EIA: Wind Integration
Operation and Planning of the Electric Grid

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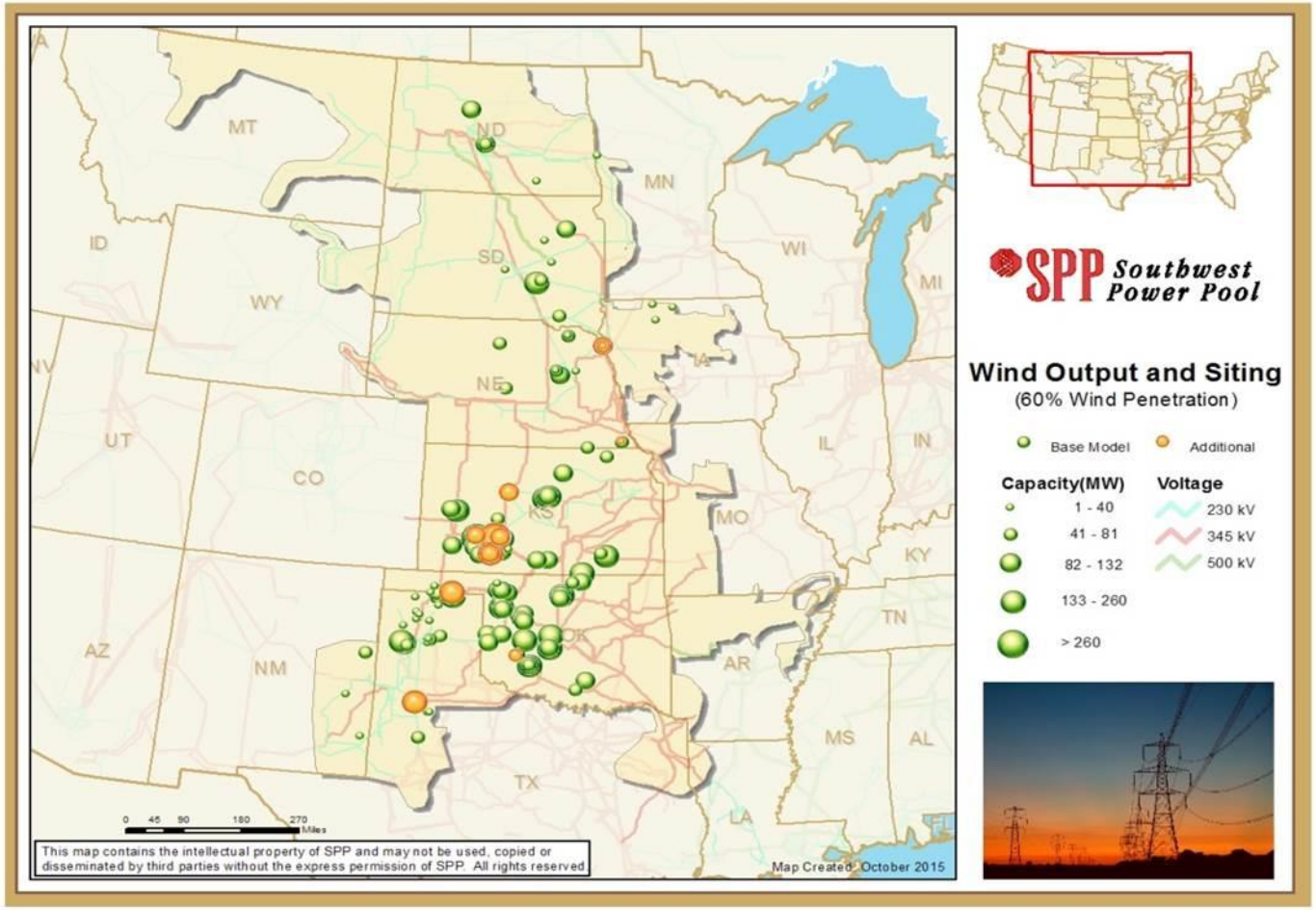
2015 Wind Integration Study

