

Operations Risk Assessment and Uncertainty Management

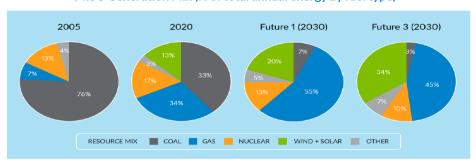
ESIG Probabilistic Forecast User Group

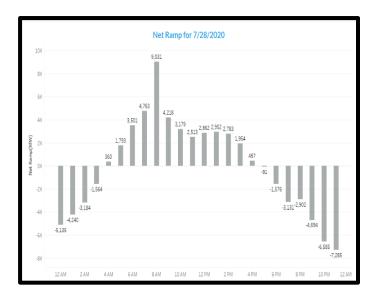
Jason Howard, Dir Operations Risk Management

With a transitioning fleet, MISO is facing increasing variability and uncertainty

- Retirement and decarbonization drives new generation mix and risk profile
- Ramping needs and uncertainty continue to increase and potentially shift to sunset hours

MISO Generation Mix (% of total annual energy by fuel type)





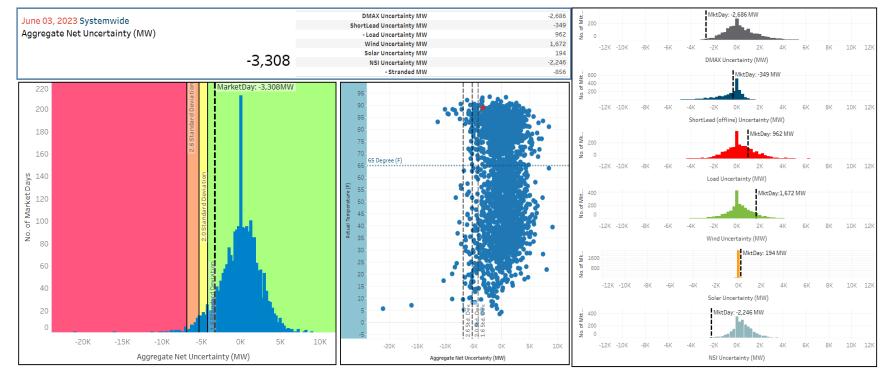
Up to > 9 GW/hr net ramp when wind drop coupled with morning load ramp



Expect the net ramp to increase when coupling with sunset and decreasing imports

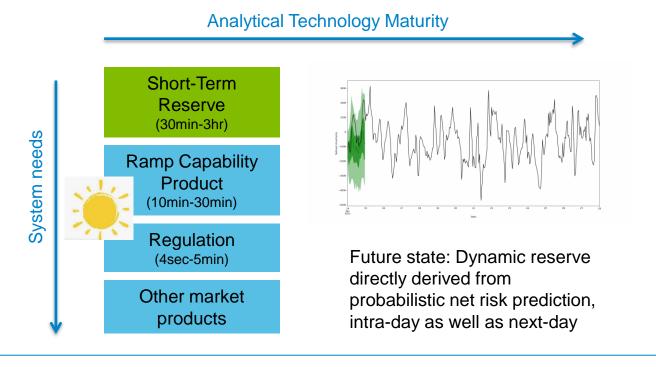


Establish dynamic reserve requirements based on daily risk profile





Roadmap to fully dynamic reserves as system needs and technology mature

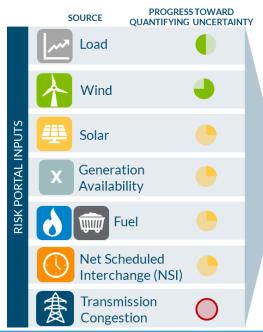




Operations Risk Platform will align MISO with industry direction and tie together our risk initiatives

PROBABILISTIC FORECASTS AND RISK ASSESSMENT

PROBABILISTIC OPERATIONS
PLANNING AND COMMITMENT



RISK PORTAL

- Visualizations
- Scenarios
- Aggregate
 Uncertainty
 (Ramp and Reserve
 Requirements)

Capacity Sufficiency Analysis Tool (CSAT)

Look Ahead Commitment (LAC)

Forward Reliability Assessment Commitment (FRAC)

Day-Ahead and Real-Time Markets (DA/RT)

