24



Wind Event 1/20/10 Solano Area HE 09 – HE13



1/20/2010	Forecast/Schedule MWhrs	Deviation		Actual MWhrs
		Lowest	Highest	
Hour ending 09	439	428 ³	471 ¹	443
Hour ending 10	451	444 ²	489 ⁵	463
Hour ending 11	461	235 ⁵	499 ¹	371
Hour ending 12	428	157 ⁶	368 ²	303
		Superscript values represent the hour interval		

Areas of Solar Forecast Investigation

■ University Collaboration

■ Sky Tracker Project - Solar

- CAISO, NREL, UCSD & Sempra collaboration
- Clouds are photographed every 5 mins
- Images are digitized and plotted.
- Using dual Sky tracker technology to triangulate cloud size and movement

■ Satellite, Sky & Land Monitoring Techniques



Areas of Forecast Improvement Investigation

- Forecast Service Providers
 - Large Ramp Alert System
 - Defines Large Ramp Event
 - Estimates the Probability of Large Ramp event
 - Time of occurrence, duration and max magnitude of ramp
 - Rapid Update Cycle of NWS forecast
- Internal Forecast Development
 - Based on NWS
 - Tuned using actual wind park data
 - Proving techniques to use on solar parks.
- New Technologies
 - SoDAR
 - LiDAR
 - High Tower Wind Monitoring