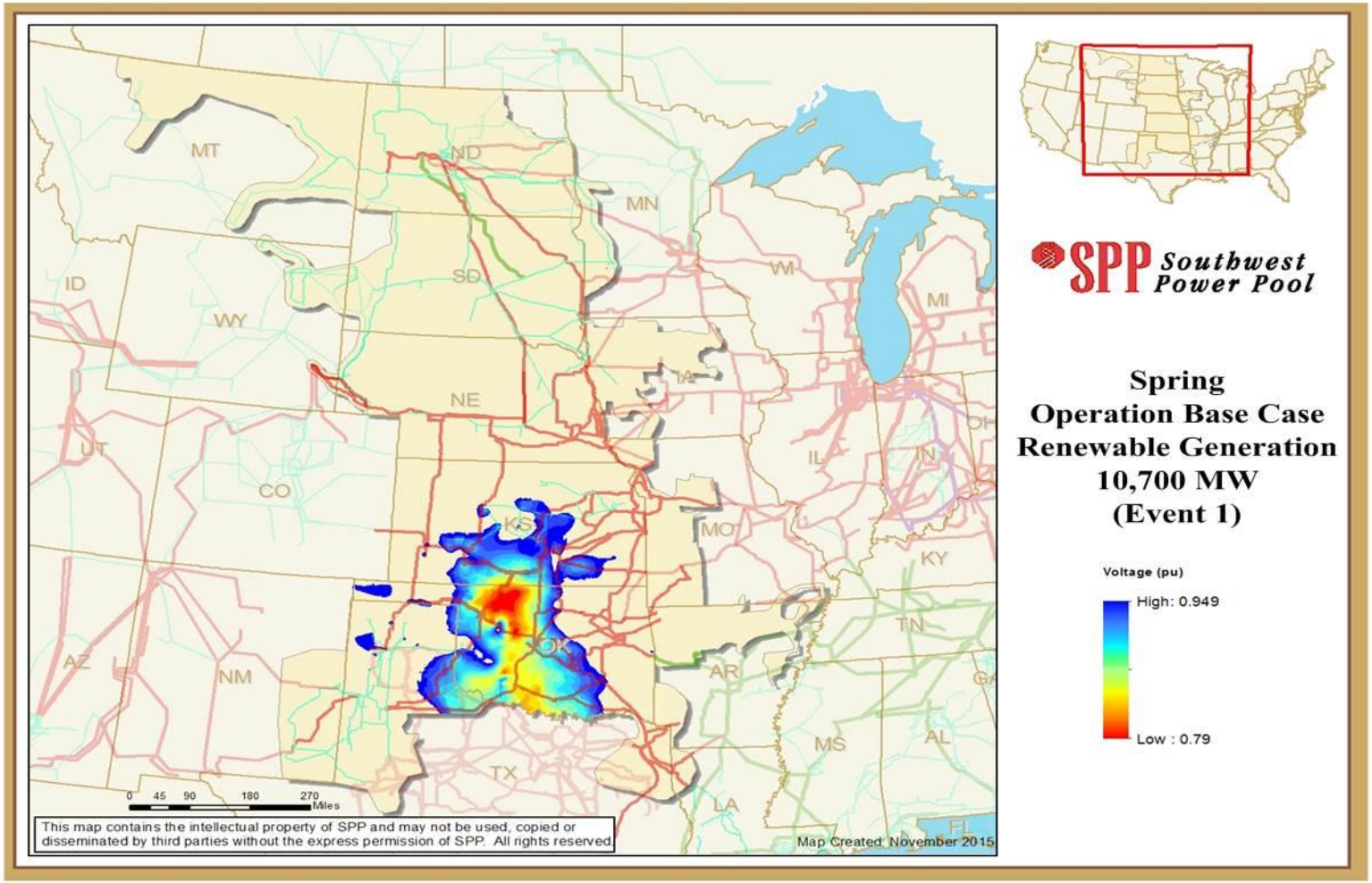
- *60% Wind Penetration Wind Output and Siting.*



