

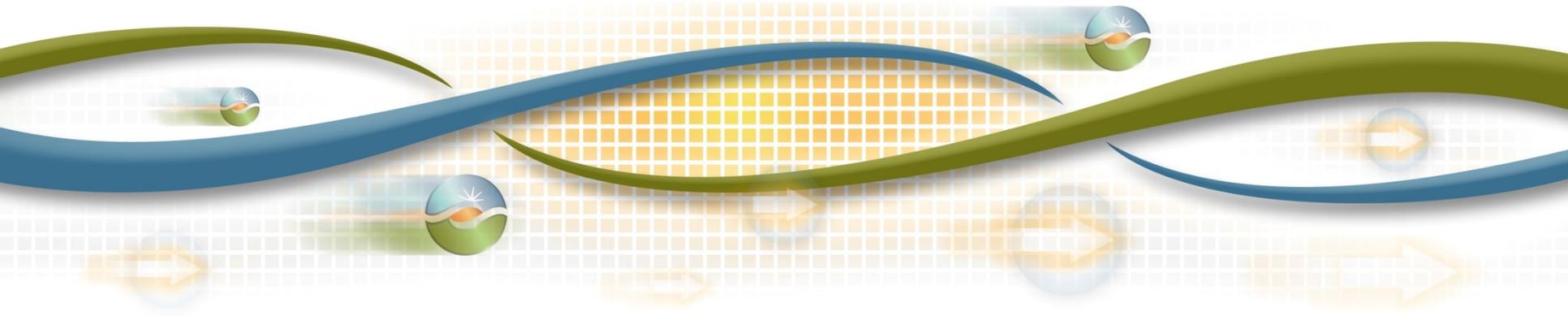
# Order 764 implementation – Flexible ramping constraint performance

Abhishek Hundiwale - Senior Market Design Engineering Specialist

Don Tretheway - Lead Market Design and Regulatory Specialist

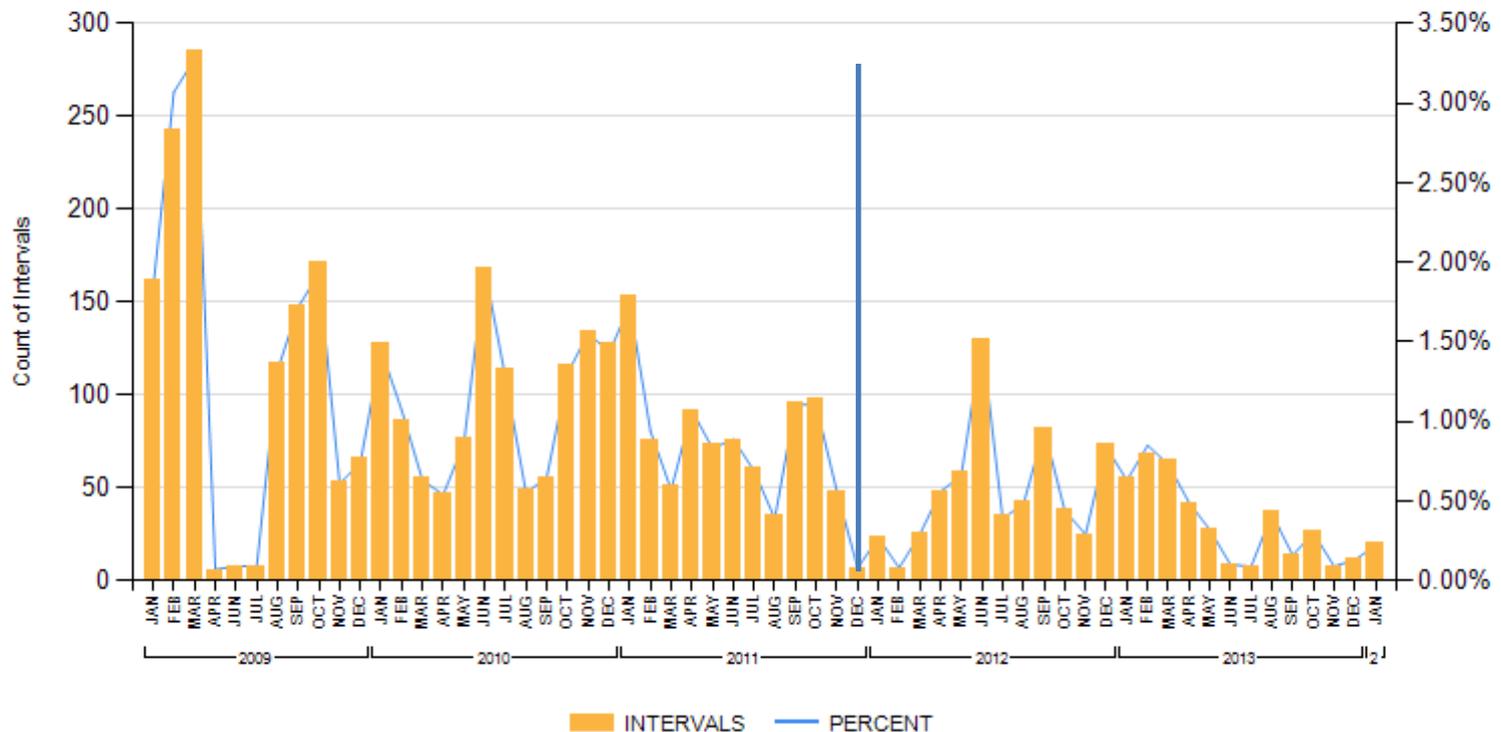
Lin Xu - Lead Market Development Engineer