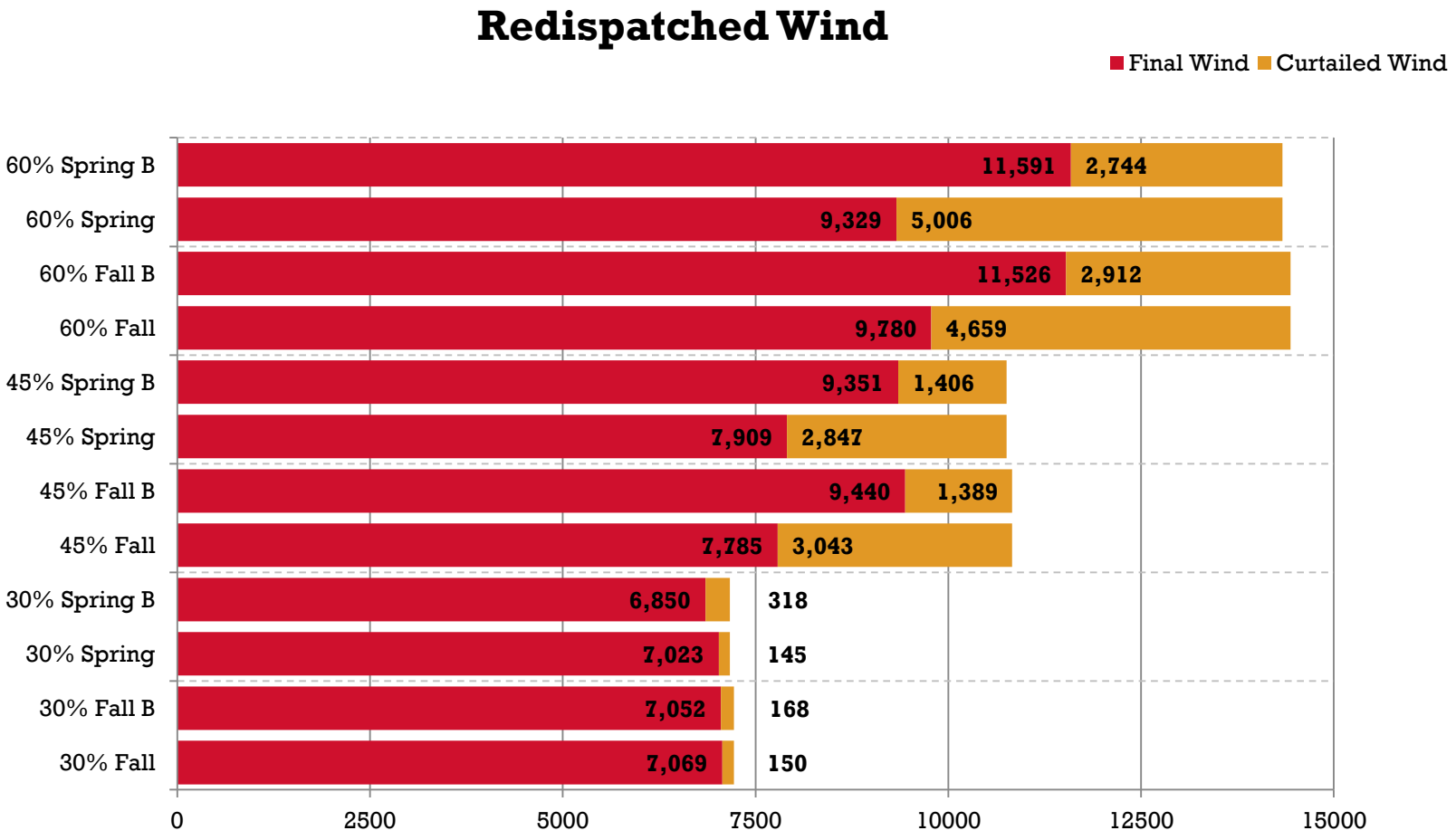
2015 Wind Integration Study results

- The Steady-state thermal and voltage analysis confirms the need for approved ITP projects
  - Additional transmission needs beyond what was approved in the ITP process was discovered
  - Some approved ITP projects should be expedited and placed in-service sooner than the projects scheduled in-service date
- The Voltage stability analysis shows that renewable penetration levels are approaching current limits
- All N-1 constraints were resolved, albeit with substantial curtailments
- Ramping analysis indicates that in general, SPP has enough ramping capability to sustain 60% penetration