March 11, 2014

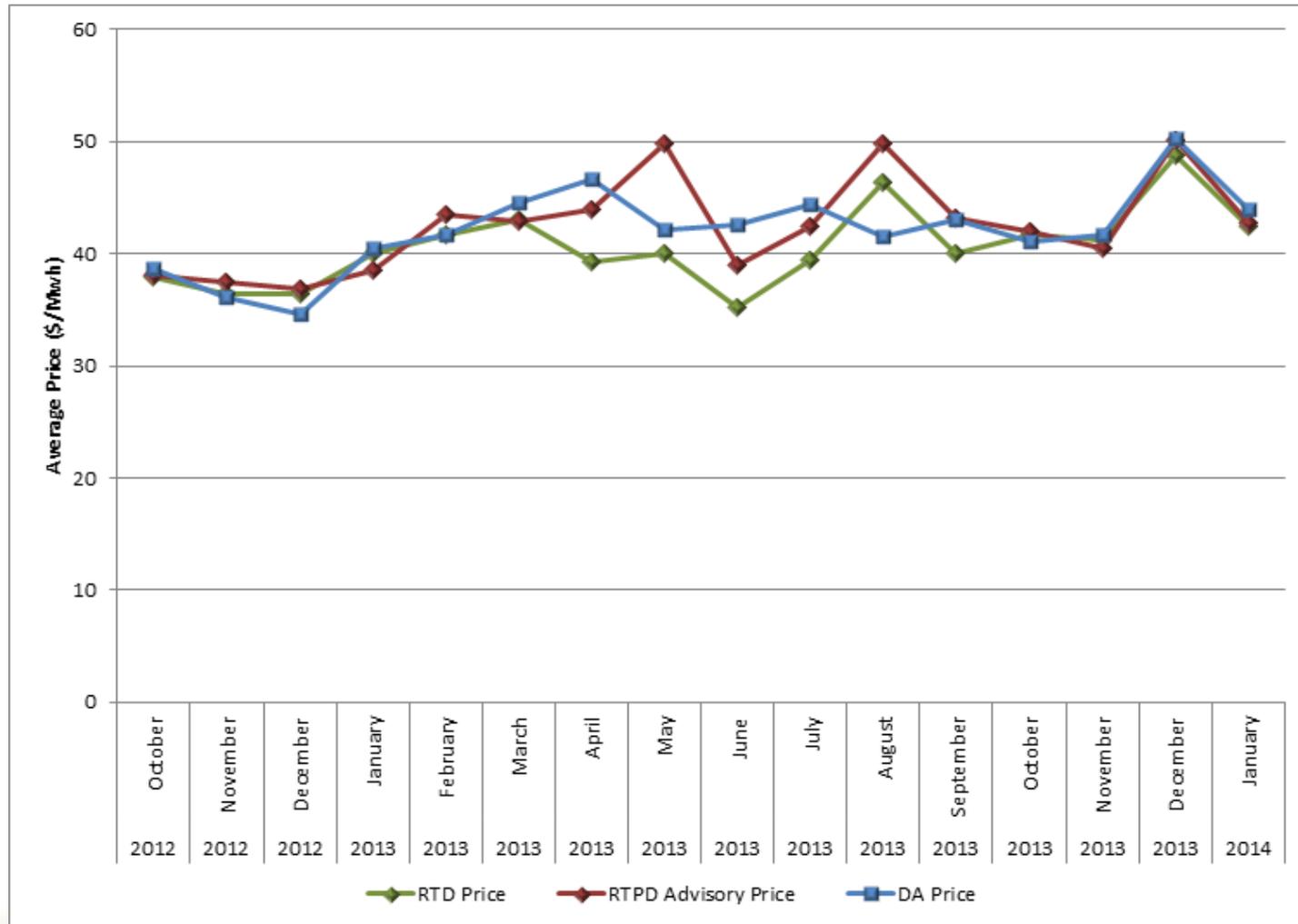


# Reduction in insufficient upward ramp since implementation of flexible ramping constraint in Dec '11

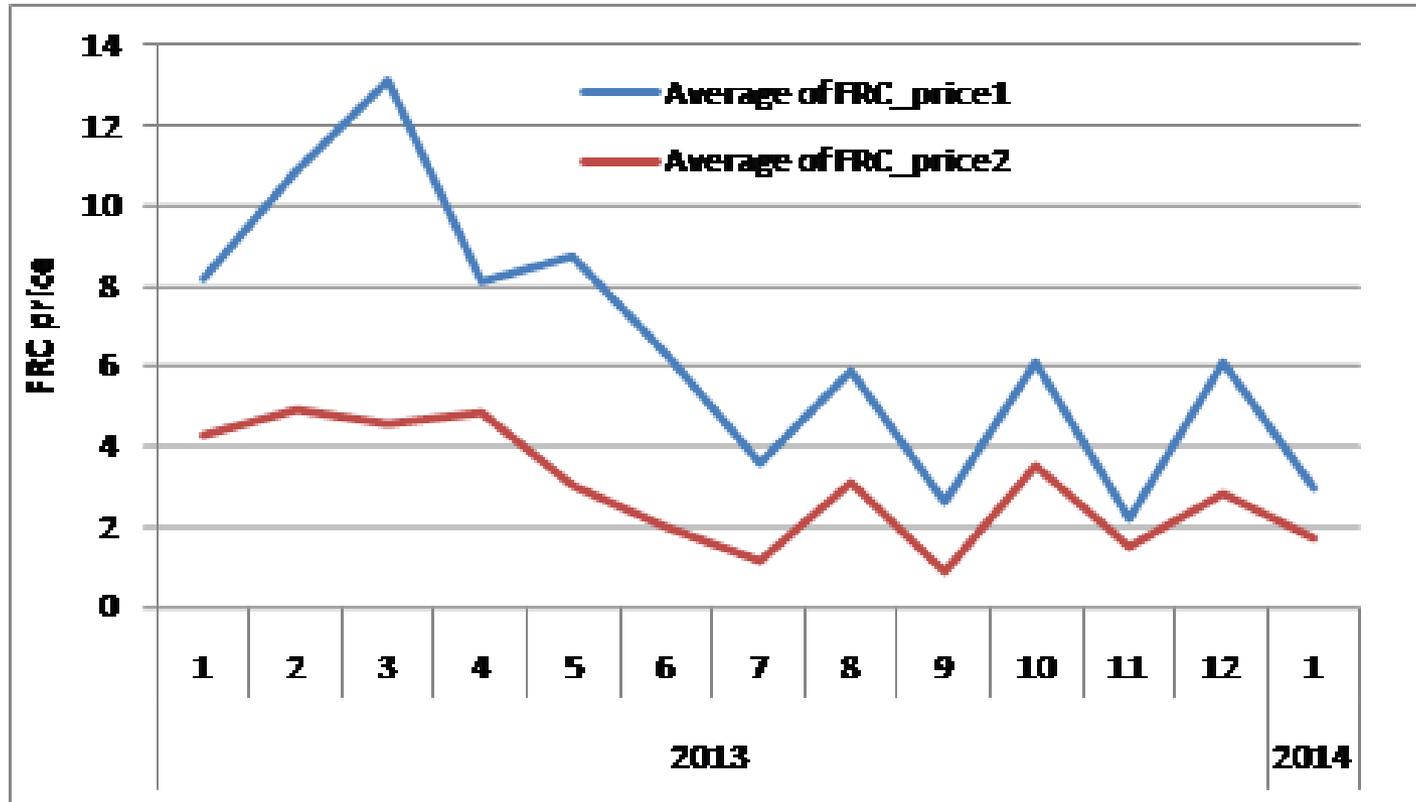
Monthly Average of RTD Intervals with Insufficient Up Ramping Capacity