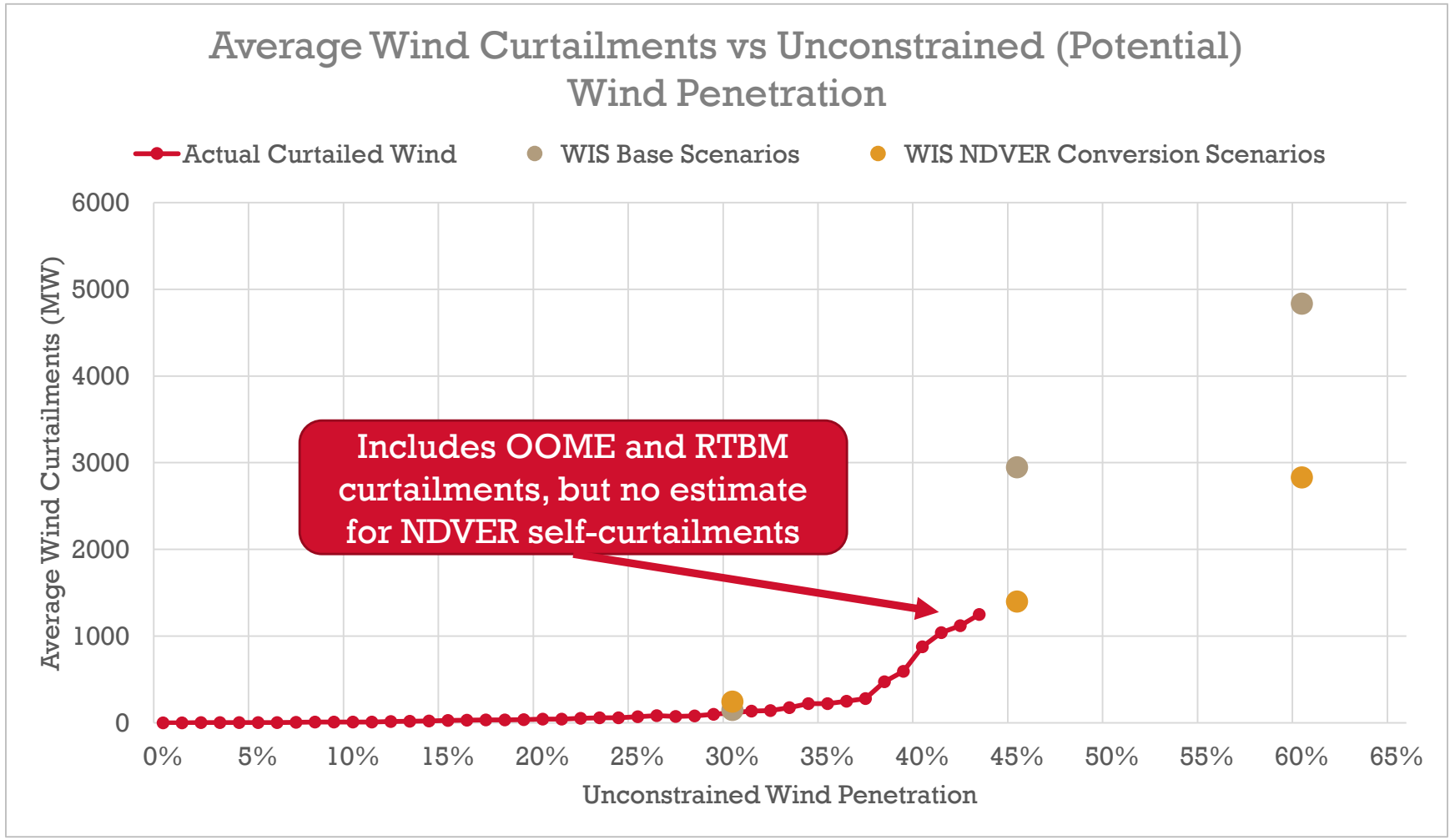
WIS - Voltage Stability Analysis
The Spring operations model (Outages)