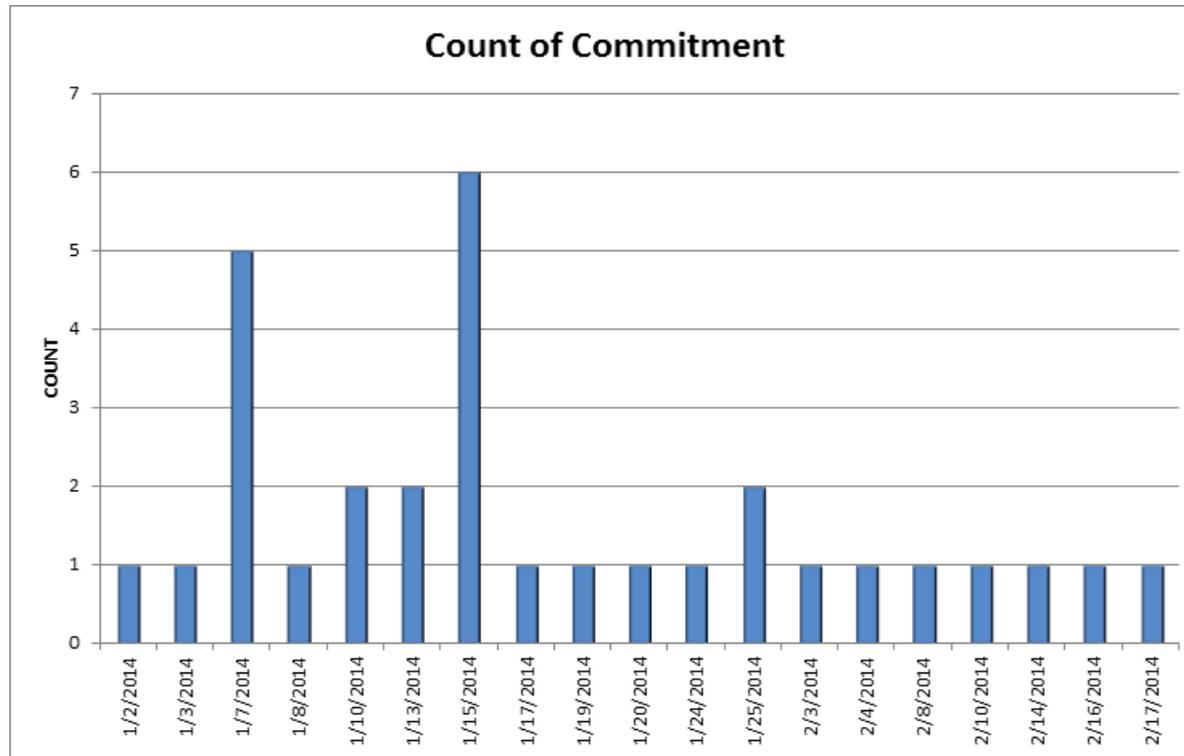
# Convergence of IFM, FMM (using second RTUC interval) and RTD