Wind Integration Study Redispatch Analysis

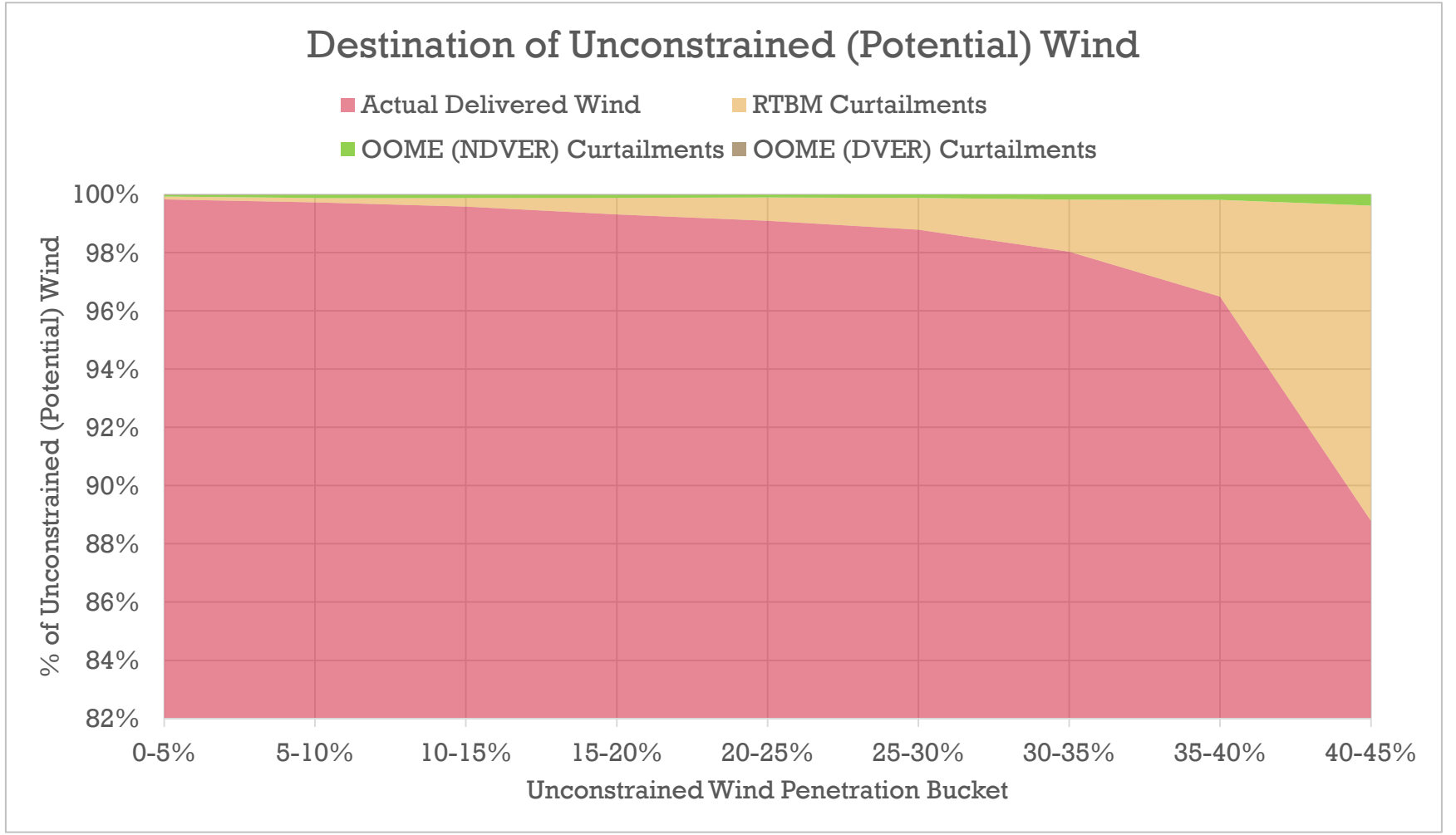


How does WIS redispatch analysis compare to actual observations from Integrated Marketplace?



*Data from 2015 Integrated Marketplace RTBM

Where does our wind power go?



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