# Shadow price in second RTUC interval (FMM) lower than first RTUC interval illustrates improved convergence

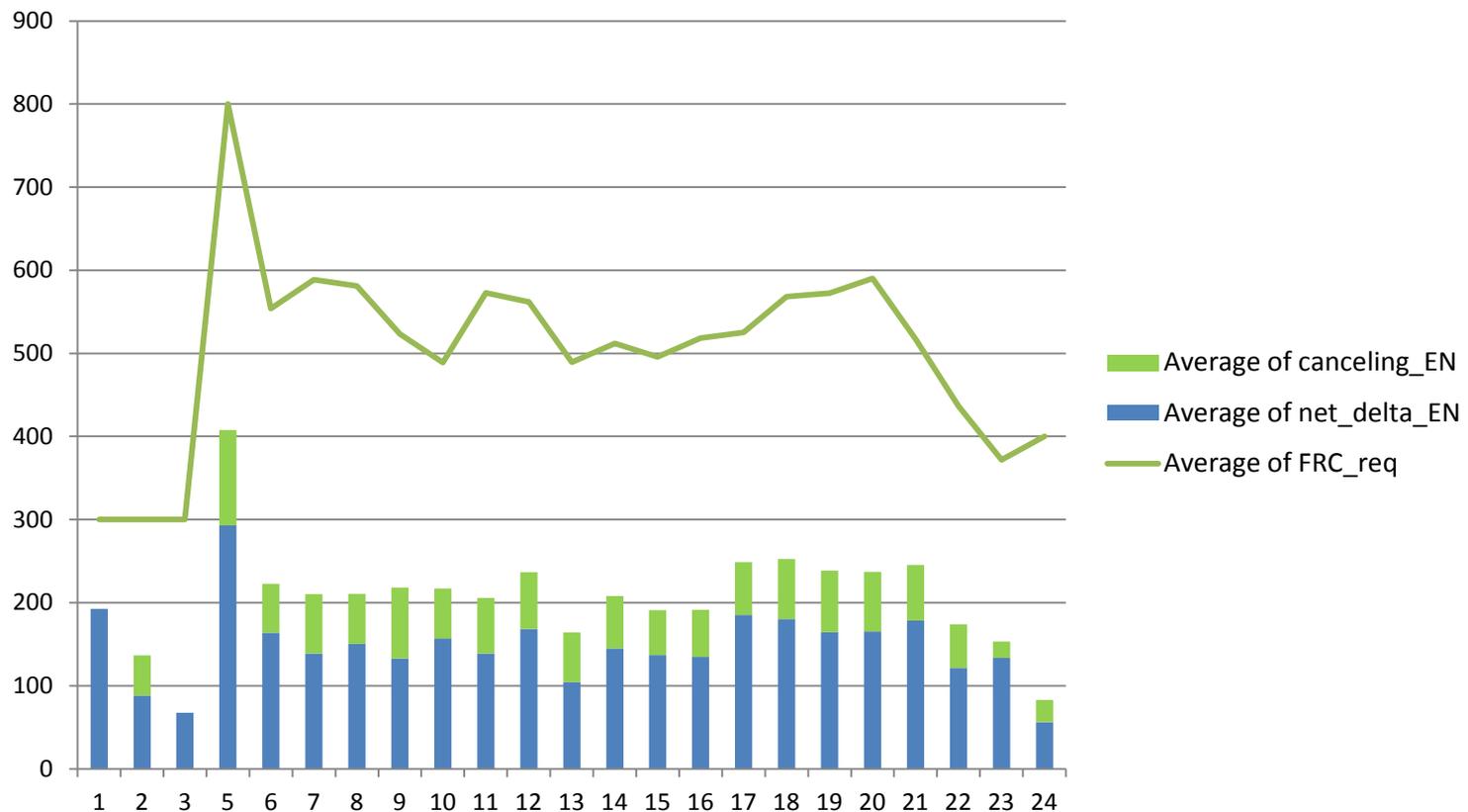


# Incremental units committed in FMM from previous RTUC market run



Precise cause cannot be determined:  
FRC, Load Forecast Change over horizon, or Outages

# Hourly estimation of phantom ramp (cancelling energy schedule in RTD) when FRC is binding



# ISO continues to monitor flexible ramping constraint performance

- Maximum procurement target reduced from 900 MW to 600 MW the end of January 2014
- Evaluate change to flexible ramping constraint penalty price
  - Current penalty price is just below spin
- Flexible ramping product stakeholder initiative will recommence shortly